North American Tungsten Corporation Limited

ISSUED FOR USE

RESPONSE TO YESAB'S REQUEST FOR SUPPLEMENTARY INFORMATION FOR THE PROPOSED MACTUNG MINE, MACMILLAN PASS, YUKON (YESAB PROJECT NUMBER: 2008-0304)

*

*

*

W23101211.003

July 2010

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

TABLES

FIGURES

1.0 INTRODUCTION

This document contains North American Tungsten Corporation's (NATC) response to the Yukon Environmental and Socio-Economic Assessment Board's (YESAB) information requests as set out in the document titled, "Request for Supplementary Information (seeking public comment complete/considering comments stage)" dated January 13, 2010 (YESAB project #2008-0304).

To help the reader follow the document each of NATC's responses follows the text of each of YESAB's rationales and information requests, i.e., rationale-request-response. Also, YESAB's rationales and information requests have a grey background to clearly delineate them from NATC's responses. The numbering of the information requests matches that in YESAB's document dated January 13, 2010.

2.0 WATER QUALITY AND QUANTITY

2.1 MINE SITE

Comments received included a number of questions about hydrological information, water balance calculations, project management of surface and sub-surface water and potential project effects on fish and fish habitat.

2.1.1 Project Compliance with the Metal Mining Effluent Regulations

The Fisheries Act, including the Metal Mining Effluent Regulations (MMER), provides Environment Canada with legislative authority to control water pollution, including mining effluent. In their letter of December 7, 2009 (YOR document #2008-0304-140-1) Environment Canada indicates that the project as proposed will be in contravention of the MMER. The mine design does not allow for effluent flow rate to be measured within 15 percent accuracy as required by the MMER, Schedule 19. In addition, the mine design allows for potential mixing of effluent with ground water prior to testing at the point of discharge contrary to the MMER, Schedule 6.

The Executive Committee believes that if outflow volumes or water quality cannot be appropriately measured, the effluent will be difficult to properly monitor and regulate. This could result in significant adverse environmental effects due to effluent discharge. Please provide the following information.

a) Demonstrate and explain how the proposed dam/reservoir/discharge system will comply with the Metal Mining Effluent Regulations (Schedules 6 and 19).

NATC has modified its plan for collection of reservoir dam underflow. The modified plan will ensure capture and containment of groundwater seepage from the reservoir and below the ravine dam for subsequent discharge quality monitoring and control. The original Project Proposal submission proposed a series of pumping recovery wells to be situated down-gradient of the ravine dam. Although this could be engineered to ensure complete capture, and be used for water quality monitoring and control if necessary, it would not be possible to estimate the volume of reservoir seepage/dam underflow with this method to the required MMER accuracy (+/-15%). The revised plan will fulfill all necessary criteria to satisfy MMER through construction of a seepage-collection dam approximately 80 m downstream of the ravine dam (Figure 2.1.1-1). A preliminary drawing showing the profile of the seepage-water dam is provided in Figure 2.1.1-2.

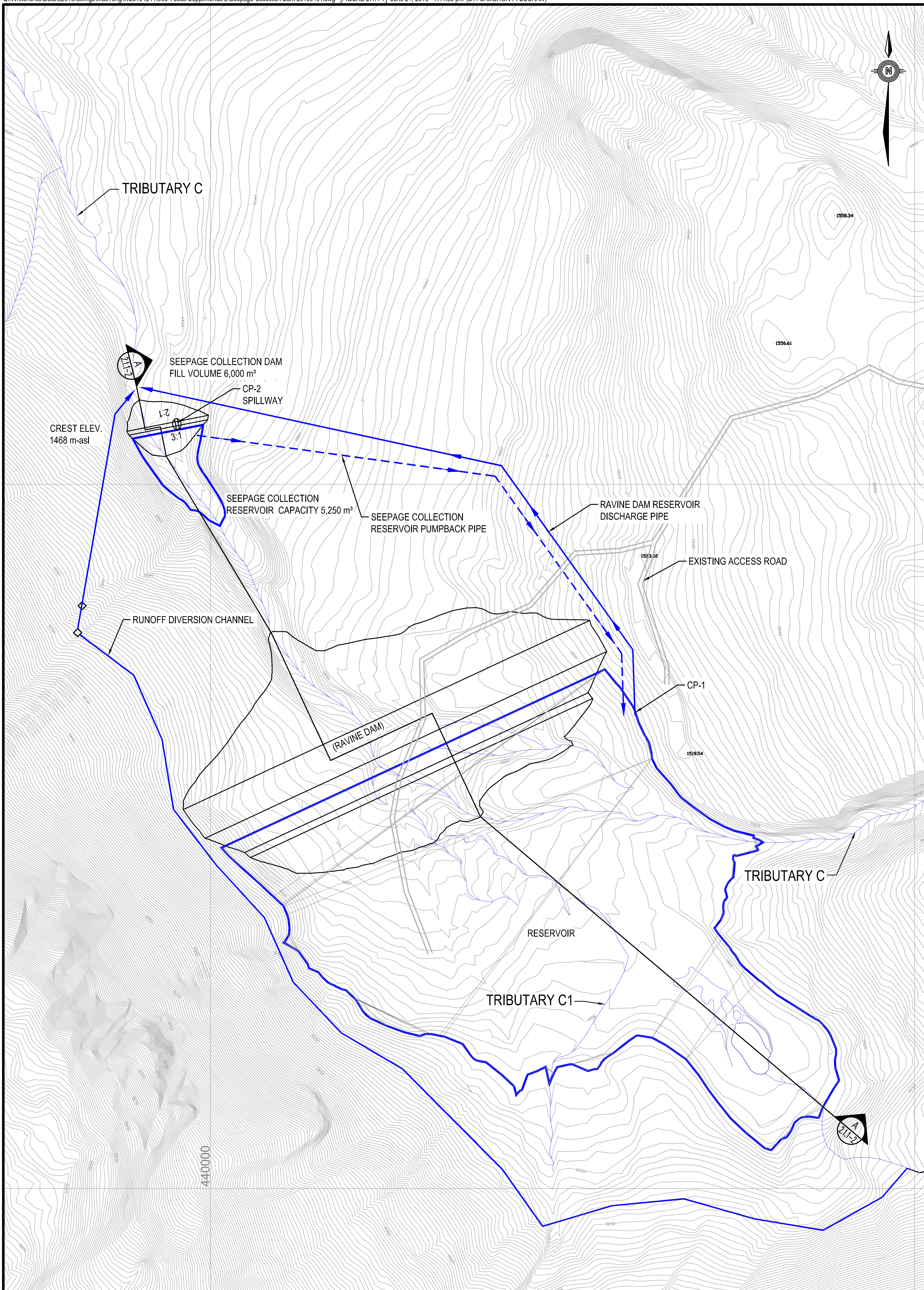
The seepage-water dam will be constructed from on-site materials; and will have an impervious liner, and be keyed into the underlying bedrock with a grout curtain. Previous volume estimates of available local borrow material indicate that adequate material is available to construct the dam (Section 3.2 of Addendum 2 of the Project Proposal). Approximately 6000 m^3 of borrow material will be required to construct the dam. The seepage-water dam will be approximately 8 m high and 60 m wide (at top) and create a reservoir with a capacity of 5,250 m^3. This lower dam will provide a means to monitor and control outflow using a gated weir/spillway.

The groundwater dewatering wells previously proposed for the project downstream from the toe of the ravine dam will no longer be installed. The construction of the seepage-water dam removes the need for the dewatering wells.

The seepage-water dam will function by collecting any seepage water/dam underflow from the reservoir and ravine dam. Impounded water from the reservoir that would underflow the ravine dam (conservatively estimated to be up to 750 m^3/day) will flow through fractured bedrock beneath the dam. Since the Tributary C ravine is a groundwater discharge area with upward groundwater gradients (indicated by previous investigations and in the existing conditions section of the Project Proposal) it is possible to locate the seepage collection dam at the optimum location to ensure that the ravine dam underflow (groundwater) has discharged back to the surface water course upstream of the seepage-water dam. To ensure that reservoir water seepage is captured by this seepage water dam and reservoir, the lower seepage collection pond elevation is at the same elevation as one reservoir dam height below the base of the upstream side of the dam (1497 m – 30 m = 1467 m). The seepage-water dam location ensures that groundwater seepage, even under horizontal flow conditions would report to the seepage collection reservoir. The dam is sized such that it can store up to seven days of groundwater underflow (based on the conservative estimate of 750 m^3/day); to facilitate weekly compliance monitoring. The final dam location, and seepage collection reservoir volume may be modified based on further detailed investigations in the vicinity of the dam, however, it will still be located to ensure full capture, and sized to accommodate the expected seven day underflow. Example, if the dam underflow estimate is adapted, and modified to 300 m^3/day based on further investigations, then the seepage dam location, size and reservoir storage volume could be adapted accordingly.

The diversion channel for Tributary C around the ravine dam will be extended so as to bypass the seepage-water dam and reservoir and channel water into Tributary C downstream of the seepage-water reservoir (as indicated on Figure 2.1.1-1). Catch basin/ water diversion structures will divert surface water from the diversion ditch, and an unnamed tributary shown on Figure 2.1.1-1, via a buried pipe to bypass the seepage-water reservoir. Water discharged directly from the ravine dam reservoir into Tributary C will be released into Tributary C downstream of the seepage-water reservoir (pump and pipe operation) along the east side of the ravine dam. Energy dissipation will be included at the pipe outflow point as required. The road constructed between the ravine dam and the seepage-collection dam will have a diversion channel along the upslope side of the road to divert runoff water from entering the seepage collection reservoir. The seepage collection pond will have suitably sized pumps (capable of pumping up to or exceeding 750 m^3/day). A separate buried pipe will be installed to convey water from the seepage collection dam, back to the main reservoir in the event that the water quality at the seepage-collection reservoir does not meet discharge criteria.

Monitoring of both the ravine dam reservoir water (Compliance Point No. 1 (CP-1)) and the seepage-water reservoir water (Compliance Point No. 2 (CP-2)) will take place prior to a decision to discharge water into Tributary C. Monitoring of flows and water quality will be conducted according to MMER requirements. In the event that water in the seepage-water reservoir does not meet MMER standards it can be pumped back to the ravine dam reservoir for additional holding time. In the event that the ravine dam reservoir is at capacity, and the water quality in the seepage-water reservoir does not meet discharge criteria, then additional mechanical or chemical treatment methods would be required to meet MMER standards.



LEGEND:

- RAVINE DAM RESERVOIR DISCHARGE PIPELINE
- SEEPAGE COLLECTION RESERVOIR PUMPBACK PIPELINE

CP– – DISCHARGE CONTROL POINT

0 100

Scale: 1: 2 500 (metres)

CLIENT

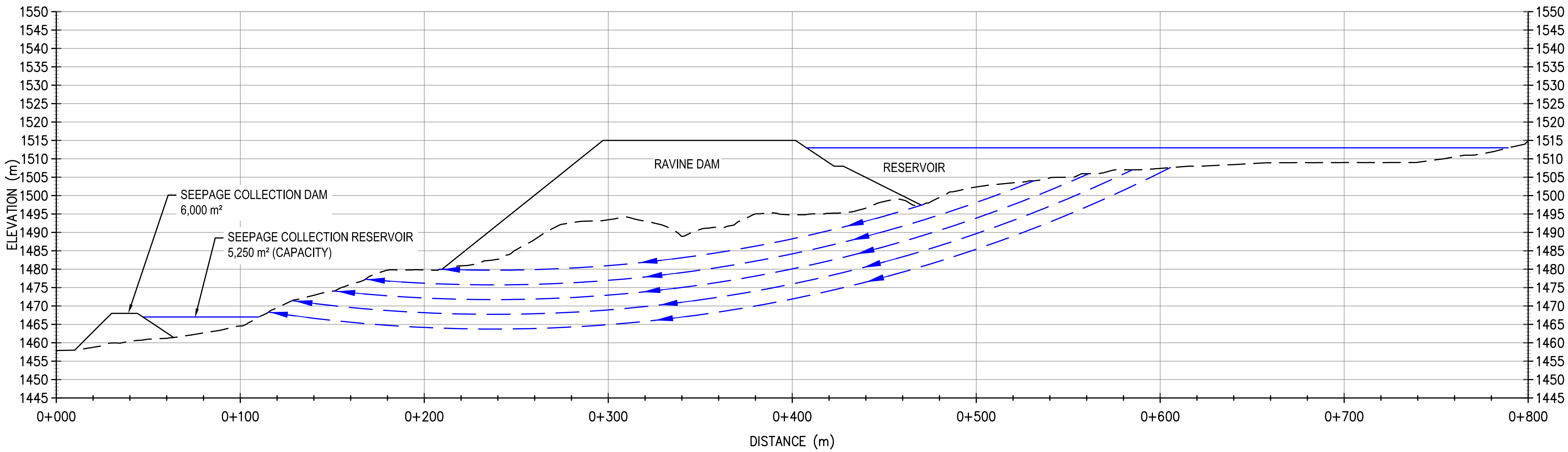
NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

MACTUNG MINE YESAA ASSESSMENT PROCESSING
MACTUNG PROJECT, MACMILLAN PASS, YUKON

LINED SEEPAGE COLLECTION DAM
BASE PLAN

PROJECT NO.	DWN	CKD	REV	
W23101211.003	CB	RMM	0	**Figure 2.1.1-1**
OFFICE	DATE			
EBA-WHSE	June 24, 2010			



A
2.1.1-1
SECTION A
SCALE 1:2500H 1:1250V

LEGEND:

GROUNDWATER SEEPAGE FLOW LINE

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

MACTUNG MINE YESAA ASSESSMENT PROCESSING
MACTUNG PROJECT, MACMILLAN PASS, YUKON

LINED SEEPAGE COLLECTION DAM SECTION

PROJECT NO.	DWN	CKD	REV
W23101211.003	KJT	RMM	0
OFFICE: WHSE	DATE: April 7, 2010		

Figure 2.1.1-2

Q:\Whitehorse\Data\0201drawings\MacTung\W23101211.003 Yessa Supplimental 2\Seepage Collection Dam 20100401.dwg [FIGURE 2.1.1-2] April 07, 2010 - 3:15:11 pm (BY: KEN TOMCZYK)

2.1.2 Project Effects on Fish and Fish Habitat

The proponent has indicated that barrier(s) exist to fish passage to the upper reaches of Tributary C (i.e., downstream of the proposed ravine dam). As a result of these barriers, the portion of Tributary C where the reservoir and ravine dam are to be constructed is being considered non-fish bearing. If there is fish habitat in the upper reaches of Tributary C it will either be excavated to form part of the reservoir, be under the ravine dam or be re-routed around the mine site. The Executive Committee agrees with the Department of Fisheries and Oceans (YOR document #2008-0304-144-1) that sufficient information has not been provided describing these barriers to support a conclusion that these reaches are non-fish bearing. Please provide the following information.

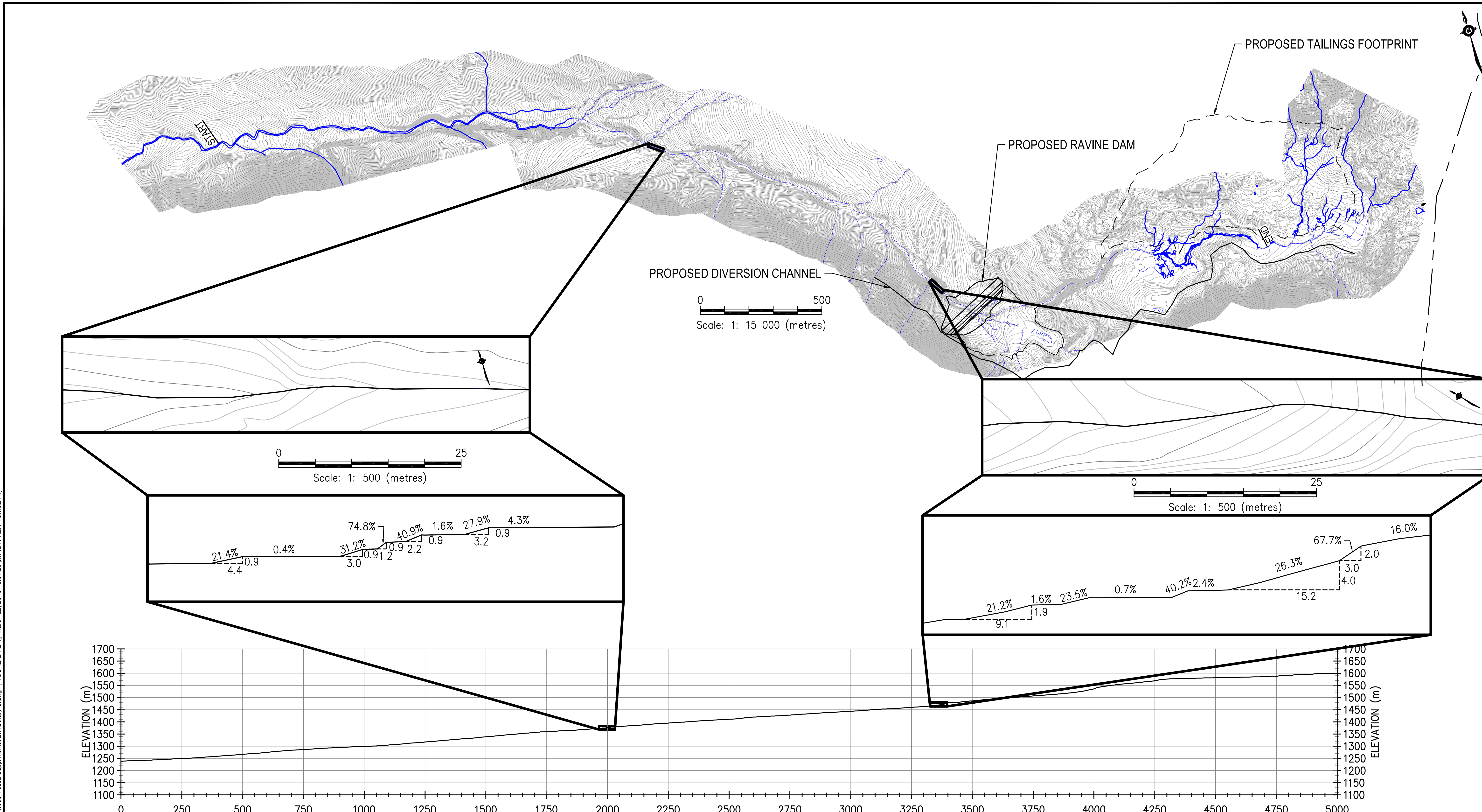
a) Detailed photographs and slope measurements of the physical barriers to fish migration on Tributary C below the ravine dam.

EBA conducted a fish and fish habitat study program between 2006 and 2008 at the proposed Mactung mine site, which included an assessment of the characteristics, fish bearing status, and habitat availability in Tributary C. As part of this study program, NATC's consultants mapped reaches, habitat features, and barriers to fish passage in Tributary C. At this time, NATC does not have access to detailed photographs for the physical fish barriers in question. In lieu of the available photographs, NATC has assembled a set of data that provides justification for the original effects assessment provided in the Mactung Project Proposal (December 2008).

As outlined in EBA's 2007 and 2008a Fisheries and Aquatic Resources Baseline Study Reports (EBA 2007, 2008), fish and fish habitat assessments were conducted in Tributary C from 2006 to 2008. While EBA did identify the presence of Dolly Varden (*Salvelinus malma*) in the lower reaches of Tributary C, none were observed in the upper reaches of that watercourse or above two identified barriers to fish passage. Also, no fish or suitable fish habitat (no riparian vegetation, little overhead cover, shallow water, and a lack of over-wintering habitat) were observed in an assessment above the uppermost barrier in 2008 (Photos 1 through 4). At that time, over 1,100 m of the narrow channel were assessed through electrofishing.

For the purpose of this assessment, detailed topographic information was reviewed and mapped for the Tributary C valley. These data are based on 1 m contours derived from aerial photography. From these data, the two barriers indentified by EBA (2008) are shown in profile in Figure 2.1.2-1. From this data, the lower barrier (identified earlier as a cascade) is shown to have a 31.2% gradient with horizontal-vertical ratio (H:V) of 3.0 m: 0.9 m, a 74.8% gradient with horizontal-vertical ratio (H:V) of 1.2 m: 0.9 m, and a 40.9% gradient with horizontal-vertical ratio (H:V) of 2.2 m: 0.9 m (Figure 2.1.2-1). As a reference, steep increases in gradient (>22%), often coupled with a reduction in pool habitats (which act as rest areas) are often identified as the upstream extent of passage for Dolly Varden (Latterell et al. 2003). Similarly, stream reaches with gradients over 25% or extended reaches with gradients over 20% are also considered to represent upper limits of passage for Dolly

Varden and other stream-dwelling salmonids (Hastings 2005, FPC 1998). Considering the height of the individual drops noted above, this feature cannot be definitively distinguished as a barrier, although it has a high likelihood of limiting upstream fish movement. Upstream from this feature, EBA also noted areas with gradients exceeding 20%, and a transition to habitat dominated by boulder step-drops that contained few pools. Additionally, no fish were observed in an assessment upstream of the first feature (Site FS-10, EBA 2008a).



Q:\Whitehorse\Data\0201drawings\MacTung\W23101211.003 Yessa Supplimental 2\Tributary C.dwg [FIGURE 2.1.2-1] March 22, 2010 - 5:07:29 pm (BY: KEN TOMCZYK)

ISSUED FOR USE

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

YESAA PROJECT PROPOSAL
MACTUNG MINE, YUKON

TRIBUTARY C STREAM GRADIENT AT IDENTIFIED FISH PASSAGE BOUNDARIES

PROJECT NO.	DWN	CKD	REV
W23101211.003	KJT	CJJ	0
OFFICE	DATE		
WHSE	March 22, 2010		

Figure 2.1.2-1

Photo 1
Typical characteristics of upper Tributary C, upstream from the proposed ravine dam. Note that vegetation is limited to herbaceous cover and overhead cover is limited. Photo taken in June of 2007.

Photo 2
Typical characteristics of upper Tributary C, upstream from the proposed ravine dam. Note that vegetation is limited to herbaceous cover and overhead cover is limited. Photo taken in June of 2007.

Photo 3

View of upper Tributary C, upstream from the proposed ravine dam. Photo taken in June of 2007.

Photo 4

An overview of the small pond complex located within the footprint of the proposed Ravine Dam. This pond complex and associated stream were electrofished during the footprint assessment in 2008, with no fish species found. Photo taken in July of 2008

The upper barrier (near the bottom of the proposed dam) is located in an area of steep topography, and is characterized by a horizontal-vertical ratio (H:V) of 15.2 m: 4.0 m with a gradient of 26.3% followed immediately by a 3.0 m: 2.0 m (H:V) section of stream with a gradient of 67.7%. This section of cascade with a slope length of approximately 3.6 m is considered to be impassable by the Dolly Varden present in Tributary C.

Based on this topographic review, field observations of the barriers, as well as the absence of both fish and suitable fish habitat above the barriers, it is NATC's opinion that there is sufficient information for the assessment of effects related to Upper Tributary C for the Mactung Project.

Decreased water flow and ice formation can remove overwintering habitat for fish populations in stream ecosystems. Models developed by the proponent have identified winter months (February-March) as most likely to have the lowest stream water flow. The Hess River Tributary is both a fish bearing stream as well as being an annual source of fresh waster for the project. A single flow recording from March 28, 2008 was used as the minimum winter flow measurement for the Hess River Tributary. Please provide the following information.

b) The results of the ongoing programs establishing baseline water conditions in and around the project.

On going hydrological field programs have been conducted to establish baseline water flow conditions in around the project site. Field trips have been conducted since March 2008 to record baseline flow conditions in the tributaries to the Hess River. The flow measurements to date are summarized in the following tables.

