

Referral Report and New Recommendation

Project Assessment 2008-0304

North American Tungsten Corporation Mactung Mine Project



June 25, 2014

Prepared by

Executive Committee

Yukon Environmental and Socio-economic Assessment Board

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EXECUTIVE SUMMARY

This Referral Report is the result of the Executive Committee's reconsideration of its initial Recommendation on the Mactung Mine Project proposed by North American Tungsten Corporation Ltd. (NTC). Under s.76(1)(b) of the Yukon Environmental and Socio-economic assessment Act (YESAA), the Government of Yukon, as a Decision Body for the Project, referred the recommendation contained in the Screening Report (YOR 2008-0304-346-1) issued on March 10, 2014 back to the Executive Committee for reconsideration.

The purpose of the Project is the construction, operation, closure and reclamation of an underground tungsten mine in east-central Yukon, approximately 250 km east of Ross River and 8 km northeast of the Macmillan Pass in the Mount Allan area. The Mactung site contains a mineral resource deposit of 33 million tonnes of ore of which 8.5 million tonnes will be extracted from underground. The total amount of waste rock is estimated to be 1 026 433 m³ and the total amount of tailings 3 378 730 m³. The Project will also establish a camp for about 250 personnel during construction and 150 during operation.

The Referral Report:

- describes the referral approach;
- addresses the key issues identified in the reasons for referral;
- considers comments received from the public and other parties regarding the initial Recommendation and the referral; and
- makes a new recommendation.

The Executive Committee notes that the proposal of this project sparked comments by First Nations about issues and concerns, such as road and environmental management, which go beyond the assessment process under the YESAA. As a consequence, a comprehensive resolution of these concerns was not possible within the context of the assessment or within the Referral Report. The Executive Committee notes that the establishment of a committee with representation from First Nations, NTC, Government of Yukon, and outfitters to develop management plans in relation to the North Canol Road and specific wildlife species would be of great benefit in addressing concerns raised during the assessment process and in reducing environmental effects of the Project.

Consideration of First Nation Concerns and Interests

The Executive Committee acknowledges that the Screening Report does not explicitly reference the concerns and interests of the First Nation of Na-Cho Nyak Dūn Nyak Dun (NND) and Liard First Nation (LFN). The absence of specific references to all of the concerns and interests of NND and LFN is an oversight on the part of the Executive Committee. The Executive Committee did, however, consider NND and LFN comments, concerns and interests; the consideration of which led to, among other things, the removal of the Nidd Road Access option, the installation of a mine water treatment plant prior to mine operation, the installation of a meteorological station with a precipitation gauge along with the collection of

additional baseline information, and more stringent design standards were recommended for the reservoir dam. Consideration of concerns about water quality also led the Executive Committee recommend a fundamentally different approach to the management of waste rock.

Waste Rock

The Government of Yukon's reasons for the referral related to waste rock indicated that there was an *"inconsistency between the analysis and terms and conditions relating to waste rock storage"* and their comments stated that *"it is not clear how the waste rock will be incorporated into the DSTF without compromising the integrity of the facility."*

To address these issues, the Executive Committee took the following actions:

- conducted an additional review of waste management alternatives outlined within proposal documents, including the adaptive management plan;
- requested additional information from the Proponent regarding the adaptive management plan alternative of waste rock disposal within the DSTF;
- retained additional technical support to review this additional information; and
- amended existing and/or developed additional recommendations for waste rock management in order to mitigate significant adverse effects to water resources.

The waste rock management section of this report addresses the following topics:

- Context for Waste Rock Management
- Consideration of Proponent Commitments
- Removal and Testing
- Temporary Storage
- Permanent Disposal
 - o Capacity of DSTF and Underground and Below Water Table
 - o Geotechnical Stability of the DSTF
 - o Geochemistry
 - o Closure

In addressing the key issues raised by the Government of Yukon on waste rock management, the Executive Committee has determined that the Project will result in significant adverse effects to water resources. These effects can be mitigated by recommended terms and conditions.

Consideration of Comments Received During the Referral

Thirteen comments were submitted during the "seeking public comment on referral back period." These comments were provided by interested First Nations, Government of Yukon, Government of Canada and members of the public. The comments identify concerns about

the Screening Report and also about components of the Project. The main subjects relate to wildlife, traditional land use, waste rock, water and aquatic resources, camp location, upgrades to the North Canol Road, impacts to the outfitter and suggested changes to the Screening Report.

New Recommendation

Pursuant to section 77(2) of YESAA the Executive Committee makes a new recommendation to Decision Bodies that the Project be allowed to proceed without a review, subject to the terms and conditions specified below; as the Executive Committee has determined that the Project will have significant adverse environmental and socio-economic effects in Yukon that can be mitigated by these terms and conditions.

The Referral Report is available on the YESAB Online Registry (www.yesab.ca/registry, YESAB Project No. 2008-0304) or copies can be obtained from:

- YESAB Head Office
- YESAB Mayo Designated Office
- YESAB Watson Lake Designated Office

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ACRONYMS AND ABBREVIATIONS

>	greater than
<	less than
ABA	acid base accounting
Activity Regulations	Assessable Activities, Exceptions and Executive Committee Projects Regulations
ANFO	ammonium nitrate fuel oil
ARD	acid rock drainage
ASL	above sea level
BC	British Columbia
BGS	below ground surface
° C	degrees Celsius
CCME	Canadian Council of Ministers of the Environment
CDA	Canadian Dam Association
cm	centimetre
COPC	constituents of potential concerns
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRL	Colorado Resources Ltd.
DFO	Department of Fisheries and Oceans Canada
DSO	Deuling Stone Outfitters
DSR	Draft Screening Report
DSTF	Dry-stacked tailings facility
EBA	EBA Engineering Consultants Ltd.

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EcoMetrix	EcoMetrix Incorporated
ELC	Ecosystem Land Classification
Executive Committee	Executive Committee of the Board
GMS	Game Management Subzone
GNWT	Government of the Northwest Territories
h	hour
ha	Hectares
hm	hoary marmot
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
IDF	inflow design flood
kg	kilogram
km	kilometre
km ²	square kilometre
L	litre
L/s	litre per second
LHB	long-hole blasting
LSA	local study area
LTF	Land Treatment Facility
LFN	Liard First Nation
m	metre
m ³	cubic metre
MA	million years
MAP	mean annual precipitation
MASL	meters above sea level

MBG	metres below ground
mg/kg	milligram per kilogram
ML	metal leaching
mm	millimetres
MMER	Mining Metal Effluent Regulations
ms ⁻¹	metre per second
m ³ /s	cubic metres per second
mw	megawatt
NND	Na-Cho Nyak Dün
NTC	North American Tungsten Corporation Limited (Proponent)
NAG	non-potentially acid generating
NP	neutralization potential
NPR	neutralization potential ratio
NTU	nephelometric turbidity units
NWT	Northwest Territories
ORV	off-road vehicle
PAG	potentially acid generating
Project	Project
Proponent	North American Tungsten Corporation Ltd
PWH	Points West Heritage Ltd.
RRDC	Ross River Dena Council
RTC	registered trapping concession
TK	traditional knowledge

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t	tonnes (metric)
tpd	tonnes (metric) per day
USGS	United States Geological Survey
VESECs	valued environmental and socio-economic components
WRSA	waste rock storage area
WTP	water treatment plant
YESAA	<i>Yukon Environmental and Socio-economic Assessment Act</i>
YESAB	Yukon Environmental and Socio-economic Assessment Board
YOR	YESAB Online Registry
XRD	Rietveld X-Ray Diffraction

PART I BACKGROUND

On March 10, 2014, pursuant to s.58 of the *Yukon Environmental and Socio-economic Assessment Act* (YESAA), the Executive Committee provided its Screening Report of the Mactung Mine Project (2008-0304) to Decision Bodies. One Decision Body, Government of Yukon, referred the Project back pursuant to s. 76(1)(b) of YESAA to the Executive Committee for reconsideration on the basis of two main concerns:

1. insufficient consideration of the interest and concerns of the affected Yukon First Nation, and in particular with respect to the First Nation of Na-Cho Nyak Dün (NND) and Liard First Nation (LFN); and
2. the inconsistency between the analysis and the terms and conditions relating to waste rock storage.

As a result of the referral, the Executive Committee invited interested persons and members of the public to submit their views about the recommendation and the referral back as is required by s.74 (b) of the *Rules for Screening Conducted by the Executive Committee*. The Executive Committee reconsidered its recommendation taking into account the reasons of the Decision Body as well as the comments received.

The Executive Committee decided that drafting a separate Referral Report would be the most efficient and effective manner in which to respond to the referral by the Government of Yukon. The Referral Report should be read in conjunction with the Screening Report, however, given that the Referral Report addresses the specific issues raised by the Government of Yukon and comments received during the referral stage only. The Screening Report contains the majority of the information, analysis and rationale in relation to the assessment of the Mactung Mine Project. The Referral Report, however, contains modifications, revisions, or additional information to the Screening Report that were necessary in order for the Executive Committee to make a new recommendation.

The purpose of the Referral Report, therefore, is to provide Decision Bodies with a new recommendation arising out of the referral and to provide the reasons for the new recommendation.

This report:

- addresses the key issues identified in the reasons for referral;
- considers comments received from the public and other parties regarding the initial Recommendation and the referral; and
- makes a new recommendation.

PART II CONSIDERATION OF REFERRAL KEY ISSUES

Part II presents the two concerns identified by the Government of Yukon in its referral as well as the Executive Committee's consideration of concerns and issues regarding the initial Recommendation and the referral.

1.0 CONSIDERATION OF CONCERNS AND INTERESTS FROM FIRST NATION OF NA-CHO NYAK DUN AND LIARD FIRST NATION

In its reasons for decision of the referral back, the Government of Yukon stated that the Executive Committee's *"screening report appears to focus exclusively – or almost so – on the potential effects of the project on RRDC."* The reasons also state that *"Yukon is of the view that the Executive Committee must also consider the potential effects of the project on LFN and NND."*

The Executive Committee acknowledges that the Screening Report does not fully explicitly reference the concerns and interests of Na-Cho Nyak Dün (NND) and Liard First Nation (LFN). The absence of specific references to all of the concerns and interests of NND and LFN is an oversight on the part of the Executive Committee. The Executive Committee did, however, consider NND and LFN comments, concerns and interests as described below:

1.1 SCOPE OF PROJECT - REMOVAL OF NIDD ROAD ACCESS OPTION

At the Executive Committee's November 13, 2012 public meeting in Watson Lake, at which members of LFN and Ross River Dena Council (RRDC) were present, attendees indicated it did not make sense to build a new road when an existing road already accesses the site (YOR 2008-0304-269-1).

Due to the concerns raised by LFN, NND, RRDC, and others, and communicated by the Executive Committee in the Draft Screening Report, the Proponent removed the proposed access route from the Project following the Draft Screening Report.

In its comments on the Draft Screening Report (YOR 2008-0304-274-1), LFN supported the Executive Committee's finding that the Nidd Road access option was completely unacceptable. NND also expressed support for the Executive Committee's recommendation regarding the proposed road, following the Draft Screening Report.

1.2 ASSESSMENT PROCESS

Throughout the assessment process, all First Nations, including NND and LFN were consistently notified through the YOR notification system about any changes to the Project, changes in stages of the assessment, deadlines for submissions of comments and any extension to those deadlines, responses to information requests and comments from various parties and the public. In addition, comments from NND and LFN resulted in numerous information requests to the Proponent.

1.3 WATER RESOURCES

Water quality was raised as a general concern at the 2012 public meeting in Watson Lake, at which members and elders from LFN were present (YOR 2008-0304-269-1).

In its comments on the Draft Screening Report, LFN identified a number of issues related to water management (YOR 2008-0304-274-1). LFN also raised concerns about the Proponent's water balance model and long-term water management for the Project.

NND also raised a large number of concerns relating to water quality and quantity (YOR 2008-0304-118-1, 2008-0304-269-1, 2008-0304-285-1).

Both LFN and NND identified concerns related to a lack of site-specific baseline data including climate, precipitation, surface water runoff and flows, and groundwater flows. Further concern was raised that a lack of site-specific baseline data inputs lead to uncertainty in predictive modeling done by the proponent. For example, LFN indicated that the lack of site specific precipitation data and coarsely estimated runoff data lead to uncertainty in the development and use of the site water balance model for predictive purposes. Additionally, they indicated high variance in predicted groundwater inflows into the underground mine workings due to inadequate baseline data. NND indicated additional baseline climate/precipitation, surface water, and groundwater data were needed in order to adequately design key water management infrastructure. LFN further indicated that the design of the ravine dam and diversion channels for a 1:100 year flood flow event was insufficient.

Additional concerns were raised by LFN and NND about water quality predictions and water treatment. LFN indicated concern with differing water discharge thresholds and the design of water treatment facility and processes to regulators during the regulatory and permitting stages. Similarly, NND expressed concern that insufficient information was provided on the water treatment methodology for the various sources of water that may need to be treated. In addition, NND expressed concerns related to sewage treatment methods to deal with waste water from the camp facilities. Questions were raised as to the effectiveness of sewage treatment options given the cold climatic conditions.

LFN and NND both raised concerns with regards to geochemical characterization of mine waste materials. LFN and NND expressed concern with the geochemical characterization due to the lack of humidity cell testing for waste rock materials. They both noted concern with acid rock drainage and metal leaching (ARD/ML) in groundwater due to uncertainties with proposed back-filling of waste rock and tailings in underground stopes. LFN indicated that a contingency plan as well as a temporary closure plan should be provided and assessed.

As a result of these numerous comments from LFN and NND, in addition to comments received from other parties, the Executive Committee issued an information request to NTC on January 4, 2013 (YOR 2008-0304-289-1). Information was requested by the proponent as a direct result of comments and concerns raised by LFN and NND including:

- Tributary C site-specific hydrology data and catchment area runoff condition estimates based on this data;
- Hess River South Tributary site-specific hydrology data and catchment area runoff condition estimates based on this data;
- site-specific precipitation data through on-site data collection;
- groundwater estimates and inflow rate scenarios including a sensitivity analysis;

- updated water balance model which includes new/updated information (as noted above), hydrological variability, and a sensitivity analysis;
- updated water quality model which includes loadings; water balance predictions from all mine sources, and concentrations and loadings for relevant water quality parameters in local receiving waters;
- water treatment targets for the receiving waters and compliance point location based on the updated water balance and water quality models;
- details on the conceptual water treatment plant required to meet treatment targets;
- develop and provide an adaptive management plan for tailings and waste rock;
- provide a temporary mine closure plan including monitoring and mitigation for potential ARD/ML conditions of the dry stack tailings facility and waste rock storage areas; and
- geochemical characterization, including kinetic testing, of geologic units that make up waste rock.

NTC responded to the January 4, 2014 request for additional information on October 15, 2014 (YOR 2008-0304-298-1 through 2008-0304-307-4). Based on the information request, NTC collected additional baseline information, updated numerous models, and provided the plans requested. For example, NTC collected and provided additional site-specific surface water data for Tributary C and the Hess River South Tributary and provided respective catchment area runoff condition estimates based on this data. In addition, NTC installed a meteorological station with a precipitation gauge on August 12, 2013 with the commitment to validate precipitation estimates and water balance and water quality predictions as data was collected. Humidity cells of representative waste rock material were started on May 3, 2013.

In finalizing the Screening Report, The Executive Committee took into account LFN's and NND's comments and concerns as well as the additional information provided by NTC in sections 6.2 (Water Quantity) and 6.3 (Water Quality).

1.4 AQUATIC RESOURCES

LFN raised concerns with respect to the potential impacts to fish and fish habitat due to the reduction of flow in Tributary C as well as regarding a sediment and erosion control plan to be approved by DFO (YOR 2008-02304-271-1).

These comments, among others, led to the inclusion in the Screening Report of a term and condition regarding the development and implementation of "*an effective sediment and erosion control plan designed by appropriate professionals with suitable experience.*" Further, these comments were communicated by the Executive Committee to NTC and thus led to the commitment by NTC to work with DFO to follow regulatory requirements during construction.

LFN raised concerns related to the ability of NTC to manage site water so that contaminated water would not be discharged into the receiving environment (YOR 2008-0304-274-1). The Executive Committee noted that the water quality of Tributary C could be affected by project activities. As such,

in Section 6.3 of the Screening Report, water quality is addressed and terms and conditions relating to water quality are presented. In addition, in Section 7.0, the Executive Committee set out terms and conditions to improve the understanding of fish and fish habitat in Tributary C and in the Hess River South Tributary.

LFN noted that DFO was providing relevant and critical feedback on the Proponent's studies regarding habitat changes from the ravine dam (YOR 2008-0304-274-1). The issues raised by DFO were considered during the screening and incorporated into the Screening Report. Although Section 7.0 of the Screening Report does not specifically reference LFN's comments along with DFO's, YG's, and RRDC's regarding fish and fish habitat and specifically fish distribution, the Executive Committee utilized the precautionary approach and assumed the upper reaches of Tributary C were fish bearing and assessed the Project accordingly.

In its 2009 comment submission, NND focuses mainly on the effects of impacting aquatic resources by petroleum spills, accidents or malfunctions, and the effects of water withdrawals. It commented on the potential effects from a fuel spill/leak into water bodies. It commented on the effects of withdrawals from the Hess River South Tributary, including fish mortality and morbidity and habitat alteration and loss, although noted that water consumption is so low that no negative changes in water volume along the river will occur (YOR 2008-0304-118-1).

In its comments on the Draft Screening Report, however, NND identified other issues relating to aquatic resources. For example, NND raised a concern regarding the sufficiency of data for seasonal flow fluctuations of the Hess River South Tributary:

These are critical parameters to understand before drawing water from the system year round. Channel depth changes could impact overwintering fish habitat and survival. NND also feels that NATC failed to fully consider alternatives to drawing water from the tributary to find less invasive options.

(YOR 2008-0304-285-1)

This comment from NND contributed to an information request to the Proponent by the Executive Committee (YOR 2008-0304-289-1). Section 7.3 of the Screening Report considers the effects from alterations to water flow in the Hess River South Tributary as well as Tributary C. The Executive Committee acknowledged its concern with the small number of flow measurements and identified terms and conditions to improve the understanding of effects on fish and fish habitat from changes to flow in Tributary C and the Hess River South Tributary.

In Section 7.0 of the Screening Report the Executive Committee identified terms and conditions to improve the understanding of fish and fish habitat in Tributary C and the Hess River Tributary, including identifying the fish bearing status of these tributaries. The Executive Committee notes the studies shall be conducted by appropriate professionals with suitable experience. The absence of flow data for the Hess River Tributary remains a concern for the Executive Committee, as discussed; terms and conditions to improve the understanding of effects on fish and fish habitat from changes to

flow in Tributary C and the Hess River South Tributary. Terms and conditions to mitigate significant adverse effects to water quality (and, in turn, fish and wildlife habitat) were identified in Section 6.3 of the Screening Report.

NND also noted that NND and the Mayo Renewable Resource Council had also identified issues relating to aquatic resources at its November 19, 2012 meeting, including “*Water intake and reservoir discharge to the headwaters of the Hess River, a valuable hunting and fishing ground for NND people,*” and “*Cumulative effects to water quality, fish and wildlife if a road is allowed*” (YOR 2008-0304-285-1).

The Executive Committee considered water intake and reservoir discharge to the Hess River South Tributary and Tributary C, as described above. The proposed access road was removed from the Project following the Draft Screening Report.

1.5 WILDLIFE

At the Watson Lake community meeting in 2012, several comments reflected general concerns about the effects of the Project on wildlife (YOR 2008-0304-269-1).

LFN commented on the Draft Screening Report's recommendation that the Proponent conduct a survey for bear dens, and set a buffer around the den “where possible”. LFN was of the view that the language in the recommendation was ambiguous and therefore not very effective. As such, the Executive Committee revised the recommended term and condition in the screening report which now states the buffers shall be applied to bear dens while they are active.

NND commented on effects to wildlife from the use of the proposed North Canol Road in its November 2009 submission (an effects assessment of the Project) to YESAB, noting impacts such as increased poaching during the work periods, subsequent hunting and fishing, impacts from land clearing and roadbed preparation including habitat loss leading to species extinction, sensory disturbances limiting wildlife movement in migration corridors, mortality associated with vehicle collisions, habitat avoidance, increase in predator-prey interactions, mortality associated with contaminants, entrapment of wildlife in open trenches, etc. (YOR 2008-0304-118-1). The Executive Committee appears to have addressed NND's concerns with respect to the proposed North Canol Road as is evidenced by NND's comments on the Draft Screening Report. NND supported the Executive Committee's recommendation that that the proposed road not be accepted. (YOR 2008-0304-285-1)

Section 8.0 of the Screening Report addresses issues specifically related to the loss, disruption and alteration of habitat, the attraction of wildlife to camps and associated activities, induced hunting due to increased access, and vehicle-wildlife collisions. The Report identifies terms and conditions such as avoiding site clearing during bird nesting season and establishing a buffer around mineral licks and bear dens, creating breaks in snow banks along the North Canol Road to avoid collisions, and monitor wildlife to establish baseline information.

Section 10.4 addresses effects to vegetation and soils, which includes consideration of wetlands and riparian ecosystems, and noted the *Quartz Mining Act* and *Quartz Mining Land Use Regulation* as per the removal and re-establishment of the vegetative mat.

1.6 HEALTH AND SAFETY

In its submission to YESAB in 2009, NND noted:

Besides creating environmental damage, the contamination resulting from the leakage of chemicals can also affect the health of the local NND population. Some mining methods may have significant environmental and public health effects.

(YOR 2008-0304-118-1)

Section 10.3 of the Screening Report addresses environmental contamination from chemical contaminants associated with the Project, and notes that such chemicals can affect humans. The Executive Committee considered that most effects on the environment as defined in this section are regulated through the *Environment Act* and associated regulations.

In its comments on the Draft Screening Report, LFN noted that the potentially carcinogenic nature of tungsten does not appear to have been addressed at all by the Proponent or the Executive Committee in this assessment. (YOR 2008-0304-274-1) In Section 3.0 of this Referral Report, the Executive Committee notes that Tungsten, which may have carcinogenic and other health effects in its elemental form, will not be extracted at the mine site. As such, neither the Screening Report nor the Referral Report examines the health effects of elemental tungsten.

1.7 ENVIRONMENTAL QUALITY

Na-Cho Nyak Dün made several comments regarding soil erosion and vegetation loss. In its November 2009 effects assessment submission, it noted potential impacts to vegetation such as deforestation and undergrowth clearance, disappearance of important reproductive areas for aquatic species, etc. It noted potential impacts to soils such as compaction, erosion and loss of topsoil as well as the potential for contamination by fuel spills or leaks (YOR 2008-0304-118-1).

Soil erosion and vegetation loss as a result of the Project have been considered in Section 10.4 of the Screening Report. Although the comments from NND are not specifically re-iterated, the issues raised by the First Nations are reflected in the Proponent's effects assessment and mitigations and the Executive Committee's significance determination.

Section 10.3 of the Screening Report addresses environmental contamination, as per NND's concern regarding the potential for environmental contamination from leaks (YOR 2008-0304-118-1).

