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February 24, 2009

Our File: 4702 011

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By Email

**Re: Draft Terms of Reference and Work Plan for the Environmental Assessment of the Tyhee NWT Corp. Yellowknife Gold Project – EA0809-003**

The draft Terms of Reference (ToR) and Work Plan have been reviewed on behalf of Environment Canada (EC) by staff with expertise in the areas of air and water quality, wildlife, mining engineering, and closure planning. The following comments on the draft ToR are offered for your consideration.

**General:**

The cover letter was somewhat misleading in terms of describing the TIA scheduling being "parallel" to the Environmental Assessment (EA). While the EA is meant to complement and provide all the necessary technical information for the subsequent process of amending the Metal Mining Effluent Regulations (MMER), it should be clarified that the process to designate a fish-bearing lake as a Tailings Impoundment Area cannot proceed to scheduling under the MMER until the EA decision has been made and accepted. The proponent should prepare the alternatives assessment concurrent with the environmental impact statement for the project to facilitate a more timely process.

**Table 1** Current Project Components – add open pit to the section describing Mining Process.

**Section 6 Terms of Reference**

**A. Baseline Conditions Assessment**

This section captures the components of concern, but should more explicitly state that the proponent must demonstrate that they have characterized the range of natural variability in the existing environment such that they will be able to differentiate project effects from natural conditions. The spatial scope is not defined here, and it would be helpful to approach this on a watershed basis.

Sub-section 5) should include outflows as well as inflows, such that a complete water balance is done.

Canada

### **C. Consideration of Alternatives**

Subsection 1) In follow up to both the cover letter and specific references in the ToR to the MMER, EC recommends that the draft Guidelines for TIA assessment be attached to the ToR for the benefit of the proponent (copy attached).

The ToR should also require the mine proponent to consider the alternatives for ore extraction methods (specifically, the use of underground vs open pit vs combination of pit and underground). The environmental implications of differing methods can be significant. It is stated in the preamble to Section C Considerations of Alternatives: "The Review Board requires that the Developer consider and explicitly outline alternative approaches to planning, developing, operating and closing the YGP in the DAR". The focus of the section then moves to the use of Winter Lake for the Tailings Impoundment area. A comprehensive site consideration of waste management at a mine site needs to include consideration of the extraction approach. As quoted above, this is reflected in the preamble, but is not stated in the Key Line or the Subjects of Note. Perhaps under Key Line of section C, add a new subsection 6) "Describe the sequential evaluation, with increasing assessment detail as the number of options is reduced, for the selection of the mining method and mining sequence for each deposit. This evaluation should include, but not be limited to a consideration of the overall waste generation, potential for future waste disposal or other use, cost, production and workforce utilization and decommissioning. "

### **D. Community Engagement**

As noted previously, the process to add Winter Lake to the MMER as a Tailings Impoundment Area can start and proceed concurrently with the EA; however, it should be noted that the responsibility for national consultation rests with the Federal Government. Subsection 3 implies that the national consultation is solely the responsibility of Tyhee, and should occur during the EIA process. It is important to clarify that national consultation does not need to be dealt with in the DAR and therefore reference to this should be removed from the ToR.

### **E. Water Resources**

Subsection 7)a. requires development of an aquatic effects monitoring program (AEMP). This requirement should be expanded to include all the aquatic monitoring aspects: the AEMP, Surveillance Network Program, MMER Environmental Effects Monitoring, and Fisheries Authorization monitoring. The proponent should provide a framework for the overall monitoring which shows how they will integrate these requirements.

### **F. Fish and Aquatic Habitat**

Items 8 & 13 should be in the Key Line of Inquiry category.

### **G. Wildlife and Wildlife Habitat.**

4.a. Should this include species listed elsewhere?

### **J. Air Quality and Climate**

Subjects of note

2) a. Remove this subsection as modelling dispersion of dioxins and furans and mercury from incinerator will not provide useable information. It is better to minimize incinerator emissions and meet the Canada-wide Standards – see below

2) d. Modify this clause to "Emissions from vehicles, diesel generators and other combustion sources".

The logo for the Government of Canada, featuring the word "Canada" in a stylized serif font with a small Canadian flag above the letter 'a'.

Add a new subsection:

“5) An incineration management plan describing how emissions will be minimized and the Canada-wide Standards for Dioxins and Furans and the Canada-wide Standards for Mercury emissions will be achieved through the use of appropriate technologies and operating practices.”

**M. Cumulative Effects**

The proposed use of a matrix for examining effects of the project on wildlife is a good approach, and EC would like to suggest that a summary table also be used to examine effects on the aquatic environment. Such a table could also be useful in assessing significance of effects, and should consider residual effects.

**N. Closure and Reclamation**

Preamble: The closure and reclamation guidelines provided to Tyhee by INAC should be formally referenced.

Subsection 2)a. The components and activities listed as requiring closure and reclamation should be clearly identified as all the project components and activities scoped into the assessment.

Subsection 2)d. The conceptual post-closure monitoring plan should be long-term and should include the monitoring of long-term structural and chemical stability.

Please do not hesitate to contact me at 867-669-4735 or by email at [anne.wilson@ec.gc.ca](mailto:anne.wilson@ec.gc.ca) with any questions or comments regarding the foregoing.