TABLE 2.1.2-1: MACTUNG - SUMMARY OF DISCHARGE MEASUREMENTS FOR THE SOUTH TRIBUTARY OF THE HESS RIVER

Date	Flow Measurement Try 1 (m^3/s)	Flow Measurement Try 2 (m^3/s)	Flow Measurement Try 3 (m^3/s)	Average Discharge m^3/s
Mar 28/08	0.14	no data	no data	0.14
Jun 18/08	14.62	14.84	12.51	13.99
Jun 19/08	17.11	18.94	16.1	17.38
Jul 15/08	15.36	15.75	no data	15.55
Sep 03/08	5.92	5.65	no data	5.79
Feb 16/09	0.27	0.27	no data	0.27
Apr 19/09	0.25	0.26	no data	0.26
May 30/09	10.01	10.46	no data	10.24
Jun 24/09	12.03	11.68	no data	11.86
Jun 25/09	9.86	10.18	no data	10.02
Jul 28/09	9.72	10.28	no data	10.00
Aug 13/09	11.80	11.04	no data	11.42
Sep 15/09	5.78	5.59	no data	5.69
Nov 29/09	0.57	0.51	no data	0.54
Dec 19/09	1.43	no data	no data	1.43

TABLE 2.1.2-2: MACTUNG - SUMMARY OF DISCHARGE MEASUREMENTS FOR TRIBUTARY A

Date	Flow Measurement Try 1 (m^3/s)	Flow Measurement Try 2 (m^3/s)	Flow Measurement Try 3 (m^3/s)	Average Discharge m^3/s
May 08/08	0.23	no data	no data	0.23
Jun 18/08	4.07	4.12	4.45	4.21
Jun 18/08	6.9	7.81	no data	7.35
Jul 15/08	4.35	4.35	no data	4.34
Sep 03/08	2.92	2.92	no data	2.92
Feb 15/09	0.23	0.24	no data	0.24
Mar 18/09	0.17	0.17	no data	0.17
Apr 18/09	0.15	0.15	no data	0.15
May 30/09	3.18	3.21	no data	3.20
Jun 23/09	4.00	4.19	no data	4.10
Jun 25/09	3.37	3.48	no data	3.43
Jul 28/09	1.53	1.38	no data	1.46
Aug 14/09	2.40	2.64	no data	2.52
Sep 15/09	2.04	2.01	no data	2.03
Dec 18/09	0.87	no data	no data	0.87

TABLE 2.1.2-3: MACTUNG - SUMMARY OF DISCHARGE MEASUREMENTS FOR TRIBUTARY C AT MOUTH				
Date	Flow Measurement Try 1 (m³/s)	Flow Measurement Try 2 (m³/s)	Flow Measurement Try 3 (m³/s)	Average Discharge m³/s
May 09/08	0.11	no data	no data	0.11
Jun 18/08	1.37	1.295	1.545	1.41
Jun 18/08	2.354	2.209	no data	2.28
Jul 15/08	1.24	1.23	no data	1.24
Sep 03/08	0.60	0.66	no data	0.63
Apr 18/09	0.03	0.03	no data	0.03
May 30/09	0.85	0.92	no data	0.89
May 31/09	0.99	1.11	no data	1.05
Jun 23/09	1.09	1.12	no data	1.11
Jun 25/09	0.81	0.85	no data	0.83
Jul 28/09	0.29	0.47	no data	0.38
Aug 14/09	0.54	0.77	no data	0.66
Sep 15/09	0.46	0.51	no data	0.48
Oct 15/09	.21	no data	no data	.21
Nov 28/09	0.08	0.08	no data	0.08
Dec 18/09	0.10	no data	no data	0.10

TABLE 2.1.2-4: MACTUNG - SUMMARY OF DISCHARGE MEASUREMENTS FOR TRIBUTARY C AT WQ-1A WARM SPRINGS			
Date	Measurement 1 m³/s	Measurement 2 m³/s	Average Discharge m³/s
May 31/09	0.79	0.80	0.80
Jun 23/09	0.92	0.90	0.91
Sep 14/09	0.31	0.32	0.32
Dec 18/09	0.02	no data	0.02

TABLE 2.1.2-5: MACTUNG - SUMMARY OF DISCHARGE MEASUREMENTS FOR WQ-C1 U/S RAVINE DAM			
Date PDST	Measurement 1 m³/s	Measurement 2 m³/s	Average Discharge m³/s
Jun 1/09	0.27	0.26	0.26
Jun 23/09	0.22	0.22	0.22
Jul 27/09	0.06	0.07	0.07
Sep 14/09	0.04	0.06	0.05
Nov 25/09	0.06	0.05	0.06

TABLE 2.1.2-6: MACTUNG - SUMMARY OF DISCHARGE MEASUREMENTS FOR TRIBUTARY C SITE (WQ-C0)			
Date PDST	Measurement 1 m³/s	Measurement 2 m³/s	Average Discharge m³/s
June 24/09	0.03	0.03	0.03

TABLE 2.1.2-7: MACTUNG - SUMMARY OF DISCHARGE MEASUREMENTS FOR TRIBUTARY C SITE (RAVINE DAM)			
Date PDST	Measurement 1 m³/s	Measurement 2 m³/s	Average Discharge m³/s
Sep 14/09	0.15	0.13	0.14
Nov 25/09	0.07	0.09	0.08

c) A detailed comparison between these additional stream flow data (in Item b) above) and the winter minimum flow measure taken in 2008 for the Hess River Tributary to inform confidence in this measure.

Results from the 2008 and 2009 baseline monitoring program are provided in Tables 2.1.2-1 to 2.1.2-7 (above). The flow of 0.14 m^3/s measured at the South Tributary of the Hess River on March 28, 2008 is the minimum flow recorded at this station. This value was calculated by converting velocity measurements across the river channel to flow using the appropriate cross-section area. It is in the same order of magnitude as the winter flow measurements in February and April, 2009.

In addition, regional analysis using Tsichu River and Hess River hydrometric stations gave estimated minimum March flows of 0.05 and 0.24 m^3/s at the south tributary of the Hess (EBA 2009). The measured flow of 0.14 m^3/s in March 2008 falls between the regional estimates. This provides an acceptable level of confidence for using the original minimum flow of 0.14 m/s as the minimum winter flow for the Hess River South Tributary.

2.1.3 Surface Water Quality and Hydrology

An understanding of the hydrology in the area is critical to the Executive Committee's assessment of potential effects to surface water from project activities. Accurate hydrological data will also allow for appropriately designed infrastructure and the implementation of effective mitigation strategies.

In the absence of comprehensive year-round sampling data, the annual hydrological regime was modeled from the measurements that were available to the proponent. The Executive Committee has required the proponent to provide updated information from the water sampling program to date (Section 2.1.2., Item b) above).

In order to ensure that water management infrastructure is properly sized and designed, information projecting maximum or flood flows is of particular importance to the

Executive Committee and is reflected in the comments received (Yukon Conservation Society, Yukon Government and Environment Canada). Gaps in hydrological sampling, precipitation measurement and modeling have led to concerns about accurate predictions of peak flows and the ability to properly plan for and manage these flows.

a) Flood flow estimation should be repeated using more suitable analytical methods. Yukon Government has recommended that one of the following methods be used: a theoretical probability distribution that provides the best fit, or use a greater number of stations for a regional flood frequency analysis.

YESAB suggested the inclusion of a regional hydrometric station operated by the Yukon Water Resources Hydrometric Program (1975-1994) as a possible addition to the Mactung hydrological analysis. The station named 180 Mile Creek at Km 295.8 along the North Canol Highway is further away than the Mactung property than the other hydrology stations, located approximately 135 km southwest of the Mactung site. However, it has a small drainage area (83.1 km^2) which is similar to the Tributary A basin. The 180 Mile Creek station has maximum instantaneous discharge records available from 1983 to 1993. The 1988 peak flow of 49.7 m^3/s was excluded from the analysis as it was affected by ice conditions. The characteristics of all the selected regional hydrometric stations for the Mactung hydrological analysis are summarized in Table 2.1.3-1.

TABLE 2.1.3-1: MACTUNG - REGIONAL HYDROMETRIC STATIONS

Station No.	Name	Lat	Long	Drainage Area (km^2)	Record Period
09DA001	Hess River above Emerald Creek	63° 20’ 10”	131° 30’ 00”	4840	1977-1996
09BB001	South Macmillan River at km 407 Canol Road	62° 55’ 30”	130° 32’ 30”	997	1975-1994
29BB001	Boulder Creek at km 387 Canol Highway	62° 51’ 50”	130° 49’ 55”	84.1	1983-1991
29BA002	180 Mile Creek at Km 295.8 North Canol Highway	62° 18’	131° 41’	83.1	1983-1993

Frequency analysis was carried out for the 180 Mile Creek hydrometric station using Environment Canada’s Consolidated Frequency Analysis program (CFA 3.1). Flood frequencies derived from the regional hydrometric stations were calculated by taking the average of the results from four frequency distributions, as all the frequency calculations are comparable. The calculated 10- to 200-year flood flows are listed in Table 2.1.3-2.

TABLE 2.1.3-2: MACTUNG - RESULTS OF THE FLOOD FREQUENCY ANALYSIS				
Boulder Creek at km 387.0 North Canol Highway (29BB001) Maximum Instantaneous Discharge (m^3/s)				
Frequency Distribution	10-yr	20-yr	100-yr	200-yr
Generalized Extreme Value (GEV)	29.5	32.7	38.4	40.3
3 Parameter Lognormal (3PLN)	29.3	32.5	38.8	41.1
LOG Pearson Type III (LPIII)	30.4	35.8	48.8	54.7
Wakeby	29.3	32.0	35.8	36.7
Average	29.6	33.3	40.5	43.2
180 Mile Creek at km 295.8 North Canol Highway (29BA002) Maximum Instantaneous Discharge (m3/s)				
Frequency Distribution	10-yr	20-yr	100-yr	200-yr
Generalized Extreme Value (GEV)	15.9	19.7	31.3	38.1
3 Parameter Lognormal (3PLN)	16.8	22.1	40.2	51.3
LOG Pearson Type III (LPIII)	16.0	19.5	29.8	35.5
Wakeby	16.4	20.2	30.5	35.7
Average	16.3	20.4	33.0	40.2
South Macmillan River at km 407 Canol Road (09BB001) Maximum Instantaneous Discharge (m3/s)				
Frequency Distribution	10-yr	20-yr	100-yr	200-yr
Generalized Extreme Value (GEV)	173.0	196.0	262.0	296.0
3 Parameter Lognormal (3PLN)	171.0	187.0	225.0	241.0
LOG Pearson Type III (LPIII)	170.0	189.0	237.0	260.0
Wakeby	176.0	199.0	256.0	282.0
Average	172.5	192.8	245.0	269.8
Hess River above Emerald Creek (09DA001) Maximum Instantaneous Discharge (m^3/s)				
Frequency Distribution	10-yr	20-yr	100-yr	200-yr
Generalized Extreme Value (GEV)	859.0	966.0	1,190.0	1,280.0
3 Parameter Lognormal (3PLN)	889.0	1,060.0	1,510.0	1,730.0
LOG Pearson Type III (LPIII)	904.0	1,120.0	1,790.0	2,180.0
Wakeby	873.0	960.0	1,100.0	1,140.0
Average	881.3	1,026.5	1,397.5	1,582.5

Regional peak flows are plotted against drainage areas in Figure 2.1.3-1. The drainage areas of Tributaries A, B, C and potential stream crossing on the South Macmillan River were applied to the equations to determine the corresponding peak flood. Peak flow estimates for these locations are updated and given in Table 2.1.3-3.

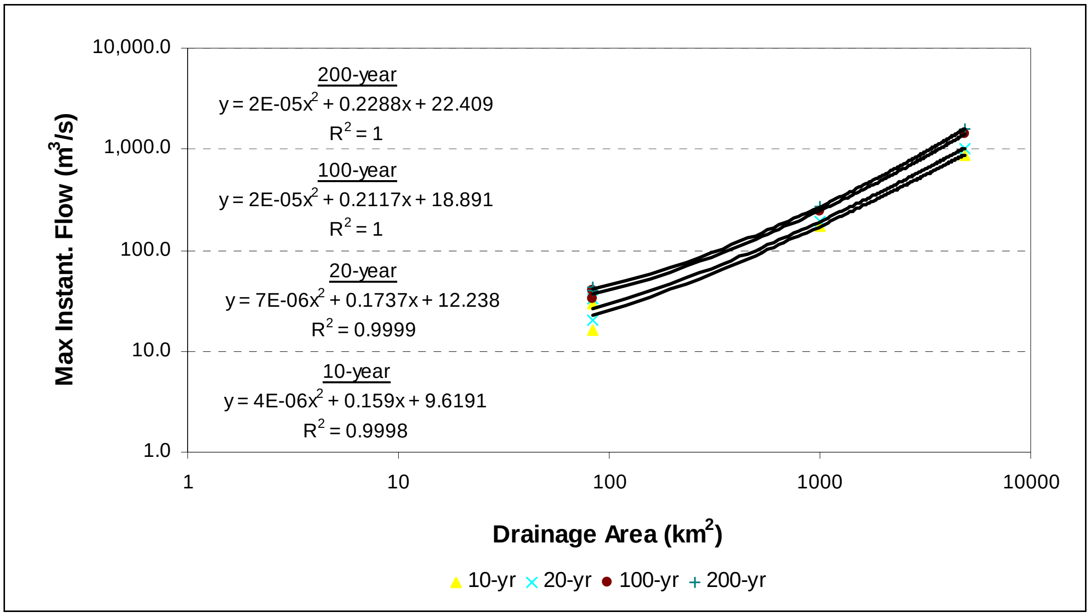


Figure 2.1.3-1
Drainage Area versus Maximum Instantaneous Flow for the Regional Hydrometric Stations

TABLE 2.1.3-3: MACTUNG - MAXIMUM INSTANTANEOUS FLOW ESTIMATES					
Basin	Catchment Area (km^2)	Maximum Instantaneous Flow (m^3/s)			
		10- year	20-year	100-year	200-year
Tributary A gauge	79.1	22.2	26.0	35.8	40.6
Tributary B mouth	22.2	13.2	16.1	23.6	27.5
Tributary C mouth	24.2	13.5	16.4	24.0	28.0
S. Macmillan River Crossing	160.1	35.2	40.2	53.3	59.6

With the additional hydrometric data the revised 200-year flood flow estimates for the Mactung area are comparable (within 5%) of the original estimates stated in the Mactung Project Proposal.

2.2 METEOROLOGICAL DATA

Precipitation data for the Mactung site were not provided with the project proposal. Rather, average monthly precipitation temperature data from the Macmillan Pass meteorological station were provided.

The Executive Committee had previously requested more site-specific precipitation information. Information from an on-site all-weather precipitation gauge has not been provided into the assessment and was noted as a concern and gap in several comments. Environment Canada has noted that the record of precipitation from the Macmillan Pass meteorological station is deficient, leading to uncertainty associated with precipitation predictions for the Mactung site. The 2007 and 2008 hydrometeorological reports prepared for the proponent, contain concerns about the quality of site precipitation data and recommendations to install an on-site precipitation gauge (Appendices E2, E3):

"Precipitation data recorded at the Environment Canada's Macmillan Pass meteorological station provides only a rough estimate of conditions at the Mactung site. The difference of nearly half a kilometre in elevation between the two sites can lead to erroneous assumptions, especially in mountainous terrain. Furthermore, numerous months of precipitation data are missing from the record and MSC has stated that the precipitation gauge is not functioning correctly and that no time frame has been set for repair or replacement. Therefore it is recommended that an all-weather precipitation gauge be installed in the vicinity of the existing meteorological station at Mactung, to obtain accurate precipitation data for the site."

Precipitation in the proposed project area may have implications for the design of on-site mine infrastructure and mitigation measures related to various values. Furthermore, precipitation survey data will allow for a more accurate description of the mine site water balance (see mine site water balance discussion).

The Executive Committee is not confident that the precipitation information provided is a consistent and defensible understanding of precipitation in the area. Please provide the following information regarding precipitation in the mine area.

a) Provide an accurate and defensible precipitation model for the Mactung site, whether determined through on-site measurement or other conservative estimations. We suggest coordinating with Yukon Government and Environment Canada in developing this model. For example, Environment Canada has suggested supporting and comparing the existing regional precipitation models with Environment Yukon's WeatherPro precipitation data. This information is critical to an accurate site water balance discussed below.

There is no precipitation gauge at the Mactung site, hence on-site data is not available. To provide additional support for an accurate and defensible precipitation model, additional precipitation records were obtained from Environment Yukon's Weatherpro database. Two climate stations, namely MacPass (different than the Meteorological Service of Canada Macmillan Pass station) and Mt. Sheldon, are located approximately 7 km southeast and 76 km southwest of the Mactung project site, respectively. Annual precipitation for the period 1999 to 2007 was calculated on a daily accumulative basis. The station summary is provided in Table 2.2-1.

TABLE 2.2-1: MACTUNG - WEATHERPRO CLIMATE STATIONS SUMMARY AND ANNUAL PRECIPITATION				
Station Name	Location	Elevation (m)	Annual Precipitation (mm)	
MacPass	63° 14' 33.8" N 130° 02' 42.0" W	1414	1999	299*
			2000	N/A
			2001	634
			2002	611
			2003	533*
			2004	459
			2005	669
			2006	595
			2007	421
			Mean Annual	**594**
Mt. Sheldon	62° 43' 10.5" N 131° 01' 59.6" W	920	1999	182*
			2000	N/A
			2001	495
			2002	492
			2003	482
			2004	510*
			2005	635
			2006	397
			2007	461
			Mean Annual	**500**

Note: * indicates incomplete monthly data record for the year. Such years were excluded from the mean annual precipitation calculation.

The data from the two WeatherPro sites summarized in (Table 2.2-1) are regionally relevant to the Mactung site due to their proximity to the project site, recent records and relatively higher station elevation for assessing the orographic effect. In the updated regional precipitation analysis, the two new climate stations were applied to replace the MSC Macmillan Pass station, which is reported to have data errors post 2005 (EBA 2008b). The properties of the selected climate stations are listed in Table 2.2-2.

TABLE 2.2-2: REGIONAL CLIMATE STATIONS FOR MACTUNG PRECIPITATION ANALYSIS					
Station	Latitude	Longitude	Period	Elevation (m)	Mean Annual Precipitation (m)
MacPass	63.24	-130.05	1999-2007	1414	594
Mt. Sheldon	62.72	-131.03	1999-2007	920	500
Tungsten	61.95	-128.25	1972-1990	1143	595
Faro	62.21	-133.38	1987-2009	717	316
Ross River	61.98	-132.45	1994-2005	698	229

The Mean Annual Precipitation (MAP) was plotted against the station elevation as shown in Figure 2.2-1. A fair correlation (R^2 equal to 0.83) results from the plot. The MAP for the Mactung site is estimated to be 766 mm by interpolating to the site elevation of 1860 m using the equation shown on Figure 2.2-1.

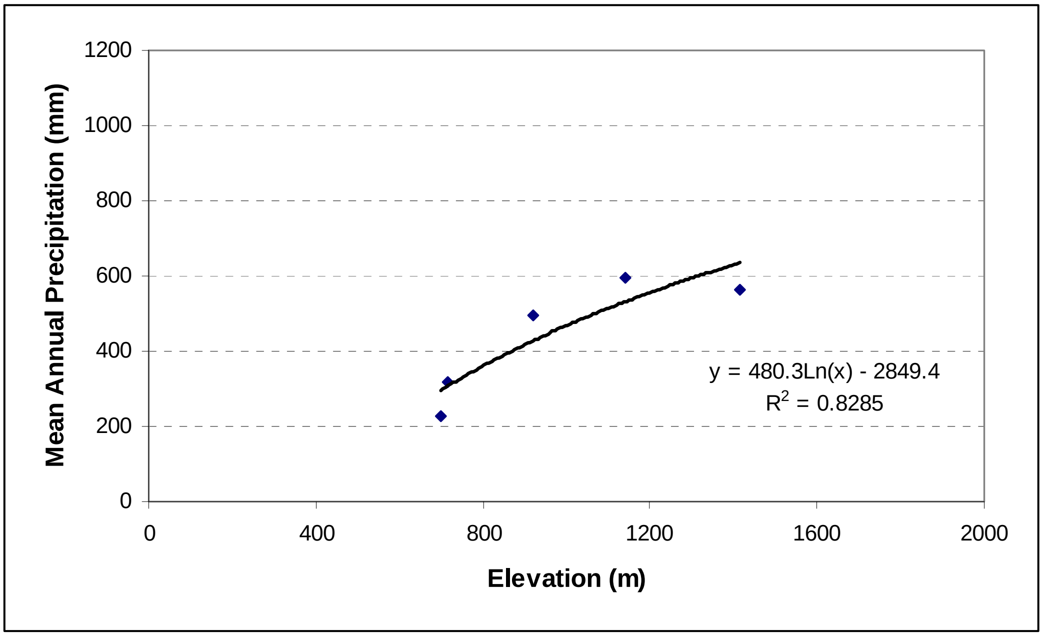


Figure 2.2-1
Mean Annual Precipitation versus Elevation for the Regional Climate Stations

A second method by Spittlehouse (2006) uses the ClimateBC computer program to estimate the MAP was applied to the Mactung site as a check on the regional estimate. ClimateBC offers high-resolution spatial climate estimation for ungauged areas in BC, Yukon Territories and part of Alberta (http://www.genetics.forestry.ubc.ca/cfcg/climate-models.html). The program calculates seasonal and annual climate variables for the point of interest based on latitude, longitude and elevation. As summarized in Table 2.2-3, the estimated MAP for the Mactung site using the Climate BC program is 724 mm using the reference "climate normal" for the period 1971-2000. The difference in the estimated precipitations using the two methods is 5%, which provides a high level of confidence in the precipitation estimate using regional precipitation analysis.

TABLE 2.2-3: ESTIMATED MEAN MONTHLY PRECIPITATION (mm) AT THE MACTUNG SITE

Input parameters for the Mactung Site				Output
Latitude	Longitude	Elevation (m)	Climate Normal	MAP (mm)
63°16'50.5"	130°8'58.6"	1860	1971-2000	724

The climate variables in the ClimateBC program are derived from 493 weather stations in BC, Yukon and parts of Alberta. The standard error of monthly precipitation estimate is 8-24 mm. It is considered more reliable than the empirical equation method developed by Aur Resources Inc. (1997) due to levels of complexity and the number of meteorological stations used in the research.

The monthly precipitation distribution at the MacPass (WeatherPro) station is considered most representative of the Mactung site. As shown in Table 2.2-4, the distribution was calculated using the measured precipitation for the period of 1999 to 2007.

TABLE 2.2-4: ESTIMATED MEAN MONTHLY PRECIPITATION (mm) AT THE MACTUNG SITE

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Distribution	3%	6%	7%	6%	5%	9%	14%	12%	12%	13%	7%	8%	100%
Precipitation (mm)	22	43	50	42	36	69	106	90	91	101	54	62	766

Climate Change

A report from Environment Canada (2006) on potential climate change effects on Probable Maximum Flood (PMF) and Probable Maximum Precipitation (PMP) in the Yukon Territory was reviewed. The research used Coupled Global Climate Models (CGCM), which simulated three climate change scenarios:

- Slow economic growth and and high population growth; Scenario A2
- Rapid economic growth with lower population growth; Scenario B2
- Greenhouse gas and aerosol scenario, GA.

Maximum temperature and precipitation change isograms (compared to the 1961-1990 baseline) were developed for the Yukon Territory and western NWT. The temperature and precipitation changes for the Mactung site were interpolated from the isograms and are summarized in Table 2.2-5.

TABLE 2.2-5: MAXIMUM CLIMATE CHANGE FACTORS FOR THE MACTUNG SITE

Year	Maximum Temperature Increase		Maximum Precipitation Increase	
2030	1.83 °C	CGCM2-GA	2%	CGCM2-B2
2060	2.88 °C	CGCM2-GA	6.6%	CGCM2-A2

To assess the potential effect of climate change on the hydrological regime, a SWMM 5 model was developed to simulate the rainfall-snowmelt-runoff process for future scenarios for 2030 and 2060. A hypothetical mountainous basin was input to the SWMM 5 model. The model is simplified in that evaporation and basin infiltration are not included in the calculations. Time series of daily temperature and daily precipitation representing current conditions (2002-2005) were obtained from the Macmillan Pass (MSC) climate station. The maximum temperature and precipitation increase factors, as listed in Table 2.2-5, were applied to the current time series to establish future climate conditions. The model output for snow pack and peak flow under current and future conditions is provided in Figures 2.2-2 and 2.2-3.