1.8 HERITAGE RESOURCE AND TRADITIONAL LAND USE

In its 2009 submission, NND noted that the Project had the potential to have significant adverse effects to heritage resources provided the Proponent follows legislation and communicates any discoveries of heritage resources (YOR 2008-0304-118-1). In its response to the Draft Screening Report, NND noted the heritage resources that could be affected related to NND ancestral travel routes through the Selwyn Mountains, as well as hunting camps along the Hess River, and trails up the Hess River through Macmillan Pass at the mine site. For example, NND stated there was "*no recognition of the special nature of the MacPass – Keele peak area*" (YOR 2008-0304-285-1).

Further, NND noted that the Hess River continues to be an important access route to hunting and fishing grounds.

NND also noted it agrees with the Executive Committee's terms and conditions to conduct traditional land use studies and heritage resource assessments of the area, and notes the Proponent should also consider the NNDFN Traditional Knowledge Framework found on the NND website.

Section 11.0 of the Screening Report considers the effects of the Project on heritage resources and traditional land use. The above concerns are included in the effects characterization (Section 11.4.2). The terms and conditions are intended to mitigate significant adverse effects identified in the Screening Report.

1.9 LAND AND RESOURCE USE

In its comment submission on the Draft Screening Report, NND noted the proposed road would have *"cumulative effects of additional land users, recreationists, infrastructure developments, and further mining because of increased access to remote area"* (YOR 2008-0303-285-1).

The proposed road has been removed from the Project.

In relation to the whole Project, NND also expressed concern that project activities would result in increased access to the Hess River by other mining companies, increased recreational travelers on the Hess and Stewart Rivers, and that there had been a *"lack of consideration of Kaska Dena (RRDC) Traditional Knowledge and inadequate consultation to community and land/resource users that will be directly affected by project activities"* (YOR 2008-0303-285-1).

Effects to land users from year-round use of the area has been considered in the effects assessment in Section 12.2.

1.10 MONITORING AND EMERGENCY PLANS

NND agreed with the Executive Committee's recommendation to implement comprehensive monitoring programs. NND stated that:

...the monitoring program should encompass the many values present at the site; water quality/quantity of river systems, air quality, vegetation toxicology, wildlife and any land treatment. Baseline data should be collected on water quantity and quality in groundwater wells for background reference. Monitoring should be ongoing for the mine life, providing for temporary closure periods. NND stresses that post closure water monitoring should extend far beyond the proposed 5 year period following closure. Also emergency plan [sic] should be established to deal with possible failure scenarios (i.e. dam breaching, contaminant release, spills, and acid leaching from tailings to groundwater).

(YOR 2008-0304-285-1)

Monitoring plans were included under Section 15.0 of the Screening Report as terms and conditions of the Executive Committee's recommendation, for effects to water quality and quantity, precipitation, drainage, aquatic resources, wildlife, and vegetation toxicity.

2.0 WASTE ROCK STORAGE

In its reasons for decision of the referral back, the Government of Yukon stated that the referral was based on two key issues, one of which was “*inconsistency between the analysis and terms and conditions relating to waste rock storage*” (YOR 2008-0304-354-1). The Government of Yukon submitted additional comments during the public comment period on the referral which stated “*it is not clear how the waste rock will be incorporated into the DSTF without compromising the integrity of the facility*” (YOR 2008-0304-362-1).

The Executive Committee retained EcoMetrix Incorporated and Terraprobe to provide technical support services in relation to the concerns raised by the Government of Yukon. EcoMetrix focused on issues related to geochemistry and Terraprobe focused on issues related to geotechnical stability. Both consultants reviewed the waste rock issues raised by the Government of Yukon and aided in the development of a request for supplementary information issued by the Executive Committee on June 13, 2014 (YOR 2008-0304-376-1). The consultants provided a technical memorandum on June 25, 2014 (Appendix C) reflecting their review of the proponent's response received June 20, 2014 (YOR 2008-0304-0377-1).

This section addresses the following topics:

- Context for Waste Rock Management
- Consideration of Proponent Commitments
- Removal and Testing
- Temporary Storage
- Permanent Disposal
 - o Capacity of DSTF¹ and Underground and Below Water Table
 - o Geotechnical Stability of the DSTF
 - o Geochemistry
 - o Closure

In addressing the key issue raised by the Government of Yukon on waste rock management, the Executive Committee has determined that the Project will result in significant adverse effects to water resources. These effects can be mitigated by recommended terms and conditions.

¹ DSTF – This refers to the Expanded Dry-Stacked Tailings Facility which will contain both tailings and waste rock generated from the mine.

2.1 CONTEXT FOR WASTE ROCK MANAGEMENT

The original proposed method for waste rock disposal for the Mactung Mine Project included co-mingling with tailings and deposition underground in mined-out stopes both below and above the groundwater table. The underground and below the water table approach was generally well-accepted by technical reviewers and was recommended as an acceptable disposal method within the Screening Report due to predicted effectiveness in minimizing the risk of acid rock drainage/metal leaching (ARD/ML) issues. However, the option to dispose of waste rock underground and above the water table was not recommended due to concerns related to potential ARD/ML and associated adverse effects to water resources. As noted in the Screening Report:

The Executive Committee is not confident that backfilled stopes above the water table with bulkheads is an effective disposal method to manage ARD/ML issues. Before using backfilled stopes above the water table as a disposal method, conclusive evidence must demonstrate containment and geochemical stability based on the in-situ monitoring program. There are no such assurances at this time.

The Executive Committee recognized that NATC may wish to develop a better understanding of the feasibility of disposing of waste rock and tailings underground and above water and, as such, recommended that:

19) The Proponent shall not dispose tailings or waste rock into any stope above a level that will be above the water table after closure with the exception of one stope should the Proponent proceed with its proposed stope monitoring program.

(YOR 2008-0304-346-3)

During the screening, there was uncertainty regarding the feasibility of disposing all potentially acid-generating (PAG) waste rock underground due to the lack of volume capacity as well as challenges associated with accessing backfilled stopes and “*particularly after closure when much of the underground workings will no longer be accessible, would not be feasible*” (YOR 2008-0304-346-3). As such, the Executive Committee requested an adaptive management plan that included alternatives for waste rock disposal should the underground methods not be feasible. NTC provided an adaptive management plan with the following proposed options for tailings and waste rock disposal:

- 1. A surface dry-stacked tailing facility which will include disposal of waste rock, within the tailings.*
- 2. Underground co-disposal of waste rock and tailing in mined out stopes above the water table behind bulkheads.*
- 3. Underground co-disposal of waste rock and tailings in mined out stopes below the water table behind bulkheads.*

(YOR 2008-0304-301-1)

As noted above, the Executive Committee determined that there was insufficient information to support option two (i.e. underground and above the water table), while there was general support for

option three. Option one (i.e. waste rock disposal within the dry stacked tailings facility) was generally accepted by the Executive Committee as an alternative due to the Proponent's information noting that the DSTF could accommodate all of the waste rock and tailings produced. As such, the Executive Committee recommended certain terms and conditions related to waste rock disposal within the DSTF, including:

16) The Proponent shall account for the costs of temporary mine closure including those costs related to the transfer of all waste rock and tailings that is not characterized as NAG to the DSTF as part of the mine security.

56) The Proponent shall only dispose tailings and waste rock into the dry-stacked tailings facility.

(YOR 2008-0304-346-3)

However, Government of Yukon's referral of the recommendation back to the Executive Committee notes an inconsistency within the Screening Report regarding waste rock disposal within the DSTF, namely that:

A DSTF is an engineered facility that is constructed with dewatered tailings that are uniform in nature; it is not clear how the waste rock will be incorporated into the DSTF without compromising the integrity of the facility. Page 171 of the screening report states "The Executive Committee notes that the DSTF is not designed for the disposal of waste other than tailings, therefore the inclusion of other type of waste could destabilize the facility and have unintended consequences." Term and Condition 56 that follows this statement allows for the placement of waste rock and tailings into the DSTF, it is unclear if this is a typographical error or if the Executive Committee has determined that the inclusion of waste rock in the DSTF will not compromise the stability of the DSTF.

(YOR 2008-0304-362-1)

The Executive Committee recognizes that waste rock disposal within the DSTF was not well-supported in proposal documents (e.g. stability assessments of the DSTF included assumptions that only tailings would be deposited within the facility). Based on the lack of detailed information, potential adverse effects associated with this alternative were not adequately assessed within the Screening Report.

To address these issues, the Executive Committee took the following actions:

- conducted an additional review of waste management alternatives outlined within proposal documents, including the adaptive management plan;
- requested additional information from the Proponent regarding the adaptive management plan alternative of waste rock disposal within the DSTF;
- retained additional technical support to review this additional information; and
- amended existing and/or developed additional recommendations for waste rock management in order to mitigate significant adverse effects to water resources.

Based on these actions, the Executive Committee confirms that waste rock will initially be stored in temporary stockpiles prior to permanent disposal within the DSTF or underground and below the water table. To be clear, the Executive Committee recommended term and condition #56 (i.e. *“the Proponent shall only dispose tailings and waste rock into the dry-stacked tailings facility”*) to ensure that the Proponent would not be permitted to deposit other forms of waste within the DSTF (e.g. large waste items such as scrap metal). As noted in the Screening Report, *“the DSTF is not designed for the disposal of waste other than tailings, therefore the inclusion of other type of waste could destabilize the facility and have unintended consequences”*.

Based on the analysis in this new recommendation, Section 10.3.1 of the Screening Report is revised as follows: the DSTF is not designed for the disposal of waste other than tailings and waste rock, therefore the inclusion of other type of waste could destabilize the facility and have unintended consequences. The Executive Committee's new recommendation addresses the concerns raised by the Government of Yukon in their referral and subsequent comments.

2.2 CONSIDERATION OF PROPONENT COMMITMENTS

The Executive Committee recognizes that there are a number of key mitigations the Proponent has committed to implementing that relate specifically to waste rock management. These commitments have been sourced from the proposal, responses to requests for supplementary information, the Adaptive Management Plan, and recent commitments made in the June 20, 2014 response. The Executive Committee has considered all of these commitments in concluding this new recommendation.

The Proponent made the following commitments in relation to disposal of waste rock in their response for supplementary information submitted June 20, 2014:

- *The tailings and waste rock would be transported separately by truck.*
- *NTC will be testing waste rock on an ongoing basis. Based on the results and whenever practical, the most reactive waste rock will be placed underground in locations that are determined to be underwater after closure.*
- *Waste rock that is considered PAG and not able to be placed underground will be placed within the dry stack areas that are located the most distant from contact with oxygen and water.*
- *The dry stack cover design will take into consideration the location of these PAG materials and will be designed accordingly.*
- *All efforts will be undertaken to store as much of the PAG waste rock as possible in this manner (i.e. underground below the water table), but it is anticipated that some PAG waste rock will need to be placed within the dry stack location.*
- *The waste rock will be disposed as a separate material which will have graded filters designed to prevent migration of fines between the units.*

(YOR 2008-304-377-1)

The Proponent's response aligns with the following commitments made in the Adaptive Management Plan provided by the Proponent in September, 2013:

- *Once the mine process plant is in operation and tailings/waste rock are being produced and placed in the DSTF or underground test stope, water samples will be collected for laboratory analysis from any water draining from the tailings and waste rock.*
- *Comparative analysis of volumes and contaminant concentrations will be completed for the leachate water prior to and following placement of the tailings and waste rock.*
- *The water quality parameters that will be monitored include pH, sulphate concentration, and dissolved metals as these are indicators of ARD/ML.*
- *Groundwater monitoring will be ongoing throughout the life of mine to refine the groundwater modelling process and to detect any groundwater changes. The groundwater monitoring will include the following:*
 - o *Piezometric monitoring of water levels in boreholes from surface and underground; and*
 - o *Collection of groundwater samples for laboratory analysis.*
- *If separation of NAG and PAG material during mining operations is not feasible then all the material will be disposed of in the DSTF.*
- *Prior to placement, both tailings and waste rock material will be sampled for geochemical characterization. Samples collected will be analyzed using a standard suite of static test work for geochemical characterization, including ABA analysis, SFE analysis, and whole rock metals analysis as per the guidelines outlined in Price (2009).*
- *NATC has committed to the installation of a water treatment facility at the outset of operation. The water treatment plant is considered to be an additional contingency in the unlikely event that surface water or groundwater related to future mine operations requires active treatment measures. The conceptual design criteria for the treatment facility have been established in other documents submitted to YESAB.*

(YOR 2008-304-301-1)

The Proponent's response included a technical memo from Tetra Tech EBA (YOR 2008-0304-377-1) that noted "*only non-PAG material will be left exposed on the front face of the DSTF*".

The Proponent provided the following commitments in their addendum to the proposal:

NATC commits to not blending potentially acid generating (PAG) and non-acid generating (NAG) waste rock for the purposes of surface infrastructure construction. PAG rock will be stored separately on surface from NAG rock and will be disposed of underground as backfill during the construction phase, as per the project proposal.

Unweathered PAG geological materials (NPR<2.0) will not be utilized for road construction materials to minimize the incorporation of PAG materials into the access road.

The existing groundwater observation wells MW-MT-08-04, and MW-MT-08-04B downgradient of the DSTF will be monitored for groundwater quality during the operational phase to confirm groundwater chemistry in this area.

Monitoring will continue post mine closure for five years to ensure that the geomembrane cover effectively prevents ongoing seepage through the DSTF.

Groundwater samples should be collected annually for the first three years following mine closure and biannually thereafter if necessary. The samples should be analyzed for major ions and dissolved metals.

NATC will establish a monitoring program for encapsulated PAG materials to determine whether design modifications are required prior to final closure.

(YOR 2008-0304-083-2 thru 086-2)

The Proponent also provided the following commitments in their Decommissioning and Closure Plan:

- *The compacted granular base will also act as a blanket drain under the DSTF structure to allow groundwater and seepage water to freely drain from beneath the pile.*
- *Geotechnical inspections to ensure that the cover system for the Dry Stacked Tailings Facility (DSTF) is functioning as per design are required annually for a period of three years.*
- *Following that initial period it is anticipated that an inspection frequency of every 5 years would be required for a total of twenty years.*
- *Groundwater monitoring downgradient from the Dry Stacked Tailings Facility (DSTF) and the underground workings is proposed to occur for a total of 10 years following the end of the production phase. Sampling trips during the first three years would coincide with the other required water quality monitoring. The remainder of the testing would be conducted on two year intervals for the ten years.*
- *All run-off from the plant site and waste rock dumps will report to the Ravine Dam in addition to that coming from the Dry Stacked Tailings Facility which will occupy half of the Tributary C basin area.*

(YOR 2008-0304-066-2)

2.3 REMOVAL AND TESTING

The Executive Committee requested supplementary information in relation to waste rock management on June 13, 2014 (YOR 2008-304-376-1). The Proponent responded June 20, 2014 (YOR 2008-304-377-1). In the response to question R2.b the Proponent committed to following the criteria outlined in the pHase Geochemistry Memorandum for segregation of PAG and non-PAG waste rock. The criteria outlined by pHase Geochemistry is as follows:

- Only rock with a carbonate NP/AP value >2 [will] be considered non-PAG and appropriate for use as construction.

- Samples with values less than 1 should be considered PAG and samples with values between 1 and 2, while considered uncertain with respect to ARD potential, should be managed as PAG until such time that more information on the variability and kinetics of geochemical behaviour of rock at Mactung on an operational scale can be obtained.
- In order to quantify the carbonate NP/AP of samples, it is recommended that NATCL provide for leco furnace capabilities on site that could be used to analyze for total sulphur and carbon of material as surrogates for AP and carbonated NP respectively. Results would be used to calculate AP and NP in units of kg CaCO₃/t equivalent and the resulting NP/AP ratios.
- It is suggested that a frequency of one sample per blast round and/or muck round be considered. Sampling would be completed such that a composite representing the blast round with a sample size no less than 2kg be collected.
- A QA/QC sampling and testing program would also be recommended to complete as part of the routine monitoring. This should consist of approximately 10% of samples being split and sent to an off-site accredited analytical laboratory for total sulphur and total carbon analyses (by leco) as well as a full acid base accounting (ABA) methodology and metals. This should include analyses completed on the bulk samples as well as specific size fractions (-2mm, 2 to 6mm and >6mm) on a proportion of the QA/QC samples.
- All results should be kept in a central database with associated annual reporting.
- After one year of operations, it is recommended that a detailed review of results and segregation success be completed. This would entail sampling and verification testing of samples representing placed construction rock to confirm the non-PAG nature. If justified, it may also include a revision to the proposed criteria and/or sampling frequency suggested here.

EcoMetrix noted the following in their review of the Proponent's June 20, 2014 response:

The criterion for segregation of non-PAG rock for construction materials was provided in the pHase Memo dated 19 June 2014. The criterion is considered to be appropriate if managed in the manner that is proposed by pHase with on-site analyses, quality assurance/quality control (QA/QC) testing and one-year follow-up. The criterion should be integrated in the Mactung Mine Project AMP, with one addition:

In addition to the method proposed in the pHase memo to estimate potential carbonate neutralization potential (NP), we recommend that the proponent add follow-up testing to verify that the total carbon measured in the different rock types encountered during mine development effectively represents carbonate NP. The use of total carbon, by combustion furnace analysis, as proposed by pHase, as an indicator of carbonate content implies that all carbon is in carbonate form. If organic carbon or non-carbonate carbon such as graphite is present in the samples, the use of total carbon as an indicator of carbonate content will result in an over-estimation of potential carbonate NP in the samples. Therefore, the assumption that total carbon is an acceptable surrogate for carbonate NP for each type of rock

encountered should be verified during the project development period and adjustments to carbonate NP made accordingly.

(Appendix C)

In addition to the consideration of commitments noted above and points raised by EcoMetrix, the Executive Committee also reviewed the following commitments from the Proponent's Adaptive Management Plan provided September, 2013:

- *Tailings sampling will be undertaken from the start of production, and will include collecting samples of materials sent to the DSTF.*
- *A daily composite sample will be taken in accordance with MEND Report 1.20.1 chapter 8. In addition, samples will be taken from the DSTF during the summer by trenching or auguring to evaluate the oxidation of the tailings within the facility.*
- *Waste rock samples collected will be submitted for the standard suite of static test work for geochemical characterization, including Acid Base Accounting (ABA) analysis, Shake Flask Extraction (SFE) analysis, and whole rock metals analysis as per the guidelines outlined in Price (2009).*
- *There will be ongoing sampling, testing, analysis of waste rock excavated during mining operations. The information collected will be compared to preliminary characterization test work completed to date, including ongoing humidity test cell analysis on waste rock material. This information will be evaluated and used to inform waste rock disposal options.*

(YOR 2008-304-301-1)

The Executive Committee also considered the following clarification to the Adaptive Management Plan made by the Proponent on December 16, 2013:

- *Ongoing sampling and analysis during development and production will guide the use and disposal of waste at the mine site. Using the appropriate scaling factors for local geochemistry and geology, results from on-site combustion analysis for carbon and sulphur can be used to establish and classify rock on the basis of ABA values and the subsequently select placement options, accordingly.*

(YOR 2008-0304-338-1)

The Executive Committee agrees with EcoMetrix that the pHase Geochemistry criteria outlined above needs to be integrated into the Adaptive Management Plan. Further, the Executive Committee also agrees with the concerns raised by EcoMetrix in relation to the potential to overestimate carbonate NP in samples. An over-estimation of carbonate NP could result in inaccurate predictions for waste rock classification. For example, waste rock could be erroneously categorized as non-PAG due to this over-estimation of carbonate NP. This has critical implications for the use and disposal of this waste rock (e.g. use of waste rock for the front face of DSTF and road construction). The Executive Committee has determined that inaccurate categorization will lead to significant adverse effects to water resources. As a result, an update to the Adaptive Management Plan is required to integrate

new commitments. The following term and conditions will ensure the Project will not result in a significant adverse effect to water quality.

Terms and Conditions

The following term and condition is specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality.

To ensure the Adaptive Management Plan is updated with appropriate waste rock classification criteria:

1. The Proponent shall update the Adaptive Management Plan to: integrate the waste rock classification criteria outlined in the June 19, 2014 pHase Geochemistry memo; and to incorporate the commitments noted in their June 20, 2014 response (YOR 2008-0304-377-1).

To ensure that carbonate NP is not overestimated and result in inaccurate predictions for waste rock classification.

2. The Proponent shall conduct follow-up testing to verify that the total carbon measured in the different rock types encountered during mine development effectively represents carbonate NP. The Proponent shall make adjustments to carbonate NP accordingly.

2.4 TEMPORARY STORAGE

The Proponent indicates in their proposal that development waste rock will be “temporarily stockpiled approximately 500 m from the existing adit portal and conveyor entrances” and “will only be stored on surface for less than five years”. (YOR 2008-0304-023-2)

The Proponent clarified in their response to the Adequacy Review Report that:

Two temporary stockpiles of waste rock from the underground workings will be established in close proximity to the portals. Approximately 32,000 m³ of waste rock will be generated near the main conveyor decline adjacent to the processing plant infrastructure pad. Approximately 92,000 m³ of waste rock will be stored near the ventilation adit portal.

(YOR 2008-0304-083-2)

The Proponent also notes the following additional commitments:

NATC will visually inspect and record the waste rock piles on a monthly basis. If the monthly visual inspection indicates the onset of acidification, monitoring of the shallow groundwater quality downgradient of the waste rock storage areas may become necessary. Samples should be taken quarterly – if necessary based on visual inspection – from a shallow observation well to be installed approximately 10 m downgradient of any proposed PAG waste rock storage areas prior to mine construction, and any springs immediately downgradient of the waste rock storage area during spring, summer, and early fall when the active layer is unfrozen.

(YOR 2008-0304-023-2)

EcoMetrix's technical review from June 25, 2014 noted that:

Temporary storage of PAG waste rock on surface and in contact with air and water may lead to the development some soluble metals and acidity that will require management and mitigation measures. We understand that there may be temporary storage of rock near the existing adit portal and the conveyor entrances respectively during operations. Additionally, should the mine be subject to temporary closure the waste rock characterized as PAG would be relocated to the DSTF to isolate PAG material at a single facility for monitoring (Temporary Closure Plan; YOR 2008-0304-299-1). Monitoring and testing of the PAG rock will be required prior to relocation to determine if mitigation will be required. Specific control measures to reduce potential adverse effects of the onset of acid generation should be identified during licensing. The associated monitoring of PAG rock and development of mitigation including triggers that will initiate additional control measures should be included in the AMP.

Methods to mitigate the onset of acid generation before, while or after placing the rock underground could include, for example, pH adjustment while relocating rock or after placement of the rock to mitigate acid and metal concentrations.

As well, during licensing, NATC will need to demonstrate how they will manage water at waste rock temporary storage areas during operations to mitigate potential releases of contact waters with elevated metals to the environment, for example, water monitoring, water collection, water treatment, low permeability liners.

(Appendix C)

The estimated volume of waste rock that will be generated by this Project is substantial (i.e. 1 026 433 m³). As noted, two temporary stockpiles will be available in proximity to the adit with respective capacities of 32 000 m³ and 92 000 m³ or a total of 124 000 m³. The majority of this material will require temporary storage prior to transfer to permanent disposal locations. Based on a mine life of 11.2 years, the amount of waste rock generated per year will be 91 645 m³ which means that within the first year and a half of operations, the temporary stockpiles could be fully utilized unless permanent disposal options are made available.

In consideration of comments from EcoMetrix, the Executive Committee has determined that there are three key issues with the temporary stockpiles: limited capacity; management of ARD/ML; and testing to determine management of waste rock prior to permanent disposal.

First, while the Proponent estimates waste rock may be stored for as long as 5 years, the reality is that the constant mine throughput will necessitate early access to the permanent disposal locations to ensure continued capacity within the temporary stockpiles. The main permanent disposal option is the DSTF. This conclusion is based on the fact that disposal of waste rock underground and below water table will not immediately be available due to operations and also that there is limited capacity (i.e. it only represents 4.1 % of the total required volume). Therefore, it is critical for the DSTF to be constructed and made available early in the mine life. According to the proposal, the construction of the DSTF will be complete prior to commencing mining operations.

Second, based on the conservative assumption that 100% of the waste rock will be PAG (i.e. given the results of static tests and the lack of kinetic test data), the temporary stockpiles will contain

potentially up to 124 000 m³ of waste rock that could result in ARD/ML. This further supports the need for the DSTF to be operational early in the mine life. Also, as indicated by EcoMetrix, the temporary stockpiles will need to be carefully managed to monitor the PAG rock and to eliminate, reduce or control adverse effects to water resources (e.g. liner system to collect, test and treat as needed contact water). In conclusion, the temporary stockpiles are critical components for waste rock management during the mine life.

In its comments on the draft screening report, NND expressed concern with the potential for acid rock drainage impacts to groundwater, and ultimately to water quality in the Hess River headwaters:

NND is concerned about deficient testing to predict Acid Rock Drainage (ARD) potential of waste rock at the Mactung mine site. The YESAB Executive committee accepted that they did not expect discharge from the temporary waste rock storage (DSR, p 127). However, L. Catalan Ph.D. (Consultant to Kaska Dena First Nation) recently stated concern about the lack of kinetic testing of PAG waste rock in humidity cells and questioned YESAB's determination. More testing should be required from the proponent in order to reduce uncertainty on the time at which the waste rock will start producing acid drainage. This information is needed for developing realistic decommissioning and water management plans.

(2008-0304-285-1)

The Executive Committee agrees with NND's concerns over the lack of kinetic testing of PAG waste rock. The Executive Committee understands that kinetic tests were initiated based on the concerns raised and that the results should be available soon, but were not available for consideration in this screening. In the absence of kinetic test data, and based on the data available from the static tests, the Executive Committee has made the conservative assumption that 100% of the waste rock will be PAG. With this in mind, NND's comments support the need to carefully manage and monitor PAG rock stored in the temporary stockpiles to eliminate, reduce or control adverse effects to water resources.

Third, the Proponent is proposing a waste rock characterization program, developed by pHase Geochemistry (YOR 2008-0304-377-1) to segregate PAG from non-PAG rock and determine placement and management within the temporary stockpiles. PAG rock temporarily stored will experience weathering and potentially the onset of acid generation and metal leaching. PAG rock will also have varying levels of reactivity depending on the characteristics of the rock and exposure to air and water. Further characterization is necessary prior to final disposal to ensure that PAG rock is properly managed.

The Screening Report considered that temporary storage of waste rock may result in significant adverse effects to water resources. Particularly in consideration of temporary mine closure and the potential for temporary storage of waste rock beyond the proposed 5 year timeline. Term and condition #16 of the Screening Report mitigated this significant adverse effect.

In light of the referral and clarification on the volume of PAG material anticipated to pass through these temporary stockpiles, the Executive Committee agrees with the concerns raised by EcoMetrix and NND. The Executive Committee has determined that the Project will result in significant adverse effects to water resources. Additional mitigation is required.

Terms and Conditions

The following term and condition is specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality.

To ensure appropriate management of waste rock stored in temporary stockpiles:

3. The Proponent shall design and build the temporary waste rock stockpiles to ensure that water infiltration is minimized and contact water is collected, monitored and sent to the water treatment plant if effluent exceeds discharge standards for COPCs. Temporary stockpiles shall include an impermeable liner to ensure complete capture of contact water. A groundwater monitoring program shall be developed and implemented to monitor groundwater downgradient of the temporary stockpiles.
4. The Proponent shall develop proactive control measures and triggers to implement those measures within their adaptive management plan to reduce, eliminate or control adverse effects associated with acid generation and metal leaching from waste rock stored in temporary stockpiles.
5. The Proponent shall implement, where necessary, measures that mitigate the onset of acid generation before, while or after placing the waste rock into permanent disposal locations (i.e. DSTF or underground and below water table). The Proponent shall develop and implement a detailed test program of the temporarily stored waste rock prior to re-location to its final repository either underground below the water table or within the DSTF. The objective of the test program is to quantify the soluble acidity and metals in the waste rock that may require pH adjustment prior to final disposal and to evaluate dosing requirements with suitable reagents, such as lime, to mitigate potential adverse effects of the waste rock on water quality after relocation. The test program shall include a frequency of sampling that recognises the potential for variations in weathering products within the PAG stockpile as it is being relocated. Rather than identifying PAG and non-PAG rock however, the purpose of the test program will be to quantify the reagent(s) required to mitigate the quality of water either in the flooded waste rock underground after flooding has occurred, or in the pore water / moisture on the waste rock that will be co-deposited with the tailings. Follow-up water quality monitoring that is included in the adaptive management plan for underground disposal and for the DSTF will monitor the effectiveness of this mitigation and identify if further measures are required to achieve and maintain acceptable water quality. This shall be consistent with the Proponents adaptive management plan that includes post closure monitoring of the various facilities at the site.
6. The Proponent shall ensure their water management plan accounts for how water at the temporary stockpiles for waste rock will be appropriately managed to mitigate potential releases of contact waters with elevated metals to the environment. For example, water collection, monitoring and treatment as needed.
7. The Proponent shall submit their updated Adaptive Management Plan and Water Management Plan for review by Environment Canada, Government of Yukon, the Yukon

Water Board, Liard First Nation, First Nation of Nacho Nyak Dun and Ross River Dena Council. The Government of Yukon and/or Yukon Water Board will determine whether to approve the plans after consideration of comments from the other named parties.

2.5 PERMANENT DISPOSAL

The Executive Committee has considered the permanent disposal of waste rock by examining the following aspects:

- Capacity of DSTF and Underground and Below Water Table
- Geostability
- Geochemistry
- Closure

The Executive Committee has determined that the permanent disposal of waste rock will result in significant adverse effects that can be mitigated by implementing recommended terms and conditions.

2.5.1 Capacity of DSTF and Underground and Below Water Table

EcoMetrix noted the following in their review of the Proponent's June 20, 2014 response:

The information provided on the estimated quantity of rock, including PAG and non-PAG rock is adequate to understand required storage capacity for PAG rock in the combination of the DSTF and underground workings below the water table. Only one uncertainty remains and it relates to the quantity of tailings expected for the project. The project description notes that the total quantity of tailings will be 4.26 Mm³ while the 2013 AMP (Figure 5), YOR document 2008-0304-301-1, quotes a value of 3.4 Mm³ for total tailings for the project. If the AMP figure is correct, then there will be adequate storage capacity for the tailings plus the upper estimate of PAG rock in the DSTF plus the underground workings below the water table. If the project proposal number is correct, then there will be inadequate storage capacity in those two facilities for the combined volumes of tailings and PAG rock.

YESAB EC should be aware that the review has considered a total tailings and waste rock storage capacity of 4,680,000 m³, including 180,000 m³ in underground workings below the water table and 4,500,000 m³ at surface in a Dry Stack Tailings Facility area. The Project Proposal does not consider the need for additional waste rock and tailings disposal beyond that maximum value and the potential environmental and socio-economic effects of storage above that maximum volume has not been assessed, therefore YESAB should consider 4,680,000 m³ as a maximum storage volume for the Mactung Mine Project.

(Appendix C)

The Executive Committee has confirmed with the Proponent that the total amount of waste rock is estimated to be 1 026 433 m³ and the total amount of tailings 3 378 730 m³ for a total of 4 405 163

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m³. These estimates are based on their June 20, 2014 response (YOR 2008-0304-377-1) and align with the estimates provided in figure 5 of their adaptive management plan, and specifically in relation to 'scenario 2: no underground backfilling' (YOR 2008-0304-301-1). The Executive Committee recognizes that the Proponent initially proposed a total amount of tailings of 4 261 000 m³ and this volume, combined with the estimated quantity of waste rock would exceed the proposed combined capacity of the DSTF and disposal underground and below water table. The Executive Committee agrees with EcoMetrix that 4 680 000 m³ is the maximum storage volume for the Project and this would be sufficient for the Proponent's revised estimates for waste rock and tailings. Exceeding the capacity for disposal of waste rock and tailings would result in this material being temporarily stored for longer periods of time which could result in significant adverse effects related to ARD/ML. The Executive Committee has determined that the Project as proposed will have an approximate buffer capacity of 274 837 m³ (i.e. available for tailings and waste rock) and that this is sufficient for permanent disposal of this material.

The Executive Committee acknowledges that there is limited capacity available to dispose of waste rock and/or tailings underground and below water. Specifically, 180 000 m³ capacity relative to the 4 405 163 m³ total volume of waste rock and tailings. The capacity underground and below water table represents 4.1% of what is required for storage. This emphasizes how important the DSTF is for managing the volume of waste rock and tailings that will be produced.

The Executive Committee reaffirms its determination that the only options available for permanent disposal of waste rock and tailings are through use of the DSTF and underground and below water table. The Proponent had listed additional options in their adaptive management plan and subsequently in their clarifications to this plan (YOR 2008-0304-301-1 and 338-1). These additional options are: *crushing and blending of PAG rock with non-PAG rock to achieve the desired ABA result (net non PAG) then placing underground and above the water table; and new proven technologies that become available and are accepted practices within the mining industry.* In relation to the first additional option, as noted in the Screening Report:

The Executive Committee is not confident that backfilled stopes above the water table with bulkheads is an effective disposal method to manage ARD/ML issues. Before using backfilled stopes above the water table as a disposal method, conclusive evidence must demonstrate containment and geochemical stability based on the in-situ monitoring program. There are no such assurances at this time.

Based on this determination, the Executive Committee recommended term and condition #19 to ensure that tailings and waste rock would not be disposed of underground and above water table.

In relation to the second additional option (i.e. new proven technologies), the Proponent has not provided any information to substantiate this option. As such, this option is not considered to be part of the project scope and the Executive Committee has not given it any further consideration.

In conclusion, the Executive Committee reaffirms term and condition #19 from the Screening Report. The Proponent must update their adaptive management plan with respect to this term and condition and the conclusions in this report.

2.5.2 Geotechnical Stability of the DSTF

The referral issued by Government of Yukon identified waste rock management as a key issue. Specifically they stated: *"it is not clear how the waste rock will be incorporated into the DSTF without compromising the integrity of the facility"*. (YOR 2008-0304-354-1) As noted, the Executive Committee contracted Terraprobe to examine this matter and they aided in the development of a request for supplementary information issued by the Executive Committee on June 13, 2014 (YOR 2008-0304-376-1). The request focused on the following issues:

- Clarification of whether the waste rock will be co-mingled, co-placed or co-disposed within the DSTF.
- Clarification of where and how waste rock will be placed within the DSTF.
- Characterization of the waste rock to demonstrate compatibility of tailings and waste rock for co-disposal.
- Characterization of the waste rock co-disposed with tailings and justification of chosen parameters.
- Plans and profiles of the proposed disposal of waste rock within the DSTF to give a visual depiction of how the tailings and waste rock will work together.
- Details of assumptions regarding the ground water table within the DSTF.
- Geotechnical stability analyses demonstrating that the required factors of safety can be achieved.

The Proponent responded to the request for supplementary information on June 20, 2014. As noted in the response:

Three cases were considered for stability analyses; a thin (5 m wide) armouring of waste rock on the front face of the DSTF, a thicker (30 m wide) armouring of waste rock on the front face of the DSTF and alternating 3 m thick layers of waste rock and tailings. In each case, the calculated factors of safety for the DSTF meet or exceed the required minimums.

(YOR 2008-0304-377-1)

Terraprobe reviewed the response and their technical memorandum is attached in full in Appendix C. In summary, Terraprobe concluded the following:

Terraprobe has no further information requests and confirms that the information provided by the proponent is adequate. Based on the responses and analyses provided by NATC and Tetra Tech EBA, it is Terraprobe's opinion that the DSTF can be designed and constructed using waste rock and tailings in one of the three manners presented such that adequate minimum factors of safety for deep seated and bench failures can be achieved.

(Appendix C)

Terraprobe based their conclusion on the assumption that the final design of the DSTF would have a general configuration that is comparable to one of the three cases proposed.

Terraprobe agrees with the EBA concluding statement regarding the viability of the preliminary options and analyses, as long as the detailed design of the final structure has a general configuration that is comparable to one of the three options for waste rock within the DSTF (5 m armouring, 30m armouring, or 3m layering of waste rock and tailings) as provided in the EBA technical memo. Therefore from a geotechnical perspective only, the response is adequate.

(Appendix C)

The Executive Committee recognizes that the Proponent did not explicitly commit to confining their design to one of these three cases. Further, that the Proponent has not completed final design of the DSTF facility which could lead to contemplating other options. Terraprobe's analysis however was confined to the three cases presented by Tetra Tech EBA on behalf of the Proponent. The Executive Committee has determined that failure to implement the DSTF using one of the three cases described would result in significant adverse effects since other options have not been given proper technical scrutiny. As such, mitigation is required.

The Executive Committee concludes that the request for supplementary information (YOR 2008-0304-376-1), the Proponent's response (YOR 2008-0304-377-1), Terraprobe's review (Appendix C) and the recommended term and condition address the concerns raised by the Government of Yukon in their referral and subsequent comments.

Terms and Condition

The following term and condition is specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality.

To ensure that the DSTF is constructed as presented by Tetra Tech EBA on behalf of the Proponent:

8. The Proponent shall complete a final design for the DSTF that has a configuration that is comparable to one of the three options for waste rock within the DSTF (i.e. 5 m armouring, 30 m armouring or 3 m layering of waste rock and tailings) as provided in the Tetra Tech EBA technical memo on June 20, 2014 (YOR 2008-0304-377-1).

2.5.3 Geochemistry

EcoMetrix reviewed the Proponent's June 20, 2014 response and in relation to geochemistry highlighted the following four aspects of the project:

- Placement of PAG Waste Rock below the water table in the underground workings
- Placement of the PAG Waste Rock by encapsulation in the tailings within the DSTF
- Use of Waste Rock as Construction Material
- Use of Waste Rock in the Construction of the DSTF Shell

This section presents the Executive Committee's determination based on EcoMetrix's findings and consideration of proponent commitments.

2.5.3.1 Placement of PAG Waste Rock below the water table in the underground workings

EcoMetrix noted the following in their review of the Proponent's June 20, 2014 response:

Placement of PAG rock below the water table in the underground workings is considered to be an appropriate mitigation measure to prevent acid generation in the future. We understand that the estimated maximum available storage in the underground workings below the water table is 180,000 m³. NATC states that they "will be testing waste rock on an ongoing basis. Based on the results and whenever practical, the most reactive waste rock will be placed underground in locations that are determined to be underwater after closure." The mitigation measures recommended by the EC in the Final Screening Report for underground disposal in mined out stopes should apply, including monitoring water quality, and if necessary, a one-time water treatment or pH adjustment can be applied as a mitigation to control COPCs in flooded stopes should they exceed acceptable levels when the stopes are initially flooded. The associated monitoring of water quality and development of mitigation including triggers that will initiate water treatment should be included in the AMP.

(Appendix C)

These comments reaffirm the terms and conditions related to disposal of waste rock underground and below water table recommended in the Screening Report. Specifically, terms and conditions #19 – 22. Further, the Executive Committee is satisfied that the terms and conditions in Section 2.4 in relation to temporary storage of waste rock are sufficient to mitigate potential acid generation and metal leaching within the underground and below water table permanent disposal location.

2.5.3.2 Placement of the PAG Waste Rock by encapsulation in the tailings within the DSTF

EcoMetrix noted the following in their review of the Proponent's June 20, 2014 response:

Placement of the PAG rock by encapsulation in the tailings within the DSTF is also considered to be an effective mitigation measure if the DSTF is appropriately covered by a membrane layer as proposed at closure. NATC states that "[w]aste rock that is considered PAG and not able to be placed underground will be placed within the dry stack areas that are located the most distant from contact with oxygen and water. The dry stack cover design will take into consideration the location of these PAG materials and will be designed accordingly." According to the conceptual design for co-disposal of tailings and PAG waste rock described by NATC, potential adverse effects to water quality from the DSTF will be similar to those assessed in the EC Screening Report for the expanded DSTF. Potential COPC loadings from the DSTF, where waste rock is fully encapsulated as layers within the DSTF, will be driven by the tailings component of the DSTF and therefore we consider that the assessment conclusions and mitigations proposed in the EC Screening Report are also valid for this disposal option. However, this opinion is based on a total maximum storage capacity of 4,500,000 m³ of tailings and waste rock in the DSTF. During licensing, regulators should ensure that the appropriate controls are imposed for DSTF construction and management.

NATC should also update estimates for waste rock production during mine development and inform regulators if the estimated volume of PAG waste rock will exceed the allowance for disposal in the DSTF.

(Appendix C)

It's the Executive Committee's understanding that PAG waste rock that is permanently disposed of within the DSTF will be isolated from oxygen and water due to encapsulation within the tailings and through the use of a cover system. This isolation is important because waste rock has a greater void space than tailings given the ability for the tailings to be compacted. Void space would potentially allow interaction with air and water if the cover system was compromised such that water infiltrated waste rock layers. This confirms the importance of properly characterizing PAG waste rock and ensuring that it is placed appropriately within the DSTF to minimize ARD/ML.

As noted by EcoMetrix, the ability to properly manage PAG waste rock is dependent on accurate estimates for waste rock and tailings production. A higher proportion of PAG waste rock could make it difficult to ensure appropriate encapsulation within the DSTF. The Executive Committee has assessed the Project as proposed, however it's critical for those estimates to be continually updated and verified to ensure appropriate capacity is available within the DSTF for PAG waste rock. As such, the Executive Committee agrees with EcoMetrix's findings and has determined that the permanent disposal of waste rock within the DSTF could result in significant adverse effects. Additional mitigation is required.

Terms and Conditions

The following term and condition is specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality.

To ensure appropriate capacity is available for PAG waste rock within the DSTF:

9. The Proponent shall conduct a sensitivity analysis annually to account for the total volume of tailings and waste rock generated to that point in time and to update estimates for future tailings and waste rock production volumes. The Proponent shall provide the sensitivity analysis for review by Environment Canada, Government of Yukon, the Yukon Water Board, Liard First Nation, First Nation of Nacho Nyak Dun and Ross River Dena Council. The Government of Yukon and/or Yukon Water Board will determine if the remaining capacity within the DSTF is sufficient to manage anticipated tailings and waste rock volumes based on the results of the sensitivity analysis, the importance of encapsulating PAG waste rock and consideration of comments from the named parties.

To ensure groundwater downgradient of the DSTF is monitored for contaminants of potential concern.

10. The Proponent shall develop and implement a groundwater monitoring program to monitor groundwater downgradient of the DSTF.

2.5.3.3 Use of Waste Rock in the Construction of the DSTF Shell

EcoMetrix noted the following in their review of the Proponent's June 20, 2014 response:

The method described by NATC includes the use of non-PAG waste rock for constructing a shell (i.e., armouring for the front face of the facility) for the DSTF. We understand that only non-PAG material may be left exposed on the front face of the DSTF (Tetra Tech, June 20, 2014 memo). In our opinion, any rock that may be left exposed to air and water within the DSTF should be tested for QA/QC to ensure that it is neither PAG nor likely to leach metals under neutral conditions. Metal leaching can be evaluated with kinetic tests on non-PAG rock and modeling will be required to demonstrate that the loadings from the kinetic test will not adversely affect the local receiving water quality. To mitigate potential adverse effects to water quality, water from the DSTF should be collected, monitored and treated as necessary to achieve the environmental objectives for the receiving environment during operations. At closure, any soluble metals or acidity resulting from the waste rock shell of the DSTF should be mitigated by appropriate pH adjustment methods and the waste rock shell should be covered along with the DSTF to mitigate long term adverse effects to water quality.

(Appendix C)

The Executive Committee understands that the use of non-PAG rock for construction material within the DSTF is sufficient to reduce adverse effects associated with ARD; however, this does not preclude metal leaching under neutral conditions. The Executive Committee is satisfied with the characterization criteria as summarized in Section 2.3; however, metal leaching under neutral conditions remains a concern especially if this rock was utilized in the DSTF shell where it would have ongoing exposure to air and water. The Executive Committee agrees with EcoMetrix's statements that water from the DSTF must be collected, monitored and treated as necessary. The closure issues related to use of waste rock as shell material in the DSTF is discussed in Section 2.5.3.3.

2.5.3.4 Use of Waste Rock as Construction Material

EcoMetrix noted the following in their review of the Proponent's June 20, 2014 response:

NATC is considering using non-PAG waste rock as construction material for mine infrastructure outside of the immediate DSTF, such as access roads. Any rock used in construction of mine infrastructure outside of the immediate DSTF should be tested to ensure that it is neither PAG nor likely to leach metals under neutral conditions. In the EC Screening report, the EC provided the following mitigation for borrow material that is also relevant to waste rock used for construction purposes:

'The following terms and conditions are specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality resulting from acid rock drainage and metal leaching.

To minimize the risk of ARD/ML from source material used for construction of infrastructure:

28) The Proponent shall conduct ABA characterization on blasted or milled rock that is intended for construction of mine infrastructure. If indicated by ABA results, kinetic testing should be completed to assess metal leaching potential of those materials. Only rock that is classified as non-acid generating and non-metal leaching shall be used for construction purposes'.

(Appendix C)

The Executive Committee agrees with EcoMetrix's findings and this reaffirms term and condition #28 recommended in the Screening Report.

2.5.4 Closure

The Executive Committee considered two issues with waste rock management in relation to closure including: closure costs and cover material; and ARD/ML of the DSTF. The Executive Committee has determined that the Project will result in significant adverse effects that can be mitigated by recommended terms and conditions.

2.5.4.1 Closure Costs and Cover Material

The Executive Committee notes that closure cost estimates for the DSTF have been provided within the Decommissioning and Closure Plan (YOR 2008-0304-066-2). However, the DSTF is now proposed to be expanded to account for the permanent disposal of both tailings and waste rock. As such, the closure cost estimates for the DSTF need to be updated to reflect the expanded DSTF. Further, the estimates for borrow materials required for the cover system also need to be updated. The Executive Committee has determined that failing to account for the increased cost and increased volume of borrow material could result in significant adverse effects. Additional mitigation is required.