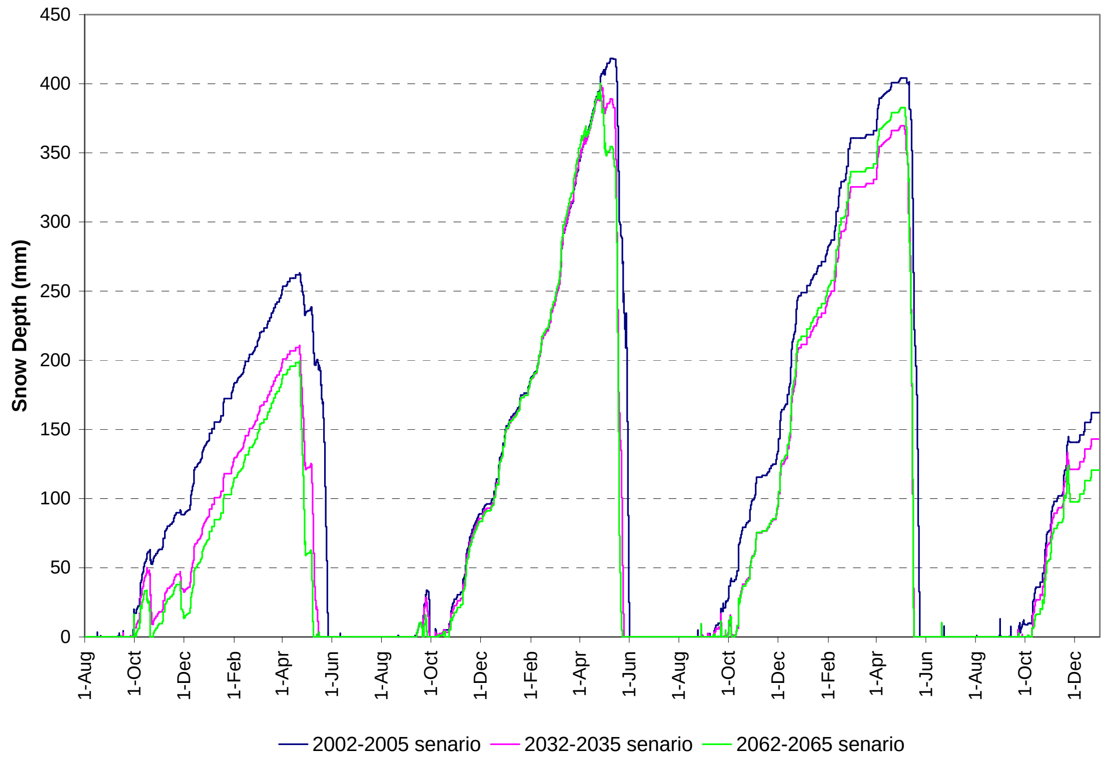


Figure 2.2-2
Simulated Basin Snow Depth 2002-2065

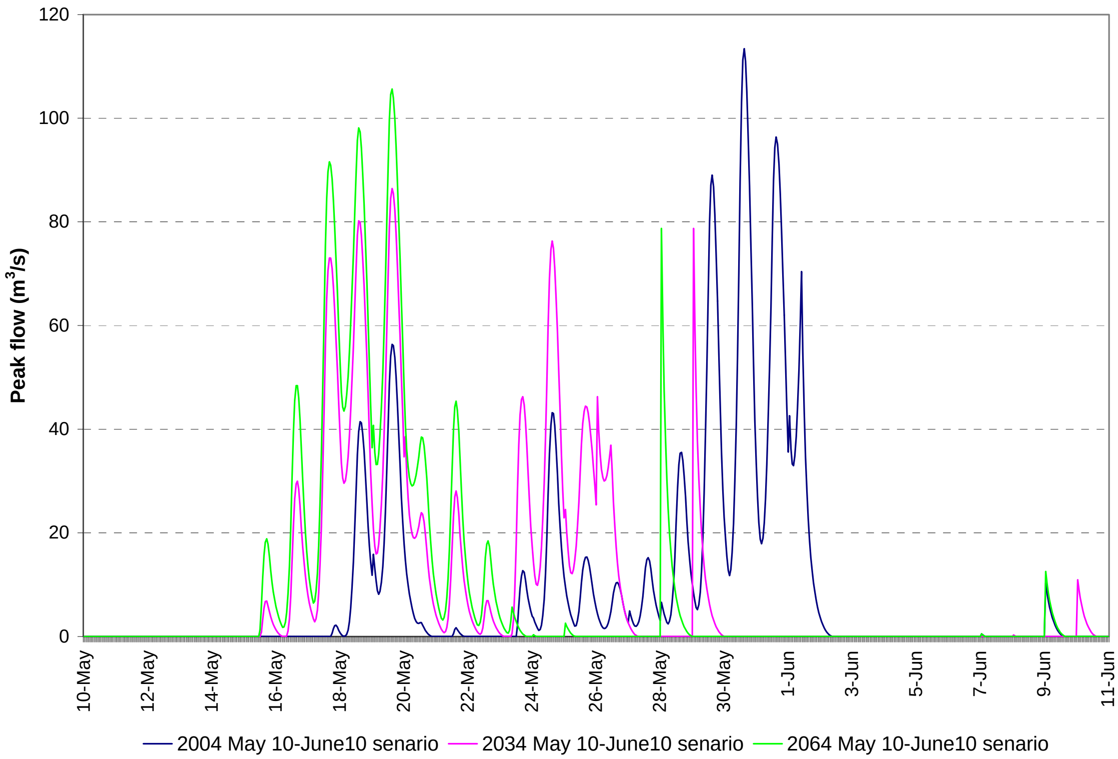


Figure 2.2-3
Simulated Flood Hydrograph 2004-2064

The simulated snowpack depth was plotted for a period of forty months, as shown in Figures 2.2-2. The snowpack is projected to decrease by an average of 35 mm from the year 2002 to 2065, which is equivalent to 0.6 mm decrease per year. This indicates that an increase in temperature affects snow accumulation. The combined effect of increasing temperature and decreasing snow pack would result in a diminished snow covered area, an earlier end of the melting period and decreased summer low flows.

The flood hydrograph, resulting from snowmelt or combined rainfall and snowmelt, was plotted for a period of one month for higher resolution in Figure 2.2-3. Over the future sixty-year time span, the snowmelt and peak flood would start three days and eleven days earlier respectively, which indicates a more intensified snowmelt process. The hydrographs show that the May 19 peak increases from 56 m^3/s in 2004 to 106 m^3/s in 2064. However, as the May 19 peak increases, the May 31 peak, which in 2004 was the annual peak, decreases. The predicted annual peak in 2064 is slightly lower than the 2004 peak, and results from a different snowmelt event. As a result, it is difficult to predict the combined effect of climate change on peak flow, as the generation of peak flow is a complex process influenced by temperature, rainfall, snowpack, the timing and the magnitude of earlier peaks, etc. On the basis of the reference report it is not possible to apply a climate change factor to the regional peak flow estimate.

b) The Executive Committee understood that the installation of an on-site precipitation gauge was being considered by the proponent. If a gauge was installed, please provide the precipitation measures to-date for comparison to the regional precipitation modeling.

It is NATC's intention to install an all-weather precipitation gauge on site at Mactung. However, there is no precipitation gauge currently on site.

c) Clarify and address the statistically inconsistent differences between the calculated average annual precipitation figure (663 mm) and the data from 2007 in the same report which states a total precipitation of 1 293 mm for only a partial year (282 days).

Macmillan Pass (ID 2100693) is an active meteorological station that has recorded daily precipitation since February 1998. However, the daily precipitation record was incomplete for most years, except for 2003, 2004 and 2005. An annual mean precipitation of 663.4 mm was calculated using the three complete years. It has been reported that the precipitation records were incorrect post 2005 as the recorded rainfall and water equivalent snowfall for each day did not add up to the total precipitation recorded. As a result, the 2007 precipitation of 1293 mm recorded for a partial year (282 days) at the MacPass station is not reliable. It should not be compared with the mean annual precipitation of 663 mm in the report.

d) Provide a copy of the document referred to as "AUR Resources (1997)" in order to support the validation of the regional precipitation analysis.

In the revised precipitation analysis in Section 2.2a above the "empirical formula method by Aur Resource" was replaced with the ClimateBC program, as discussed and agreed at the meeting held between YESAB, EBA, Government of Yukon, Environment Canada and NATC staff on February 10, 2010. The Aur Resource empirical formula has not been used for the analyses presented in Section 2.2a and is therefore not included as part of this submission.

2.3 MINE SITE WATER BALANCE

An understanding of the site water balance throughout all the phases of the project is critical to the assessment. An accurate understanding of the water balance will validate the design of on-site mine infrastructure and aid in determining the appropriateness of mitigation measures.

The project proposal and addenda provided information regarding site water characteristics such as baseline climate, hydrology and hydrogeology data and integrated this information into a water balance for the site. The information provided relating to the site water balance does not incorporate climatic variables such as precipitation and evaporation (Yukon

Government, YOR Document #2008-0304-131-1; Environment Canada YOR Document #2008-0304-140-1). Please provide the following information:

a) Describe and demonstrate how the direct inputs from precipitation affect the water balance model proposed.

The original mine site water balance for Mactung incorporates precipitation through the use of calculations for run-off that reports to the reservoir and the diversion channel. The calculations are based on the mine site catchment area and the conservative precipitation estimates previously submitted to YESAB.

The revised precipitation estimate in Section 2.2a (above) is approximately 75% that of the previously submitted estimate. To maintain a conservative approach to the mine site water balance the information previously submitted in Section 5.4 of Addendum 1 of the Mactung Project Proposal will be used.

Direct precipitation into the reservoir is accounted for in the estimated monthly inflows to the reservoir since the undiverted catchment area of this facility (2.51 km^2) includes the flooded portion of the reservoir. The reservoir has an operating capacity of 540,000 m^3 with a maximum capacity of 612,000 m^3 before overtopping (emergency spillway discharge), which allows for approximately 72,000 m^3 of emergency storage capacity.

Direct precipitation into the reservoir would result in small increases in the water level of the reservoir which would be accounted for by corresponding small increases in the discharge rate from the dam.

3.0 ACID ROCK DRAINAGE AND METAL LEACHING

3.1 PREDICTION OF ACID ROCK DRAINAGE AND METAL LEACHING POTENTIAL

The proponent has used two approaches to predict acid rock drainage and metal leaching potential (ARD/ML) at Mactung. First, comparisons of the Mactung and Cantung ore grade materials and the Cantung tailings were conducted. Second, the proponent established two humidity cells in late June 2009 using tailings solids produced during the current metallurgical testing program.

The Executive Committee requires additional information on ARD/ML potential in order to properly understand potential effects on water quality and aquatic ecosystems

3.1.1 Geochemical Kinetic Testing

The proponent established two humidity cells in late June 2009. The humidity cells were developed using tailings solids produced during the current metallurgical testing program. Details and results were provided in the Supplementary Geochemical Information for Waste and Mineralized Rocks, Mactung Deposit, Yukon Territory (supplementary report). The supplementary report provided preliminary humidity cell results for five weeks of testing and with two cycles of complete water quality (metals) results.

In their letter of December 7, 2009 (YOR document #2008-0304-140-1) Environment Canada indicates that the project proposal does not contain sufficient geochemical analysis to determine ARD/ML potential of material that is to be disturbed at the Mactung site. The lack of a full kinetic test program and results makes it difficult to assess the impact these waste materials may have and the confidence that they will be handled correctly in the long-term. Further, Environment Canada has indicated that, given the lack of description of the bench scale production, it is uncertain whether or not the surrogate tailings produced for the kinetic test program will suitably mimic tailings expected to be produced during mining.

In Addendum 1, Supplementary Geochemical Information for Waste and Mineralized Rocks submitted July 31, 2009, the proponent has committed to compiling results from the ongoing humidity cell tests on a monthly basis and forwarding to the Executive Committee. On a quarterly basis more detailed analysis of data will be forwarded. To date, the proponent has not provided any results or detailed analysis of ongoing humidity cell tests.

Time to onset of ARD is critical information to determine appropriate mitigation measures for dealing with potentially acid generating waste rock and tailings. If waste rock stockpiled on the surface were to become acid generating, or if tailings were to become acid generating before they could be flooded, it may compromise the success of underground disposal, or result in higher effects from the outset. The time to onset for ARD may also affect the length of post mining monitoring required. Furthermore, if the mine were to stop operating for an undetermined amount of time, the waste rock piles or the DSTF may pose an ARD/ML concern.

a) Provide results and interpretation of the humidity cell testwork to determine the time to onset of ARD for tailings and potentially acid generating waste rock (as outlined in the Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia [Price, 1997]). Final results should be presented when the humidity cells have stabilized geochemically.

A humidity cell program for Mactung was initiated during the latter half of 2009 using ore grade samples collected during bulk sampling in 2005 and from a composite of exploration drill core samples collected during the 2008 field program. The humidity cell tests continue and are being conduced by SGS CEMI, Vancouver. Data from the first 47 weeks of testing for both tailings composites are available for evaluation and interpretation. The humidity cells are intended to be maintained for a period of up to several years in order to ensure that the long-term behaviour of the tailings materials is properly characterized. Interpretative data reports for the ongoing kinetic testing program will be issued as the project proceeds through assessment and permitting.

It is understood that "final results" from these tests would be ideal; however, the development of management and mitigation plans for the tailings has been developed based on assuming a worst-case scenario, which assumes that all tailings materials being generated will be potentially acid-generating. Generally, "final results" from humidity cell tests are difficult to obtain because the tests are kinetic and the end point is interpretive. The tests are also conducted under a worst case scenario as the humidity cells are being performed on loose tailings and this increases the ability of oxygen and water to access the available sulphide mineralization, which will not be the case during operation. Tailings at the proposed Mactung Mine will be placed in a compacted state that reduces the ability of water and oxygen to access the sulphides.

Discussion of Humidity Cell Leachate Concentrations

Table 3.1-1 and Table 3.1-2 contain the available results from the ongoing humidity cell tests on the 2008 and 2005 tailings samples, respectively. Figure 3.1-1 through Figure 3.1-11 show the available Mactung humidity cell data against the results of ongoing Cantung tailings composite humidity cell data that have been collected for more than 132 weeks. Discussion of the Cantung tailings and the comparison to the Mactung tailings is presented in Section 3.1.2.

The pH of the 2008 tailings humidity cell leachate (Figure 3.1-1) steadily declined from an initial value of 8.96 but has remained neutral to slightly alkaline since initiation of the testing. The pH value for this cell has fluctuated between a pH of 7.4 and 7.7 since week 39. The pH of the 2005 tailings humidity cell (Figure 3.1-1) remained above 8.0 for the first seven weeks of testing and since showed a fluctuation of pH between 7.6 and 7.8 since week 29 of the testing program. Overall, the leachate from both cells has remained in the neutral to slightly alkaline range, which is similar to what was observed in the Cantung tailings.

TABLE 3.1-1: LEACHATE CHEMISTRY RESULTS FOR 2008 DRILL CORE COMPOSITE TAILINGS

Date	Cycle No.	Volume mL Input	Volume mL Output	pH	ORP	Conductivity ųmhos/cm	Acidity (pH 4.5)	Acidity (pH 8.3)	Alkalinity	Sulphate	Hardness CaCO3	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb
					mV		mgCaCO3/L	mgCaCO3/L	mgCaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
23-Jun-09	1	750	250	8.96	315	861	#N/A	#N/A	224.8	314	6.5	0.244	0.0098	0.0958	0.0029	0.0001	0.00445	<0.5	0.00025	2.28	<0.001	0.00104	0.0364	0.705	0.00814
30-Jun-09	2	500	440	8.60	291	1037																			
7-Jul-09	3	500	380	8.37	329	1214	#N/A	#N/A	233.7	293	11	0.176	0.0258	0.183	0.0016	0.0001	0.00931	<0.5	0.00007	3.88	<0.001	0.0006	0.0204	0.521	0.00294
14-Jul-09	4	500	440	8.45	304	1050																			
21-Jul-09	5	500	460	8.40	299	961	#N/A	#N/A	228.9	193	17.2	0.387	0.0201	0.0802	0.0022	0.00023	0.0286	<0.3	0.00026	6.02	<0.0005	0.0003	0.0138	1.21	0.00673
28-Jul-09	6	500	455	8.23	329	783																			
4-Aug-09	7	500	485	8.21	336	655	#N/A	2.1	160.3	175	36.4	0.138	0.0151	0.0841	0.00181	0.00007	0.0092	<0.05	0.00011	13	0.0005	0.000163	0.00855	0.368	0.00243
11-Aug-09	8	500	465	8.15	308	625																			
18-Aug-09	9	500	475	7.83	281	588	#N/A	4.2	92.8	181	125	0.0277	0.0126	0.039	0.00309	0.00002	0.000791	<0.05	0.000186	44.7	<0.0001	0.000198	0.00423	0.035	0.000238
25-Aug-09	10	500	485	8.10	333	521																			
1-Sep-09	11	500	440	7.76	285	721	#N/A	7.5	74.5	270	292	0.0171	0.00869	0.0277	0.00598	0.00001	0.000077	<0.05	0.000255	106	<0.0001	0.000424	0.00369	0.006	0.000081
8-Sep-09	12	500	440	7.75	341	717																			
15-Sep-09	13	500	440	7.48	305	795	#N/A	7.2	67.7	334	387	0.0182	0.00641	0.0193	0.00699	0.00002	0.000044	<0.05	0.000324	143	<0.0001	0.000621	0.00363	0.009	0.000034
22-Sep-09	14	500	450	7.84	348	734																			
29-Sep-09	15	500	445	7.68	354	783	#N/A	6.0	67.5	438	396	0.0201	0.00495	0.0139	0.00811	0.00002	0.000034	<0.05	0.000293	148	<0.0001	0.000768	0.00455	0.011	0.000017
6-Oct-09	16	500	405	7.70	326	835																			
13-Oct-09	17	500	395	7.66	324	846	#N/A	4.0	57.6	418	470	0.0208	0.00407	0.0127	0.00787	<0.00001	0.00003	<0.05	0.000289	178	<0.0001	0.000925	0.00574	0.006	0.000028
20-Oct-09	18	500	375	7.63	331	800																			
27-Oct-09	19	500	395	7.68	324	752	#N/A	4.4	55.0	360	399	0.0247	0.00401	0.0089	0.00651	0.00001	0.000025	<0.05	0.000239	152	<0.0001	0.000769	0.00332	0.004	0.000051
3-Nov-09	20	500	410	7.79	326	647																			
10-Nov-09	21	500	415	7.39	320	594	#N/A	6.7	59.0	329	310	0.0271	0.0039	0.00688	0.00544	0.00002	0.00003	<0.05	0.000362	119	<0.0001	0.000747	0.0041	0.008	0.000047
17-Nov-09	22	500	400	7.77	327	666																			
24-Nov-09	23	500	470	7.84	368	592	#N/A	3.9	73.7	266	296	0.0233	0.00312	0.00474	0.00549	0.00002	0.000027	<0.05	0.000273	114	0.0001	0.000857	0.00474	0.004	0.000022
1-Dec-09	24	500	445	7.93	355	635																			
8-Dec-09	25	500	480	7.55	333	594	#N/A	5.2	70.6	269	301	0.0245	0.00261	0.00419	0.0054	0.00002	0.000028	<0.05	0.000222	116	<0.0001	0.000848	0.00371	0.004	0.000013
15-Dec-09	26	500	470	7.98	323	577																			
22-Dec-09	27	500	430	7.80	314	618	#N/A	3.3	63.9	341	381	0.0272	0.00251	0.00283	0.00609	0.00002	0.000025	<0.05	0.000259	148	<0.0001	0.00102	0.00371	0.009	0.000007
29-Dec-09	28	500	440	7.87	387	660																			
5-Jan-10	29	500	490	7.72	354	593	#N/A	5.2	85.2	256	307	0.0234	0.0022	0.00388	0.00567	0.00003	0.000021	<0.05	0.000283	120	<0.0001	0.00135	0.00497	0.006	0.000041
12-Jan-10	30	500	425	7.76	334	857																			
19-Jan-10	31	500	435	7.74	319	775	#N/A	6.9	63.1	415	395	0.0273	0.00189	0.00286	0.00703	0.00002	0.00002	<0.05	0.000466	155	<0.0001	0.00116	0.0139	0.007	0.000457
26-Jan-10	32	500	430	7.74	360	698																			
2-Feb-10	33	500	480	7.67	337	527	#N/A	5.2	81.8	255	340	0.0209	0.00182	0.00277	0.00636	0.00003	0.000017	<0.05	0.000335	133	<0.0001	0.00155	0.00776	0.002	0.000047
9-Feb-10	34	500	445	7.75	291	837																			
16-Feb-10	35	500	445	7.65	238	791	#N/A	6.0	66.1	480	502	0.0252	0.00148	0.00296	0.00806	0.00003	0.000019	<0.05	0.000371	197	<0.0001	0.0018	0.00434	0.006	0.000018
23-Feb-10	36	500	435	7.86	315	728																			
2-Mar-10	37	500	435	7.69	289	909	#N/A	4.4	57.6	469	571	0.0306	0.00127	0.00229	0.00785	0.00002	0.000019	<0.05	0.000346	225	0.0001	0.00163	0.00354	0.008	0.000038
9-Mar-10	38	500	375	7.66	350	860																			
16-Mar-10	39	500	515	7.58	321	693	#N/A	5.8	64.3	386	466	0.0291	0.00108	0.00123	0.0113	0.00002	0.000069	<0.05	0.000296	184	<0.0001	0.00168	0.00496	0.003	0.000012
23-Mar-10	40	500	475	7.78	325	674																			
30-Mar-10	41	500	450	7.46	361	1653	#N/A	5.2	36.8	416	417	0.0318	0.0009	0.0015	0.0135	0.00002	0.000016	<0.05	0.000245	165	<0.0001	0.00234	0.00365	0.004	0.000042
6-Apr-10	42	500	460	7.70	342	745																			
13-Apr-10	43	500	460	7.53	307	971	#N/A	7.7	64.7	567	557	0.0287	0.00089	0.00118	0.0121	0.00002	0.000027	<0.05	0.00042	221	<0.0001	0.00244	0.00448	0.008	0.000061
20-Apr-10	44	500	450	7.75	305	1089																			
27-Apr-10	45	500	455	7.47	327	1014	#N/A	3.8	60.2	598	578	0.0254	0.00078	0.00082	0.0145	0.00002	0.000031	<0.05	0.000411	229	<0.0001	0.00231	0.00485	0.004	0.000008
4-May-10	46	500	445	7.72	344	729																			
11-May-10	47	500	455	7.60	324	1128	#N/A	6.2	59.7	649	686	0.027	0.00084	0.00083	0.0147	0.00002	0.000016	<0.05	0.00042	272	<0.0001	0.00266	0.00408	0.005	0.000021
18-May-10	48	500	435	7.63	333	1215																			
25-May-10	49	500	440	7.37	384	1141	#N/A	9.1	61.1	473															