Terms and Conditions

The following term and condition is specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality.

To ensure closure costs and borrow materials are accurately estimated for proper closure of the DSTF.

11. The Proponent shall update the estimates for closure costs and borrow material requirements within the Decommissioning and Closure Plan. These updates will account for the expanded size of the DSTF.

2.5.4.2 ARD/ML of DSTF

As noted above, EcoMetrix expressed concerns with neutral metal leaching from waste rock (i.e. non-PAG) used within the shell of the DSTF. Specifically, EcoMetrix noted the following in their review of the Proponent's June 20, 2014 response:

At closure, any soluble metals or acidity resulting from the waste rock shell of the DSTF should be mitigated by appropriate pH adjustment methods and the waste rock shell should be covered along with the DSTF to mitigate long term adverse effects to water quality.

(Appendix C)

The Executive Committee has determined that long-term exposure of waste rock used in the DSTF could result in metal leaching under neutral conditions. As such, the Project will result in significant adverse effects to water resources. Additional mitigation is required.

Terms and Conditions

The following term and condition is specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality.

To ensure waste rock used in the shell of the DSTF does not contribute to neutral metal leaching.

12. The Proponent shall, prior to closure, conduct in-situ testing of leachate from waste rock within the shell of the DSTF to ensure it is not producing soluble metals or acidity. If waste rock is leaching metals and/or producing acid, the Proponent shall mitigate with appropriate measures, such as pH adjustment, at closure and prior to installing a cover.
13. The Proponent shall cover the entire DSTF including the waste rock shell at closure.

3.0 CONSIDERATION OF COMMENTS RECEIVED DURING THE REFERRAL

The following sections address comments and concerns regarding the screening that were identified during the comment period on the Screening Report.

3.1 NORTH CANOL ROAD, TLU & WILDLIFE

The North Canol Road is the proposed access route to the Project for the transport of employees, contractors, fuel, supplies and concentrate. Section 11.4 of the Screening Report identifies that ground based traffic will be approximately ten round-trips per day during construction and four round-trips per day during operation. This is an increase from baseline conditions. The Project would lead to near year-round use of the North Canol Road which is currently only serviced seasonally by barge at Ross River. Sections 8.3, 11.4 and 12.2 of the Screening Report address the implications of year-round access to the North Canol Road by vehicle.

3.1.1 North Canol Road Upgrade and the Project

The Executive Committee received several comments regarding a lack of road management, landscape based planning, and environmental management in relation to North Canol Road. Throughout the assessment process, comments have identified traditional land use and wildlife values associated with the North Canol Road. Several comments received during the referral period

explicitly reference the road upgrade and its possible effects (YOR 2008-0304-358-1, 2008-0304-371-1, 2008-0304-357-1).

While the Executive Committee acknowledges these valid concerns, the upgrading of the North Canol Road was not included in the scope of the Project for the following reasons:

- The Proponent did not include the upgrade of the North Canol Road as a proposed activity and has indicated in its proposal that the Project can be undertaken without upgrading the North Canol Road.
- The Government of Yukon stated in its letter dated November 14, 2008, that it is preparing a project proposal to YESAB regarding the upgrade of the North Canol Road (YOR 2008-0304-029-2).

Significant upgrading of the North Canol Road would trigger an assessment. Valid concerns regarding the effects of a major road upgrade, including the effects of induced development and hunting would need to be fully considered in such an assessment, providing a forum to debate concepts such as area-wide management planning for key values and access management on the North Canol Road. The Executive Committee encourages interested and affected parties to engage in a discussion of these concepts at the earliest opportunity.

3.1.2 Comments Regarding Traditional Camps

The Ross River Dena Council in their referral comment submission (YOR 2008-0304-0358-1) expressed concern about the continued and expanded use of its traditional camps. With the proposed year-round access on the North Canol Road in addition to possible upgrades to the North Canol Road, use of traditional camps by non-traditional users may increase. RRDC points out that this issue has been a concern for some time and predates this screening.

The Executive Committee addressed traditional camps, trails, and gathering areas as heritage resources in Section 11.0 of the Screening Report. The Executive Committee recommended terms and conditions to mitigate project effects.

3.1.3 Comments Regarding Off-Road Vehicles

A number of comments submitted raised concerns about the use of off-road recreational vehicles (ORVs) and snowmobiles along the North Canol Road. The Ross River Dena Council (YOR 2008-0304-0358-1), Deuling Outfitters (YOR 2008-0304-0357-1), and D. Hannah (YOR 2008-0304-0366-1) raised this issue.

The use of ORVs and snowmobiles along the North Canol Road can displace wildlife while simultaneously damaging habitat. The Executive Committee did not include this activity since it is not proposed in the proposal and because the Proponent has committed to prohibit the use of ATVs and snowmobiles at the project site. Currently, the public can use ORVs and snowmobiles off the North Canol Road regardless of the Project since there is no legislation regulating the use of ORVs off the North Canol Road.

Despite that, the North Canol Road can presently be used in winter by snowmobiles and adapted heavy equipment, the Project could result in an increase in snowmobile use due to the clearing of the road in winter.

3.1.4 Comments Regarding Access and Exploration Roads

Deuling Outfitters, in its referral period comment submission (YOR 2008-0304-357-1), requested that any exploration trails or roads be decommissioned to discourage motorized access.

The Executive Committee addressed this issue with respect to the road and trails proposed by the Proponent in Section 12.2 of the Screening Report. Also, the Executive Committee has agreed with the Proponent's commitment to decommission the mine access roads after mine closure. Access roads located on claims in Yukon will also be limited to employees during construction and operation. The *Quartz Mining Land Use Regulation* also provides direction to limits access from exploration trails. Future exploration projects to be submitted will be assessed accordingly.

3.1.5 Comments Regarding Induced Exploration

Deuling Outfitters and D. Hannah, in their referral period comment submissions (YOR 2008-0304-357-1, 2008-0304-366-1), raised concerns related to induced exploration as a result of the Project. Liard First Nation, in its referral period comment submission (YOR 2008-0304-371-1), raised concerns regarding the lack of planning relating to mineral exploration and other activities within their Traditional Territory.

Year-round access, without upgrading the North Canol Road, may increase exploration activities along the North Canol Road. However, exploration projects can still be proposed without upgrading or snow plowing the North Canol Road. For example, 2014-0048 a current project under assessment, proposes winter road use of the North Canol while access during summer will remain the same. The Screening Report considers existing exploration activities in the cumulative effects section of Section 12.0.

The Executive Committee recognizes Liard First Nations' interest in planning related to mineral activities. This planning exercise goes beyond the scope of this assessment. However, the Executive Committee encourages interested and affected parties to engage in a discussion of these concepts at the earliest opportunity.

3.1.6 Comments Regarding Induced Hunting

During the screening, several parties identified concerns that the Project may increase induced hunting due to opening the North Canol Road year-round. RRDC (YOR 2008-0304-0358-1), LFN (YOR 2008-0304-0371-1), NND (YOR 2008-0304-118-1) and D. Hannah (YOR 2008-0304-0366-1) for example, have identified in their comments on the referral that opening and upgrading the North Canol Road year-round will increase effects to wildlife due to induced hunting.

As discussed in Section 3.1.1 above, the Executive Committee determined that the scope of the Project only includes the year-round opening and use of the North Canol Road by the Proponent and not the upgrade of it. To access the North Canol Road, individuals have to cross the Pelly River from the community of Ross River. During the summer months, people can use the Pelly barge, the recently closed foot bridge or personal boats. During winter, people usually cross by foot or snowmobiles once the river is frozen. The Ross River ferry, also known as the Pelly River barge, typically operates daily from late May to early October.

Currently, the North Canol Road can be travelled by regular vehicles (mostly 4X4 trucks), equipment, motorcycles and off-road vehicles while the barge is in operation. From October until May, off-road vehicles, snowmobiles and low ground-pressure vehicles are the main means of transportation.

As such, access to the North Canol Road will remain unchanged during summer months as no change in service or road access is expected. The main anticipated change brought by the Project until the road is upgraded, is that the road will be useable for travel once the Pelly River freezes until the spring thaw and resuming of the ferry schedule. It is unlikely that crossing the Pelly River by vehicle on an ice bridge be feasible before November. Similarly, there will be a period in April-May where the ice bridge will not be useable until break-up.

The *Hunting Regulations* state that the hunting season for licensed hunters is from August 1 to October 31 for caribou, moose and sheep. For grizzly and black bear, the spring hunting season is from April 15 to June 21 while the fall hunting season is from August 1 to November 15.

The overlap between both spring and fall hunting seasons and the increased access from a snow plowed North Canol Road is not likely to be significantly different from the current conditions.

The presence of the personnel at the mine site is the main change expected from the proposed project that could result in a significant adverse effect to wildlife. The Proponent's commitments to prohibit hunting by employees and the recommended terms and conditions in Section 8.0, are designed to mitigate these adverse effects.

3.1.7 Comments Regarding Pelly River Crossing & Ross River

T. Smith, in his referral period comment submission (YOR 2008-0304-370-1), raised concerns regarding the safety and capacity of traffic within Ross River and the crossing of the Pelly River. In its referral period comment submission, Yukon Conservation Society questioned the capacity of the Pelly River barge while recognizing that it is not the Proponent's responsibility (YOR 2008-0304-369-1).

Section 11.4 of the Screening Report examines the effects of truck traffic on the North Canol Road. The Proponent has indicated in its proposal that the Project will require approximately 10 round-trips per day during construction and four round-trips during the longer operation phase. The Proponent has committed to prepare a traffic plan with the input of the community to minimize negative effects. The Government of Yukon has also committed to provide the required level of maintenance to the North Canol Road in summer and winter, as well as to provide adequate level of ferry service in summer and an ice bridge in winter.

3.1.8 Comments Regarding Management of North Canol Road

Liard First Nation, in its referral period comment submission (YOR 2008-0304-371-1), indicated that *“an access management plan for the North Canol Road needs to be in place before this project proceeds.”*

The Executive Committee recognizes Liard First Nations' interest in planning related to the North Canol Road. However, this planning exercise goes beyond the scope of this assessment. The Executive Committee encourages the Government of Yukon to engage in a discussion on the ongoing issues related to the North Canol Road with First Nations and other affected parties at the earliest opportunity.

3.1.9 Comments Regarding Traditional Land Use along the North Canol Road

T. Smith, in his referral period comment submission (YOR 2008-0304-370-1), is concerned about the impacts of road use on traditional land use and that there may be an impact to fish in many of the stream crossings along the road. D. Hannah, in his comment submission (YOR 2008-0304-366-1), indicates that the cumulative effects of the road – relating to exploration and hunting – will affect the same wildlife populations as those affected by project traffic and year-round access. Liard First Nation and Ross River Dena Council, in their referral period comment submissions (YOR 2008-0304-371-1, 2008-0304-358-1), state that traditional land use is threatened by this project.

Section 11.4 of the Screening Report addresses traditional land use within the context of year-round access and the use of the North Canol Road. Terms and conditions that were recommended by the Executive Committee to help mitigate the effects of project traffic and year-round access include requiring the Proponent to conduct a traditional land use survey prior to project construction; starting discussions with RRDC and the Government of Yukon for additional mitigations; and enter into discussions with RRDC and other affected trappers regarding possible compensation regarding disruption to trapping resulting from winter road access. The Executive Committee has amended its terms and conditions to include LFN and NND. The consolidated list of terms and conditions can be found in Section 5.0.

3.1.10 Comments Regarding Vehicular-Wildlife Collisions

Ross River Dena Council, in its referral period comment submission (YOR 2008-0304-258-1), indicated that vehicular accidents might adversely affect both wildlife and traditional land use values along the road.

Section 8.3.4 of the Screening Report discusses the impacts of vehicular collisions. The Proponent committed to limit the speed of its vehicles which will reduce the effects of the Project. As a mitigation, the Executive Committee also recommended term 46, which requires snow breaks along the North Canol Road to minimize the physical barrier to wildlife movement that snow banks may present.

3.2 CAMP LOCATION

The Proponent has proposed a temporary camp at the Macmillan Pass Aerodrome and a main camp located at the mine site. The main camp has a capacity of 250 people during construction and up to 150 people during operation. The temporary camp has the capacity to house approximately 49 people. The full project description is provided in the proposal (YOR 2008-0304-023-2).

3.2.1 Comments Regarding Camp Location

Ross River Dena Council and Liard First Nation, in their comment submissions during the referral (YOR 2008-0304-358-1, 2008-0304-371-1), referenced the cultural importance of the headwaters area in general, but also of Mount Allan. Both First Nations stressed desire to see the proposed main camp moved to the Macmillan Pass Aerodrome area rather than Mt Allan and communicated this concern prior to the Screening Report. In addition to the cultural values of Mt Allan, the environmental sensitivity and biological value inherent in the proposed camp location are also significant to both LFN and RRDC. The camp and mine site are also in the area of a unique phenotype of marmot according to RRDC and LFN.

The Executive Committee determined that the proposed camp location represents a lesser incursion and obstruction to wildlife and use of the land than a temporary camp at the Macmillan Pass Aerodrome. Section 5.5 of the Screening Report, emphasizes the reduction in traffic from the Macmillan Pass Aerodrome to the mine site – a distance of approximately 28km – at the beginning and end of each shift is a significant avoidable impact on the wildlife values adjacent to the access road. The reduction in traffic, by placing the camp at the mine site, along the access road will also reduce edge effects resulting in wildlife displacement. This determination is based on wildlife values.

The camp, as proposed, is located within the mine complex. Its additional physical impact on the landscape will be minimal within the context of the mine footprint. To reduce environmental impacts from its employees, the Proponent has committed to policies such as no hunting and a prohibition on ATVs and snowmobile use by employees. The Executive Committee determined that significant adverse effects of the camp within the mine footprint can be mitigated by the recommended terms and conditions and Proponent's commitments.

Terms and Conditions

The Executive Committee recognizes that it can provide further clarification by recommending the following terms and conditions.

14. The Proponent shall implement a no-hunting or fishing policy and no-firearm in company vehicles policy for all its employees and contractors at and around the mine site, staging areas and at the temporary camp at the Macmillan Pass Aerodrome.
15. The Proponent shall only use off-road vehicles and snowmobile for operational purposes and shall restrict their use to roads and trails within the mine site, staging areas and the temporary camp at the Macmillan Pass Aerodrome.

16. The Proponent shall prohibit employees and contractors from bringing personal off-road and snowmobiles to the mine site, staging areas and the temporary camp at the Macmillan Pass Aerodrome.
17. The Proponent shall implement a mandatory education program in collaboration with RRDC, LFN and NND for its employees working at the mine site and temporary camp. The education program shall focus on the cultural importance of the project area for RRDC, LFN and NND as a spiritual and sacred place.
18. The Proponent shall restrict employees and contractors to the confines of the mine complex for their personal safety and to help preserve the integrity of the surrounding habitat to lessen impacts with wildlife and avoid the opportunity to encounter wildlife.

As identified in Section 5.5 of the Screening Report, the Executive Committee considered the comments provided and examined the option of having a camp at the Macmillan Pass Aerodrome, while recognizing that a permanent camp at that location was not proposed by the Proponent.

While considering the Macmillan Pass Aerodrome camp option, the Executive Committee considered the effects to wildlife, traditional land use and also to employee health and safety. The Executive Committee noted that this option would increase the footprint of the Project. Additionally, risks to employee health and safety could increase with extensive daily trips along a 28 km mountain road twice a day, all year-round, especially in winter. Between 150 and 250 workers would have to travel by bus on this road twice a day. Depending on bus capacity, this amounts to approximately 5-8 bus round-trips per day assuming 30-seat capacity buses. Traffic would also be expected to increase on the North Canol Road from visitors to the camp and employees.

3.3 AQUATIC RESOURCES

The Project proposes to withdraw water from the Hess River South Tributary. Access to the water intake would be by an access road to the Hess River South Tributary and pass near a mineral lick noted for its overwinter capacity. Section 6.2.6 of the Screening Report discusses the water intake while Section 11.2.1 of the Screening Report discusses First Nations' objections to this water body as a water source.

The upper reaches of the Hess River Drainage consists in scattered creeks and lakes near the Project. These creeks are also the habitat of a local, unique, variety of lake trout as revealed by traditional knowledge. The exact location of this trout variety's habitat is considered confidential. At the water intake, the Hess River South Tributary is known to contain Dolly Varden, Arctic grayling, and slimy sculpin. None of the tributaries identified in Section 4.9 of the Screening Report are described as non-fish bearing, though fish may not be present in all channels.

3.3.1 Comments Regarding the Water Source

The Ross River Dena Council, in its referral period comment submission (YOR 2008-0304-0358-1), objected to the use of the Hess River South Tributary as the Project's water source. The comment states that the Executive Committee ignored their previous comments which identified the Hess River

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headwaters as having significant cultural importance, that the access road and pipeline would inhibit access to the mineral lick, and that the withdrawal of water may have effects on a unique variety of lake trout. RRDC has stated that even without the wildlife effects, it would be unable to support the proposed water intake (YOR 2008-0304-258-1). Liard First Nation, in its referral period comment submission (YOR 2008-0304-0371-1), argues that the sensitive and fragile ecosystem present in the Hess River South Tributary warrants a different water source. Both First Nations identify Cirque Lake or the Tsichu River as an alternative water source for the Project.

The Executive Committee appreciates the cultural significance of the headwaters of the Hess River and is of the view that the alternative water resource from Cirque Lake or the Tsichu River watershed could have detrimental effects on those important values. Taking water from the Tsichu River watershed and discharging it into the Hess River watershed could result in the introduction of foreign organisms or aquatic invasive species.

The Department of Fisheries and Oceans Canada (DFO), in its referral period comment submission (YOR 2008-0304-360-1), supports this conclusion and stated that “*water transfers between the Yukon and Mackenzie River watersheds present unnecessary risks to the Yukon River.*” DFO also opposes any inter-basin diversion projects, within Canada in accordance with the *Canadian Action Plan to Address the Threat of Aquatic Invasive Species*.

Section 5.5 of the Screening Report discusses alternatives to the Hess River South Tributary as water source, including rationale against inter-basin transfers. Section 6.2.6 discusses the Hess River South Tributary intake. Section 11.2.1 of the report discusses First Nation's objections to the water source. Section 3.4.2 below addresses the concerns from RRDC and LFN regarding the mineral lick.

The Executive Committee made the determination that controlled and monitored withdrawal of water from the Hess River watershed mitigates significant adverse effects of the Project. However, the Executive Committee fully recognizes the importance of this issue to the Kaska Dene and as such urges the Proponent to continue to work with the Kaska Dene to incorporate traditional knowledge in an effort to resolve any remaining issues.

3.3.2 Comments Regarding Fish

Ross River Dena Council and Liard First Nation, in their referral period comment submissions (YOR 2008-0304-358-1, 2008-0304-371-1), stated that there is a unique variety of trout (glacier trout) in the Project's vicinity; furthermore, that the use of this water source may endanger this variety of trout.

The Executive Committee focused its assessment on aquatic resources in general to limit effects to all species of fish including trout. The Screening Report discusses effects to aquatic resources in Section 7.0 and it specifically addresses this unique variety of trout in Section 7.2. The Executive Committee also recognizes that Section 6.0 Water Resources addresses several issues related to fish through water quantity and quality controls and project design.

The Executive Committee's recommended terms and conditions and commitments from the Proponent ensure that:

- water quality is monitored and maintained during the life of the Project;

- adequate water flow is maintained to sustain fish population in the streams where water will be withdrawn;
- erosion and sedimentation in channels and streams downstream is limited by monitoring and reporting precipitation and water releases from the dam;
- further studies are conducted in the tributaries involved by the Project to predict potential impacts and develop adaptive management; and
- fish do not get entrained or impinged during water withdrawal.

The consolidated list of terms and conditions can be found in Section 5.0.

The Department of Fisheries and Oceans Canada, in its referral period comment regarding this variety of trout (YOR 2008-0304-360-1), requests a more detailed summary of traditional knowledge regarding the location of this trout to better evaluate potential effects. The Executive Committee posted a summary of the confidential information on the YESAB Online Registry (YOR 2008-0304-344-1). YESAA prohibits the Executive Committee from disclosing more than the summary on the YOR.

3.4 WILDLIFE & PROJECT FOOTPRINT

The Project is to take place within the Selwyn Mountain Ecoregion, which displays the highest diversity of mammals in the Taiga Cordillera of Yukon. The mine site is located in habitat that is of varied quality for different species. Moose, for example, do not utilize the mine site extensively but may use the mineral lick along the Road to Hess River Tributary a certain time of the year. Caribou may use the area during calving and post-calving seasons. The Mackenzie Mountains, where the Project is proposed, are considered to support the highest concentrations of grizzly bears in the NWT. It is assumed for grizzly bear that the Mackenzie Mountains are highly productive for grizzly bear.

Section 4.8 of the Screening Report outlines the baseline conditions for wildlife within the project area. Section 8.0 of the Screening Report contains the Executive Committee's effects assessment regarding wildlife values, although the assessment of other values often relates to wildlife as well.

3.4.1 Comments Regarding Caribou Calving

D. Hannah, in his comment during the referral period (YOR 2008-0304-366-1), observes that the Screening Report indicates existing concerns regarding caribou including "*that the current harvest level may be unsustainable.*" D. Hannah also reminds the Executive Committee that the Project will displace caribou during the calving and post-calving life stages while traffic may also interfere with migration.

The Screening Report, with the support of the traditional knowledge provided, acknowledges that caribou calving has taken place in the plateaus and upland sites within and around the project area. Calving for woodland caribou typically occurs in June. Female caribou are noted as particularly sensitive to disturbance during the calving and post-calving stage. The Screening Report further acknowledges that the area of mine infrastructure will no longer be suitable for calving. The Executive

Committee also recognizes that the project area was identified by RRDC and the Government of Yukon as an important denning area for bears, which would suggest that caribou are unlikely to calve in an around the project area due to the presence of bears at that time of year.

The Executive Committee has acknowledged the commitments from the Proponent regarding vehicular traffic and has recommended terms and conditions to monitor the species so that adaptive management can be implemented if the Project affects migration. The full list of consolidated terms and conditions can be found in Section 5.0.

3.4.2 Comments Regarding Mineral Lick

Ross River Dena Council, in its referral comment submission (YOR 2008-0304-0358-1), expresses concern over the proposed mineral lick mitigation for the lick located close to the mine site. This mitigation raises concerns over the use of a “qualified biologist” to determine mineral lick buffers without reference or consideration of traditional knowledge or input from elders. Liard First Nation, in its referral comment submission (YOR 2008-0304-371-1), states the centrality of mineral licks to the survival of caribou herds.

The Screening Report, in term and condition 39, seeks RRDC input alongside Government of Yukon’s in determining the location of mineral licks, which would then be buffered by a qualified biologist. The primary mineral lick of concern is located near the access road to the Hess River South Tributary, this lick is utilized extensively by moose overwintering: *“The mineral lick has a corresponding high moose distribution during the fall and winter as it is a critical habitat requirement (149-150).”*

The Executive Committee has amended term and condition 39 to require input from the interested First Nations involved (Appendix B, C).

3.4.3 Comments Regarding Baseline Data

Ross River Dena Council, Liard First Nation and D. Hannah identified concerns regarding the quality and age of the baseline data in their referral period comment submissions (YOR 2008-0304-358-1, 2008-0304-371-1 and 2008-0304-366-1).

Section 4.8 of the Screening Report details different baseline studies within the project area. The Proponent conducted twelve systematic ungulate surveys for the assessment process; these surveys included substantial observations on landscape utilization in the project area. Baseline data was also collected for grizzly bears. Avian surveys were also conducted on several dates to catalogue landscape use near the Project.

Additionally, the Executive Committee considered comments submitted by the Government of Yukon, RRDC, LFN, NND, Environment Canada and other parties regarding wildlife during the screening. The Executive Committee also considered traditional knowledge in the form of a confidential map submitted by RRDC to establish various wildlife species ranges and distribution. Direct references to the confidential information were limited in the Screening Report to preserve the confidentiality of the information. In attempting to balance the confidential nature of the traditional knowledge with

providing sufficient reference to the information, the Executive Committee may have erred on the side of being too cautious. However, the information was considered by the Executive Committee and provided critical information in establishing the presence of certain wildlife species.

The Executive Committee acknowledges RRDCs' contribution to the understanding of sheep distribution and use of the project area. These contributions are reflected in Section 8.2.3 and 8.3.1 of the Screening Report. The Executive Committee has also recommended that the Proponent implements monitoring programs to collect data that will inform baseline data that can be used in adaptive management plans. The full list of consolidated terms and conditions can be found in Section 5.0.

3.4.4 Comments Regarding Marmot

Ross River Dena Council and Liard First Nation, in their referral period comment submission (YOR 2008-0304-358-1, 2008-0304-371-1), indicated that the Project is located in an area where a rare phenotype of marmot that is a non-typical color live. This characteristic is suggested to be possibly advantageous in a changing climate. Previous comments received by First Nations had identified the cultural significance of marmots within the project area.

Sections 4.8.5, 8.2.5 and 8.3.1 of the Screening Report acknowledge the cultural significance of marmot for fur and food within the context of traditional land use.

The Project is largely to take place within valley floors, which has a low potential for overlap with marmots as they rely on broken rock and talus slopes for their core habitat area. While some displacement may occur due to the zone of influence of the Project, this is anticipated to be minor and not disturb marmot populations to a great degree.

3.4.5 Comments Regarding Aircraft Activity

Comments submitted during the screening by RRDC, NND and Deuling Outfitters identified concerns associated with aircraft activity, the use of the Macmillan Pass Aerodrome and the potential effects this activity could have on wildlife (YOR 2008-0304-271-1, 2008-0304-118-1 and 2008-0304-357-1). Deuling Outfitters specifically expressed concern over the potential effects weekly flights could have on wildlife and on the wilderness experience on which his outfitting concession relies. The issue of aircraft use and the associated potential effects on wildlife has been flagged several times during the assessment process.

Section 12.2 of the Screening Report outlines the extent of and potential effects of aircraft use. The Proponent identified in its proposal that during operation, up to three flights per week will be used to fly workers to the Macmillan Pass Aerodrome before being shuttled by bus to the mine site. While improvements to the Macmillan Pass Aerodrome may increase air traffic in the area for the duration of the Project, it will also increase the safety of those using it, including other users and potential clients of Deuling Outfitters.

To address the issues associated with flights into the Macmillan Pass Aerodrome, the Executive Committee has provided a term and condition to ensure that the communication between the

Proponent and Deuling Outfitters remains open for the duration of the Project. The recommended terms and conditions identified in Section 8.0 to reduce effects on wildlife will also help address these concerns. Finally, legislation such as the *Quartz Mining Act* and the *Environment Act* also provide guidance to protect or restore wildlife habitat during the different phases of the Project.

3.4.6 Comments Regarding the Displacement of Bears & Bear Denning

RRDC, LFN and D. Hannah, raised concerns over the displacement of bears through the reduction of suitable or existing denning sites due to project activities (YOR 2008-0304-358-1, 2008-0304-271-1 and 2008-0304-366-1). Sections 8.2 and 8.3 of the Screening Report evaluate effects of the Project on bears. Terms and conditions 39, 41, 42, 43, 44 and 45 of the Screening Report mitigates effects to bears. The terms and conditions recommend the implementation of a bear monitoring program, a Wildlife Conflict Prevention Plan, the designation of wildlife monitor, the search and recording of bear dens before conducting any clearing activity and the use of electric fences around camp. These terms and conditions are provided to reduce, control or eliminate significant adverse effects of the Project on bear at various life stages. The Government of Yukon suggested further minor changes to the above terms and conditions. These changes are reflected in Section 5.0 and Appendix B of this report.

3.4.7 Comments Regarding Harlequin Ducks

Ross River Dena Council in their referral period comment submission demonstrates concern that the Executive Committee ignored or failed to address their concern for harlequin ducks that utilize Tributary C (YOR 2008-0304-258-1).

Section 4.8.6, 8.2.6 and 8.3.1 of the Screening Report acknowledges the presence of 112 species of migratory birds in the project area and the potential effects of the Project on migratory birds. The Proponent has conducted several bird studies in 2006, 2007 and 2008. While the Screening Report does not discuss directly the effects of the Project on harlequin ducks, the Executive Committee has considered effects on migratory birds as a whole. Term and condition 40 in Section 8.3.1 addresses the potential effects of the Project on nesting migratory birds. Section 6.0 also discusses how water resources will be managed to preserve water quality, water quantity and the flow of the streams that may be used during the Project. Water flows as seen in Section 6.2.4 of the Screening Report demonstrate minimal impacts to water quantity during operation and during seasons which would experience highest utilization.

3.5 IMPACTS TO OUTFITTING IN PROJECT AREA

Deuling Outfitters, in its referral period comment submission (YOR 2008-0304-357-1), raised concerns regarding the ongoing lack of communication between the Proponent and Deuling Outfitters, the use of ORVs due to increased access and impacts to the core outfitting area. Concerns relating to the North Canol Road, the use of ORVs and aircraft have been addressed in Sections 3.1.1, 3.1.3 and 3.4.5.

Section 12.2 of the Screening Report addresses concerns identified by Deuling Outfitters. Additionally, the Executive Committee has determined that the mine site does not appear to overlap with preferred outfitting areas.

The Executive Committee recommended term and condition 65, which requires the Proponent to engage in ongoing and continued communication with the holder of Outfitting Concession number nine in order to help minimize disruption to outfitting operations. The recommended terms and conditions in Section 8.0 will also address concerns associated with wildlife which should aim at maintaining healthy wildlife populations.

3.6 ECONOMICS & SECURITY

3.6.1 Comments Regarding Security Bond

Deuling Outfitters, in its referral period comment submission (YOR 2008-0304-357-1), raised concerns over the bond requirement's sufficiency to cover decommissioning in the event of bankruptcy. Secondly, Deuling Outfitters requested that the bond amount be made public. The question of appropriate security is beyond the scope of this screening and it will be addressed by the appropriate regulator.

3.6.2 Comments Regarding Royalties

Yukon Conservation Society, in its referral period comment submission (YOR 2008-0304-369-1), raised concerns regarding the amount of royalties that will be derived from the Project.

The Screening Report, in Section 13.2.1, addresses economic benefits of the Project. The issue of royalties is beyond the scope of this screening.

3.7 WASTE ROCK

Waste rock and tailing management forms one of the reasons for the Decision Body's referral of the Screening Report back to the Executive Committee, and is dealt with in Section 2.0. Yukon Conservation Society's submitted a similar comment which quoted extensively from the Decision Body's referral.

3.7.1 Comments Regarding Temporary Closure

Liard First Nation's referral period comment submission (YOR 2008-0304-371-1), raised concerns regarding temporary closure and the potential for acid generation without proper decommissioning.

Section 6.3.2 of the Screening Report addresses temporary closure and waste rock storage options. During the screening, the Executive Committee required a temporary closure plan from the Proponent and included term 16 to account for the costs of a temporary mine closure in order to inform security determinations. The Executive Committee maintains that the plan, as presented in Appendix D of the Proponent's information request response of January 4, 2013 (YOR 2008-0304-302-1) remains

sufficient to address a temporary closure scenario. Further, Section 2.4 of this new recommendation provides further consideration for management of waste rock in the event of a temporary closure.

3.7.2 Comments Regarding Use of Waste Rock

Yukon Conservation Society, in its referral period comment submission (YOR 2008-0304-369-1), raise the concern, that given recent events, it is conceivable that waste rock from the Project may be utilized in future projects as borrow material or other construction purposes.

The Proponent did not propose to use waste rock outside of the proposed activities. Therefore, the Executive Committee did not include the use of waste rock outside of the proposed activities in the scope of the Project. The use of waste rock outside of the assessed activities would likely require its own assessment and the appropriate authorizations from the Government of Yukon.

3.8 RAVINE DAM & WATER BALANCE

The ravine dam will contain contact water from the mine, in addition to surface drainage within the mine site. The ravine dam will be located on the upper reaches of Tributary C near the mine site itself.

3.8.1 Comments Regarding Dam Design Standard

Liard First Nation, in its referral period comment submission (YOR 2008-0304-371-1), reference that climate change may lead to increased variability and frequency of hydrological events, suggesting that the ravine dam be engineered to a 1:500 year standard. Yukon Conservation Society, in its referral period comment submission (YOR 2008-0304-369-1), also expresses concern that a 1:100 year design standard appears to be inadequate.

Section 5.6.2 of the Screening Report discusses the design standards that are expected for the dam and diversion channels. While the Proponent proposed to design to a 1:100 year event, this is based on a regression of the much larger Hess drainage. As mentioned in this section of the Screening Report, smaller drainages, especially those with steeper slopes, are prone to much more pronounced flood events. The Executive Committee has taken the input received during the assessment process, including from government, and arrived at a design standard of a 1:250 year flood event as an appropriate design standard. This is reflected in term and condition eight.

The Executive Committee maintains that a 1:250 year event is satisfactory for the Project.

3.8.2 Comments Regarding Baseline Data for Water Balance

Liard First Nation, in its referral period comments submission (YOR 2008-0304-371-1), stated that the water balance and hydrological modeling should incorporate a greater deal of uncertainty and variability to account for a changing climate. This is included as rationale for the more robust design standard of the ravine dam, 1:500 years.

The Executive Committee maintains that increasing the design standard for the dam and diversion channels from 1:100 years to 1:250 years eliminates the needs for enhanced hydrological modeling to account for possible threats to dam and structure stability.

3.9 HEALTH IMPACTS

Yukon Conservation, in its referral period comment submission (YOR 2008-0304-369-1), expressed concern over the possible health effects of tungsten in relation to its extraction, processing and shipping as it may be a possible carcinogen.

The Screening Report does not examine the possible health effects of the extraction of scheelite (CaWO₄), the primary ore for the Project. Tungsten, which may have carcinogenic and other health effects in its elemental form, will not be extracted at the mine site. The Executive Committee address potential health effects in Section 9.0 of the Screening Report. Existing regulations regarding the extraction, processing, and transport of tungsten compounds also address these potential health effects.

3.10 CUMULATIVE EFFECTS

Liard First Nation, and in its referral period comment submissions, stated that “*without landscape based planning, the cumulative impacts of this project is a huge question.*” (YOR 2008-0304-371-1)

While the Executive Committee agrees that landscape planning would be of great benefit in addressing LFN concerns, this type of planning exercise is beyond the scope of the assessment process under YESAA. The Executive Committee encourages interested and affected parties to engage in a discussion of these concepts at the earliest opportunity.

Ross River Dena Council and D. Hannah expressed concerns regarding the consequences of upgrading the North Canol Road and the cumulative effects that may result (YOR 2008-0304-358-1, 2008-0304-366-1).

As set out in Section 5.6 of the Screening Report, the Executive Committee maintains that the current level of activity in the vicinity of the Project is relatively low. Generally, the valued components considered in the effects assessment will not experience significant adverse effects due to cumulative effects of multiple projects as projects in the area are dispersed. Should activities continue to increase in the vicinity of the Project; cumulative effects considerations will become increasingly important. As a result, ongoing monitoring of baseline conditions is important to inform future cumulative effects assessment and/or planning processes in the project area.

The Executive Committee acknowledges that significant upgrading of the North Canol Road would trigger an assessment. Valid concerns regarding the effects of a major road upgrade, including the effects of induced development and hunting would need to be fully considered in such an assessment, providing a forum to debate concepts such as area-wide management planning for key values and access management on the North Canol Road.

Within the Screening Report cumulative effects of the Project are addressed for each identified valued component including aquatic resources (Section 7.4), wildlife (Section 8.4), health and safety (Section 9.7), environmental quality (Section 10.5), heritage resources and traditional land use (Section 11.5), land and resource use (Section 12.3), and cultural and community well-being (Section 13.4). Different aspects of the North Canol Road are dealt with separately within each section; furthermore, clarification has been provided on specific cumulative effects, such as induced exploration, within this report.

3.11 CONSIDERATION OF TRADITIONAL KNOWLEDGE

Liard First Nation stated that *"it is unclear how YESAB Recommendations include the traditional knowledge done by RRDC."* (YOR 2008-0304-271-1)

The Executive Committee considered traditional knowledge in the form of comments from RRDC, LFN and NND during the screening. RRDC also provided a confidential map to the Executive Committee to establish various wildlife species ranges and distribution. Section 1.0 explains more specifically how traditional knowledge, among other types of information, was incorporated into the Screening Report.

3.12 CONSIDERATION OF SUGGESTED CHANGES TO ASSESSMENT PROCESS DETAILS

Comments from the Government of Yukon, Environment Canada and Department of Fisheries and Oceans Canada suggested changes to the Screening Report related to the assessment process, authorization required and a change in decision body. The following sections address these changes.

3.12.1 Change of federal department responsible for determining whether a water body is a natural water body frequented by fish.

Environment Canada commented:

As mentioned by our colleagues at DFO (YOR Doc. No. 2008-0304-360-1), on February 28, 2014 an Order designating the Minister of the Environment as the Minister responsible for the administration and enforcement of subsections 36(3) to (6) of the Fisheries Act was passed. This responsibility previously rested with the Department of Fisheries and Oceans (DFO).

...

Accordingly, Table 1 Government of Canada Decision Bodies and Authorizations Required of the Recommendation document should be modified and include Environment Canada as a Decision Body under the Fisheries Act.

(YOR 2008-0304-361-1)

The Executive Committee acknowledges this change of decision body.

3.12.2 Consideration of update to Species under SARA

Environment Canada provided updates to Table 14 of the Screening Report. The suggested changes modify the conservation status of four bird species from the Committee On Status of Endangered Wildlife In Canada (COSEWIC) to the *Species at Risk Act* (SARA).

Table 14 Species Distribution, Designation, and Nesting Habitat should be updated. The conservation status of these bird species should be at the highest level at which legal protections are required; and therefore should be corrected to SARA Schedule 1 designations when applicable. In some instances the species have not been listed by SARA and the COSEWIC status would be the most appropriate conservation status for these species. Corrections of the conservation status for the following is recommended:

- Common Nighthawk as Threatened (SARA)
- Olive-sided Flycatcher as Threatened (SARA)
- Rusty Blackbird as Special Concern (SARA)
- Short-eared owl as Special Concern (SARA)

Also, the content of this table appears to repeat itself (e.g. two duplicate copies are pasted together).

(YOR 2008-0304-361-1)

The Executive Committee acknowledges these changes.

3.12.3 Government of Yukon and Authorizations Required

The Government of Yukon suggested changes to Table 2 Government of Yukon and Authorizations Required in the Screening Report in relation to the regulators associated with certain permits.

Table 2 (page 3): While the Department of Community Services does administer Storage Tanks Permits, the remaining permits and associated legislation in that section should be listed under the Department of Environment: Air Emissions Permit, Solid Waste Permit, Special Waste Permit, Relocation Permit, and Land Treatment Facility Permit.

(YOR 2008-0304-363-1)

Table 2 (page 4) does not reflect the correct permit requirements for the Mactung sewage disposal system. A sewage disposal system serving over 50 people (other than a holding tank) requires a Type B Municipal Undertaking Water License. No permit is required under the Sewage Disposal Systems Regulation. The attached document outlines the Permit requirements for any Sewage Disposal System.

(YOR 2008-0304-362-1)

The Executive Committee acknowledges these changes.

3.12.4 YG – Minor Typos and Edits

The Government of Yukon suggested changes to Table 6 Scope of the Project in the Screening Report in relation to typos and other minor edits.

Table 6: On page 20, there is an extra “and” before 207 000 m³. On page 21, Mount Allan is misspelled in the ANFO Emulsion Plant section and in the power section, the pad is presumably 1 808 m². On page 24, in the reclamation and closure section, an “of” is missing after Progressive closure.

(YOR 2008-0304-363-1)

The Executive Committee acknowledges these changes.

3.13 CONSIDERATION OF SUGGESTED CHANGES TO TERMS AND CONDITIONS – YG (2008-0304-362-1)

3.13.1 Term and Condition #1 Precipitation Monitoring

The Government of Yukon recommended amending terms and conditions 1, 3, 4 and 11 relating to precipitation monitoring, flow rates of Tributary C, hydraulic conductivity and Hess River South Tributary Hydrograph to reflect water-related data requirements by referencing “adequate data as required by the regulator”.

Term and Condition 1) states the Proponent shall incorporate precipitation monitoring,... but does not identify the minimum duration required, pre-licencing, to achieve a reasonable understanding of the variability of this factor.

Term and Condition 3) states the Proponent shall update flow rates of Tributary C to include a minimum two year of continuous data,...

Term and Condition 4) states the Proponent shall validate hydraulic conductivity for the overburden aquifer by on-site in-situ tests,... but does not identify the minimum duration required, pre-licencing, to achieve a reasonable understanding of the variability of this factor.

Term and Condition 11) states the Proponent shall update the Hess River South Tributary hydrograph based on additional data,... include at least two years of continuous flow measurements.

(YOR 2008-0304-362-1)

The Government of Yukon recommended terms and conditions listed above are not clear. As such, the Executive Committee reaffirms terms and conditions 1, 3, 4 and 11 of the Screening Report.

3.13.2 Term and condition #16 Mine Security (Cost of temporary mine closure)

The Government of Yukon recommended removing term and condition 16 and replacing with:

The Proponent shall account for the costs of temporary mine closure including those costs related to the transfer of all waste rock and tailings that is not characterized as NAG to the appropriate location(s), as determined by regulators, as part of the mine security.

(YOR 2008-0304-362-1)

The Executive Committee revises the recommended term and condition from the Screening Report as follows:

The Proponent shall account for the costs of temporary mine closure including those costs related to the transfer of all waste rock and tailings that is not characterized as NAG to the DSTF or underground and below the water table as part of the mine security.

The rationale for this revision is that the analysis in Section 2.0 of this new recommendation confirms that PAG waste rock and tailings may only be disposed of permanently within the DSTF or underground and below the water table.

3.13.3 Term and condition #23 Base line water data Trib C

The Government of Yukon recommended revising term and condition 23 by replacing it with the following two terms and conditions:

The proponent shall collect base-line water quantity and quality data, the parameters and duration of which are to be determined by the appropriate regulator, from Tributary C prior to undertaking design of the proposed water treatment plant.

The Proponent shall ensure that the proposed water treatment plant is designed to achieve predetermined water quality objectives for the receiving environment and provide:

- a) water treatment approaches that are readily adaptable should the quality of COPCs at risk of being above threshold be different from that predicted;*
- b) redundancies in pump design and power supply; and*
- c) maintaining sufficient water treatment plant reagent supplies on-site to allow the plant to function for 30 days.*

(YOR 2008-0304-362-1)

The Executive Committee agrees with this recommendation. The full list of consolidated terms and conditions can be found in Section 5.0.

3.13.4 Term and Condition #39 Wildlife Monitoring Program

The Government of Yukon recommended revising term and condition 39. The Executive Committee has revised the recommended term and condition and replaces it with:

The Proponent shall establish a Wildlife Monitoring Program prior to project initiation. For this program the Proponent shall:

- a) monitor at least woodland caribou, moose, Dall sheep and grizzly bear to establish baseline information of these species;*
- b) develop the program in consultation with appropriate Government of Yukon agencies, Northwest Territories Government agencies, RRDC, LFN, NND, Sahtu Dene and communities;*
- c) analyze the monitoring data and report annually to Government of Yukon and other wildlife management agencies involved. The Proponent shall develop an Adaptive Management Plan within one year of a request by a management agency to address monitoring-identified wildlife management issues; and*
- d) establish an appropriate buffer around the mineral licks identified by RRDC and Government of Yukon to reduce the zone of influence to wildlife species using the mineral lick. The appropriate buffer zone shall be determined in consultation with RRDC, LFN, NND and a qualified biologist.*

The full list of consolidated terms and conditions can be found in Section 5.0.

3.13.5 Term and Condition #41 Wildlife Conflict Prevention Plan

The Government of Yukon recommended replacing term and condition 41 and 42, and merging the two terms and conditions as follows:

The Proponent shall develop, for review and approval, a Wildlife Conflict Prevention Plan that references Guidelines for Industrial Activity in Bear Country (MPERG, 2008) and includes:

- a) details of a worker education program;*
- b) attractant management procedures;*
- c) site containment details;*
- d) aversive conditioning of bears procedures; and*
- e) a description of investment dedicated to bear management resources and personnel.*

(YOR 2008-0304-362-1)

The Executive Committee changes this term and condition to:

Prior to commencing the activities, the Proponent shall develop, for review and approval, a Wildlife Conflict Prevention Plan that references Guidelines for Industrial Activity in Bear Country (MPERG, 2008) and includes:

- a) details of a worker education program;*
- b) attractant management procedures;*
- c) site containment details;*
- d) aversive conditioning of bears procedures; and*

e) a description of investment dedicated to bear management resources and personnel.

3.13.6 Term and Condition #44 Bear

The Government of Yukon recommended removing term and condition 44 and replacing with:

Clearing, construction and/or mining activities in the area of the mine, mill, dry stack tailing facility, reservoir and camp shall not occur between December and mid-June if the area to be cleared, constructed and/or mined was undisturbed during September to late November of the previous year (i.e. during pre denning and early denning period).

(YOR 2008-0304-362-1)

The Executive Committee agrees with this recommendation. The full list of consolidated terms and conditions can be found in Section 5.0.