TABLE 3.1-1 (cont'd): LEACHATE CHEMISTRY RESULTS FOR 2008 DRILL CORE COMPOSITE TAILINGS

Date	Cycle No.	Volume mL Input	Volume mL Output	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr	Major Anions	Major Cations	Diff	Diff
				mg/L	mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				(%)
23-Jun-09	1	750	250	<0.005	0.2	0.0171	<0.1	0.0382	0.0023	0.698	4.12	0.0086	13.7	0.00087	211	0.0152	176	0.00003	0.0024	<0.005	0.00624	0.02	0.004	<0.001	11.04	9.41	-1.63	-8.0%
30-Jun-09	2	500	440																									
7-Jul-09	3	500	380	<0.005	0.32	0.0241	<0.1	0.0252	0.0029	<0.02	4.07	0.016	9.53	0.00013	227	0.0319	229	0.00002	0.0004	<0.005	0.0117	0.004	0.005	<0.001	10.78	10.19	-0.58	-2.8%
14-Jul-09	4	500	440																									
21-Jul-09	5	500	460	0.006	0.54	0.0479	<0.05	0.0065	0.0022	0.021	5.09	0.0075	10.4	0.00005	205	0.039	82	0.00003	0.00034	0.006	0.0055	0.002	0.0068	<0.0005	8.60	9.39	0.79	4.4%
28-Jul-09	6	500	455																									
4-Aug-09	7	500	485	0.0063	0.99	0.0642	<0.01	0.00527	0.00068	0.008	5.84	0.00309	9.14	0.000011	127	0.0643	66	0.000032	0.00028	0.002	0.0031	0.0013	0.0032	<0.0001	6.85	6.40	-0.45	-3.4%
11-Aug-09	8	500	465																									
18-Aug-09	9	500	475	0.0095	3.18	0.149	<0.01	0.00499	0.00072	0.004	8.38	0.00175	8.37	<0.000005	79.3	0.164	82	0.000045	0.00016	<0.0005	0.00164	0.0004	0.0063	<0.0001	5.63	6.15	0.53	4.5%
25-Aug-09	10	500	485																									
1-Sep-09	11	500	440	0.013	6.9	0.362	<0.01	0.00477	0.00126	<0.002	9.42	0.0021	8.37	<0.000005	41	0.342	113	0.000127	0.00022	<0.0005	0.00162	<0.0002	0.0119	<0.0001	7.12	7.88	0.77	5.1%
8-Sep-09	12	500	440																									
15-Sep-09	13	500	440	0.0151	7.45	0.539	0.01	0.00471	0.00145	0.003	9.39	0.00119	8.01	<0.000005	19.8	0.429	129	0.000057	0.00014	<0.0005	0.00146	<0.0002	0.0073	<0.0001	8.31	8.85	0.54	3.1%
22-Sep-09	14	500	450																									
29-Sep-09	15	500	445	0.0147	6.45	0.615	<0.01	0.00416	0.00163	0.003	8.25	0.00111	8.28	<0.000005	10.7	0.416	133	0.000049	0.00013	<0.0005	0.00136	<0.0002	0.0044	<0.0001	10.47	8.59	-1.88	-9.9%
6-Oct-09	16	500	405																									
13-Oct-09	17	500	395	0.0132	6.1	0.784	<0.01	0.00449	0.00185	0.003	8.04	0.00145	6.69	<0.000005	7.57	0.42	152	0.000045	0.00011	<0.0005	0.00132	<0.0002	0.0059	<0.0001	9.86	9.92	0.06	0.3%
20-Oct-09	18	500	375																									
27-Oct-09	19	500	395	0.0118	4.49	0.664	<0.01	0.00445	0.00148	<0.002	6.78	0.00112	6.17	<0.000005	5.06	0.327	127	0.00004	0.00011	<0.0005	0.00126	<0.0002	0.005	<0.0001	8.60	8.35	-0.25	-1.5%
3-Nov-09	20	500	410																									
10-Nov-09	21	500	415	0.0116	3.17	0.587	<0.01	0.00363	0.0013	0.004	5.64	0.00094	6.03	0.000009	3.26	0.254	97	0.00004	0.00016	<0.0005	0.00127	<0.0002	0.0196	<0.0001	8.03	6.49	-1.55	-10.7%
17-Nov-09	22	500	400																									
24-Nov-09	23	500	470	0.0111	2.75	0.671	<0.01	0.00272	0.00141	<0.002	5.54	0.00076	5.93	<0.000005	2.63	0.223	83	0.000039	0.00011	<0.0005	0.00143	<0.0002	0.0111	<0.0001	7.02	6.17	-0.84	-6.4%
1-Dec-09	24	500	445																									
8-Dec-09	25	500	480	0.01	2.57	0.694	<0.01	0.00237	0.00136	0.002	4.81	0.00158	5.16	<0.000005	2.16	0.217	83	0.000039	0.00018	<0.0005	0.00133	<0.0002	0.0083	<0.0001	7.02	6.22	-0.80	-6.0%
15-Dec-09	26	500	470																									
22-Dec-09	27	500	430	0.0101	2.66	0.879	0.02	0.00267	0.00161	<0.002	5.85	0.00082	4.76	0.000047	1.93	0.252	121	0.00005	0.00011	<0.0005	0.00121	<0.0002	0.005	<0.0001	8.38	7.84	-0.54	-3.4%
29-Dec-09	28	500	440																									
5-Jan-10	29	500	490	0.0098	1.95	0.932	<0.01	0.00247	0.00185	<0.002	5.28	0.00067	6.11	<0.000005	1.55	0.202	88	0.000046	0.00038	<0.0005	0.00131	<0.0002	0.0085	<0.0001	7.03673	6.35095	-0.6858	0.05123
12-Jan-10	30	500	425																									
19-Jan-10	31	500	435	0.0094	2.14	0.958	0.01	0.00284	0.00154	0.002	5.15	0.00097	4.89	<0.000005	1.35	0.253	125	0.000044	0.00031	<0.0005	0.000945	<0.0002	0.0077	<0.0001	9.90743	8.10107	-1.8064	0.10031
26-Jan-10	32	500	430																									
2-Feb-10	33	500	480	0.0098	1.73	1.11	<0.01	0.00238	0.00176	<0.002	4.94	0.00119	5.07	<0.000005	1.25	0.199	96	0.000053	0.0002	<0.0005	0.0011	<0.0002	0.0097	<0.0001	6.9485	6.9598	0.0113	0.00081
9-Feb-10	34	500	445																									
16-Feb-10	35	500	445	0.0101	2.16	1.45	<0.01	0.00215	0.00179	0.003	5.75	0.00102	5.11	<0.000005	1.24	0.283	160	0.00005	0.0001	<0.0005	0.000884	<0.0002	0.0058	<0.0001	11.3218	10.2091	-1.1127	0.05168
23-Feb-10	36	500	435																									
2-Mar-10	37	500	435	0.0092	1.99	1.47	<0.01	0.00233	0.00191	0.003	5.93	0.00155	5.9	<0.000005	1.1	0.279	191	0.000045	0.00008	<0.0005	0.000804	<0.0002	0.0048	<0.0001	10.9228	11.5908	0.668	0.02967
9-Mar-10	38	500	375																									
16-Mar-10	39	500	515	0.0089	1.52	1.36	<0.01	0.00259	0.00181	0.003	5.54	0.00077	5.22	0.000021	1.01	0.233	146	0.000048	0.00007	<0.0005	0.000761	<0.0002	0.0047	<0.0001	9.32667	9.49234	0.1657	0.0088
23-Mar-10	40	500	475																									
30-Mar-10	41	500	450	0.0084	1.35	0.735	<0.01	0.00245	0.002	<0.002	3.33	0.00148	4.04	<0.000005	0.99	0.268	133	0.000056	0.00012	<0.0005	0.000612	<0.0002	0.0088	<0.0001	9.40227	8.47285	-0.9294	0.05199
6-Apr-10	42	500	460																									
13-Apr-10	43	500	460	0.009	1.6	1.94	<0.01	0.00279	0.00249	<0.002	5.37	0.00094	4.33	<0.000005	0.88	0.249	183	0.000051	0.00013	<0.0005	0.000692	<0.0002	0.0062	<0.0001	13.1059	11.3352	-1.7707	0.07245
20-Apr-10	44	500	450																									
27-Apr-10	45	500	455	0.0058	1.58	1.9	<0.01	0.00277	0.00206	<0.002	4.99	0.00091	3.86	0.00001	0.75	0.238	195	0.000041	0.00008	<0.0005	0.000391	<0.0002	0.0068	<0.0001	13.6631	11.7174	-1.9457	0.07666
4-May-10	46	500	445																									
11-May-10	47	500	455	0.0088	1.71	2.27	<0.01	0.0026	0.00224	<0.002	5.52	0.00089	5.75	<0.000005	0.85	0.248	248	0.000054	0.00007	<0.0005	0.00043	<0.0002	0.0085	<0.0001	14.7138	13.8917	-0.8221	0.02874
18-May-10	48	500	435																									
25-May-10	49	500	440																									

TABLE 3.1-2: LEACHATE CHEMISTRY RESULTS FOR 2005 DRILL CORE COMPOSITE TAILINGS

Date	Cycle No.	Volume mL Input	Volume mL Output	pH	ORP	Conductivity ųmhos/cm	Acidity (pH 4.5)	Acidity (pH 8.3)	Alkalinity	Sulphate	Hardness CaCO3	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg
					mV		mgCaCO3/L	mgCaCO3/L	mgCaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L
30-Jun-09	1	750	235	8.81	295	740	#N/A	#N/A	248.0	32	27	0.28	0.0034	0.0347	0.0181	<0.0001	0.00005	<0.5	0.00085	7.6	<0.001	0.00055	0.0114	0.566	0.00077	<0.005	1.94	0.0154	<0.5
7-Jul-09	2	500	460	9.02	292	967																							
14-Jul-09	3	500	455	8.87	267	912	#N/A	#N/A	316.8	66	5.3	0.083	0.0201	0.195	0.0007	<0.0002	0.0002	<1	<0.0001	2.1	<0.002	0.0002	0.016	0.099	0.0008	<0.01	<0.2	0.006	<0.2
21-Jul-09	4	500	435	8.56	287	845																							
28-Jul-09	5	500	475	8.32	316	770	#N/A	#N/A	199.4	179	14.8	0.064	0.0182	0.13	0.0014	<0.00005	0.00028	<0.3	0.00008	5.33	<0.0005	0.00012	0.008	0.063	0.00071	0.009	0.37	0.0137	0.07
4-Aug-09	6	500	425	8.11	338	754																							
11-Aug-09	7	500	460	8.09	312	719	#N/A	4.0	102.9	274	98.8	0.026	0.0104	0.0898	0.0049	<0.00005	<0.00003	<0.3	0.00004	35.6	<0.0005	0.00021	0.0031	0.008	0.00029	0.018	2.39	0.0771	<0.05
18-Aug-09	8	500	460	7.93	296	625																							
25-Aug-09	9	500	425	8.08	336	606	#N/A	3.4	74.9	210	204	0.0231	0.00919	0.0406	0.00674	<0.00001	0.00002	<0.05	0.000142	74.7	<0.0001	0.000458	0.00467	0.004	0.000113	0.0225	4.17	0.169	<0.01
1-Sep-09	10	500	490	7.98	274	578																							
8-Sep-09	11	500	495	7.84	334	557	#N/A	6.9	87.7	213	237	0.0212	0.00723	0.0248	0.00775	0.00001	0.000022	<0.05	0.000166	87.9	0.0011	0.000944	0.0039	0.004	0.000031	0.0203	4.29	0.308	0.01
15-Sep-09	12	500	510	7.98	300	607																							
22-Sep-09	13	500	435	7.93	345	887	#N/A	5.5	74.0	420	479	0.0211	0.00515	0.0162	0.015	0.00001	0.000022	<0.05	0.000233	181	<0.0001	0.00177	0.00366	0.004	0.000028	0.0256	6.72	0.608	<0.01
29-Sep-09	14	500	400	7.77	347	770																							
6-Oct-09	15	500	440	7.85	318	759	#N/A	5.6	66.8	429	393	0.0266	0.0043	0.0104	0.0121	<0.00001	0.000027	<0.05	0.000168	150	<0.0001	0.00123	0.00296	0.019	0.000051	0.0221	4.59	0.441	<0.01
13-Oct-09	16	500	425	7.84	320	826																							
20-Oct-09	17	500	445	7.8	319	623	#N/A	3.6	55.8	301	319	0.0342	0.00355	0.00749	0.00972	<0.00001	0.000022	<0.05	0.000238	123	<0.0001	0.00105	0.0034	0.003	0.000148	0.0168	3.16	0.385	<0.01
27-Oct-09	18	500	440	7.83	312	732																							
3-Nov-09	19	500	385	7.85	325	645	#N/A	3.6	55.8	334	328	0.04	0.00295	0.00569	0.00933	0.00001	0.000025	<0.05	0.00016	127	<0.0001	0.00135	0.00283	0.004	0.000027	0.0151	2.85	0.454	<0.01
10-Nov-09	20	500	505	7.63	315	631																							
17-Nov-09	21	500	465	7.9	323	590	#N/A	6.2	59.7	285	309	0.0476	0.00239	0.0042	0.00937	<0.00001	0.000024	<0.05	0.000156	120	<0.0001	0.00125	0.00241	0.001	0.00001	0.0133	2.19	0.418	<0.01
24-Nov-09	22	500	460	7.9	354	652																							
1-Dec-09	23	500	450	7.93	342	678	#N/A	3.0	63.5	322	348	0.042	0.00242	0.004	0.0107	0.00002	0.000026	<0.05	0.000196	136	<0.0001	0.00152	0.00351	0.006	0.000162	0.0149	2.29	0.493	<0.01
8-Dec-09	24	500	440	7.77	331	607																							
15-Dec-09	25	500	435	7.71	336	601	#N/A	3.7	50.6	298	309	0.0407	0.00181	0.0032	0.00886	<0.00001	0.000029	<0.05	0.000141	121	<0.0001	0.00133	0.0164	0.007	0.000341	0.011	1.67	0.434	<0.01
22-Dec-09	26	500	445	7.87	312	601																							
29-Dec-09	27	500	445	7.89	362	624	#N/A	3.0	58.4	267	312	0.0464	0.00167	0.00292	0.00963	0.00001	0.000025	<0.05	0.000142	122	0.0002	0.00137	0.00923	0.012	0.000054	0.0108	1.66	0.441	0.01
5-Jan-10	28	500	490	7.86	328	614																							
12-Jan-10	29	500	440	7.82	314	632	#N/A	6.7	59.6	307	325	0.055	0.00241	0.00275	0.00971	0.00001	0.000023	<0.05	0.000316	127	0.0001	0.00148	0.00745	0.006	0.000434	0.0106	1.68	0.482	<0.01
19-Jan-10	30	500	405	7.81	318	670																							
26-Jan-10	31	500	395	7.76	333	614	#N/A	3.8	53.9	354	351	0.0367	0.00131	0.00236	0.0102	<0.00001	0.000025	<0.05	0.000131	138	<0.0001	0.00141	0.036	0.009	0.000823	0.0092	1.47	0.466	<0.01
2-Feb-10	32	500	445	7.70	334	508																							
9-Feb-10	33	500	440	7.76	294	630	#N/A	3.8	56.0	286	355	0.0429	0.00138	0.00233	0.0106	0.00001	0.000015	<0.05	0.000156	140	<0.0001	0.0014	0.00286	0.005	0.000033	0.0097	1.46	0.468	<0.01
16-Feb-10	34	500	440	7.68	244	534																							
23-Feb-10	35	500	430	7.84	312	504	#N/A	3.4	53.7	266	313	0.0411	0.0012	0.002	0.0132	<0.00001	0.00002	<0.05	0.000126	124	<0.0001	0.00126	0.00208	0.004	0.000021	0.0084	1.09	0.422	<0.01
2-Mar-10	36	500	410	7.77	297	628																							
9-Mar-10	37	500	385	7.75	341	635	#N/A	3.5	51.8	317	355	0.0362	0.00113	0.00248	0.00957	0.00001	0.00002	<0.05	0.000141	140	0.0004	0.00139	0.00251	0.012	0.00006	0.0085	1.2	0.466	0.01
16-Mar-10	38	500	510	7.70	312	489																							
23-Mar-10	39	500	465	7.79	303	630	#N/A	4.6	70.0	351	361	0.0373	0.00102	0.00135	0.011	<0.00001	0.000022	<0.05	0.00019	143	<0.0001	0.00198	0.00262	0.002	0.000022	0.0086	1.21	0.63	<0.01
30-Mar-10	40	500	450	7.74	322	973																							
6-Apr-10	41	500	455	7.71	324	977	#N/A	5.3	61.6	484	569	0.028	0.0009	0.0019	0.0124	<0.00005	<0.00003	<0.3	0.00047	225	<0.0005	0.00213	0.0047	0.033	0.00008	0.009	1.65	1.92	<0.05
13-Apr-10	42	500	460	7.66	291	713																							
20-Apr-10	43	500	440	7.84	297	810	#N/A	4.5	62.5	391	441	0.0414	0.00091	0.00181	0.0153	0.00002	0.000022	<0.05	0.000257	174	<0.0001	0.00245	0.00252	0.006	0.000027	0.0085	1.26	0.736	<0.01
27-Apr-10	44	500	450	7.75	291	693																							
4-May-10	45	500	455	7.73	322	1024	#N/A	5.3	62.5	579	586	0.0253	0.00085	0.00098	0.0134	0.00002	0.000021	<0.05	0.00042	232	<0.0001	0.00237	0.00589	0.008	0.000195	0.0087	1.47	1.88	<0.01
11-May-10	46	500	445	7.72	300	721																							
18-May-10	47	500	445	7.74	301	743	#N/A	5.2	59.8	335	424	0.04	0.00079	0.0018	0.0143	0.00001	0.000011	<0.05	0.000236	168	<0.0001	0.00204	0.00268	0.002	0.000011	0.0076	1.13	0.608	<0.01
25-May-10	48	500	415	7.65	343	765																							

TABLE 3.1-2 (cont'd): LEACHATE CHEMISTRY RESULTS FOR 2005 DRILL CORE COMPOSITE TAILINGS

Date	Cycle No.	Volume mL Input	Volume mL Output	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn	Zr	Major Anions	Major Cations	Diff	Diff
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				(%)
30-Jun-09	1	750	235	0.0215	0.0049	0.067	0.85	0.0025	6.5	0.00009	85.6	0.0529	49	0.00013	0.0004	0.008	0.00438	0.006	0.064	<0.001	5.63	4.28	-1.34	-13.6%
7-Jul-09	2	500	460																					
14-Jul-09	3	500	455	0.017	0.0036	0.085	2.7	0.0089	11.2	<0.0001	206	0.016	157	0.00006	0.0002	<0.01	0.00875	0.008	0.006	<0.002	7.71	9.13	1.42	8.4%
21-Jul-09	4	500	435																					
28-Jul-09	5	500	475	0.0066	0.0015	0.014	3.62	0.0063	8.93	0.00004	150	0.036	111	0.00014	0.00026	<0.003	0.00353	0.003	0.0119	<0.0005	7.72	6.91	-0.81	-5.5%
4-Aug-09	6	500	425																					
11-Aug-09	7	500	460	0.0044	0.0018	<0.01	6.29	0.002	8.03	<0.00003	111	0.154	90	0.00006	0.00009	<0.003	0.00135	<0.001	0.0029	<0.0005	7.77	6.96	-0.81	-5.5%
18-Aug-09	8	500	460																					
25-Aug-09	9	500	425	0.00435	0.00121	0.002	6.89	0.00126	6.92	<0.000005	49.8	0.251	90	0.000067	0.00023	<0.0005	0.0011	0.0002	0.0081	<0.0001	5.87	6.41	0.54	4.4%
1-Sep-09	10	500	490																					
8-Sep-09	11	500	495	0.00391	0.00194	0.005	5.76	0.00059	7.15	0.000066	19.9	0.268	70	0.000059	0.00017	<0.0005	0.00127	<0.0002	0.0084	<0.0001	6.19	5.75	-0.44	-3.7%
15-Sep-09	12	500	510																					
22-Sep-09	13	500	435	0.00399	0.00262	0.003	6.82	0.00073	6.78	<0.000005	12	0.481	157	0.000072	0.00012	<0.0005	0.00116	<0.0002	0.0082	<0.0001	10.23	10.28	0.05	0.3%
29-Sep-09	14	500	400																					
6-Oct-09	15	500	440	0.00477	0.00186	0.003	6.18	0.0007	6.18	<0.000005	6.83	0.375	122	0.000062	0.00009	<0.0005	0.000986	<0.0002	0.0059	<0.0001	10.27	8.32	-1.95	-10.5%
13-Oct-09	16	500	425																					
20-Oct-09	17	500	445	0.00475	0.00142	0.003	4.72	0.00062	4.67	<0.000005	4.08	0.294	101	0.000197	0.00007	<0.0005	0.000759	<0.0002	0.0275	<0.0001	7.39	6.70	-0.69	-4.9%
27-Oct-09	18	500	440																					
3-Nov-09	19	500	385	0.00473	0.0015	<0.002	4.29	0.00055	4	<0.000005	3.1	0.281	95	0.000046	0.00013	<0.0005	0.000781	<0.0002	0.0062	<0.0001	8.07	6.82	-1.26	-8.5%
10-Nov-09	20	500	505																					
17-Nov-09	21	500	465	0.00385	0.0014	<0.002	4.17	0.00048	4.03	<0.000005	2.32	0.263	91	0.000047	0.00007	<0.0005	0.000809	<0.0002	0.0071	<0.0001	7.13	6.38	-0.76	-5.6%
24-Nov-09	22	500	460																					
1-Dec-09	23	500	450	0.0038	0.0015	<0.002	4.5	0.00054	4.68	<0.000005	2.21	0.277	107	0.000055	0.0001	<0.0005	0.000749	<0.0002	0.0085	<0.0001	7.98	7.19	-0.79	-5.2%
8-Dec-09	24	500	440																					
15-Dec-09	25	500	435	0.00299	0.00139	0.002	3.7	0.00058	3.59	<0.000005	1.54	0.229	94	0.000042	0.00021	<0.0005	0.000675	<0.0002	0.0057	<0.0001	7.22	6.34	-0.88	-6.5%
22-Dec-09	26	500	445																					
29-Dec-09	27	500	445	0.00292	0.00146	<0.002	3.69	0.00048	4	<0.000005	1.5	0.236	92	0.000043	0.00011	<0.0005	0.000674	<0.0002	0.0063	<0.0001	6.7313	6.38	-0.35	2.6%
5-Jan-10	28	500	490																					
12-Jan-10	29	500	440	0.00293	0.00159	0.003	3.72	0.00053	4.46	<0.000005	1.48	0.226	99	0.000048	0.00016	<0.0005	0.000644	<0.0002	0.0075	<0.0001	7.5868	6.64	-0.95	6.7%
19-Jan-10	30	500	405																					
26-Jan-10	31	500	395	0.00258	0.00163	<0.002	3.46	0.00059	4.22	0.000009	1.21	0.235	109	0.000038	0.0003	<0.0005	0.000498	<0.0002	0.025	<0.0001	8.4526	7.14831	-1.3043	0.0836
2-Feb-10	32	500	445																					
9-Feb-10	33	500	440	0.00281	0.00145	<0.002	3.65	0.00057	4.41	<0.000005	1.16	0.229	110	0.00004	0.00016	<0.0005	0.000604	<0.0002	0.0051	<0.0001	7.0791	7.24998	0.1708	0.01192
16-Feb-10	34	500	440																					
23-Feb-10	35	500	430	0.00252	0.00105	<0.002	3.12	0.0006	3.84	<0.000005	0.86	0.217	97	0.000039	0.00009	<0.0005	0.000468	<0.0002	0.0043	<0.0001	6.6151	6.39452	-0.2205	0.01695
2-Mar-10	36	500	410																					
9-Mar-10	37	500	385	0.00326	0.00134	0.005	3.42	0.00084	3.88	<0.000005	0.96	0.219	107	0.000043	0.00045	<0.0005	0.000576	<0.0002	0.0055	<0.0001	7.64	7.214	-0.426	0.02868
16-Mar-10	38	500	510																					
23-Mar-10	39	500	465	0.00267	0.00139	<0.002	3.49	0.00053	3.99	<0.000005	0.96	0.23	107	0.000046	0.00006	<0.0005	0.000666	<0.0002	0.0069	<0.0001	8.7119	7.36631	-1.3456	0.08369
30-Mar-10	40	500	450																					
6-Apr-10	41	500	455	0.0025	0.0023	<0.01	5.14	0.0012	3.57	0.00006	0.79	0.25	179	0.00003	0.00011	0.004	0.00047	<0.001	0.0118	<0.0005	11.316	11.5292	0.2134	0.00934
13-Apr-10	42	500	460																					
20-Apr-10	43	500	440	0.0028	0.00183	0.003	3.68	0.00155	4	<0.000005	0.92	0.27	138	0.000072	0.00012	<0.0005	0.000472	<0.0002	0.0082	<0.0001	9.3948	8.92046	-0.4744	0.0259
27-Apr-10	44	500	450																					
4-May-10	45	500	455	0.0026	0.00203	<0.002	4.92	0.00094	4	<0.000005	0.76	0.234	192	0.000052	0.00007	<0.0005	0.000385	<0.0002	0.0092	<0.0001	13.313	11.8567	-1.4558	0.05784
11-May-10	46	500	445																					
18-May-10	47	500	445	0.00274	0.00166	<0.002	3.32	0.0005	5.42	<0.000005	0.8	0.238	138	0.000047	0.00008	<0.0005	0.000334	<0.0002	0.0066	<0.0001	8.1752	8.59593	0.4208	0.02509
25-May-10	48	500	415																					

The sulphate concentrations of effluents from the 2008 tailings fluctuated between 180 and 440 mg/L for the first 33 weeks of testing. Sulphate concentrations in this cell have increased since week 33 and are showing an increasing trend up to a maximum of 649 mg/L (Figure 3.1-2). Leachate from the 2005 tailings cell (Figure 3.1-2) increased in sulphate concentration from an initial value of 32 mg/L to a maximum concentration of 429 mg/L during week 15 and also shows fluctuations in a similar range as that of the 2008 tailings. The 2005 tailings cell also shows a trend in recent weeks towards higher sulphate concentrations. The available data suggest that there is an upward trend to these fluctuations in leachate sulphate concentrations similar to that of the Cantung humidity cell. An upward trend in sulphate would be indicative of increased release of sulphate because of increased sulphide oxidation.

The alkalinity of the 2008 tailings humidity cell leachates (Figure 3.1-3) spiked at 316.8 mg/L during the first couple of leach cycles before showing a decreasing trend to a minimum of 55 mg/L during week 19. Since week 19, the alkalinity has shown fluctuations between a range of 55 mg/L to 85 mg/L with a minimum concentration of 36.8 mg/L reported for week 41. The 2005 tailings humidity cell results (Figure 3.1-3) show a similar spike in alkalinity during the initial weeks of testing before decreasing to a minimum of 50.6 mg/L during week 25. The most recent results showed the alkalinity to be fluctuating between 50 and 63 mg/L. It is expected that the alkalinity of Mactung humidity cells will continue to fluctuate with an upwards trend over time in response to the neutralization of acidic weathering products produced during sulphide oxidation.