3.13.7 Term and Condition #54 Air Quality

The Government of Yukon recommended removing term and condition 54 and replacing with:

The Proponent shall develop an Air Quality Management Plan and receive regulatory approval prior to commencement of site works. The Air Quality Management Plan shall include:

- a) A quantification of projected emissions presented and modeled using an established air quality model to predict local and regional dispersion, resulting ambient concentrations, and deposition of pollutants;*
- b) A description of specific mitigation and adaptive management strategies and monitoring methods to be used and a plan for implementation to minimize emissions;*
- c) Quantification of any potential links between predicted air quality and subsequent impacts to other valued components such as water quality, fish, wildlife and human health;*
- d) Potential sources and quantities of contaminants from the handling and transport of ore and concentrate, and their expected deposition range; and*
- e) Description of specific mitigation and adaptive management strategies, and monitoring methods to minimize contamination by fugitive dust from the handling and transport of raw ore and concentrate, the dry-stacked tailings facility, and the processing operations.*

And add a new term and condition

The Proponent shall develop a Dust Management Plan and receive regulatory approval prior to commencement of site works. The Dust Management Plan shall include: details regarding the sources of dust, the anticipated dust deposition range and suppression mechanisms. If

calcium chloride (CaCl) or alternative product usage is proposed, volume of use should be presented in order to determine potential adverse effects to the soil, vegetation, surface and groundwater.

(YOR 2008-0304-362-1)

The Executive Committee agrees with this recommendation. The full list of consolidated terms and conditions can be found in Section 5.0.

3.13.8 Term and Condition #56 Waste Rock in DSTF

The Government of Yukon recommended removing term and condition 56 below:

56) The Proponent shall only dispose tailings and waste rock into the dry-stacked tailings facility.

And replacing with:

The Proponent shall develop management plans that demonstrate that waste rock and tailings can be disposed of in a manner that is both physically and chemically stable. These management plans shall be provided to the appropriate regulators during the licensing process.

The Proponent shall develop a robust adaptive management plan that includes surface and subsurface storage options for all waste rock and tailings produced during the mine life. The adaptive management plan shall be provided to the appropriate regulators during the licensing process.

(YOR 2008-0304-362-1)

The Executive Committee revises the recommended term and condition as follows:

56) No material other than tailings and waste rock may be disposed of within the DSTF.

The Executive Committee recognizes that tailings and waste rock will also be permanently disposed of underground and below the water table. However, the purpose of this term and condition is to ensure only tailings and waste rock are deposited within the DSTF, and not the deposition of other waste materials that were proposed by the Proponent (e.g. scrap metal).

In addition to this revision, the Executive Committee agrees with the following term and condition recommended by the Government of Yukon:

The Proponent shall develop management plans that demonstrate that waste rock and tailings can be disposed of in a manner that is both physically and chemically stable. These management plans shall be provided to the appropriate regulators during the licensing process.

However, the Executive Committee does not support the wording of the subsequent suggestion noted above (i.e. the Proponent shall develop a robust adaptive management plan that includes surface and subsurface storage options for waste rock and tailings produced during the mine life...). The reason for not supporting this wording is that the Executive Committee has determined that the only

appropriate permanent storage locations for waste rock and tailings are the DSTF and underground and below water table. Section 2.0 of this report recommends additional terms and conditions regarding waste rock management.

3.13.9 Term and Condition #57 Heritage Resources (Hess River South Access Road)

The Government of Yukon recommended revising term and condition 57. The Executive Committee reaffirms its recommended term and condition.

3.13.10 Term and Condition #58- Heritage Resources

The Government of Yukon recommended removing term and condition 58. The Executive Committee reaffirms its recommended term and condition.

3.13.11 Term and Condition #59- Heritage Resources

The Government of Yukon recommended removing term and condition 59 below:

The Proponent shall engage Ross River Dena Council and Government of Yukon Heritage Resources Branch in all further heritage assessment work that may be required at the project site to ensure that heritage resources of value to the Ross River Dena are clearly understood.

(YOR 2008-0304-362-1)

3.13.12 Term and Condition #60- Heritage Resources

The Government of Yukon recommended revising term and condition 60. The Executive Committee reaffirms its recommended term and condition.

3.13.13 Term and Condition #64- RRDC Group Trapline

The Government of Yukon recommended revising term and condition 64 to read:

The Proponent shall enter into discussions with representatives of the Ross River Dena group trapline and holder of trapline concession #112 to establish additional mitigation/compensation, if necessary, for the expected disruption to trapping that will result from the construction of the new access road, the winter maintenance of North Canol Road, and the increase in traffic through all phases of the Project.

(YOR 2008-0304-362-1)

The Executive Committee agrees with this recommendation. The full list of consolidated terms and conditions can be found in Section 5.0.

3.13.14 Term and Condition #65- Outfitter

The Government of Yukon recommended removing term and condition 65 and replacing it with a Letter of Commitment from the Proponent to the outfitter. The Executive Committee replaces it with:

The Proponent shall enter into a letter of commitment with the holder of Outfitting Concession #9 to establish mitigation measures for the expected disruption of outfitting that will result from the construction and use of the new road to the Hess River South Tributary and the increase in air traffic through all phases of the Project.

4.0 NEW RECOMMENDATION

Pursuant to paragraph 77(2) of YESAA the Executive Committee recommends to the Decision Body that the Project be allowed to proceed without a review, subject to the terms and conditions specified below; as the Executive Committee has determined that the Project will have significant adverse environmental and/or socio-economic effects in Yukon that can be mitigated by these terms and conditions.

5.0 TERMS AND CONDITIONS OF NEW RECOMMENDATION (CONSOLIDATED)

The consolidated list contains reaffirmed terms and conditions from the Screening Report as well as new and amended terms and conditions. The strikethrough edits noted below represent terms and conditions that have been changed or amended and are no longer valid.

This consolidated listed forms the Executive Committee's New Recommendation.

In order to reduce uncertainties associated with the precipitation scenario and water balance model, as well as provide sufficient basis for future monitoring:

- 1) The Proponent shall incorporate precipitation monitoring at the Mactung Mine site as part of the meteorological monitoring program. Daily site-specific rainfall and snowfall data shall be collected. The precipitation data shall be collected to allow a determination of crucial flow periods and site hydraulic responses such as during freshet and transition from rainfall to snowfall. This information shall be provided to the appropriate regulators during the regulatory approval process.
- 2) The Proponent shall review and update the runoff coefficient using on-site rainfall, snowfall, and Tributary C streamflow data collected or update the model in a way that will account for site-specific precipitation data. Should changes to predictions from the model result, the Proponent shall ensure appropriate measures are in place and update the water management plan to account for changes. This information shall be provided to the appropriate regulators during the regulatory approval process.

In order to reduce uncertainties associated with the Tributary C hydrology and water balance model, as well as provide a sufficient basis for future monitoring:

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- 3) The Proponent shall update flow rates for Tributary C to include a minimum two years of continuous data and use this data to update the water balance model. The updated flow data and water balance model shall be provided to the appropriate regulators during the regulatory approval process.

In order to reduce uncertainties associated with the groundwater estimates and the water balance model as well as provide sufficient basis for future monitoring:

- 4) The Proponent shall validate hydraulic conductivity for the overburden aquifer by on-site in-situ tests in order to refine the hydrogeological model. This information shall be provided to the appropriate regulators during the regulatory approval process.

To reduce the uncertainties of the water balance model:

- 5) The Proponent shall update the water balance model assumptions, incorporating the most recent environmental data and rerun scenarios. Should the updated predictions indicate that changes to the design of water management structures or to the water management plan are warranted, the Proponent shall ensure these are incorporated in the final designs for the Project. The Proponent shall provide an updated water balance model to the appropriate regulators.

- 6) During operations, the Proponent shall monitor inputs to the reservoir and report total monthly inputs from the different mine components. This information should be used to validate the water balance model and to identify follow-up programs that should be conducted to improve the accuracy of the model should discrepancies be found between the measured data and the model assumptions and/or predictions.

To minimize the risk of discharging untreated water with constituents of potential concern to Tributary C:

- 7) The Proponent shall develop additional management options in the event the reservoir volume exceeds the operational capacity of 540 000 m³. Management options to meet discharge criteria must consider the potential that water treatment at a described rate is required to meet discharge targets. Management options must be provided to the appropriate regulators for consideration and, if necessary, approval prior to operation.

To minimize the risk of reservoir overtopping and discharge channel washout during severe weather events:

- 8) The Proponent shall design the reservoir dam to a minimum IDF 1:250 year flood event. The design standard will account for variability and uncertainties as a result of flood

event predictions, higher unit peak floods in smaller basins in steep high gradient areas, and climate change.

9) The Proponent shall design the discharge channels around the DSTF and on the north slope of the valley to an IDF equivalent as the reservoir dam. This will prevent a washout scenario for the DSTF and will ensure non-contact water from the north slope of the valley is successfully diverted around the reservoir during severe weather events.

10) The Proponent shall ensure that discharge channels are lined in a manner that is stable.

11) The Proponent shall update the Hess River South Tributary hydrograph based on additional data collected from Hess River during the low-flow winter period and high flow periods. The monitoring results will include at least two years of continuous flow measurements. The monitoring results will be provided to the appropriate regulators.

12) The Proponent shall not withdraw more than 10 percent surficial flow of Hess River South Tributary.

13) The Proponent shall develop an adaptive management plan to accommodate periods when 10 percent of the Hess River South Tributary flows is insufficient for the mine and camp water requirements.

To minimize the uncertainties with respect to the geochemical characterization of waste rock and tailings:

14) The Proponent shall provide the results of geochemical characterization of geologic units that make up the waste rock including a minimum 40 weeks of kinetic testing results to the appropriate regulators as part of the licensing process. The geochemical characterization shall be consistent with the MEND Report 1.20.1 "Prediction Manual Drainage Chemistry from Sulphidic Geologic Materials" (Price 2009).

To minimize the uncertainties associated with water quality predictions:

15) The Proponent shall update the water quality prediction model providing an interpretation based on loadings (e.g. mg-constituents of potential concern per time per mass of material or mg/kg/wk) and results of the waste rock humidity cell tests. In addition, the time to acid generation in the waste rock will be estimated from the humidity cell test results. This information shall be provided to appropriate regulators during the licensing process.

To minimize effects from the DSTF and underground disposal below the water table:

~~16) The Proponent shall account for the costs of temporary mine closure including those costs related to the transfer of all waste rock and tailings that is not characterized as NAG to the DSTF as part of the mine security.~~

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- 17) The Proponent shall inspect the DSTF cover system at a frequency to be determined by appropriate regulators.
- 18) The Proponent shall account for the costs of DSTF inspection and DSTF discharge monitoring after closure for the duration to be determined by the appropriate regulators as part of the mine security.
- 19) The Proponent shall not dispose tailings or waste rock into any stope above a level that will be above the water table after closure with the exception of one stope should the Proponent proceed with its proposed stope monitoring program.
- 20) The Proponent shall put in place management controls prior to proceeding with co-disposal of waste rock and tailings below the water table to ensure that waste rock will be completely encapsulated within the tailings during co-disposal.
- 21) During operations, the Proponent shall monitor drainage in the mine and in the backfilled waste to demonstrate that metal leaching effects are acceptable for water quality in the mine, and measures such as pumping and treating non-compliant mine waters are a part of a Water Quality Management Plan in order to avoid inputs of poor water quality to groundwater and conditions down gradient of the backfilled material.
- 22) As the water table rises during mine decommissioning, the Proponent shall monitor flooded backfilled waste is required to demonstrate how soluble products that form prior to flooding are affecting water quality in the mine. Measures such as pumping and treating non-compliant mine waters are required as part of a Water Quality Management Plan in order to avoid inputs of poor water quality to groundwater and conditions down gradient of the flooded backfilled material.

To improve the reliability of water quality model predictions leading to a decreased likelihood of effects on water resources:

- ~~23) To account for the uncertainty associated with the water quantity and quality predictions, in advance of their Water Licence Application, the Proponent shall ensure that the proposed water treatment plant is designed to provide for:~~
- ~~a) the range of possible water quality predictions to remain below appropriate threshold values for COPCs in the receiving environment;~~
 - ~~b) water treatment approaches that are readily adaptable should the quality of COPCs at risk of being above threshold water be different from that predicted;~~
 - ~~c) redundancies in pump design and power supply; and,~~
 - ~~d) maintaining sufficient water treatment plant reagent supplies on-site to allow the plant to function for 30 days.~~
- 24) The Proponent shall monitor quantity and quality of contact waters during operations, closure and post-closure in order to characterize contact waters from the different sources,

verify assumptions and inform the mine closure plan. The monitoring program shall, at a minimum, specify routine surface water monitoring from temporary waste rock storage areas, the DSTF, mill and reservoir. The data shall be reviewed periodically to update loading assumptions for COPCs in the site water balance and water quality models.

25) The Proponent shall implement follow-up programs to verify the assumptions and conclusions of geochemical predictions and effectiveness of the resulting mitigation measures.

26) The Proponent shall ensure that contact water discharged by the mine during post-closure meets discharge criteria established by the regulators.

27) At closure, the Proponent shall ensure that active mine water treatment is in operation until water quality meets discharge criteria established by the regulators.

28) The Proponent shall conduct ABA characterization on blasted or milled rock that is intended for construction of mine infrastructure. If indicated by ABA results, kinetic testing should be completed to assess metal leaching potential of those materials. Only rock that is classified as non-acid generating and non-metal leaching shall be used for construction purposes.

To improve the understanding of the western barrier on Tributary C:

29) The Proponent shall develop a program using appropriate professionals with suitable experience to determine the extent of fish distribution within Tributary C.

30) If Tributary C above the western barrier is fish bearing, the Proponent shall submit the new information to the appropriate regulators for consideration and appropriate approvals. Should it be found that approvals pursuant to the Federal Fisheries Act are required; the Proponent will be required to develop plans to offset any losses to fisheries productivity.

To improve the understanding of fish and fish habitat in Tributary C and in the Hess River South Tributary:

31) The Proponent shall conduct additional studies for fish presence and fish habitat along Hess River South Tributary and provide additional information to appropriate regulators describing the extent of fish habitat loss as a result 10 percent reduction of flows during low flow periods. The studies shall be conducted by appropriate professionals with suitable experience.

32) The Proponent shall conduct additional studies for fish presence and fish habitat along Tributary C and provide additional information to appropriate regulators describing the extent of fish habitat loss as a result of a reduction of flows during low flow periods. The studies shall be conducted by appropriate professionals with suitable experience.

33) The Proponent shall predict potential impacts to fish and fish habitat due to the reduction of flow in Tributary C and Hess River South Tributary resulting from the construction

of the reservoir and seepage dams and water intake. This prediction will include an analysis of the amount and type of fish habitat likely to be affected in both Tributary C and the Hess River South Tributary. The Proponent shall submit the prediction to appropriate regulators.

34) The Proponent shall conduct benthic invertebrate monitoring and fisheries investigations on an annual basis at water quality sampling locations on the Hess River South Tributary and Tributary C. Annual reports detailing the result of the monitoring and investigations shall be submitted to appropriate regulators.

To ensure the conformance point on Tributary C protects fish and fish habitat:

35) If the western barrier does not prevent fish passage, the Proponent shall identify an appropriate conformance point that protects fish and fish habitat to the satisfaction of appropriate regulators.

To minimize the effects of erosion and sedimentation on fish and fish habitat:

36) The Proponent shall develop and implement an effective sediment and erosion control plan designed by appropriate professionals with suitable experience.

37) The Proponent shall conduct in-stream works during the time of year that poses the least risk to the fish species that use the watercourse. When it is not possible to conduct works during the period of least risk, the work should be conducted in a manner that prevents fish mortality.

To minimize the effects of entrainment or impingement on fish and fish habitat:

38) The Proponent shall use fish screens according to DFO's "Freshwater Intake End-of-Pipe Screen Guidelines".

To improve the understanding of baseline information for woodland caribou, moose, Dall sheep and grizzly bear and minimize the effects of the Project on these species:

~~39) The Proponent shall establish a Wildlife Monitoring Program prior to project initiation. For this program the Proponent shall:~~

~~a) monitor at least woodland caribou, moose, Dall sheep and grizzly bear to establish baseline information of these species;~~

~~b) develop the program in consultation with appropriate Government of Yukon agencies, Northwest Territories Government agencies, RRDC, LFN, NND, Sahtu Dene and communities;~~

~~c) analyze the monitoring data and report annually to Government of Yukon and other wildlife management agencies involved. If determined to be required by a management~~

~~agency, the Proponent shall develop an Adaptive Management Plan within one year after the project initiation; and~~

~~d) — establish an appropriate buffer around the mineral licks identified by RRDC and Government of Yukon to reduce the zone of influence to wildlife species using the mineral lick. The appropriate buffer zone shall be determined in consultation with RRDC, LFN, NND and a qualified biologist.~~

To minimize the effects of the Project on migratory birds:

40) The Proponent shall avoid clearing vegetation during the migratory bird nesting season (approximately May 1st to July 31st). If clearing must occur during this period, the Proponent shall ensure nest surveys are conducted by qualified and experienced personnel prior to clearing. If active nests or migratory birds are discovered, the Proponent shall record these locations and postpone activities in the nesting area until nesting is completed.

To minimize conflicts with wildlife:

~~41) — The Proponent shall develop a Wildlife Conflict Prevention Plan (the Plan) that includes:~~

~~a) — details of a worker education program;~~

~~b) — attractant management procedures;~~

~~c) — site containment details;~~

~~d) — aversive conditioning of bears procedures;~~

~~e) — a description of investment dedicated to bear management resources and personnel; and~~

~~f) — the Guidelines for Industrial Activity in Bear Country (MPERG, 2008).~~

42) The Proponent shall provide the Plan to Government of Yukon for review prior to commencing activities.

43) The Proponent shall designate a wildlife monitor on-site to:

a) ensure that the Plan is implemented;

b) ensure that electric fences and other related systems are operational;

c) ensure that attractants are contained and out of reach by bears and other wildlife;

d) monitor and report bear activity, sightings and incidents to Government of Yukon.

~~44) Prior to any clearing and construction of undisturbed areas, qualified personnel shall conduct a thorough search of the area to identify and record the location of bear dens. Where a bear den is found, the Proponent shall record the location and establish a one to 1.6 km no-development buffer around the den while active. Clearing and construction activities around~~

~~identified active dens shall not occur between November and mid-June or until two weeks after den emergence. This accommodates the needs of family groups that must remain close to their dens up to two weeks after den emergence.~~

45) The Proponent shall use bear-proof or electric fences around camps and all areas considered a potential attractant, including but not limited to food, waste and petroleum products storage areas.

To minimize the risk of vehicle-wildlife collisions:

46) During the winter months, the Proponent shall create breaks in the snow banks created by snow plowing along the North Canal Road to allow moose, and other wildlife, egress off the road to avoid vehicle-wildlife collisions and undue stress.

47) The Proponent shall develop a reporting system for users of the access roads to report potential terrain hazard areas (e.g. avalanche, rock fall, debris slide) and actual geomorphologic processes that have the potential to affect human safety. Reports of such observations shall result in appropriate action being taken to limit terrain hazard risks to road users.

48) The Proponent shall provide annual avalanche training and other terrain hazard training to emergency response workers at the Mactung Mine. Contractors utilizing the access road during winter months shall be required to undertake avalanche hazard training and to ensure that vehicles traveling the road have the appropriate radio frequencies.

49) The Proponent shall develop and complete a terrain hazard management plan prior to the start of construction. The terrain hazard management plan for the Mactung Mine shall include:

- a) A terrain hazard path atlas for the access road and mine site area detailing the location of rock slide, debris slide, and avalanche paths. This atlas shall also be used to record natural geomorphologic activity on a path by path basis in addition to recording the results of geomorphologic control activities at the site;
- b) Establishment of a snow safety program for snow stability assessment;
- c) Establishment of a terrain hazard reporting protocol to assist with forecasting efforts;
- d) Avalanche, rock slide, and debris slide hazard signage along the access road and signage indicating safe turnout areas;
- e) A detailed Emergency Response Procedure for avalanche and other terrain hazards including a list of external specialists (RCMP, SAR, avalanche specialists) that may be contacted to provide additional support during avalanche and other terrain hazard responses;
- f) Details on recommended amount and type of avalanche response equipment that should be maintained for an emergency situation;

- g) Annual avalanche hazard and response training for emergency response team members; and,
 - h) Development of road closure and avalanche and other terrain hazard control protocols for avalanche blasting activities and other terrain hazard management activities associated with the Project. Control work will be performed by qualified technicians.
- 50) The Proponent shall update its Emergency Management Plan, in consultation with Government of Yukon, to include consideration that the access road may be closed for terrain hazard maintenance and/or terrain hazards causing the road to be impassable. The following additional measures shall be included in the finalized Emergency Management Plan:
- a) Identification of an alternate method(s) of evacuation if an injury occurs on-site while the access road is not passable;
 - b) Identification of the storage of and/or alternative modes of transportation for critical supplies used for the maintenance of the camp; and
 - c) Identification of operational changes that might be required as a result of supplies and/or personnel not being able to be transported during road closure.
- 51) The Proponent shall install signs, approved by Government of Yukon, Department of Highways and Public Works, that indicate the period of mining activities, including truck traffic, on the North Canol Road.
- 52) The Proponent shall locate the signs, at a minimum, at the beginning of the North Canol Road, possibly at the ferry crossing and at the Yukon/NWT border.
- 53) The Proponent shall implement radio communication protocols between its vehicles to inform each other of oncoming traffic. This includes posting the radio frequency used so that other users can monitor traffic.

To minimize the effects of the Project on air quality:

- ~~54) The Proponent shall develop an Air Quality Management Plan and receive regulatory approval prior to commencement of site works. The Air Quality Management Plan shall include:~~
- ~~a) A quantification of projected emissions presented and modeled using an established air quality model to predict local and regional dispersion, resulting ambient concentrations, and deposition of pollutants;~~
 - ~~b) A description of specific mitigation and adaptive management strategies and monitoring methods to be used and a plan for implementation to minimize emissions;~~
 - ~~c) Details regarding the anticipated dust deposition range so that suppression mechanisms can be appropriately established. An estimate of calcium chloride (CaCl) or alternative product usage should be presented in order to determine potential adverse effects to the soil, vegetation, surface and groundwater;~~

~~d) Quantification of any potential links between predicted air quality and subsequent impacts to other valued components such as water quality, fish, wildlife and human health;~~

~~e) Potential sources and quantities of contaminants from the handling and transport of ore and concentrate, and their expected deposition range; and~~

~~f) Description of specific mitigation and adaptive management strategies, and monitoring methods to minimize contamination by fugitive dust from the handling and transport of raw ore and concentrate, the dry-stacked tailings facility, and the processing operations.~~

55) The Proponent shall develop and implement a plan for the monitoring of plant metal uptake and toxicity. The sampling locations should take into account prevailing winds and water flows.

~~56) The Proponent shall only dispose tailings and waste rock into the dry-stacked tailings facility.~~

To minimize project effects on heritage resources in the mine site area:

57) Prior to construction of the proposed Hess River South Access Road and water pipeline and mine site development, the Proponent shall conduct a detailed heritage resource assessment of the area to be disturbed. The Proponent shall provide the results of the detailed heritage resource assessment to Ross River Dena Council and YG Heritage Resources Branch.

58) The Proponent shall work with Ross River Dena Council and YG Heritage Resources Branch to avoid, and/or minimize effects to any heritage resource of value identified in the heritage resource assessment and/or discovered during all phases of the Project.

59) The Proponent shall engage Ross River Dena Council and Government of Yukon Heritage Resources Branch in all further heritage assessment work that may be required at the project site to ensure that heritage resources of value to the Ross River Dena are clearly understood.