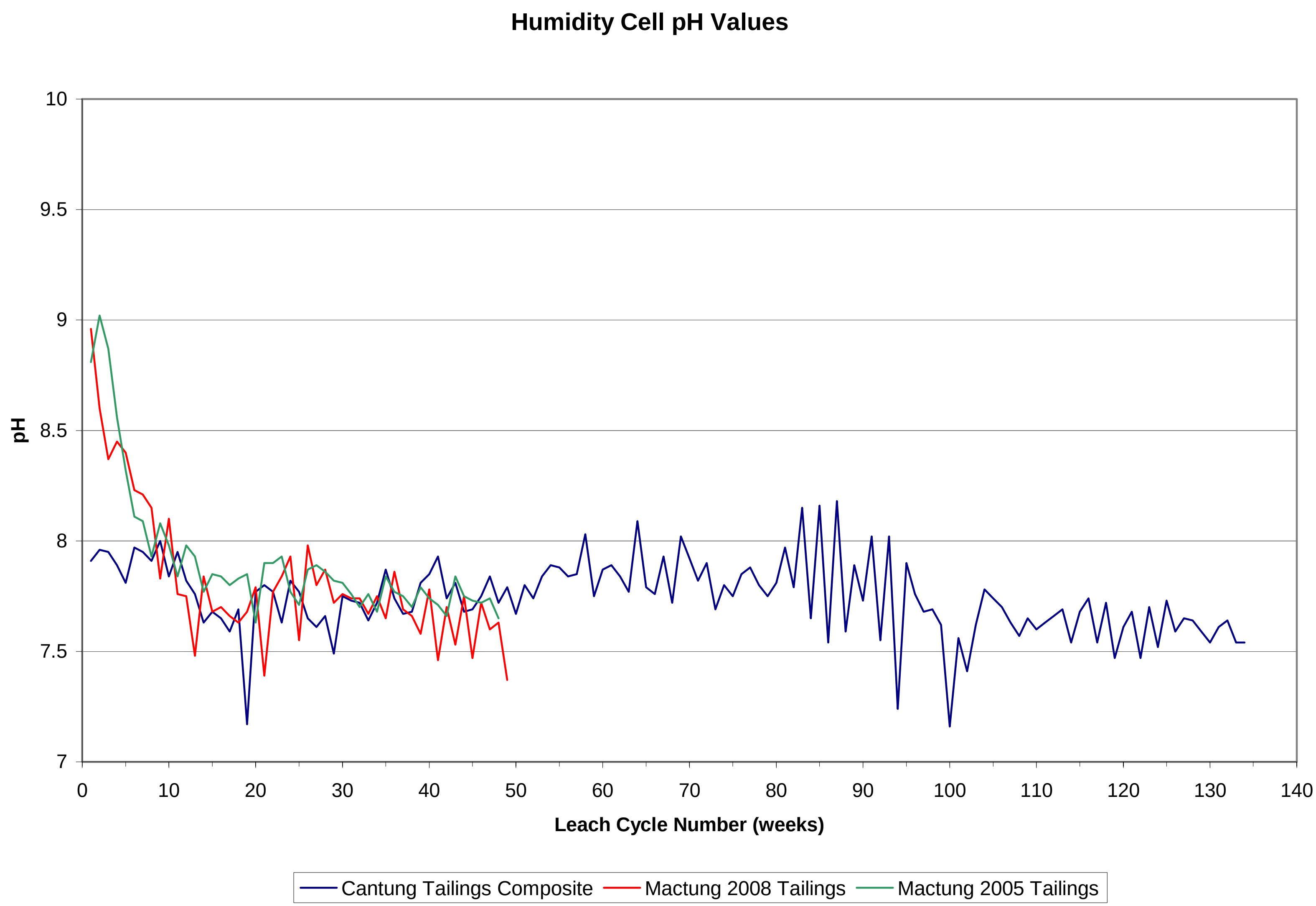
The acidity of the leachate from the 2008 tailings humidity cell (Figure 3.1-4) has fluctuated between approximately 3.3 and 7.5 mg/L with the exception of the most recent results from week 49 which were the highest recorded concentrations at 9.1 mg/L. The acidity from the 2005 tailings humidity cell (Figure 3.1-4) fluctuated between approximately 3.0 and 6.9 mg/L since the start of the testing program. The acidity for this cell has remained near to 5 mg/L since week 39. The reported acidity is a measure of the buffering requirements to raise the pH of the solution, through titration, to its indicated end-point. The pH endpoint is currently at 8.3 for the Mactung humidity cells, which is representative of buffering by carbonate mineralization.

The Environment Canada Metal Mining Effluent Regulations (MMER) were considered as the standard for comparison of leachate chemistry as the Dry-Stacked Tailings Facility (DSTF) will be entirely located upstream of the final discharge point for the site. During operation of the mine, the application of site specific water quality objectives based on the monitoring data, or the Canadian Council of Ministers of the Environment (CCME) guidelines for the protection of aquatic life will be applied somewhere downstream of the Mactung Mine. The point at which CCME is applied will be established during permitting of the project and is not relevant to this program.

The measured concentration of metals in the leachates from the Mactung humidity cells was below the MMER Schedule 5 instantaneous grab sample limits for all elements as shown on Figure 3.1-5 through Figure 3.1-9.

In order to understand the chemistry of water leaching from the DSTF prior to leaving the site it is important to understand the on-site dilution that will occur. The DSTF is planned to have a surface area of approximately 25 ha within the reservoir catchment area of 251 ha resulting in a ten times dilution factor for run-off from this facility. The dilution factor for run-off from this facility will increase to a factor of 20 for the same catchment area following closure of the mine when the diversion channels, ravine dam and reservoir are decommissioned. Installation of the low permeability cover system over the surface of the DSTF at closure will further reduce any loadings of metals from the DSTF by limiting infiltration into the tailings reducing tailings leachate to less than 1% of the overall run-off from the post-closure DSTF. This would be equivalent to a post closure dilution factor of greater than three orders of magnitude.

The concentrations of undiluted leachate from the humidity cells are currently within one order of magnitude for all MMER elements and for other CCME parameters. Selenium concentrations (Figures 3.1-10) were initially elevated above CCME but have repeatedly been below CCME for much of the testing program. Iron concentrations (Figure 3.1-11) were initially above the CCME guideline but steadily decreased and are now more than two orders of magnitude below these guidelines. This suggests that any run-off from the DSTF will be compliant with all applicable regulations and regulatory guidance criteria prior to passing the ravine dam.



Cantung humidity cell data provided by phase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

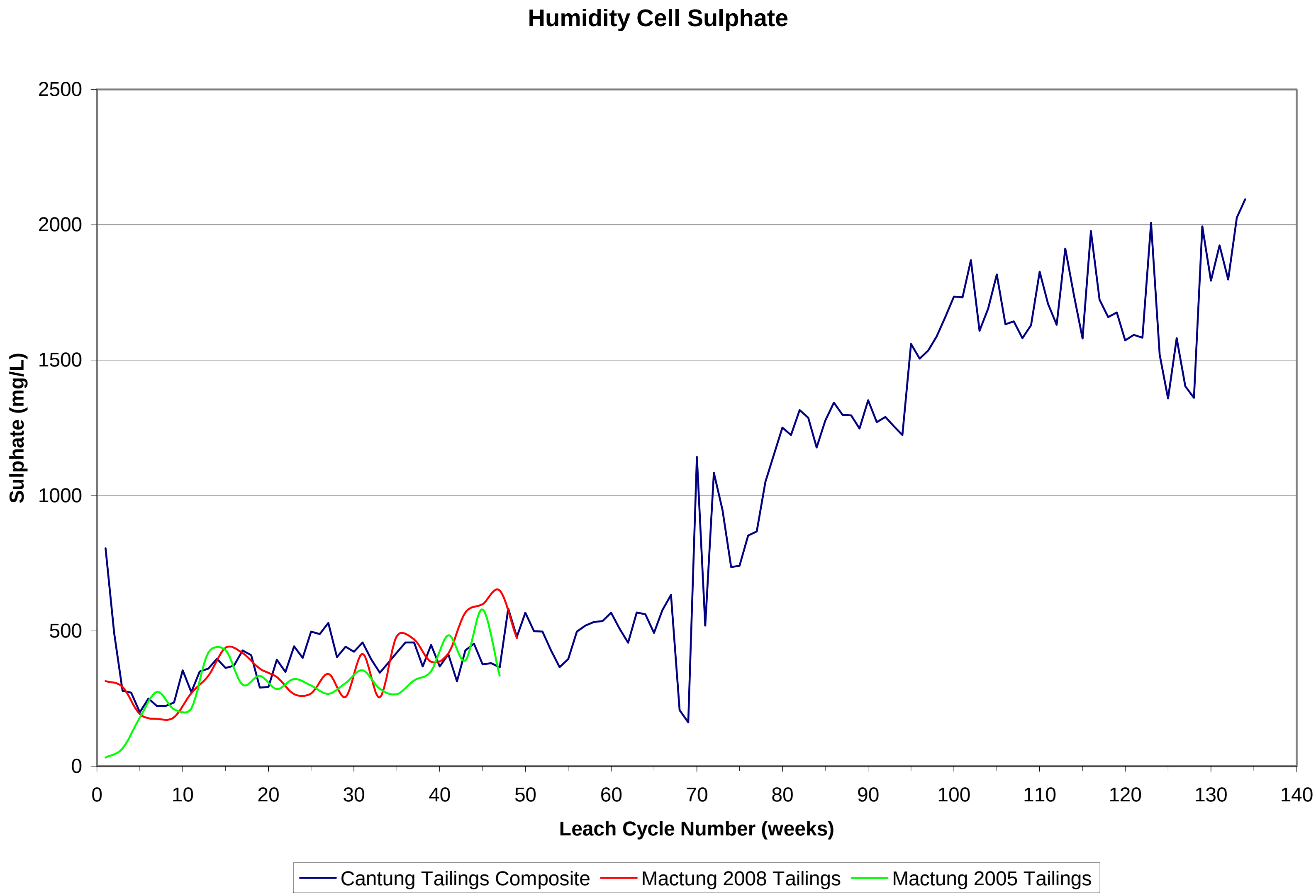
Mactung

Humidity Cell pH Values

PROJECT NO.	DWN	CKD	REV
W23101221.003	SJT	SCD	2
OFFICE	DATE		
EBA-WHSE	June 22, 2010		

Figure 3.1-1

Humidity Cell Sulphate



Cantung humidity cell data provided by pHase Geochemistry Inc.

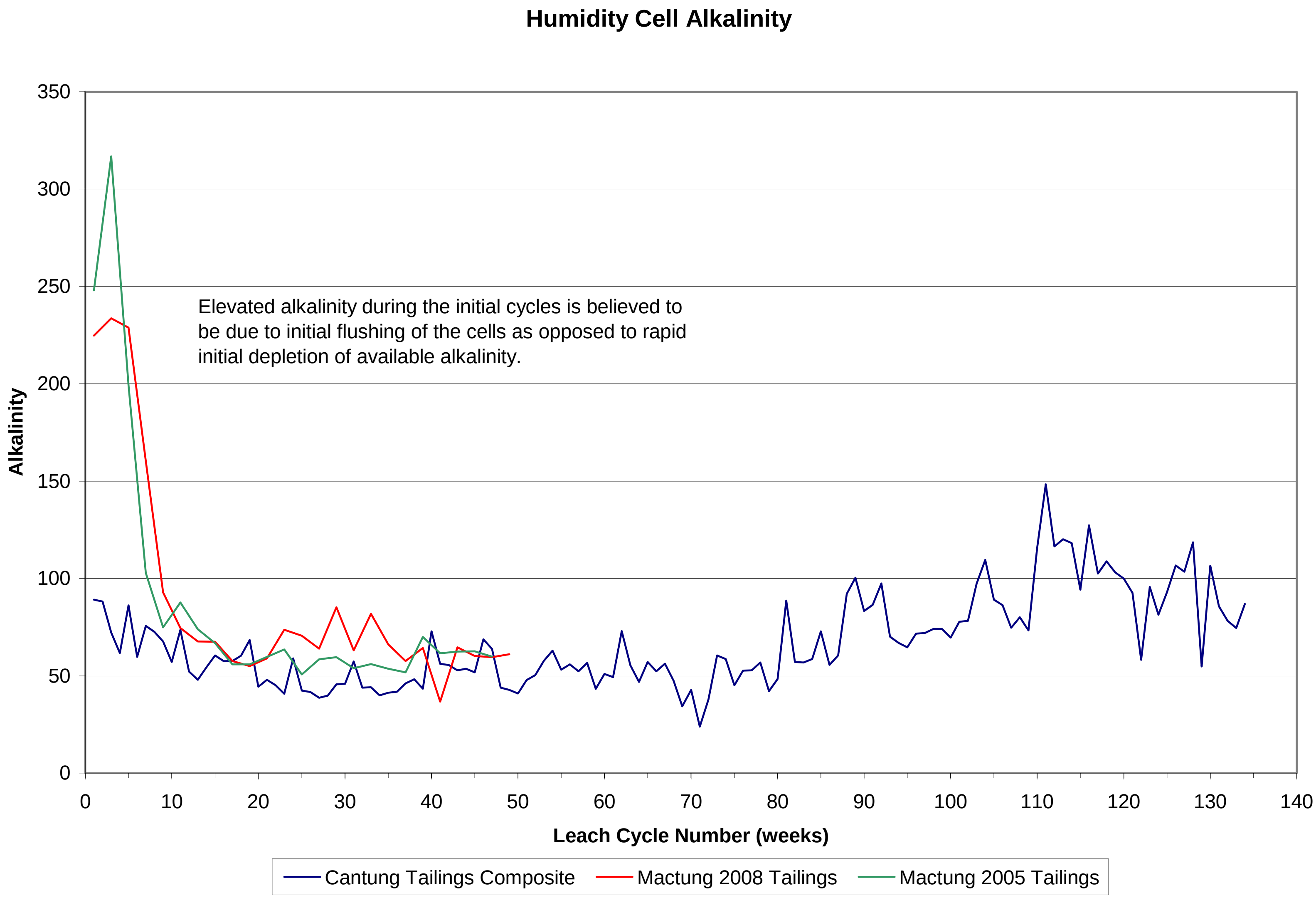
NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

Mactung				
Humidity Cell Sulphate				
PROJECT NO. W23101211.003	DWN SJT	CKD SCD	REV 2	Figure 3.1-2
OFFICE EBA-WHSE	DATE June 22, 2010			



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

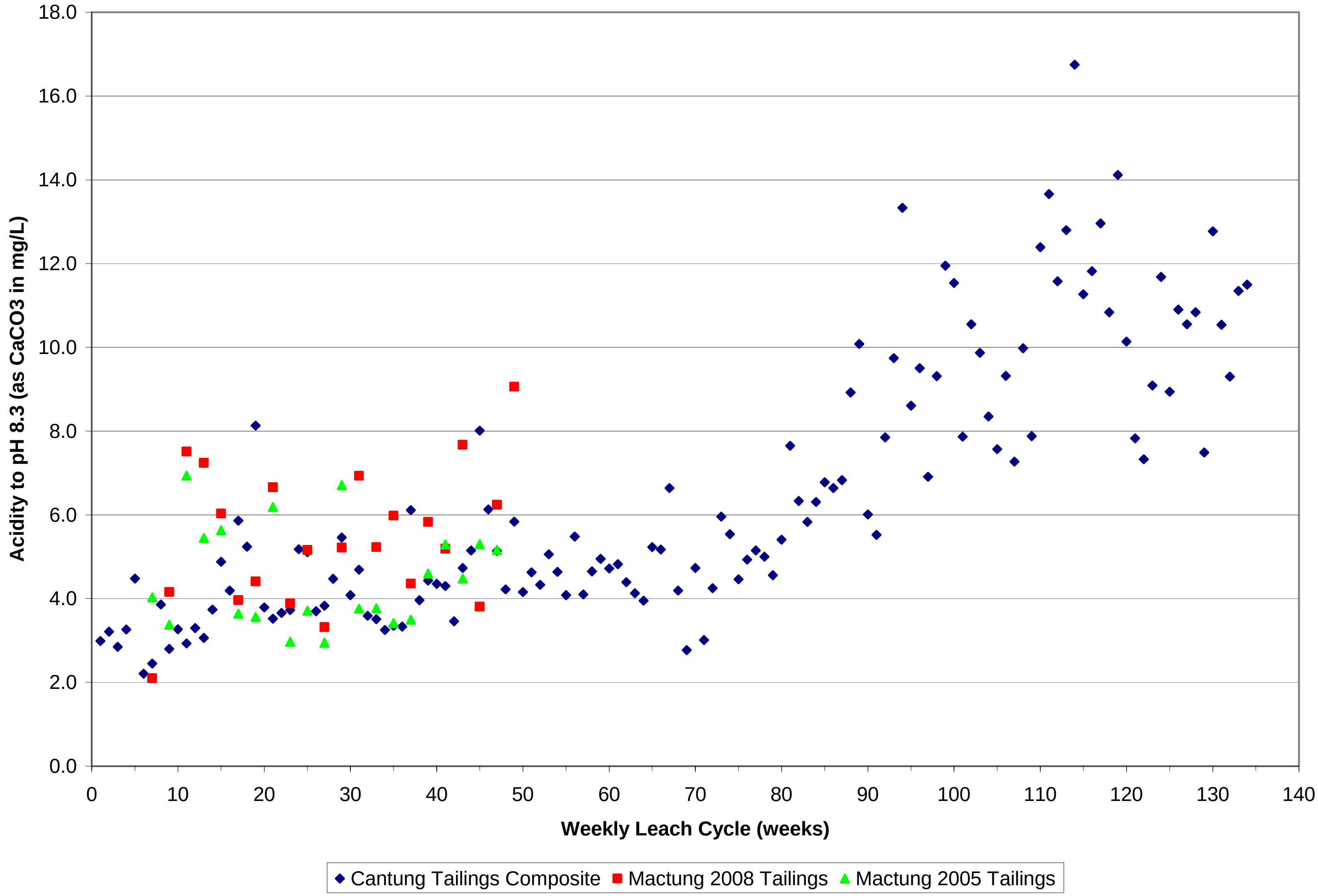
EBA Engineering Consultants Ltd.

Mactung

Humidity Cell Alkalinity

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2
OFFICE	DATE		
EBA-WHSE	June 22, 2010		

Figure 3.1-3



Cantung humidity cell data provided by pHase Geochemistry Inc.

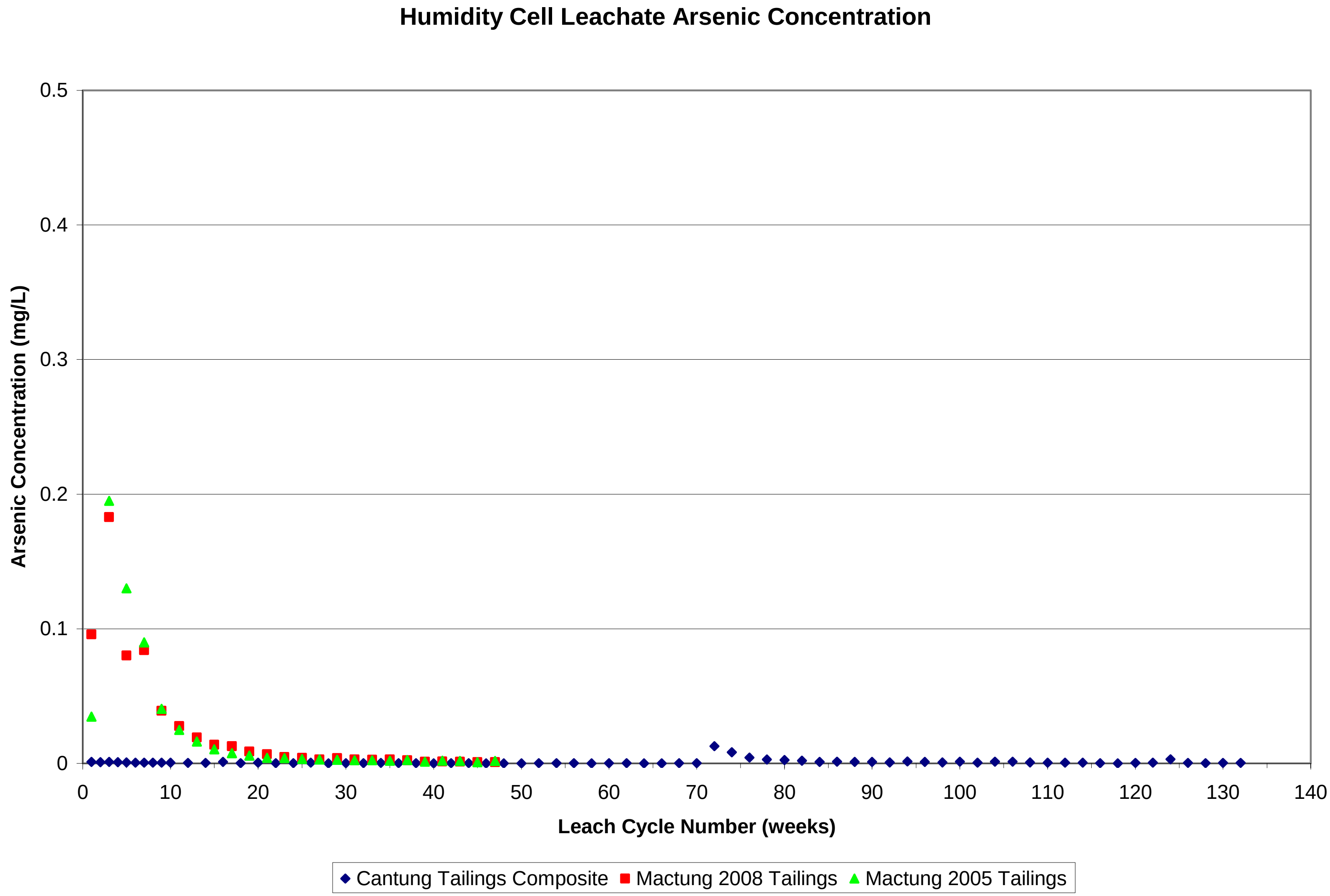
NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

Mactung					
Humidity Cell Acidity (to pH 8.3)					
PROJECT NO. W23101211.003	DWN SJT	CKD SCD	REV 2	Figure 3.1-4	
OFFICE EBA-WHSE	DATE June 22, 2010				



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

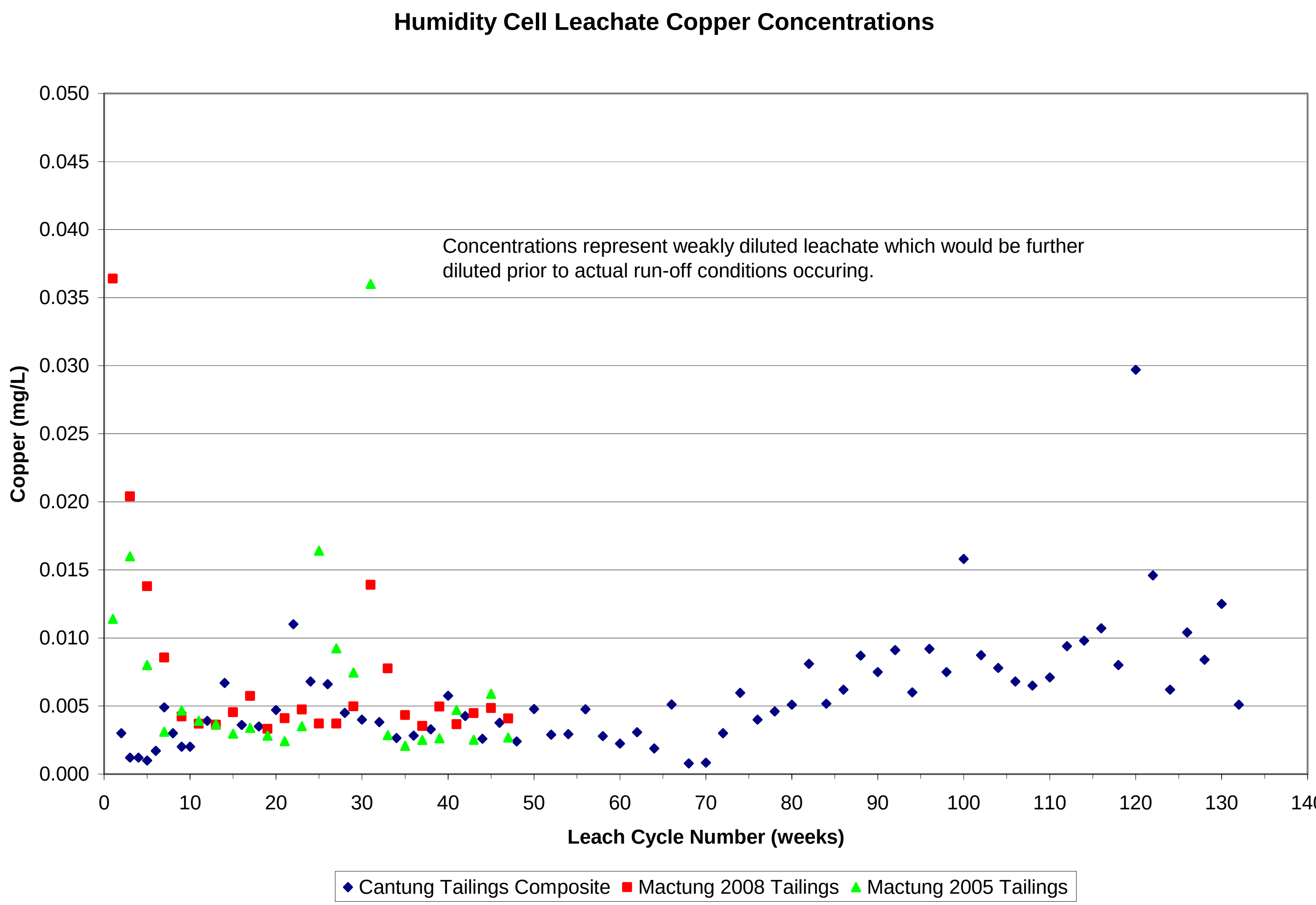
EBA Engineering Consultants Ltd.

Mactung

Humidity Cell Arsenic

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2
OFFICE	DATE		
EBA-WHSE	June 22, 2010		

Figure 3.1-5



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

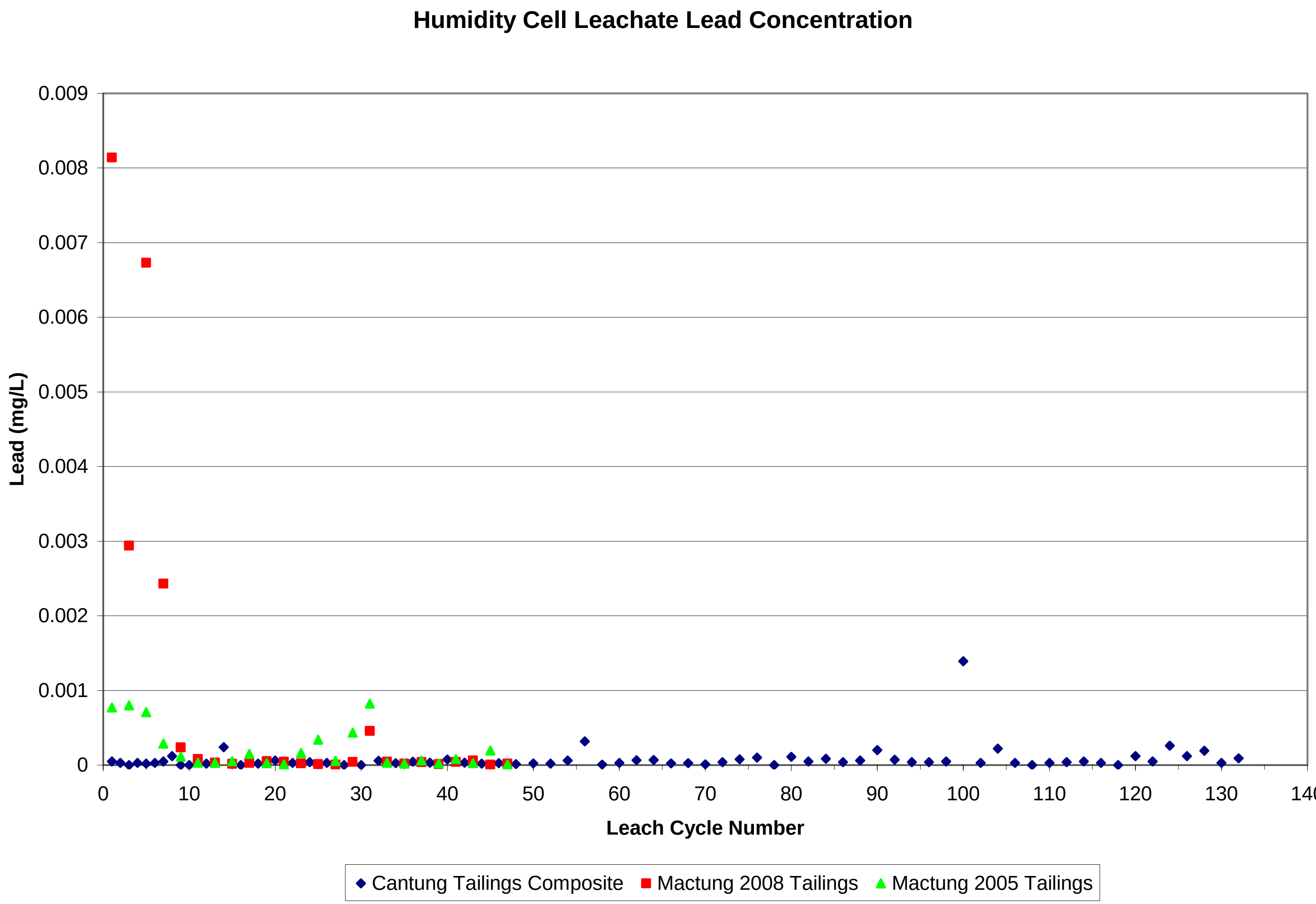
EBA Engineering Consultants Ltd.

Mactung

Humidity Cell Copper

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2
OFFICE EBA-WHSE	DATE June 22, 2010		

Figure 3.1-6



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

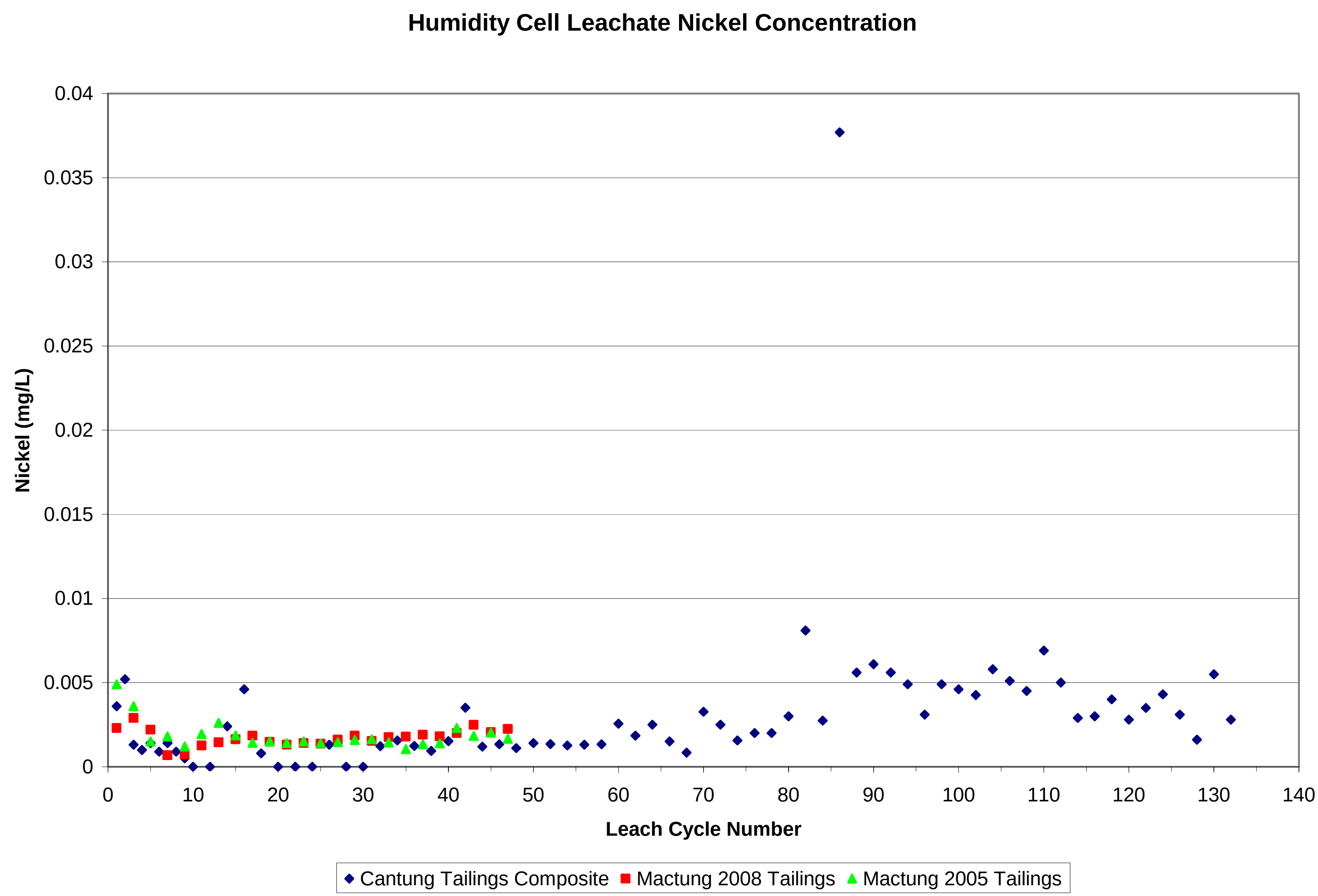
EBA Engineering Consultants Ltd.

Mactung

Humidity Cell Lead

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2
OFFICE	DATE		
EBA-WHSE	June 22, 2010		

Figure 3.1-7



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

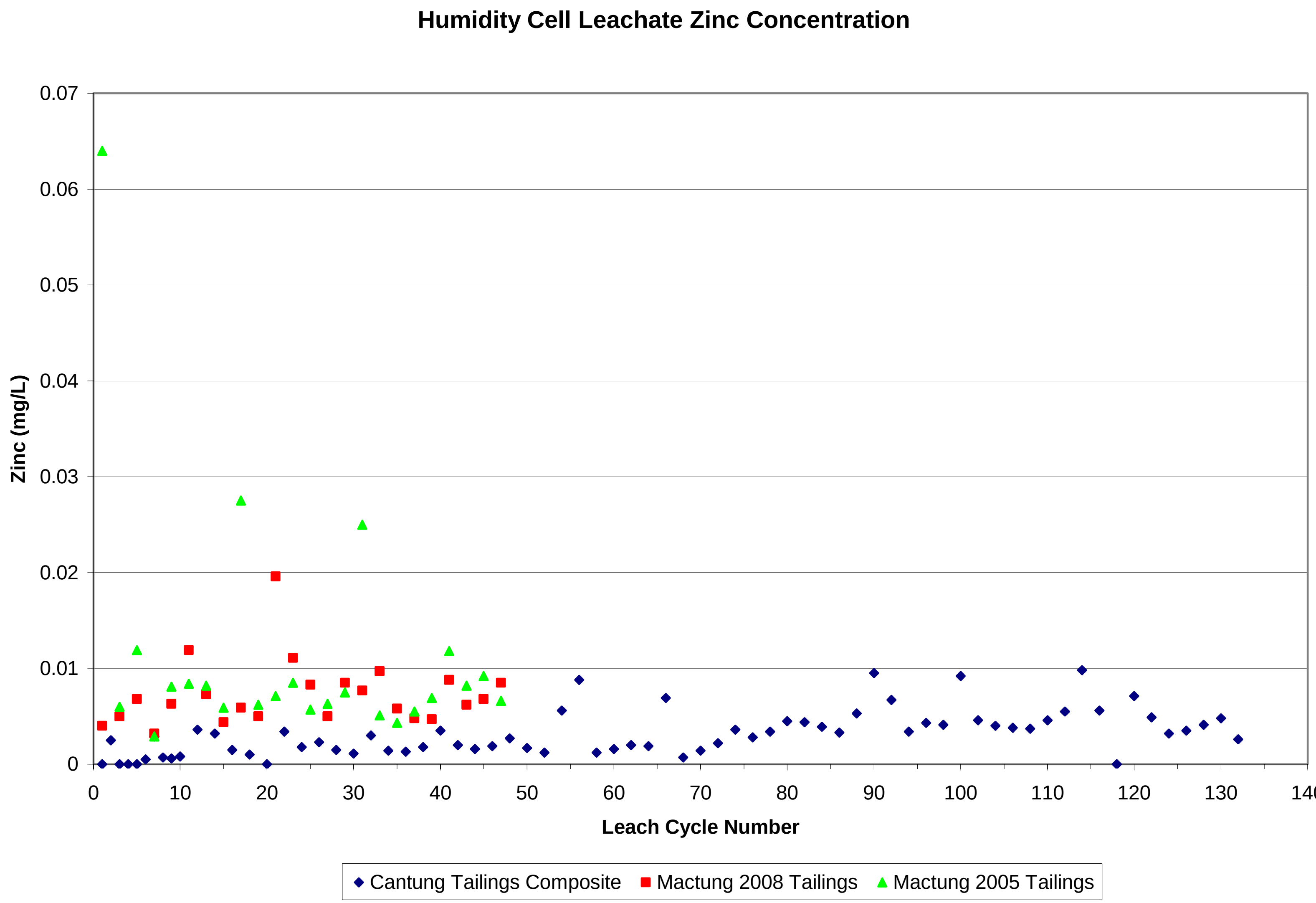
EBA Engineering Consultants Ltd.

Mactung

Humidity Cell Nickel

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2
OFFICE	DATE		
EBA-WHSE	June 22, 2010		

Figure 3.1-8



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

eba

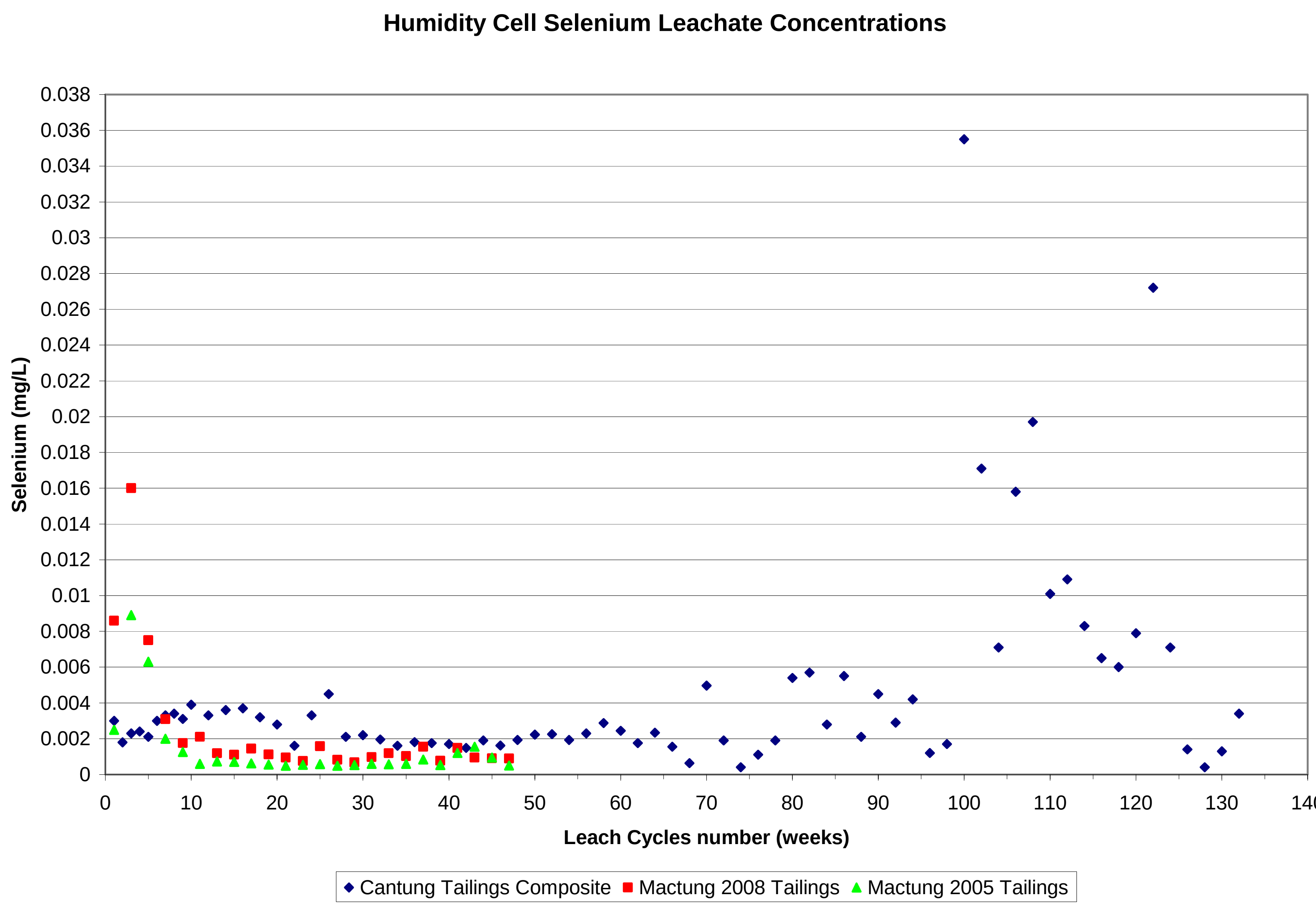
Mactung

Humidity Cell Zinc

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2

OFFICE	DATE
EBA-WHSE	June 22, 2010

Figure 3.1-9



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

Mactung

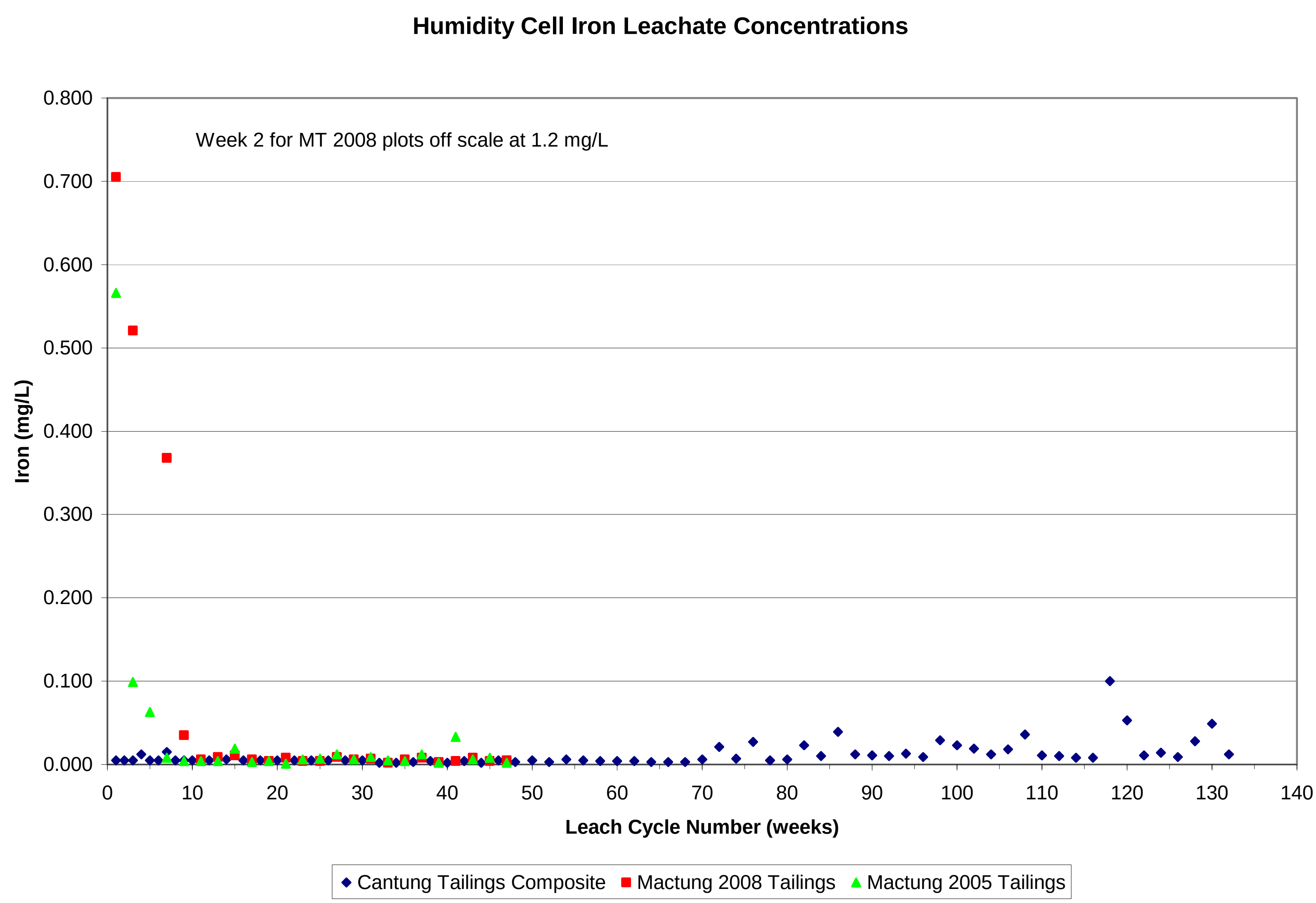
Humidity Cell Selenium

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2

OFFICE: EBA-WHSE

DATE: June14, 2010

Figure 3.1-10



Cantung humidity cell data provided by pHase Geochemistry Inc.

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

Mactung				
Humidity Cell Iron				
PROJECT NO. W23101211.003	DWN SJT	CKD SCD	REV 2	Figure 3.1-11
OFFICE EBA-WHSE	DATE June 22, 2010			

Discussion of Humidity Cell Sulphide Oxidation and Neutralizing Potential (NP) Depletion Estimates

Tables 3.1-3 and Table 3.1-4 contain the ongoing estimates for the acid production rate and NP depletion rate for the 2008 and 2005 tailings humidity cell respectively. The rates for both cells are plotted on Figure 3.1-12. The rates were calculated using equations contained in Price (1997) and MEND (2009). Price (1997) was issued as a draft document by the BC Ministry of Energy and Mines and was recently finalized and released in December 2009 as a national guidance document for the Mining Environment Neutral Drainage (MEND, 2009) Program.

The sulphate production and NP depletion rates for both Mactung humidity cells quickly converge following the initial 9 weeks of testing. These closely matching rates show that the cells are currently neutralizing any acidic weathering products as they are produced. The alkalinity production rates also quickly decreases over the initial 9 weeks of testing and both are now more or less constant in the 5 to 35 mg $CaCO^3$/L range. The acidity production rate for both cells is currently in the range of 1 to 3.8 mg/L.

Figure 3.1-13 shows the total sulphur and NP depletion curves for the Mactung humidity cells. The sulphur depletion curves for both cells are almost identical and show that approximately 1% of the total-sulphur has been depleted in six months of testing. The NP depletion curves for both humidity cells also show a similar trend. The difference in the trends for the 2005 and 2008 tailings is believed to be due to the different source materials used to prepare the tailings as the 2005 cell was constructed from a bulk sample while the 2008 sample was constructed from drill core. The time to acidity, under the ideal conditions of the humidity cell, as shown in Table 3.6-1, can be estimated by extension of the depletion curves, but with the current amount of data this method of estimation is considered to be uncertain. It is expected that the predictability will improve as more data becomes available.