To minimize the effects of the Project on heritage resources along the North Canol Road:

60) The Proponent shall conduct heritage resource assessments of the aerodrome expansion area, lay-down areas, gravel resources, or other areas that require land clearing. The heritage resource assessments shall identify mitigation options for heritage resources discovered and/or areas of increased heritage resource potential. NTC shall provide the results of the heritage resource assessments to Ross River Dena Council and YG Heritage Resources Branch.

To minimize the effects of the Project on traditional land use:

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- 61) Prior to construction of the Project, the Proponent shall complete a traditional land use study of the area potentially affected by the proposed project. The traditional knowledge study may form a part of or be the required traditional land use study. The traditional land use study shall outline potential impacts the Project may have on traditional land use. The Proponent shall make best efforts to involve RRDC in the design and conduct of the study.
- 62) The Proponent shall enter into discussions with the Ross River Dena Council and Government of Yukon to establish additional mitigation, if necessary, for the construction of the mine and road to the Hess River South Tributary. The completed traditional land use study shall be taken into account in these discussions.
- 63) The Proponent shall enter into discussions with the Ross River Dena Council and Government of Yukon to establish additional mitigation, if necessary, for the year-round access of the North Canol Road.
- 64) ~~The Proponent shall enter into discussions with representatives of the Ross River Dena group trapline to establish additional mitigation/compensation, if necessary, for the expected disruption to trapping that will result from the construction of the new access road, the winter maintenance of North Canol Road, and the increase in traffic through all phases of the Project.~~

To minimize the effects of the Project on the holder of Outfitting Concession #9:

- 65) ~~The Proponent shall continue communications with the holder of Outfitting Concession #9 to establish additional mitigation measures, if necessary, for the expected disruption of outfitting that will result from the construction and use of the new road to the Hess River South Tributary and the increase in air traffic through all phases of the Project.~~

The following are the new and amended terms and conditions

To ensure the Adaptive Management Plan is updated with appropriate waste rock classification criteria:

66. The Proponent shall update the Adaptive Management Plan to: integrate the waste rock classification criteria outlined in the June 19, 2014 pHase Geochemistry memo; and to incorporate the commitments noted in their June 20, 2014 response (YOR 2008-0304-377-1).

To ensure that carbonate NP is not overestimated and result in inaccurate predictions for waste rock classification.

67. The Proponent shall conduct follow-up testing to verify that the total carbon measured in the different rock types encountered during mine development effectively represents carbonate NP. The Proponent shall make adjustments to carbonate NP accordingly.

To ensure appropriate management of waste rock stored in temporary stockpiles:

68. The Proponent shall design and build the temporary waste rock stockpiles to ensure that water infiltration is minimized and contact water is collected, monitored and sent to the water treatment plant if effluent exceeds discharge standards for COPCs. Temporary stockpiles shall include an impermeable liner to ensure complete capture of contact water. A groundwater monitoring program shall be developed and implemented to monitor groundwater downgradient of the temporary stockpiles.
69. The Proponent shall develop proactive control measures and triggers to implement those measures within their adaptive management plan to reduce, eliminate or control adverse effects associated with acid generation and metal leaching from waste rock stored in temporary stockpiles.
70. The Proponent shall implement, where necessary, measures that mitigate the onset of acid generation before, while or after placing the waste rock into permanent disposal locations (i.e. DSTF or underground and below water table). The Proponent shall develop and implement a detailed test program of the temporarily stored waste rock prior to re-location to its final repository either underground below the water table or within the DSTF. The objective of the test program is to quantify the soluble acidity and metals in the waste rock that may require pH adjustment prior to final disposal and to evaluate dosing requirements with suitable reagents, such as lime, to mitigate potential adverse effects of the waste rock on water quality after relocation. The test program shall include a frequency of sampling that recognises the potential for variations in weathering products within the PAG stockpile as it is being relocated. Rather than identifying PAG and non-PAG rock however, the purpose of the test program will be to quantify the reagent(s) required to mitigate the quality of water either in the flooded waste rock underground after flooding has occurred, or in the pore water / moisture on the waste rock that will be co-deposited with the tailings. Follow-up water quality monitoring that is included in the adaptive management plan for underground disposal and for the DSTF will monitor the effectiveness of this mitigation and identify if further measures are required to achieve and maintain acceptable water quality. This shall be consistent with the Proponents adaptive management plan that includes post closure monitoring of the various facilities at the site.
71. The Proponent shall ensure their water management plan accounts for how water at the temporary stockpiles for waste rock will be appropriately managed to mitigate potential releases of contact waters with elevated metals to the environment. For example, water collection, monitoring and treatment as needed.
72. The Proponent shall submit their updated Adaptive Management Plan and Water Management Plan for review by Environment Canada, Government of Yukon, the Yukon Water Board, Liard First Nation, First Nation of Nacho Nyak Dun and Ross River Dena Council. The Government of Yukon and/or Yukon Water Board will determine whether to approve the plans after consideration of comments from the other named parties.

To ensure that the DSTF is constructed as presented by Tetra Tech EBA on behalf of the Proponent:

73. The Proponent shall complete a final design for the DSTF that has a configuration that is comparable to one of the three options for waste rock within the DSTF (i.e. 5 m armouring, 30 m armouring or 3 m layering of waste rock and tailings) as provided in the Tetra Tech EBA technical memo on June 20, 2014 (YOR 2008-0304-377-1).

To ensure appropriate capacity is available for PAG waste rock within the DSTF:

74. The Proponent shall conduct a sensitivity analysis annually to account for the total volume of tailings and waste rock generated to that point in time and to update estimates for future tailings and waste rock production volumes. The Proponent shall provide the sensitivity analysis for review by Environment Canada, Government of Yukon, the Yukon Water Board, Liard First Nation, First Nation of Nacho Nyak Dun and Ross River Dena Council. The Government of Yukon and/or Yukon Water Board will determine if the remaining capacity within the DSTF is sufficient to manage anticipated tailings and waste rock volumes based on the results of the sensitivity analysis, the importance of encapsulating PAG waste rock and consideration of comments from the named parties.

To ensure groundwater downgradient of the DSTF is monitored for contaminants of potential concern.

75. The Proponent shall develop and implement a groundwater monitoring program to monitor groundwater downgradient of the DSTF.

To ensure closure costs and borrow materials are accurately estimated for proper closure of the DSTF.

76. The Proponent shall update the estimates for closure costs and borrow material requirements within the Decommissioning and Closure Plan. These updates will account for the expanded size of the DSTF.

To ensure waste rock used in the shell of the DSTF does not contribute to neutral metal leaching.

77. The Proponent shall, prior to closure, conduct in-situ testing of leachate from waste rock within the shell of the DSTF to ensure it is not producing soluble metals or acidity. If waste rock is leaching metals and/or producing acid, the Proponent shall mitigate with appropriate measures, such as pH adjustment, at closure and prior to installing a cover.

78. The Proponent shall cover the entire DSTF including the waste rock shell at closure.

To mitigate Project effects on wildlife and wildlife habitat

79. The Proponent shall implement a no-hunting or fishing policy and no-firearm in company vehicles policy for all its employees and contractors at and around the mine site, staging areas and at the temporary camp at the Macmillan Pass Aerodrome.

80. The Proponent shall only use off-road vehicles and snowmobile for operational purposes and shall restrict their use to roads and trails within the mine site, staging areas and the temporary camp at the Macmillan Pass Aerodrome.

81. The Proponent shall prohibit employees and contractors from bringing personal off-road and snowmobiles to the mine site, staging areas and the temporary camp at the Macmillan Pass Aerodrome.

To mitigate Project effects on health and safety effects to

82. The Proponent shall implement a mandatory education program in collaboration with RRDC, LFN and NND for its employees working at the mine site and temporary camp. The education program shall focus on the cultural importance of the project area for RRDC, LFN and NND as a spiritual and sacred place.

83. The Proponent shall restrict employees and contractors to the confines of the mine complex for their personal safety and to help preserve the integrity of the surrounding habitat to lessen impacts with wildlife and avoid the opportunity to encounter wildlife.

To ensure that PAG waste rock and tailings may only be disposed of permanently within the DSTF or underground and below the water table.

84. The Proponent shall account for the costs of temporary mine closure including those costs related to the transfer of all waste rock and tailings that is not characterized as NAG to the DSTF or underground and below the water table as part of the mine security.

To improve the reliability of water quality model predictions leading to a decreased likelihood of effects on water resources

85. The proponent shall collect base-line water quantity and quality data, the parameters and duration of which are to be determined by the appropriate regulator, from Tributary C prior to undertaking design of the proposed water treatment plant.

86. The Proponent shall ensure that the proposed water treatment plant is designed to achieve predetermined water quality objectives for the receiving environment and provide:

a) water treatment approaches that are readily adaptable should the quality of COPCs at risk of being above threshold be different from that predicted;

b) redundancies in pump design and power supply; and

c) maintaining sufficient water treatment plant reagent supplies on-site to allow the plant to function for 30 days.

To improve the understanding of baseline information for woodland caribou, moose, Dall sheep and grizzly bear and minimize the effects of the Project on these species

87. The Proponent shall establish a Wildlife Monitoring Program prior to project initiation. For this program the Proponent shall:

- a) monitor at least woodland caribou, moose, Dall sheep and grizzly bear to establish baseline information of these species;
 - b) develop the program in consultation with appropriate Government of Yukon agencies, Northwest Territories Government agencies, RRDC, LFN, NND, Sahtu Dene and communities;
 - c) analyze the monitoring data and report annually to Government of Yukon and other wildlife management agencies involved. The Proponent shall develop an Adaptive Management Plan within one year of a request by a management agency to address monitoring-identified wildlife management issues; and
 - d) establish an appropriate buffer around the mineral licks identified by RRDC and Government of Yukon to reduce the zone of influence to wildlife species using the mineral lick. The appropriate buffer zone shall be determined in consultation with RRDC, LFN, NND and a qualified biologist.
88. Prior to commencing the activities, the Proponent shall develop, for review and approval, a Wildlife Conflict Prevention Plan that references Guidelines for Industrial Activity in Bear Country (MPERG, 2008) and includes:
- a) details of a worker education program;
 - b) attractant management procedures;
 - c) site containment details;
 - d) aversive conditioning of bears procedures; and
 - e) a description of investment dedicated to bear management resources and personnel.
89. Clearing, construction and/or mining activities in the area of the mine, mill, dry stack tailing facility, reservoir and camp shall not occur between December and mid-June if the area to be cleared, constructed and/or mined was undisturbed during September to late November of the previous year (i.e. during pre denning and early denning period).

To minimize effects of the Project on air quality

90. The Proponent shall develop an Air Quality Management Plan and receive regulatory approval prior to commencement of site works. The Air Quality Management Plan shall include:
- a) A quantification of projected emissions presented and modeled using an established air quality model to predict local and regional dispersion, resulting ambient concentrations, and deposition of pollutants;
 - b) A description of specific mitigation and adaptive management strategies and monitoring methods to be used and a plan for implementation to minimize emissions;

- c) Quantification of any potential links between predicted air quality and subsequent impacts to other valued components such as water quality, fish, wildlife and human health;
- d) Potential sources and quantities of contaminants from the handling and transport of ore and concentrate, and their expected deposition range; and
- e) Description of specific mitigation and adaptive management strategies, and monitoring methods to minimize contamination by fugitive dust from the handling and transport of raw ore and concentrate, the dry-stacked tailings facility, and the processing operations.

91. The Proponent shall develop a Dust Management Plan and receive regulatory approval prior to commencement of site works. The Dust Management Plan shall include: details regarding the sources of dust, the anticipated dust deposition range and suppression mechanisms. If calcium chloride (CaCl) or alternative product usage is proposed, volume of use should be presented in order to determine potential adverse effects to the soil, vegetation, surface and groundwater.

To ensure appropriate management of waste rock and tailings

92. No material other than tailings and waste rock may be disposed of within the DSTF.

93. The Proponent shall develop management plans that demonstrate that waste rock and tailings can be disposed of in a manner that is both physically and chemically stable. These management plans shall be provided to the appropriate regulators during the licensing process.

To minimize the effects of the Project on traditional land use

94. The Proponent shall enter into discussions with representatives of the Ross River Dena group trapline and holder of trapline concession #112 to establish additional mitigation/compensation, if necessary, for the expected disruption to trapping that will result from the construction of the new access road, the winter maintenance of North Canol Road, and the increase in traffic through all phases of the Project.

To minimize the effects of the Project on the holder of Outfitting Concession #9

95. The Proponent shall enter into a letter of commitment with the holder of Outfitting Concession #9 to establish mitigation measures for the expected disruption of outfitting that will result from the construction and use of the new road to the Hess River South Tributary and the increase in air traffic through all phases of the Project.

6.0 SIGNATORY PAGE



June 25, 2014

Ken McKinnon

Date

Chair



June 25, 2014

Dave Keenan

Date

Executive Committee Member

APPENDICES

Appendix A

Appendix B

Appendix C

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Appendix A COMMENTS ON THE REFERRAL

Seeking Public Comment on Recommendation (April 30 – May 21, 2014)		
YOR Document Number	Author	Date Posted
2008-0304-357-1	Deuling Outfitters	May 08, 14
2008-0304-358-1	Ross River Dena Council	May 08, 14
2008-0304-359-1	Deuling Outfitters	May 12, 14
2008-0304-360-1	Department of Fisheries and Oceans Canada	May 12, 14
2008-0304-361-1	Environment Canada	May 14, 14
2008-0304-362-1	Government of Yukon	May 16, 14
2008-0304-363-1	Government of Yukon	May 16, 14
2008-0304-364-1	Ross River Dena Council	May 21, 14
2008-0304-365-1	Liard First Nation	May 21, 14
2008-0304-366-1	D. Hannah	May 21, 14
2008-0304-369-1	Yukon Conservation Society	May 30, 14
2008-0304-370-1	T. Smith	Jun 02, 14
2008-0304-371-1	Liard First Nation	Jun 04, 14

Appendix B LIST OF NEW AND AMENDED TERMS AND CONDITIONS

The following list includes the new terms and conditions that are recommended as a result of reconsidering the screening. The numbering reflects the sequential ordering in Section 5.0 Recommended Terms and Conditions (Consolidated).

To ensure the Adaptive Management Plan is updated with appropriate waste rock classification criteria:

66. The Proponent shall update the Adaptive Management Plan to: integrate the waste rock classification criteria outlined in the June 19, 2014 pHase Geochemistry memo; and to incorporate the commitments noted in their June 20, 2014 response (YOR 2008-0304-377-1).

To ensure that carbonate NP is not overestimated and result in inaccurate predictions for waste rock classification.

67. The Proponent shall conduct follow-up testing to verify that the total carbon measured in the different rock types encountered during mine development effectively represents carbonate NP. The Proponent shall make adjustments to carbonate NP accordingly.

To ensure appropriate management of waste rock stored in temporary stockpiles:

68. The Proponent shall design and build the temporary waste rock stockpiles to ensure that water infiltration is minimized and contact water is collected, monitored and sent to the water treatment plant if effluent exceeds discharge standards for COPCs. Temporary stockpiles shall include an impermeable liner to ensure complete capture of contact water. A groundwater monitoring program shall be developed and implemented to monitor groundwater downgradient of the temporary stockpiles.
69. The Proponent shall develop proactive control measures and triggers to implement those measures within their adaptive management plan to reduce, eliminate or control adverse effects associated with acid generation and metal leaching from waste rock stored in temporary stockpiles.
70. The Proponent shall implement, where necessary, measures that mitigate the onset of acid generation before, while or after placing the waste rock into permanent disposal locations (i.e. DSTF or underground and below water table). The Proponent shall develop and implement a detailed test program of the temporarily stored waste rock prior to re-location to its final repository either underground below the water table or within the DSTF. The objective of the test program is to quantify the soluble acidity and metals in the waste rock that may require pH adjustment prior to final disposal and to evaluate dosing requirements with suitable reagents, such as lime, to mitigate potential adverse effects of the waste rock on water quality after relocation. The test program shall include a frequency of sampling that recognises the potential for variations in weathering products within the PAG stockpile as it is being relocated. Rather than identifying PAG and non-PAG rock however, the purpose of the test program will be to quantify the reagent(s) required to mitigate the quality of water either in the flooded waste rock

underground after flooding has occurred, or in the pore water / moisture on the waste rock that will be co-deposited with the tailings. Follow-up water quality monitoring that is included in the adaptive management plan for underground disposal and for the DSTF will monitor the effectiveness of this mitigation and identify if further measures are required to achieve and maintain acceptable water quality. This shall be consistent with the Proponents adaptive management plan that includes post closure monitoring of the various facilities at the site.

71. The Proponent shall ensure their water management plan accounts for how water at the temporary stockpiles for waste rock will be appropriately managed to mitigate potential releases of contact waters with elevated metals to the environment. For example, water collection, monitoring and treatment as needed.

72. The Proponent shall submit their updated Adaptive Management Plan and Water Management Plan for review by Environment Canada, Government of Yukon, the Yukon Water Board, Liard First Nation, First Nation of Nacho Nyak Dun and Ross River Dena Council. The Government of Yukon and/or Yukon Water Board will determine whether to approve the plans after consideration of comments from the other named parties.

To ensure that the DSTF is constructed as presented by Tetra Tech EBA on behalf of the Proponent:

73. The Proponent shall complete a final design for the DSTF that has a configuration that is comparable to one of the three options for waste rock within the DSTF (i.e. 5 m armouring, 30 m armouring or 3 m layering of waste rock and tailings) as provided in the Tetra Tech EBA technical memo on June 20, 2014 (YOR 2008-0304-377-1).

To ensure appropriate capacity is available for PAG waste rock within the DSTF:

74. The Proponent shall conduct a sensitivity analysis annually to account for the total volume of tailings and waste rock generated to that point in time and to update estimates for future tailings and waste rock production volumes. The Proponent shall provide the sensitivity analysis for review by Environment Canada, Government of Yukon, the Yukon Water Board, Liard First Nation, First Nation of Nacho Nyak Dun and Ross River Dena Council. The Government of Yukon and/or Yukon Water Board will determine if the remaining capacity within the DSTF is sufficient to manage anticipated tailings and waste rock volumes based on the results of the sensitivity analysis, the importance of encapsulating PAG waste rock and consideration of comments from the named parties.

To ensure groundwater downgradient of the DSTF is monitored for contaminants of potential concern.

75. The Proponent shall develop and implement a groundwater monitoring program to monitor groundwater downgradient of the DSTF.

To ensure closure costs and borrow materials are accurately estimated for proper closure of the DSTF.

76. The Proponent shall update the estimates for closure costs and borrow material requirements within the Decommissioning and Closure Plan. These updates will account for the expanded size of the DSTF.

To ensure waste rock used in the shell of the DSTF does not contribute to neutral metal leaching.

77. The Proponent shall, prior to closure, conduct in-situ testing of leachate from waste rock within the shell of the DSTF to ensure it is not producing soluble metals or acidity. If waste rock is leaching metals and/or producing acid, the Proponent shall mitigate with appropriate measures, such as pH adjustment, at closure and prior to installing a cover.

78. The Proponent shall cover the entire DSTF including the waste rock shell at closure.

To mitigate Project effects on wildlife and wildlife habitat

79. The Proponent shall implement a no-hunting or fishing policy and no-firearm in company vehicles policy for all its employees and contractors at and around the mine site, staging areas and at the temporary camp at the Macmillan Pass Aerodrome.

80. The Proponent shall only use off-road vehicles and snowmobile for operational purposes and shall restrict their use to roads and trails within the mine site, staging areas and the temporary camp at the Macmillan Pass Aerodrome.

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- a) water treatment approaches that are readily adaptable should the quality of COPCs at risk of being above threshold be different from that predicted;
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- a) monitor at least woodland caribou, moose, Dall sheep and grizzly bear to establish baseline information of these species;
 - b) develop the program in consultation with appropriate Government of Yukon agencies, Northwest Territories Government agencies, RRDC, LFN, NND, Sahtu Dene and communities;
 - c) analyze the monitoring data and report annually to Government of Yukon and other wildlife management agencies involved. The Proponent shall develop an Adaptive Management Plan within one year of a request by a management agency to address monitoring-identified wildlife management issues; and
 - d) establish an appropriate buffer around the mineral licks identified by RRDC and Government of Yukon to reduce the zone of influence to wildlife species using the mineral lick. The appropriate buffer zone shall be determined in consultation with RRDC, LFN, NND and a qualified biologist.
88. Prior to commencing the activities, the Proponent shall develop, for review and approval, a Wildlife Conflict Prevention Plan that references Guidelines for Industrial Activity in Bear Country (MPERG, 2008) and includes:
- a) details of a worker education program;
 - b) attractant management procedures;
 - c) site containment details;
 - d) aversive conditioning of bears procedures; and

e) a description of investment dedicated to bear management resources and personnel.

89. Clearing, construction and/or mining activities in the area of the mine, mill, dry stack tailing facility, reservoir and camp shall not occur between December and mid-June if the area to be cleared, constructed and/or mined was undisturbed during September to late November of the previous year (i.e. during pre denning and early denning period).

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- a) A quantification of projected emissions presented and modeled using an established air quality model to predict local and regional dispersion, resulting ambient concentrations, and deposition of pollutants;
 - b) A description of specific mitigation and adaptive management strategies and monitoring methods to be used and a plan for implementation to minimize emissions;
 - c) Quantification of any potential links between predicted air quality and subsequent impacts to other valued components such as water quality, fish, wildlife and human health;
 - d) Potential sources and quantities of contaminants from the handling and transport of ore and concentrate, and their expected deposition range; and
 - e) Description of specific mitigation and adaptive management strategies, and monitoring methods to minimize contamination by fugitive dust from the handling and transport of raw ore and concentrate, the dry-stacked tailings facility, and the processing operations.
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To minimize the effects of the Project on traditional land use

94. The Proponent shall enter into discussions with representatives of the Ross River Dena group trapline and holder of trapline concession #112 to establish additional mitigation/compensation, if necessary, for the expected disruption to trapping that will result from the construction of the new access road, the winter maintenance of North Canol Road, and the increase in traffic through all phases of the Project.

To minimize the effects of the Project on the holder of Outfitting Concession #9

95. The Proponent shall enter into a letter of commitment with the holder of Outfitting Concession #9 to establish mitigation measures for the expected disruption of outfitting that will result from the construction and use of the new road to the Hess River South Tributary and the increase in air traffic through all phases of the Project.

Appendix C ECOMETRIX – TECHNICAL MEMORANDUM

MEMO

To: Steve Caram,
YESAB Executive Committee

From: Lynnae Dudley
Ron Nicholson

**Ref: Response from North American
Tungsten Corporation Ltd. to YESAB
Supplementary Information Request to
for the Mactung Mine Project (2008-
0304), Dated 13 June 2014**

Date: 25 June 2014

EcoMetrix Incorporated was requested to review the responses provided by North American Tungsten Corporation Ltd. (NATC) to the Yukon Environmental and Socio-economic Assessment Board (YESAB) Executive Committee (EC) Request for Supplemental information (SIR) (YOR Document 2008-0304-376-1). The objective of this review was to support the YESAB EC's assessment of the Mactung Mine Project and response to the Yukon Government's referral of YESAB recommendations of April 24, 2014 (YOR Document 2008-0304-354-2), in the areas of geochemical and geotechnical stabilities of the proposed tailings and waste rock management plan which includes co-disposal of tailings and waste rock within the Dry Stack Tailings Facility (DSTF).

This memo focuses on the geochemical aspects of the tailings and waste rock management plan for the Mactung Mine Project. The comments and recommendations concerning geotechnical aspects of the DSTF are provided in the attached memo authored by Terraprobe.

In our opinion, relating to the areas of expertise of the EcoMetrix review team and understanding that more detailed geochemical information will be required from NATC during licensing, we conclude that NATC has provided sufficient information to support the effects assessment and identify additional mitigation measures for:

- a management plan for a total of 4,680,000 m³ waste rock and tailings, including 180,000 m³ of storage in underground workings below the water table and 4,500,000 m³ at surface in a Dry Stack Tailings Facility area;
- management of potentially acid generating (PAG) rock;

Reference: Response from North American Tungsten Corporation Ltd. to YESAB Supplementary Information Request to for the Mactung Mine Project (2008-0304), Dated 13 June 2014

- separation of PAG rock from non-PAG rock; and
- identification of non-PAG rock that may be metal leaching at neutral pH and may affect water quality.

This Memo represents our opinion of the responses provided by NATC and provides discussion of additional mitigating measures that YESAB can consider to limit or eliminate potential residual adverse effects of the project on aquatic resources which we have identified during this review.

This review focused on NATC's response to the YESAB SIR provided in one letter and 2 attachments;

1. **Letter from Allan Krasnick, NTC Ltd., to Ken McKinnon dated 20 June 2014 Re; Mactung Project (2008-0304): Supplementary Information Request,**
2. **Memorandum from Shannon Shaw, pHase Geochemistry, to Rod Ambrosie (NTC Ltd.), dated 19 June 2014, Re; Suggested Criteria for Segregation on non-PAG Construction Rock at the Mactung Project, Yukon Territories; and**
3. **Technical Memo from Jonathon G. Dixon (Tetra Tech EBA) to Rod Ambrose (NTC Ltd.), dated 20 June 2014, Re; Mactung DSTF – June 13, 2014 Supplementary Information Request Response to R1b through g.**

This review has also considered the project information available on the YOR, and specifically on the 2009 Mactung Mine Project Proposal (YOR document 2008-0304-023-1), the 2013 Adaptive Management Plan (YOR document 2008-0304-301-1), December 16, 2013 clarifications to the AMP (YOR document 2008-0304-338-1), and EBA 2009 supplemental geotechnical investigations (YOR documents 2008-0304-328-1 through 335-1). Other project documents are referenced by YOR number, as required.

Geochemical Considerations for Proposed Tailings and Waste Rock Management for the Mactung Mine

The following comments are provided on responses to items R2-a., -b. and -c.

Reference: Response from North American Tungsten Corporation Ltd. to YESAB Supplementary Information Request to for the Mactung Mine Project (2008-0304), Dated 13 June 2014

R2-a. – Estimates for the total quantities of potentially acid generating (PAG) and non-PAG waste rock that will be produced.

The information provided on the estimated quantity of rock, including PAG and non-PAG rock is adequate to understand required storage capacity for PAG rock in the combination of the DSTF and underground workings below the water table. Only one uncertainty remains and it relates to the quantity of tailings expected for the project. The project description notes that the total quantity of tailings will be 4.26 Mm³ while the 2013 AMP (Figure 5), YOR document 2008-0304-301-1, quotes a value of 3.4 Mm³ for total tailings for the project. If the AMP figure is correct, then there will be adequate storage capacity for the tailings plus the upper estimate of PAG rock in the DSTF plus the underground workings below the water table. If the project proposal number is correct, then there will be inadequate storage capacity in those two facilities for the combined volumes of tailings and PAG rock.

YESAB EC should be aware that the review has considered a total tailings and waste rock storage capacity of 4,680,000 m³, including 180,000 m³ in underground workings below the water table and 4,500,000 m³ at surface in a Dry Stack Tailings Facility area. The Project Proposal does not consider the need for additional waste rock and tailings disposal beyond that maximum value and the potential environmental and socio-economic effects of storage above that maximum volume has not been assessed, therefore YESAB should consider 4,680,000 m³ as a maximum storage volume for the Mactung Mine Project.

R2-b. – Criteria that will be used in the Adaptive Management Plan (AMP) to segregate PAG rock from rock that is appropriate for construction purposes.

The criterion for segregation of non-PAG rock for construction materials was provided in the pHase Memo dated 19 June 2014. The criterion is considered to be appropriate if managed in the manner that is proposed by pHase with on-site analyses, quality assurance/quality control (QA/QC) testing and one-year follow-up. The criterion should be integrated in the Mactung Mine Project AMP, with one addition:

In addition to the method proposed in the pHase memo to estimate potential carbonate neutralization potential (NP), we recommend that the proponent add follow-up testing to verify that the total carbon measured in the different rock types encountered during mine development effectively represents carbonate NP. The use of total carbon, by combustion furnace analysis, as proposed by pHase, as an indicator of carbonate content implies that all carbon is in carbonate form. If organic carbon or non-carbonate

Reference: Response from North American Tungsten Corporation Ltd. to YESAB Supplementary Information Request to for the Mactung Mine Project (2008-0304), Dated 13 June 2014

carbon such as graphite is present in the samples, the use of total carbon as an indicator of carbonate content will result in an over-estimation of potential carbonate NP in the samples. Therefore, the assumption that total carbon is an acceptable surrogate for carbonate NP for each type of rock encountered should be verified during the project development period and adjustments to carbonate NP made accordingly.

R2-c. – Clarification regarding the contingency measures at closure for mitigating potential adverse effects of PAG waste rock stored on surface.

Placement of PAG rock below the water table in the underground workings

Placement of PAG rock below the water table in the underground workings is considered to be an appropriate mitigation measure to prevent acid generation in the future. We understand that the estimated maximum available storage in the underground workings below the water table is 180,000 m³. NATC states that they “*will be testing waste rock on an ongoing basis. Based on the results and whenever practical, the most reactive waste rock will be placed underground in locations that are determined to be underwater after closure.*” The mitigation measures recommended by the EC in the Final Screening Report for underground disposal in mined out stopes should apply, including monitoring water quality, and if necessary, conducting a one-time water treatment or pH adjustment as a mitigation to control COPCs in flooded stopes should they exceed acceptable levels when the these stopes are initially flooded. The associated monitoring of water quality and development of mitigation including triggers that will initiate water treatment should be included in the AMP.

Placement of the PAG rock by encapsulation in the tailings within the DSTF

Placement of the PAG rock by encapsulation in the tailings within the DSTF is also considered to be an effective mitigation measure if the DSTF is appropriately covered by a membrane layer as proposed at closure. NATC states that “[w]aste rock that is considered PAG and not able to be placed underground will be placed within the dry stack areas that are located the most distant from contact with oxygen and water. The dry stack cover design will take into consideration the location of these PAG materials and will be designed accordingly.” According to the conceptual design for co-disposal of tailings and PAG waste rock described by NATC, potential adverse effects to water quality from the DSTF will be similar to those assessed in the EC Screening Report for the expanded DSTF. Potential COPC loadings from the DSTF, where waste rock is fully encapsulated as layers within the DSTF, will be driven by the tailings component of the DSTF and therefore we consider that the assessment conclusions and mitigations

Reference: Response from North American Tungsten Corporation Ltd. to YESAB Supplementary Information Request to for the Mactung Mine Project (2008-0304), Dated 13 June 2014

proposed in the EC Screening Report are also valid for this disposal option. However, this opinion is based on a total maximum storage capacity of 4,500,000 m³ of tailings and waste rock in the DSTF. During licensing, regulators should ensure that the appropriate controls are imposed for DSTF construction and management. NATC should also update estimates for waste rock production during mine development and inform regulators if the estimated volume of PAG waste rock will exceed the allowance for disposal in the DSTF.

Use of Waste Rock in the Construction of the DSTF Shell

The method described by NATC includes the use of non-PAG waste rock for constructing a shell (i.e., armouring for the front face of the facility) for the DSTF. We understand that only non-PAG material may be left exposed on the front face of the DSTF (Tetra Tech, June 20, 2014 memo). In our opinion, any rock that may be left exposed to air and water within the DSTF should be tested for QA/QC to ensure that it is neither PAG nor likely to leach metals under neutral conditions. Metal leaching can be evaluated with kinetic tests on non-PAG rock and modeling will be required to demonstrate that the loadings from the kinetic test will not adversely affect the local receiving water quality. To mitigate potential adverse effects to water quality, water from the DSTF should be collected, monitored and treated as necessary to achieve the environmental objectives for the receiving environment during operations. At closure, any soluble metals or acidity resulting from the waste rock shell of the DSTF should be mitigated by appropriate pH adjustment methods and the waste rock shell should be covered along with the DSTF to mitigate long term adverse effects to water quality.

Temporary Storage of PAG Waste Rock on Surface

Temporary storage of PAG waste rock on surface and in contact with air and water may lead to the development some soluble metals and acidity that will require management and mitigation measures. We understand that there may be temporary storage of rock near the existing adit portal and the conveyor entrances respectively during operations. Additionally, should the mine be subject to temporary closure the waste rock characterized as PAG would be relocated to the DSTF to isolate PAG material at a single facility for monitoring (Temporary Closure Plan; YOR 2008-0304-299-1). Monitoring and testing of the PAG rock will be required prior to relocation to determine if mitigation will be required. Specific control measures to reduce potential adverse effects of the onset of acid generation should be identified during licensing. The associated

Reference: Response from North American Tungsten Corporation Ltd. to YESAB Supplementary Information Request to for the Mactung Mine Project (2008-0304), Dated 13 June 2014

monitoring of PAG rock and development of mitigation including triggers that will initiate additional control measures should be included in the AMP.

Methods to mitigate the onset of acid generation before, while or after placing the rock underground could include, for example, pH adjustment while relocating rock or after placement of the rock to mitigate acid and metal concentrations.

As well, during licensing, NATC will need to demonstrate how they will manage water at waste rock temporary storage areas during operations to mitigate potential releases of contact waters with elevated metals to the environment, for example, water monitoring, water collection, water treatment, low permeability liners.

Use of Waste Rock as Construction Material

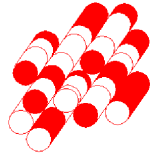
NATC is considering using non-PAG waste rock as construction material for mine infrastructure outside of the immediate DSTF, such as access roads. Any rock used in construction of mine infrastructure outside of the immediate DSTF should be tested to ensure that it is neither PAG nor likely to leach metals under neutral conditions. In the EC Screening report, the EC provided the following mitigation for borrow material that is also relevant to waste rock used for construction purposes:

The following terms and conditions are specified by the Executive Committee to mitigate significant adverse environmental effects of the Project on water quality resulting from acid rock drainage and metal leaching.

To minimize the risk of ARD/ML from source material used for construction of infrastructure:

28) The Proponent shall conduct ABA characterization on blasted or milled rock that is intended for construction of mine infrastructure. If indicated by ABA results, kinetic testing should be completed to assess metal leaching potential of those materials. Only rock that is classified as non-acid generating and non-metal leaching shall be used for construction purposes.

We trust that this information meets your requirements at this time. Please do not hesitate to contact us with any questions or comments.



Terraprobe
*Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing*

June 25, 2014

File No. 11-13-3184

Brampton Office

EcoMetrix Incorporated
6800 Campobello Road
Mississauga, ON
L5N 2L8

Attention: Ms. Lynnae Dudley
EcoMetrix Incorporated

**RE: YESAB PROJECT #2008-0304
MACTUNG MINE REVIEW – ADEQUACY & RESPONSE
YUKON TERRITORY**

Dear Ms. Dudley:

This letter comprises Terraprobe's comments and questions relating to the Mactung Mine, Yukon. The scope of Terraprobe's work was to review the geotechnical aspects of the proposed ravine dam and the dry stacked tailings facility ("DSTF"). The Mactung Mine is owned/operated by North American Tungston Corporation ("NATC"). This letter specifically addresses YESAB's June 13, 2014, Request for Supplementary Information (the "Supplementary Requests"), which address the issue of including waste rock within the DSTF. In response to the information request, NATC provided a letter response dated June 20, 2014 and an attachment to that letter, which was a technical memo from Tetra Tech EBA ("EBA") dated June 20, 2014 (EBA file no. W23101211.004).

A background of the purpose of the supplementary request is provided first, and then the letter is structured to follow the NATC and EBA responses to the supplementary requests and provides our comments and questions for each section as it relates only to geotechnical engineering.

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Background for the Supplementary Request

In the Adaptive Management Plan (“AMP”) dated September 2013, EBA suggests that NATC is “committed to increasing the capacity of the DSTF to accommodate all tailings and waste rock from above the natural water table...”

- To do this they suggest increasing the size of the DSTF by “adding the tailings and waste rock originally destined for underground backfill.”
- A plan and profile (Figs. 6A and 6B) are provided that show the 11 year tailings elevation as per the 2008 project proposal and then above that the elevation of the “11 year tailings plus underground material from above water table”.
- No geotechnical analysis or parameters or material types were described or provided.
- Terraprobe recommended more information be provided (ground characteristics, tailings properties, ground water table assumption, geotechnical stability analyses of overall slope and individual benches).

In response to our questions, the proponent provided in information response in December 2013 which included a technical memo by EBA (December 6, 2013). The technical memo provided details and stability analyses of the DSTF.

- The assumed material properties included bedrock, the native sand and gravel, and “tailings”.
- The material properties for the tailings “were assumed based on previous experience with dry stack tailings in Yukon, at both the Minto Mine and the Belkeno Mine.” That is, the properties were only based on tailings, not on co-mingled or co-disposed tailings with waste rock.
- Neither the text nor the Appendix B (stability analysis output) refer to waste rock, and only refer to tailings being in the DSTF.

Therefore, but for the mention in the text of waste rock in the DSTF, there was no mention nor technical support of waste rock in the DSTF. Details of parameters, stability analyses, etc. would need to be provided for assessment.

In the supplementary requests regarding waste rock in the DSTF, Terraprobe recommended that more information is needed to proceed to evaluation stage. For the DSTF, the proponent should provide:

- ground characterization, including at a minimum soil and ground water conditions and / or rock types, faults, joints, strength parameters;
- characterization of the tailings properties to be used in design;
- details of assumptions regarding the ground water table within the DSTF for stability analysis purposes; and
- geotechnical stability analyses demonstrating that the required factors of safety can be achieved for both the overall slope and the individual 10 m high benches.

NATC and EBA Responses to Supplementary Requests

R1. In order to review the adequacy of co-disposing or co-mingling of waste rock with the tailings in the dry-stacked tailings facility (DSTF), our technical consultant, Terraprobe, recommends that the following information be provided:

a) Clarification of whether the waste rock be co-mingled (i.e. transported independently and mixed together usually by mechanical means or as a single discharge stream when pumped), co-placed (i.e. transported independently, but not mixed to form a single discharge stream), or co-disposed (i.e. placed in independent layers allowing the deposited tailings to naturally enter the voids in the underlying waste rock).

- The response by NATC indicates that waste rock will not be mechanically mixed, but will be used as a facing material of the DSTF or as pads or roads all with appropriate filters.
- **RESPONSE:** It should be noted that the EBA technical memo proposed one additional option to those indicated by NATC in this response; that being using waste rock in alternating 3 m layers with the tailings. From a geotechnical perspective only, and given the additional information in the EBA technical memo regarding the three options for use of waste rock in the DSTF, the response is adequate.

b) Clarification of where and how waste rock will be placed within the DSTF (e.g. layers, mixed in, armoured); how will they be placed, compacted, filtered and protected against fines migration, etc.

- The proponent's geotechnical engineer, EBA, provided a technical memo addressing items R1.b to R1.g. The response to R1.b. provided a discussion that indicated that waste rock would be used either as armouring of the face of the DSTF, as isolated construction access roads within the DSTF or as layers within the DSTF. A discussion as to the approach for filtering and fines migration was provided.
- **RESPONSE:** Terraprobe agrees that these are reasonable methods of disposing of waste rock within the DSTF. Terraprobe agrees that the isolated construction roads and pads will have negligible effect on global stability. Therefore, from a geotechnical perspective only, the response is adequate.

c) Characterization of the waste rock (e.g. grain size distribution) to demonstrate the compatibility of tailings and waste rock for co-disposal.

- The EBA technical memo provided a discussion that indicated that the grain size distribution would likely vary from around 1 m to 300 mm, with typically small portions of sand or silt. Assumed material property (unit weight, friction angle, and cohesion) values were provided for the waste rock for the purposes of preliminary slope stability analyses.
- **RESPONSE:** Terraprobe considers that the assumptions with respect to grain size are reasonable and that the assumed material parameters are appropriately conservative. From a geotechnical perspective only, the response is adequate.

d) Characterization of the waste rock co-disposed with tailings (including unit weight, cohesion and friction angle) and justification of chosen parameters (i.e. properties to be used in stability analyses).

- The EBA technical memo indicated co-disposed material was not modelled, and that if waste rock and tailings were co-disposed that the material parameters would only be better than the tailings already modelled in the December 2013 EBA memo and hence provide conservative factors of safety should the waste rock be co-disposed.
- **RESPONSE:** Terraprobe generally agrees with the discussion from EBA regarding the use of dewatered tailings properties in stability analyses when co-disposing waste rock with tailings, although it is noted that the overall unit weight of the co-mingled material would increase marginally. However, the co-disposing method is not currently proposed and hence is not relevant. Only the three options proposed in the EBA memo were presented (armouring or layering, not co-disposing). Therefore, from a geotechnical perspective only, Terraprobe is in agreement with the assumptions and hence the response is adequate.

e) Plans and profiles of the proposed disposal of waste rock within the DSTF to give a visual depiction of how the tailings and waste rock will work together.

- Typical cross-sections through the DSTF were provided for each of the potential three options for disposing waste rock within the DSTF (5 m wide armouring, 30 m wide armouring, 3 m alternating layers of waste rock and tailings).
- **RESPONSE:** The typical cross sections provided show enough detail at this stage of preliminary development of options to provide a visual depiction of the proposed methodology. The concepts for disposal of the waste rock seem reasonable and are standard methods of disposing waste rock within a dry stack tailings facility. Therefore, Terraprobe is in agreement with the proposed preliminary waste rock disposal options within the DSTF. From a geotechnical perspective only, the response is adequate.

f) Details of assumptions regarding the ground water table within the DSTF co-disposed / co-mingled tailings/waste rock.

- The EBA technical memo indicated that the ground water assumptions would not change from those assumed in the December 2013 memo and analyses based on the addition of waste rock into the DSTF. A discussion was provided regarding the potential of piping of surface water into the DSTF and methods to avoid this issue.
- **RESPONSE:** Terraprobe agreed with the previous discussion regarding the ground water assumptions in the DSTF, given the existing sand and gravel overburden above the rock that will form the foundation for the DSTF. Terraprobe agrees with EBA that the addition of waste rock in the DSTF (armouring or in alternating layers) will not alter the previously assumed ground water regime. Therefore, from a geotechnical perspective only, the response is adequate.

f) Geotechnical stability analyses demonstrating that the required factors of safety can be achieved for both the overall slope and individual 10 m high benches.

- The EBA technical memo provided three potential options for incorporating waste rock into the DSTF:
 - a 5 m wide armouring of waste rock on the front face of the DSTF;
 - a 30 m wide armouring of waste rock on the front face of the DSTF; and
 - alternating 3 m thick layers of waste rock and tailings within the DSTF.
- The EBA technical memo analysed each option for static and pseudo-static conditions, and with and without 10 m benches at the face (except for the alternating 3 m thick layers option). The factors of safety for each of the sixteen cases all found minimum factors of safety exceeding the minimum required factor of safety as per the BC guidelines for mined rock and overburden piles that is applicable to this facility.
- Of note, there were two inconsistencies noticed in the modeling when compared to the technical memo text:
 - the unit weight assumed for the waste rock in the technical memo is 19.6 kN/m^3 . This value appears to have been used in each of the models but the final four models in the alternating 3 m thick layers option. In this option, shown in Figure A5, a unit weight for waste rock in the models was 18 kN/m^3 . Given that the factors of safety in these four models are well above the required minimum factors of safety, this unfortunate typographic error or mistake in the model are not considered likely to decrease the computed minimum factor of safety to below the minimum required factor of safety; and
 - the calculated minimum factor of safety for the 30 m wide armouring of waste rock on the face for static, deep seated failure is reported in the table within the body of the memo as 2.1, whereas the model on Figure A4 shows a factor of safety of 2.2. This is considered an unfortunate typographical error and is considered by Terraprobe to not affect the potential stability of the proposed option.

- The EBA technical memo also indicates that the actual layout of tailings, waste rock and other granular materials would be checked in the detailed design phase. The memo concluded that based on the preliminary analyses that “there should be no reasonable construction layout that will cause the DSTF to be constructed so that it would not meet the minimum required factors of safety.”
- **RESPONSE:** Terraprobe is satisfied with the calculated factors of safety achieved in the sixteen models. The minimum factors of safety achieved in the models meet or exceed the standards quoted in the memo. The standards of comparison are considered appropriate. Terraprobe agrees with the EBA concluding statement regarding the viability of the preliminary options and analyses, as long as the detailed design of the final structure has a general configuration that is comparable to one of the three options for waste rock within the DSTF (5 m armouring, 30 m armouring, or 3 m layering of waste rock and tailings) as provided in the EBA technical memo. Therefore from a geotechnical perspective only, the response is adequate.

SUMMARY

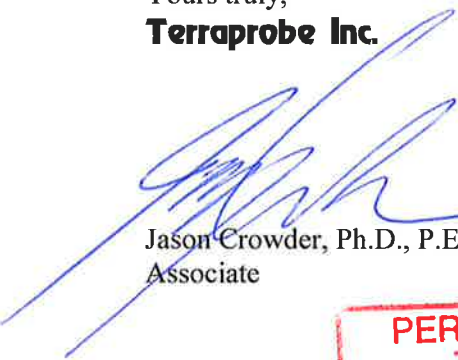
In summary, Terraprobe has no further information requests and confirms that the information provided by the proponent is adequate. Based on the responses and analyses provided by NATC and Tetra Tech EBA, it is Terraprobe’s opinion that the DSTF can be designed and constructed using waste rock and tailings in one of the three manners presented such that adequate minimum factors of safety for deep seated and bench failures can be achieved. Those proposed methods are:

- a 5 m wide armouring of waste rock on the front face of the DSTF;
- a 30 m wide armouring of waste rock on the front face of the DSTF; and
- alternating 3 m thick layers of waste rock and tailings within the DSTF.

We trust this information is sufficient for your present purposes. Should you have any questions concerning the above, please do not hesitate to contact the undersigned.

Yours truly,

Terraprobe Inc.


Jason Crowder, Ph.D., P.Eng.
Associate