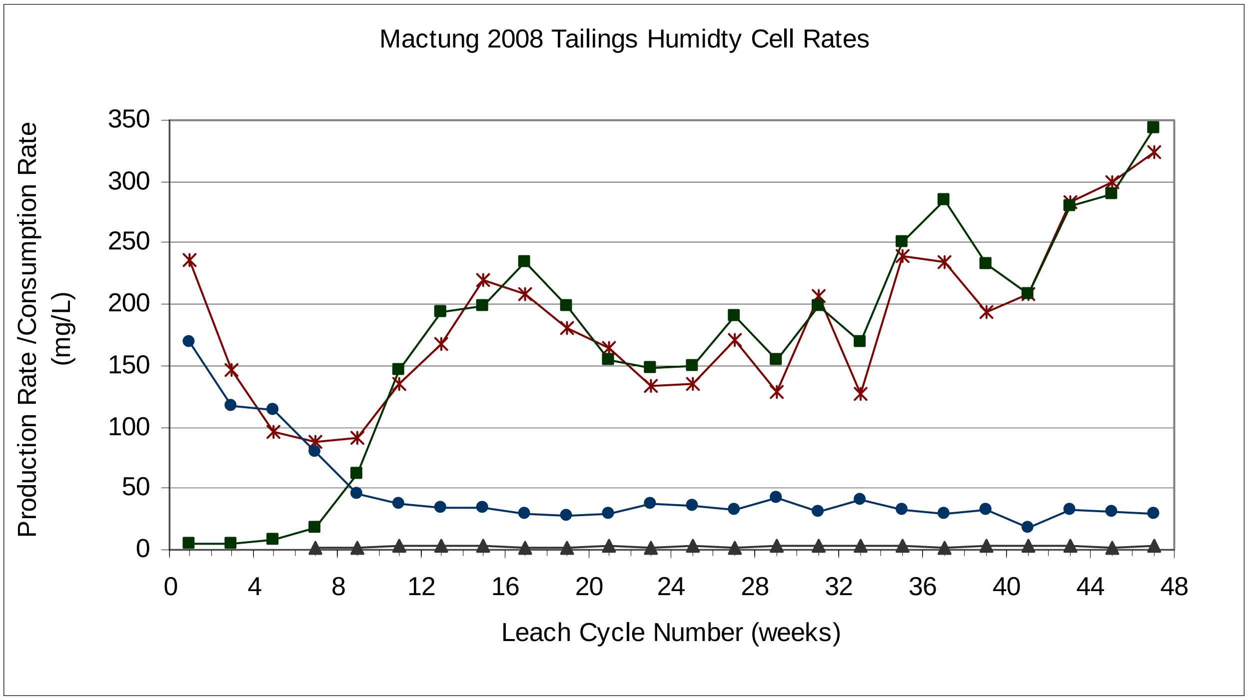
TABLE 3.1-3: ESTIMATED SULPHUR AND NEUTRALIZATION POTENTIAL DEPLETION CALCULATIONS FOR 2008 DRILL CORE COMPOSITE TAILINGS

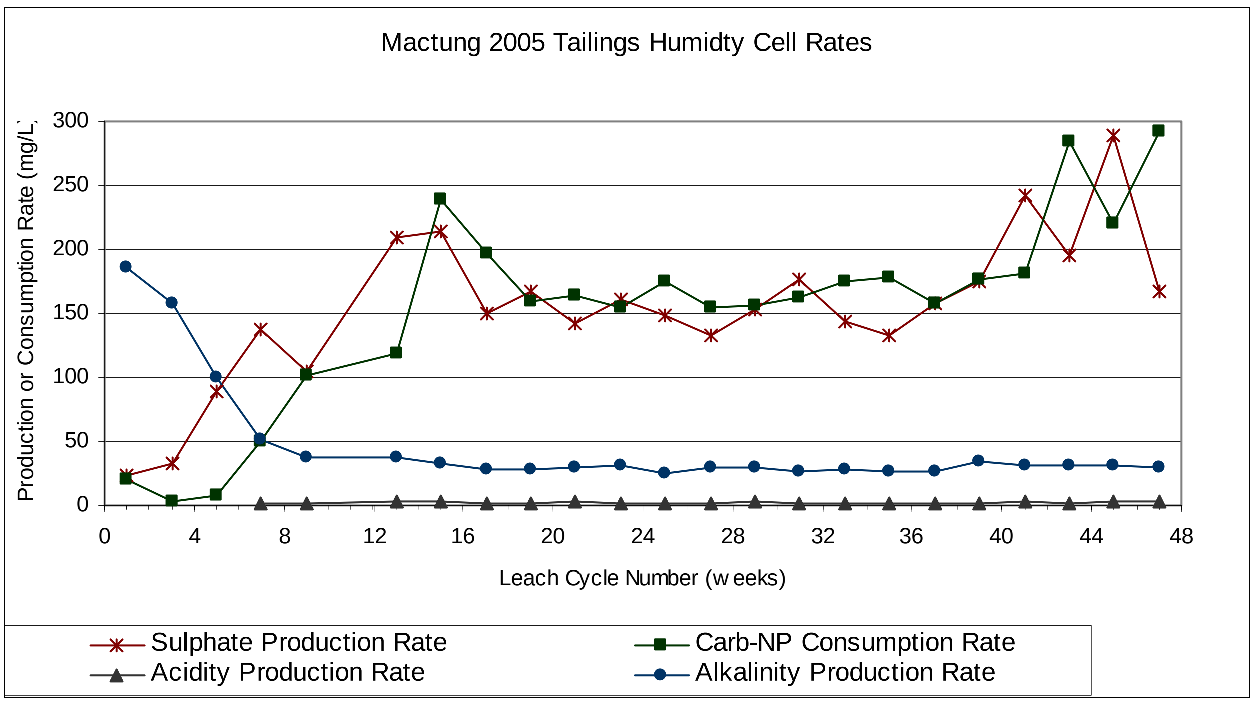
Date	Cycle No.	Volume mL Input	Volume mL Output	pH	ORP	Conductivity ųmhos/cm	Acidity (pH 4.5)	Acidity (pH 8.3)	Alkalinity	Sulphate	Hardness CaCO3	Ca	Ca-Loading	Mg	Mg-Loading	Acidity Production Rate	Sulphate Production Rate	Cumulative Sulphate Prod Rate	Remaining Total-S	Alkalinity Production Rate	Carbonate Molar Ratio	Theoretical NP Consumption at pH 6	Carbonate NP Consumption	Cumulative NP Consumtion	Remaining NP
					mV		mgCaCO3/L	mgCaCO3/L	mgCaCO3/L	mg/L	mg/L	mg/L	mg/flush	mg/L	mg/flush				(% original)						(% original)
23-Jun-09	1	750	250	8.96	315	861	#N/A	#N/A	224.8	314	6.5	2.28	1.71	0.2	0.15000		235.5	235.5	0.9987	168.57	0.02	245.38	4.89	4.89	99.98%
7-Jul-09	3	500	380	8.37	329	1214	#N/A	#N/A	233.7	293	11	3.88	1.94	0.32	0.16000		146.5	382	0.9979	116.84	0.04	152.65	5.50	10.39	99.96%
21-Jul-09	5	500	460	8.4	299	961	#N/A	#N/A	228.9	193	17.2	6.02	3.01	0.54	0.27000		96.5	478.5	0.9974	114.45	0.09	100.55	8.63	19.02	99.92%
4-Aug-09	7	500	485	8.21	336	655	#N/A	2.1	160.3	175	36.4	13	6.5	0.99	0.49500	1.05	87.5	566	0.9969	80.165	0.20	91.17	18.27	37.29	99.85%
18-Aug-09	9	500	475	7.83	281	588	#N/A	4.2	92.8	181	125	44.7	22.35	3.18	1.59000	2.08	90.5	656.5	0.9964	46.395	0.66	94.30	62.36	99.65	99.60%
1-Sep-09	11	500	440	7.76	285	721	#N/A	7.5	74.5	270	292	106	53	6.9	3.45000	3.755	135	791.5	0.9957	37.26	1.04	140.66	146.56	246.21	99.02%
15-Sep-09	13	500	440	7.48	305	795	#N/A	7.2	67.7	334	387	143	71.5	7.45	3.72500	3.62	167	958.5	0.9948	33.825	1.11	174.01	193.89	440.10	98.24%
29-Sep-09	15	500	445	7.68	354	783	#N/A	6.0	67.5	438	396	148	74	6.45	3.22500	3.015	219	1177.5	0.9936	33.745	0.87	228.19	198.07	638.17	97.45%
13-Oct-09	17	500	395	7.66	324	846	#N/A	4.0	57.6	418	470	178	89	6.1	3.05000	1.98	209	1386.5	0.9925	28.785	1.08	217.77	234.81	872.99	96.51%
27-Oct-09	19	500	395	7.68	324	752	#N/A	4.4	55.0	360	399	152	76	4.49	2.24500	2.205	180	1566.5	0.9915	27.48	1.06	187.55	199.03	1072.02	95.71%
10-Nov-09	21	500	415	7.39	320	594	#N/A	6.7	59.0	329	310	119	59.5	3.17	1.58500	3.33	164.5	1731	0.9906	29.5	0.90	171.40	155.11	1227.13	95.09%
24-Nov-09	23	500	470	7.84	368	592	#N/A	3.9	73.7	266	296	114	57	2.75	1.37500	1.945	133	1864	0.9899	36.85	1.07	138.58	148.00	1375.14	94.50%
8-Dec-09	25	500	480	7.55	333	594	#N/A	5.2	70.6	269	301	116	58	2.57	1.28500	2.58	134.5	1998.5	0.9891	35.305	1.07	140.14	150.13	1525.27	93.90%
22-Dec-09	27	500	430	7.8	314	618	#N/A	3.3	63.9	341	381	148	74	2.66	1.33000	1.66	170.5	2169	0.9882	31.93	1.07	177.65	190.27	1715.54	93.14%
5-Jan-10	29	500	490	7.72	354	593	#N/A	5.2	85.2	256	307	120	60	1.95	0.97500	2.61	128	2297	0.9875	42.585	1.15	133.37	153.85	1869.39	92.52%
19-Jan-10	31	500	435	7.74	319	775	#N/A	6.9	63.1	415	395	155	77.5	2.14	1.07000	3.465	207.5	2504.5	0.9864	31.54	0.92	216.21	197.94	2067.34	91.73%
2-Feb-10	33	500	480	7.67	337	527	#N/A	5.2	81.8	255	340	133	66.5	1.73	0.86500	2.615	127.5	2632	0.9857	40.9	1.28	132.85	169.63	2236.97	91.05%
16-Feb-10	35	500	445	7.65	238	791	#N/A	6.0	66.1	480	502	197	98.5	2.16	1.08000	2.99	240	2872	0.9844	33.05	1.00	250.07	250.43	2487.39	90.05%
2-Mar-10	37	500	435	7.69	289	909	#N/A	4.4	57.6	469	571	225	112.5	1.99	0.99500	2.18	234.5	3106.5	0.9831	28.80	1.17	244.34	285.04	2772.43	88.91%
16-Mar-10	39	500	515	7.58	321	693	#N/A	5.8	64.3	386	466	184	92	1.52	0.76000	2.915	193	3299.5	0.9820	32.13	1.16	201.10	232.88	3005.31	87.98%
30-Mar-10	41	500	450	7.46	361	1653	#N/A	5.2	36.8	416	417	165	82.5	1.35	0.67500	2.595	208	3507.5	0.9809	18.39	0.96	216.73	208.80	3214.11	87.14%
13-Apr-10	43	500	460	7.53	307	971	#N/A	7.7	64.7	567	557	221	110.5	1.6	0.80000	3.835	283.5	3791	0.9794	32.34	0.95	295.39	279.24	3493.35	86.03%
27-Apr-10	45	500	455	7.47	327	1014	#N/A	3.8	60.2	598	578	229	114.5	1.58	0.79000	1.905	299	4090	0.9777	30.12	0.93	311.54	289.19	3782.54	84.87%
11-May-10	47	500	455	7.60	324	1128	#N/A	6.2	59.7	649	686	272	136	1.71	0.85500	3.12	324.5	4414.5	0.9760	29.83	1.01	338.11	343.15	4125.68	83.50%

ISSUED FOR USE

TABLE 3.1-4: ESTIMATED SULPHUR AND NEUTRALIZATION POTENTIAL DEPLETION CALCULATIONS FOR 2005 DRILL CORE COMPOSITE TAILINGS

Date	Cycle No.	Volume mL Input	Volume mL Output	pH	ORP	Conductivity ųmhos/cm	Acidity (pH 4.5)	Acidity (pH 8.3)	Alkalinity	Sulphate	Hardness CaCO3	Ca	Mg	Acidity Production Rate	Sulphate Production Rate	Cumulative Sulphate Prod Rate	Remaining Total-S	Alkalinity Production Rate	Carbonate Molar Ratio	Theoretical NP Consumption at pH 6	Carbonate NP Consumption	Cumulative NP Consumtion	Remaining NP
					mV		mgCaCO3/L	mgCaCO3/L	mgCaCO3/L	mg/L	mg/L	mg/L	mg/L				(% original)						(% original)
30-Jun-09	1	750	235	8.81	295	740	#N/A	#N/A	248.0	32	27	7.6	1.94		24	24	0.9999	186.02	0.81	25.01	20.22	20.22	0.9993
14-Jul-09	3	500	455	8.87	267	912	#N/A	#N/A	316.8	66	5.3	2.1	0.1		33	57	0.9997	158.41	0.08	34.38	2.83	23.05	0.9992
28-Jul-09	5	500	475	8.32	316	770	#N/A	#N/A	199.4	179	14.8	5.33	0.37		89.5	146.5	0.9991	99.68	0.08	93.25	7.42	30.47	0.9989
11-Aug-09	7	500	460	8.09	312	719	#N/A	4.0	102.9	274	98.8	35.6	2.39	2.015	137	283.5	0.9983	51.44	0.35	142.75	49.37	79.84	0.9972
25-Aug-09	9	500	425	8.08	336	606	#N/A	3.4	74.9	210	204	74.7	4.17	1.69	105	388.5	0.9977	37.46	0.93	109.41	101.86	181.70	0.9936
22-Sep-09	13	500	435	7.93	345	887	#N/A	5.5	74.0	420	479	87.9	4.29	2.725	210	598.5	0.9964	36.99	0.54	218.81	118.59	300.28	0.9894
6-Oct-09	15	500	440	7.85	318	759	#N/A	5.6	66.8	429	393	181	6.72	2.815	214.5	813	0.9952	33.38	1.07	223.50	239.84	540.12	0.9809
20-Oct-09	17	500	445	7.8	319	623	#N/A	3.6	55.8	301	319	150	4.59	1.82	150.5	963.5	0.9943	27.91	1.25	156.81	196.74	736.86	0.9740
3-Nov-09	19	500	385	7.85	325	645	#N/A	3.6	55.8	334	328	123	3.16	1.78	167	1130.5	0.9933	27.91	0.92	174.01	160.09	896.95	0.9683
17-Nov-09	21	500	465	7.9	323	590	#N/A	6.2	59.7	285	309	127	2.85	3.095	142.5	1273	0.9924	29.86	1.11	148.48	164.44	1061.39	0.9625
1-Dec-09	23	500	450	7.93	342	678	#N/A	3.0	63.5	322	348	120	2.19	1.485	161	1434	0.9915	31.76	0.92	167.75	154.34	1215.74	0.9570
15-Dec-09	25	500	435	7.71	336	601	#N/A	3.7	50.6	298	309	136	2.29	1.855	149	1583	0.9906	25.32	1.12	155.25	174.53	1390.26	0.9509
29-Dec-09	27	500	445	7.89	362	624	#N/A	3.0	58.4	267	312	121	1.67	1.475	133.5	1716.5	0.9898	29.22	1.11	139.10	154.52	1544.78	0.9454
12-Jan-10	29	500	440	7.82	314	632	#N/A	6.7	59.6	307	325	122	1.66	3.355	153.5	1870	0.9889	29.78	0.97	159.94	155.75	1700.53	0.9399
26-Jan-10	31	500	395	7.76	333	614	#N/A	3.8	53.9	354	351	127	1.68	1.88	177	2047	0.9878	26.94	0.88	184.43	162.03	1862.57	0.9342
9-Feb-10	33	500	440	7.76	294	630	#N/A	3.8	56.0	286	355	138	1.47	1.885	143	2190	0.9870	28.02	1.18	149.00	175.34	2037.91	0.9280
23-Feb-10	35	500	430	7.84	312	504	#N/A	3.4	53.7	266	313	140	1.46	1.71	133	2323	0.9862	26.84	1.28	138.58	177.81	2215.72	0.9217
9-Mar-10	37	500	385	7.75	341	635	#N/A	3.5	51.79	317	355	124	1.09	1.75	158.5	2481.5	0.9852	25.895	0.95	165.15	157.07	2372.79	0.9162
23-Mar-10	39	500	465	7.79	303	630	#N/A	4.6	69.97	351	361	140	1.2	2.3	175.5	2657	0.9842	34.985	0.97	182.86	177.28	2550.07	0.9099
6-Apr-10	41	500	455	7.71	324	977	#N/A	5.29	61.62	484	569	143	1.21	2.645	242	2899	0.9828	30.81	0.72	252.15	181.04	2731.12	0.9035
20-Apr-10	43	500	440	7.84	297	810	#N/A	4.48	62.45	391	441	225	1.65	2.24	195.5	3094.5	0.9816	31.225	1.40	203.70	284.34	3015.45	0.8934
4-May-10	45	500	455	7.73	322	1024	#N/A	5.3	62.5	579	586	174	1.26	2.65	289.5	3384	0.9799	31.25	0.73	301.65	219.86	3235.31	0.8857
18-May-10	47	500	445	7.74	301	743	#N/A	5.16	59.8	335	424	232	1.47	2.58	167.5	3551.5	0.9789	29.9	1.68	174.53	292.71	3528.02	0.8753
25-May-10												168	1.13										





NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

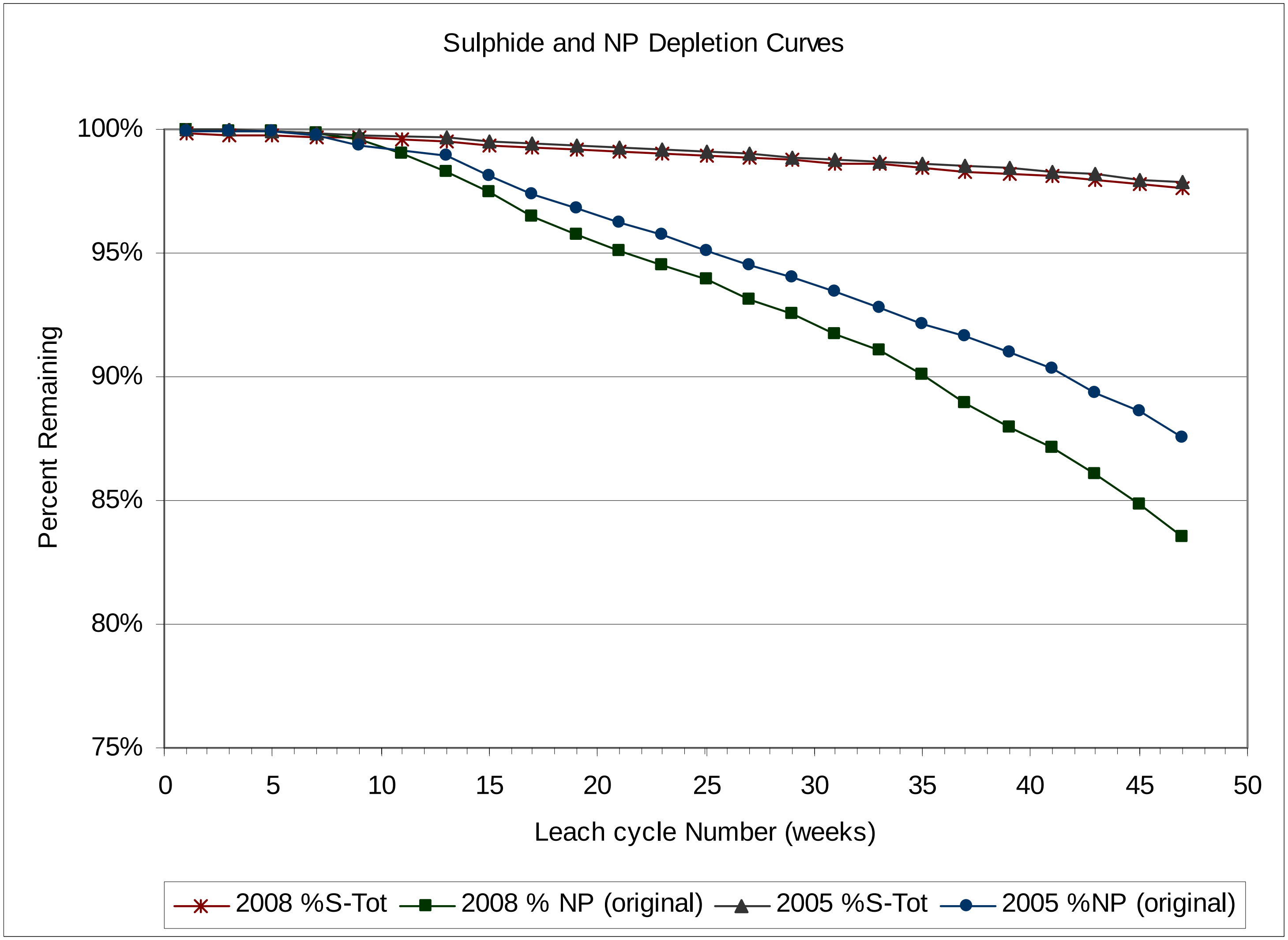
EBA Engineering Consultants Ltd.

Mactung

Mactung Humidity Cell Rates

PROJECT NO.	DWN	CKD	REV
W23101211.103	SJT	SCD	2
OFFICE	DATE		
EBA-WHSE	June 22, 2010		

Figure 3.1-12



NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

Mactung

Sulphide and NP Depletion Curves

PROJECT NO.	DWN	CKD	REV
W23101211.003	SJT	SCD	2
OFFICE	DATE		
EBA-WHSE	June 22, 2010		

Figure 3.1-13

It is necessary to account for the effects of cold site temperatures on the processes driving acid rock drainage in order to estimate the time to acidity for potentially acid-generating tailings. This is considered appropriate where the consumption of NP is directly related to the oxidation of sulphide minerals, which is the case for Mactung. Table 3.1-5 (MEND 2006) contains the results of laboratory tests and temperature effects on sulphide oxidation rates. The K4 to K20 ratio is the oxidation rate at 40°C relative to the rate at 200°C. The results of this testing are considered as being applicable to the Mactung site which has an average annual temperature of less than 40°C (see Section 4.1.5.3 of the Project Proposal).

TABLE 3.1-5. RELATIVE SULPHIDE OXIDATION RATES FROM LABORATORY TESTING FOR 4^{0}C AND 20^{0}C (MEND 2006)

Site	Tests	Mineral	K4 to K20 Ratio
Calculated		pyrrhotite, pyrite	0.24 to 0.31
Diavik	4	pyrrhotite	0.3 to 0.4
Ekati	2	pyrite	0.26
Pogo	4	pyrite, arsenopyrite	0.29
		pyrite	0.4 to 0.8
Red Dog Mine	4	pyrite	1
		pyrite	0.37, 0.40
		pyrite	0.11
		pyrite, sphalerite	0.11
Ulu Lake	4	pyrite, arsenopyrite	0.23
		pyrite	0.23
Windy Craggy	11	pyrrhotite, pyrite	0.34 to 0.67

A conservative cold temperature modifier of 0.5 for the estimation of the time to acidity from the laboratory to the field has been used. This modifier is based on available laboratory testing data from other northern sites and the available temperature data from the Mactung property. The fine-grained, compacted nature of the tailings coupled with an 80% saturation level will limit the ability of exothermic energy released during sulphide oxidation and therefore the modifier is considered appropriate for the Mactung tailings due to the method by which the tailings are placed during operations.

Table 3.1-6 summarizes the current estimated range in time to acidity for the humidity cells based on the sulphide and NP depletion rates. Two different methods were used to estimate the sulphur and NP depletion rates for the tailings. The first method was based on the average of the previous six weeks of results while the second method used the average rate for all weeks. The estimated time to deplete the NP is equivalent to the time to acidity for the materials, assuming that sulphur has not been depleted first.

TABLE 3.1-6. ESTIMATION OF TIME TO ACIDITY FOR THE MACTUNG TAILINGS HUMIDITY CELLS					
2008 Tailings Sample					
Sulphide Depletion Rate		Time to Deplete Sulphides	NP Depletion Rate		Time to Deplete NP
Last 6 weeks	-0.0008 %/wk	23.7 yrs	Last 6 wks	-0.608%/wk	3.5 yrs
All weeks	-0.051%/wk	37.6 yrs	All wks	-0.351%/wk	5.5 yrs
Estimated Duration of Acidic Conditions		Last 6 wks	20.2 yrs	All wks	32.1 yrs
Temperature Modified NP Depletion Time Estimate (0.5)		Last 6 wks	7.1 years	All wks	11.0 yrs
2005 Tailings Sample					
Sulphide Depletion Rate		Time to Deplete Sulphides	NP Depletion Rate		Time to Deplete NP
Last 6 weeks	-0.065%/wk	30.0	Last 6 wks	-0.469%/wk	4.5
All weeks	-0.045%/wk	42.8	All wks	-0.265%/wk	7.3
Estimated Duration of Acidic Conditions		Last 6 wks	25.5 yrs	All wks	35.5 yrs
Temperature Modified NP Depletion Time Estimate (0.5)		Last 6 wks	9.0 yrs	All wks	14.5 yrs

The estimated time to acidity based on the available humidity cell data suggests that there is the potential for tailings materials to become acidic during the operating period of the mine. Monitoring and mitigations for this were included in the original project proposal. The updated humidity cell data does not affect any of the previously described monitoring or mitigations (see Addendum 1 of the Project Proposal, Section 4.1.3, page 114). Please also see Section 4.1.1 below regarding any oxygen and water infiltration into the dry-stacked tailings facility.

There are two field operational considerations that have not been factored into the above estimation of time to acidity. The first is the presence of the alkaline process water within the DSTF. This process water will be the dominant source of water present in the DSTF during operations and post-closure. The process water will provide buffering capacity that will also increase the time to deplete the material NP under field conditions. The supernatant from the 2009 testing program had a reported carbonate alkalinity of 147 mg/L.

The second consideration is the construction method for the DSTF, which will result in the oldest tailings being buried by fresh tailings over the operations phase. The result of this construction method is that only the outermost face of the DSTF will have tailings exposed to potential weathering for extended periods of time prior to the installation of the system at closure. As the time to covering of the tailings during construction is less than the expected time to acidity, and as the DSTF will be covered with an impermeable material, it is not expected that the tailings will become acidic.

b) Provide a detailed description of the bench-scale tailings production and methodologies used in setting up the humidity cells. In addition, provide a discussion surrounding how representative the humidity cells will be of the tailings produced during mining.

The bench-scale metallurgical program to create the tailings samples was conducted by SGS, Vancouver. Figure 3.1-14 shows the mineral processing flowsheet that was used to create the Mactung tailings samples for humidity cell testing. The flowsheet was designed to mimic the proposed mineral processing at the site for all of the tailings streams that would report to the DSTF. The tailings solids produced by the bench-scale milling are expected to be representative of the tailings that will be produced during operation.

The supernatant produced during the bench-scale testing is not expected to be representative of the supernatant from processing at the site during operations. The bench-scale supernatant is expected to have lower quality than the operations supernatant as there was a need to recycle the supernatant during the bench testing, which will not occur during operations.

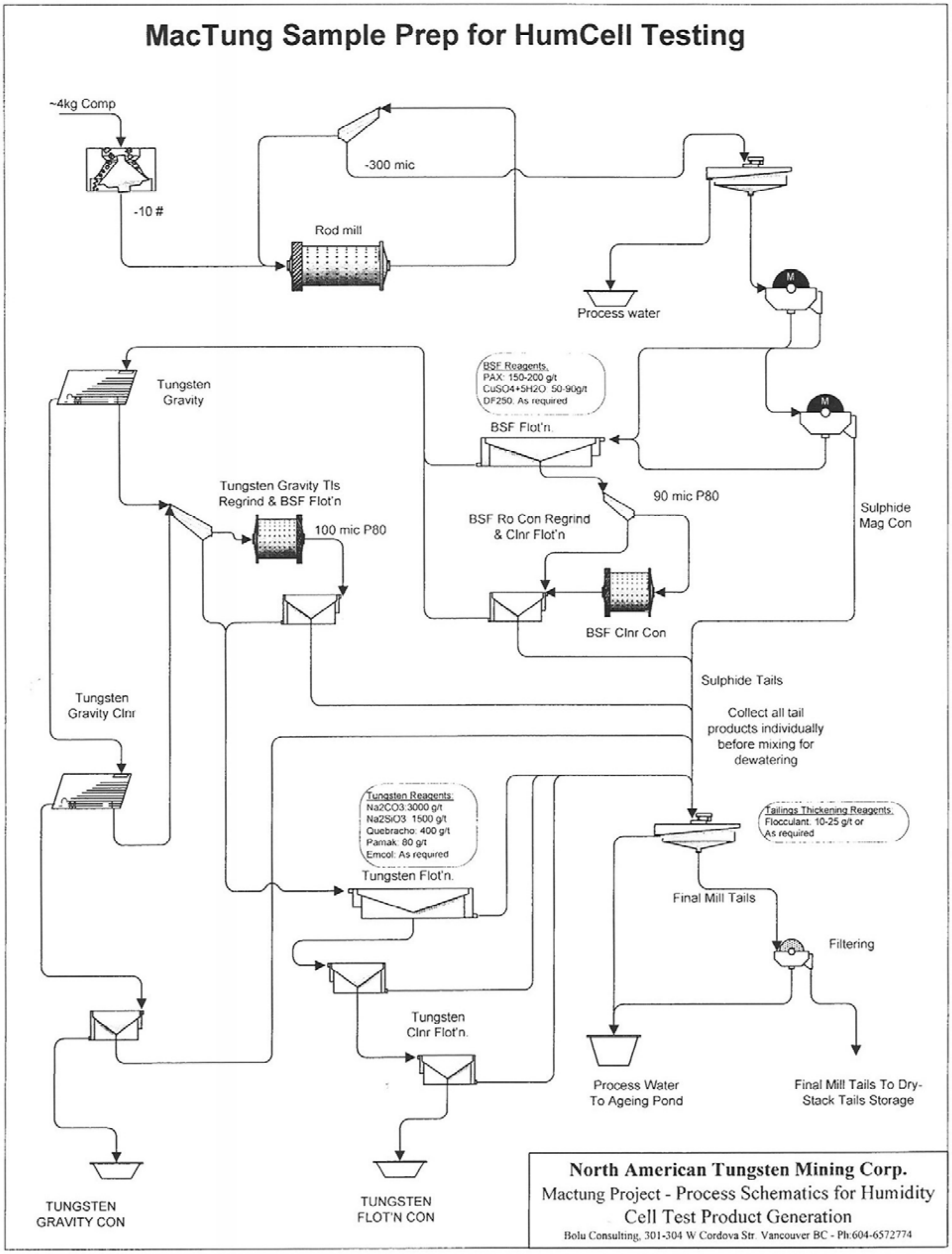


Figure provided by Bolu Consulting
BSF = Bulk Sulphide Flotation

NOTES

CLIENT

NORTH AMERICAN TUNGSTEN CORPORATION LTD

EBA Engineering Consultants Ltd.

Mactung

2009 Metallurgical Testing Program Flowsheet

PROJECT NO.	DWN	CKD	REV	
W23101211.003	SJT	SCD	2	Figure 3.1-14
OFFICE	DATE			
EBA-WHSE	June 22, 2010			

3.1.2 Comparison of Mactung and Cantung Geology

The tailings that will be produced at the Mactung Mine have not been fully characterized. Rather, comparisons of the Mactung and Cantung ore grade materials and the Cantung tailings were conducted. Based on these results, the project proposal anticipates the tailings produced at the Mactung Mine to be potentially acid generating. Environment Canada notes in their submission that the data presented does not support that the deposit and waste generated from the Cantung mine are the same as the deposit and waste generated at the proposed Mactung Mine. Further concern is raised due to the fact that tailings disposal methods are considerably different at both sites. Yukon Government, in their letter of December 3, 2009 (YOR document #2008-0304-131-1), also express concern that substituting Cantung geochemical data for Mactung is unacceptable based on the differences between the ore bodies.

Conclusions drawn from a comparison between ore and tailings may not provide an accurate representation of the tailings. The milling process results in finer grain sizes, addition of amendments, and a fairly homogenous mixture. Therefore, the tailings may be significantly different than ore in terms of potential for ARD/ML. As well, tailings at the Mactung Mine may be significantly different from the tailings from the Cantung Mine based on the difference in mineralogy and higher sulphur content in Mactung ore. Appendix D2 of the project proposal, Geochemical Comparison of the Cantung and Mactung Deposits, indicates that Cantung humidity cell testwork may be representative of Mactung tailings "however metallurgical program samples for the Mactung deposit would be required in order to substantiate this" (p.6). Appendix D2 concludes that, in order to refine the comparison between the Mactung and Cantung deposits, additional sample results would be required.

a) Address the assertion that the geochemical comparison between Mactung and Cantung deposits is not appropriate. This should include a comparison of the humidity cell test results from the Mactung tailings and similar geochemical tests from Cantung.

The intent of the geochemical comparison between Mactung and Cantung deposits that was performed earlier in the project was to give an indication of the potential impact from the Mactung operation prior to having any test samples for Mactung. The comparative analysis was not intended to replace the need for conducting geochemical testwork on Mactung for use in the assessment and permitting process.

Data from Cantung used in the comparison was obtained from geochemical reports prepared by MESH Consulting Limited and pHase Geochemistry Inc., who have been coordinating geochemical programs for that site. In order to achieve a sufficient sample size to support a proper statistically supported comparison of the two deposits, it would be necessary to incorporate all available operational and exploration program assay data for the different materials types at the Cantung site. This level of detailed comparison is no longer required for the ongoing assessment of the proposed Mactung Mine due to the availability of the Mactung tailings samples.

The initial comparison between the sites was intended to determine if there were sufficient similarities between the materials at each site that would support the use of humidity cells established at the Cantung site to estimate the geochemical behaviour of tailings at Mactung. The ongoing results of this Mactung geochemical testing program have been described in Section 3.1-1 of this report and in Addendum 1 of the Project Proposal and the data shows that an ongoing comparison of leachate chemistry data from the Cantung and Mactung humidity cells is appropriate for the following reasons:

- Similar processing methods between Cantung and the proposed Mactung mill;
- Provides another longer term (> 137 weeks) data series for evaluation from an operating mill to buttress the results for the Mactung tailings produced; and
- There are similar lithologies and geologic origin between the Cantung and Mactung deposits which supports the continued comparison of the behaviour of tungsten-sheelite deposits.

Comparisons to the Cantung Mine humidity cell will be continued in order to understand potential longer-term behaviour of the milled materials. Table 3.1-7 contains summary acid base accounting results for the composites materials used to construct each of the humidity cells. The different sources of feed material used to create each tailings composite are shown in the table. The total sulphur content of the Mactung tailings composites is lower than that of the Cantung composite sample, as are the calculated carbonate neutralization potentials.

TABLE 3.1-7. CANTUNG AND MACTUNG HUMIDITY CELL PHYSICAL PARAMETERS				
Humidity Cell		Cantung	Mactung 2008 Tailings	Mactung 2005 Tailings
Sample Type		composite	composite	Composite
Sample Source		Individual Grabs from Operationally Milled Tailings	Drill core	Bulk sample from underground workings
Paste pH		8.04	9.49	9.67
Total Sulphur	%	8.98	6.13	5.61
Sulphate Sulphur	%	0.02	0.05	0.06
Acid Potential	kg $CaCO_3$/tonne	280.0	191.6	173.4
Sobek NP	kg $CaCO_3$/tonne	401.3	Not reported	Not reported
Carbonate NP	kg $CaCO_3$/tonne	137.5	40.6	25.7

Figures 3.1-1 through Figure 3.1-9 show the humidity cell results from the Cantung tailings composite and the two Mactung tailings samples. The pH values (Fig 3.1-1) for the Mactung humidity cells show a similar range of fluctuation as the Cantung tailings during the same time period. The Cantung tailings have continued to show fluctuations in the near-neutral pH range with all but seven of the recorded values having a pH greater than 7.5. The seven pH values below 7.5 all had neutral pH values with a minimum value of 7.2. Sulphate concentrations (Fig 3.1-2) for the Cantung humidity cell have shown a steadily rising trend over time. The sulphate concentrations from the Mactung cells are similar in magnitude to the Cantung cell for the first 20 weeks of testing, however following the first 20 weeks the MacTung tailings have had lower sulphate concentrations.

The alkalinity (Fig 3.1-3) concentrations from the Cantung humidity cell are variable from week to week but have shown a general decreasing trend over the first 40 weeks of testing. The alkalinity for the Cantung cell has shown an increasing trend since approximately week 70. The alkalinities noted in the two Mactung cell are currently higher than those noted in the Cantung cell. There is insufficient data from the Mactung cells following the large initial spike in alkalinity to describe any trends for those cells. The acidity (Fig 3.1-4) for the Cantung cell shows a great deal of scatter. The general trend for the Cantung cell is an increase in acidity of the leachate. The data from the two Mactung cells show a similar degree of scatter to the Cantung cell data during the same initial period.

4.0 INFRASTRUCTURE QUESTIONS

4.1 MINE SITE INFRASTRUCTURE DESIGN AND PERFORMANCE

4.1.1 Dry-Stacked Tailings Facility

The proponent has proposed to install a low permeability cover system on the dry stacked tailings facility at closure. Details surrounding the liner are limited to the installation of a synthetic impermeable liner installed over the tailings with an earthen cover placed over the synthetic liner for protection. The intent of the cover system is to encapsulate the materials and minimize the ability of oxygen and water to access the materials. Several comment submissions (Yukon Government Department of Environment, D. Shorty Group Submission, Yasmine Djabri, Yukon Conservation Society, and Kingmik Expeditions Yukon) raised concern surrounding the cover system.

While it is not reasonable to request detailed engineering design of a cover system to be constructed at the end of the operation phase, the Executive Committee does require certainty that the proposed cover system is a feasible closure option. Therefore, please provide the following information.

a) Describe the effects of oxygen and water infiltration into dry stacked tailings facility if/when the cover system fails.

The DSTF will be constructed through mechanical placement and compaction of the tailings in 600 mm layers. The tailings will be compacted to 95% density, which is a standard for this type of construction methodology. The compacted tailings are estimated to have a permeability of 7×10^{-7} m/s. The surface of the DSTF will be graded at approximately 2% prior to cover installation in order to prevent ponding. A synthetic liner will be placed on the surface of the tailings at closure. A granular layer will be placed over the surface of the synthetic liner as part of the final cover. The granular layer will also have a similar grading to promote drainage of infiltrated water towards the perimeter collection system. Water draining from the footprint of the DSTF will flow into Tributary C upstream of the ravine dam reservoir. The above activities are proposed to minimize infiltration of water and oxygen into the DSTF. Further information on the DSTF is provided below.

The proposed cover system for the DSTF will consist of a synthetic liner placed over top of the tailings to provide a low permeability layer. The synthetic liner is being proposed due to the limited volumes of fine-grained materials for construction of the low permeability layer. A granular (sands and gravels) cover layer (0.5 m) will be placed over top of the liner in order to protect it from damage and UV degradation. The granular cover will be seeded to promote the establishment of a self-sustaining vegetative cover system. The vegetative cover will assist with evapotranspiration of water while also providing rooting to increase the erosion resistance of the granular cover. Non-acid generating waste rock will be incorporated into the surface of the sloping portions of the cover system to reduce the potential for long-term erosion to degrade the cover effectiveness.

The above activities will be completed in order to prevent failure of the cover system. However, the most likely failure mechanism for the proposed cover system would be related to a small hole in the synthetic liner or a faulty seam. Each of these failure mechanisms would result in a small, isolated gap in the cover system that could, theoretically, provide an opening through which oxygen or water could potentially reach the tailings. Because of the compaction of the tailings and the limited amount of water and oxygen that might enter the tailings, no significant effects to the water quality are anticipated. A large-scale failure of the cover would most probably require an event beyond the design requirements for that facility. Ultra-violet degradation of the synthetic cover would require significant erosion of the granular cover system which would be able to be identified through periodic, post-closure inspections of the site.

Water

Water will always tend to follow the path of least resistance, which means that it will flow along the path with the highest permeability. A granular cover comprising sands and gravels with an approximate thickness of 0.5 m is proposed to be installed over top of the synthetic liner. The hydraulic conductivity of the granular cover will be a minimum of two orders of magnitude greater than that of the underlying tailings which will result in water flowing through the granular materials before it can infiltrate into the tailings.

The grading of the surface of the DSTF, coupled with the low permeability of the compacted tailings, will reduce the ability of water to infiltrate into the tailings pile during operations and also during the closure phase, prior to installation of the cover system. Any minor amounts of water that are able to infiltrate into the tailings through small tears or failed seams would first be retained as pore water in the partially saturated materials. Even if sufficient water was able to enter the tailings in order to saturate the materials then the water would migrate vertically downward until it reached the base of the compacted cover layer and would then migrate laterally along the contact between the compacted tailings layers.

Oxygen

The movement of oxygen through fine-grained compacted tailings will be primarily limited to diffusive processes as the materials are too fine-grained to allow for convective or advective processes to occur. The size gradation of the tailings expected to be produced at the Mactung ranges from 0.001 mm to 0.21 mm with a D_{50} of approximately 0.06 mm. The moisture content of the compacted tailings is estimated to be between 16% and 18%. In Section 5.6 of Addendum 2 of the Project Proposal, EBA presented a discussion of the relation between moisture content and compaction. The optimum moisture content of a compacted material is equivalent to a saturation level of approximately 80%. The extent of oxygen diffusion is reduced as the saturation level in the tailings increases.

Oxygen diffusion through fine-grained tailings has been reported to be limited to within the upper portions of the tailings at sites where there is no cover system (MEND 2009). The limited depth of diffusion is due primarily to the low permeability, the higher saturation level and because oxygen is consumed during sulphide oxidation. The rate of oxygen consumption is dependent on the temperature and the exposure level of the sulphide mineralization. The effects of a cover system with a low-permeability synthetic liner over the tailings at Mactung would be to further greatly reduce the ability for water and oxygen to infiltrate the tailings.

Small tears of failed seams in the synthetic liner would only allow for very limited oxygen diffusion to occur in the immediate vicinity of the opening. It is expected that small (less than 1 to 2 m^3) oxidized pockets of tailings could form over time in the area below these openings but the rate of the development would be very long due to the limited volumes of oxygen and the minor amounts of water that could penetrate through the same small opening. Any acidic drainage produced would be immediately neutralized by the available neutralization potential of the surrounding and underlying tailings.

b) Estimate volumes and on-site sources of appropriate materials for cover construction.

NATC is confident that the on-site sources for material for the construction of the DSTF cover are sufficient. The conservative estimates for the volume of available borrow material on site, along with the data that supported the estimate, were provided within Section 3.2 of Addendum 2 of the Project Proposal. The estimated volume of cover material required for the DSTF is approximately 200,000 m^3.

4.1.2 Explosives Facility

Ammonia Nitrate Fuel Oil (ANFO) explosives will be used during the construction phase of the project as well as for underground long-hole blasting during the operations phase. Explosives will be manufactured on-site at the ANFO emulsion plant that is to be located on the west side of Mount Allen, shown in Figure3.7-1 of the proponent's response to the Executive Committee's Adequacy Review Report.

It is understood by the Executive Committee that the acquisition, storage and use of explosives in mining operations is regulated by Natural Resources Canada under the Explosives Act. In their letter of December 4, 2009 (YOR document #2008-0304-132-1) Natural Resources Canada raised several questions surrounding the use of explosives for the proposed project. While some of their request focused on regulatory requirements, some of the information will enable the Executive Committee to fully understand any potential effects that might be related to the transportation, storage and use of this type of explosive, and to ensure that the proponent has identified and intends to implement appropriate mitigation measures. Therefore please provide the following information.

a) Provide distances of the explosives factory to vulnerable features and demonstrate that the safety distances required by the Explosives Regulatory Division of Natural Resources Canada has been met.

The explosives factory ("ANFO Plant") is located on Figure 3.7-1 and Figure 3.7-2 (pages 45 and 46) in Addendum 1 of the Mactung Project Proposal (issued July 2009). Figure 3.7-1 indicates that the ANFO Plant meets the minimum quantity-distance criteria as stated by the Explosives Regulatory Division (2008a) of Natural Resources Canada. NATC plans to store up to 30 tonnes of ammonium nitrate and 30 tonnes of dynamite and emulsion explosives on site. The D7 quantity-distance category was used to establish a safe distance for the explosives storage facility from buildings where more than 20 people may assemble, i.e., the mill and camp.

b) Specify fuel and ammonium nitrate storage plans.

Ammonium nitrate and diesel fuel will be stored within the ANFO Plant according to the guidelines and regulations covered by the documents listed below:

- Explosives Regulatory Division (2008a). Blasting Explosives and Initiation Systems. Storage Possession, Transportation, Destruction and Sale. Natural Resources Canada.
- Explosives Regulatory Division (2008b). Guidelines for Bulk Explosives Facilities – Minimum Requirements. Natural Resources Canada.

The ANFO plant will serve as the base for process vehicles and will also house the washing facilities for vehicles used in the transport of explosives or components of the explosives.

The ammonium nitrate will be stored in silos at the ANFO plant. The fuel oil will be stored in a double-walled enviro-tank with a capacity of 7,500 L.

c) Describe the management and disposal plans for liquid effluent produced.

The storage and manufacture of ANFO-based explosives does not result in effluent being produced. Ammonium nitrate and fuel oil are mixed to form an emulsion. No effluent results from this process.

Vehicles used to transport or load the explosives will be washed at the ANFO Plant (the base plant). Any "heel" remaining in the vehicles will be removed and either re-used or disposed off-site or on-site at an appropriately permitted facility, e.g., the permitted Land Treatment Facility. The vehicles used to transport ANFO emulsion underground are contained to prevent spills (not open-backed trucks). When process vehicles associated with the transport and use of explosives are washed the grey water will be collected in trenches around the wash bay. This water will then either exfiltrate or be used within the Land Treatment Facility to help further the remediation of any contaminated soil.

d) Provide spill contingency plans specifically related to the production and use of explosives.

A Spill Contingency Plan was included in the Emergency Response Plan (Appendix M2) of the Mactung Project Proposal (submitted December 2008). The Spill Contingency Plan provides information on what actions will be taken in the event of a spill, including spills associated with explosives.

e) Provide details regarding any temporary explosives facilities required prior to the construction and commissioning of the explosives plant.

During construction and prior to operation of the Mactung Mine a temporary permitted explosives facility will be required on site.

The permitted facility will include explosives storage magazines (dynamite and blasting accessories), temporary storage facilities for ANFO and portable washing facilities. The precise locations for the temporary facility will not be known until the detailed engineering stage of the project. However, any temporary explosives facility will need to meet the guidelines and regulations as stated in the documents listed below:

- Explosives Regulatory Division (2008a). Blasting Explosives and Initiation Systems. Storage Possession, Transportation, Destruction and Sale. Natural Resources Canada.
- Explosives Regulatory Division (2008b). Guidelines for Bulk Explosives Facilities – Minimum Requirements. Natural Resources Canada.
- Temporary Factory Licence issued by the Explosives Regulatory Division, Natural Resources Canada.

REFERENCES

British Columbia Forest Service (BCFS). 1998. Forest Practices Code of British Columbia, Fish Stream Identificatoin Guidebook. Second Edition, Version 2.1. BC Environment.

Dave Spittlehouse, 2006. ClimateBC: Your Access to Interpolated Climate Data for BC. http://www.genetics.forestry.ubc.ca/cfcg/climate-models.html

EBA Engineering Consultants Ltd. (EBA). 2008a. Mactung Project, 2008 Environmental Baseline Studies, Fisheries and Aquatic Resources Program. Prepared for North American Tungsten Corporation Ltd.

EBA Engineering Consultants Ltd (EBA). 2008b. Mactung Project 2007 Hydrometeorological Report.

EBA Engineering Consultants Ltd. (EBA). 2007. Mactung Project, 2007 Environmental Baseline Studies, Fisheries and Aquatic Resources. Prepared for North American Tungsten Corporation Ltd.

EBA Engineering Consultants Ltd (EBA). 2009. Estimate of Available Water Supply for the Mactung Project.

Environment Canada, Pacific & Yukon Region. 2006. Advice on Assessing Potential Impacts of Future Climate Change on PMF and PMP in Yukon Territory, Canada

Explosives Regulatory Division. 2008a. Blasting Explosives and Intitiation Systems. Storage Possession, Transporation, Destruction and Sale. Natural Resources Canada.

Explosives Regulatory Division. 2008b. Guidelines for Bulk Explosives Facilities. Minimum Requirements. Natural Resources Canada.

Hastings, Kim. 2005. Long-Term Persistence of Isolated Fish Populations in the Alexander Archipelago – Chapter 4. Long-Term Persistence of Small Isolated Fish Populations. Pages 76-112. USFWS Juneau

Latterell, J.J., R.J. Naiman, B.R. Fransen, and P.A. Bisson. 2003. Physical Constraints on trout (Onchorhynchus spp.) Distribution in the Cascade Mountains: A Comparison of Logged and Unlogged Streams. Canadian Journal of Fisheries and Aquatic Sciences, 60:1007-1017.

MEND 2006. Update on cold temperature effects on geochemical weathering. MEND Report 1.61.6. Mine Environmental Neutral Drainage Program, Natural Resources Canada

MEND Report No. 1.20.1. 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geological Materials. Report prepared by W.A. Price. Work performed for the Mining Environmental Neutral Drainage (MEND) Program.

Price, W.A. 1997. Draft Guidelines and Recommended Methods for the Prediction of Metal Leaching and Acid Rock Drainage at Minesites in British Columbia, British Columbia Ministry of Energy and Mines, Victoria.