Yours truly,

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## Guidelines for the Assessment of Alternatives for Tailings Storage for Metal Mining Projects Proposing to use Natural, Fish-bearing Water Bodies as Tailings Impoundment Areas

Prepared by Mining and Processing Division

### Background

The *Metal Mining Effluent Regulations* (MMER), made pursuant to the *Fisheries Act*, include provisions to designate natural, fish-bearing water bodies as tailings impoundment areas (TIAs) on Schedule 2 of the Regulations. These provisions exist because proponents have demonstrated that in certain cases the storage of mine waste or related waste residues in natural water bodies makes the most environmental, technical and socio-economic sense when all factors, including long term risks, are taken into account.

Any mine proposal seeking to use a natural water body as a TIA is subject to a federal environmental assessment (EA), either pursuant to the *Canadian Environmental Assessment Act* (CEAA) or other legislation in cases where CEAA does not apply, such as in Nunavut. Mine proposals may also be subject to provincial EA obligations.

With regard to the MMER, the addition of TIAs to Schedule 2 requires a regulatory amendment, including the preparation of a Regulatory Impact Analysis Statement (RIAS). The RIAS must describe the rationale for the amendment, and describe the costs and benefits of the amendment. An essential element of the RIAS is the outcome of a thorough assessment of alternatives for tailings storage, including alternatives to the use of natural fish-bearing water bodies as a TIA: an alternatives assessment. The alternatives assessment must present the rationale and demonstrate that the proposed use of the water body as a TIA is the most appropriate option for mine waste storage from an environmental, technical and socio-economic perspective.

In addition, Section 27.1 of the MMER requires the owner/operator of a mine to submit a fish habitat compensation plan to the Minister of Fisheries and Oceans Canada, the purpose of which is to offset the loss of fish habitat that would result from the use of a water body as a TIA. Section 27.1 also identifies other requirements such as costing of the plan, posting a Letter of Credit, and follow-up monitoring and remediation as may be required.

Therefore, a mining company that is proposing use of a natural fish-bearing water body as a TIA must:

- undergo a federal environmental assessment;
- prepare an alternatives assessment to inform both the environmental assessment (including public/Aboriginal consultation) and the MMER regulatory process, including the RIAS; and

- prepare a fish habitat compensation plan to offset the fish habitat that would be lost as a result of the proposed TIA.

This document is intended to provide guidance in addressing the second requirement listed above: the requirement to complete an alternatives assessment. Guidance is provided in the following sections in terms of general requirements, specific considerations that should be included in the assessment of alternatives, and recommendations on how best to present the comparative analysis undertaken as part of process in determining the best option.

### **General Guidance**

The most timely and efficient mechanism for conducting the alternatives assessment is to ensure that it is done concurrently with the environmental assessment for such a project and then integrated into the EA. However, some of the parameters to be evaluated in an alternatives assessment may be different than those which are evaluated through the environmental assessment process. Thus, while the alternatives assessment may be concurrent with the broader environmental assessment process, and integral to that process, it is important to ensure that information needs specific to the alternatives assessment are addressed.

In general:

- The alternatives assessment should objectively consider all available options for tailings storage. In particular, options that do not involve the use of a natural, fish bearing natural water body as a TIA, including the on-land disposal of tailings, and the use of tailings as mine backfill as well as alternative options for use of the water body or other water bodies should be rigorously evaluated. This assessment should address environmental, technical and socio-economic aspects of each alternative, and provide a defensible explanation as to why alternatives were chosen or disqualified.
- The alternatives assessment should assess both the short term impacts of each alternative through the mine construction and operations phases of the mine life cycle, and the long term risks through the closure and post-closure phases. This assessment is particularly important with regard to engineered structures such as dams and stream diversions or other containment structures that would be required.
- The alternatives assessment needs to include all aspects of the project that may contribute to the predicted impacts associated with the TIA. These may include; the design of the mine and ore processing, to the extent that they would impact waste rock and tailings characterization and storage options, and water management and water treatment. The assessment will consider the predicted quality and quantity of effluent discharged from any TIA, for each alternative, taking into account the effluent quality limits set in the MMER, and the predicted impacts associated with the proposed TIA, if any, on surface and groundwater water quality and flow.
- The economic assessment of the alternatives should consider the full costs of each alternative throughout the mine life cycle, from construction through post-closure, including long term maintenance and monitoring requirements. This economic

assessment should also consider all costs associated with any compensation agreements that are to be developed, including the habitat compensation plan associated with using the water body as a TIA.

### **Specific Considerations**

For additional clarity and transparency, the assessment of alternatives to a TIA can be separated into three categories:

- environmental considerations;
- technical considerations; and
- socio-economic considerations.

### **Environmental Considerations of Alternatives Assessed**

The assessment of environmental considerations should include both the short term impacts of each alternative through the mine construction and operations phases of the mine life cycle, and the long term risks through the closure and post-closure phases. This assessment is particularly important with regard to engineered structures such as dams and stream diversions or other containment structures that would be required.

The assessment for environmental considerations should include:

- physical and geochemical characterization of wastes (e.g., acid rock drainage or metal leaching, or both);
- topographical factors (e.g., relief and complexity of topography);
- geotechnical and seismic stability (e.g., depth of permafrost, geology of bedrock);
- hydrology issues;
- hydrogeological issues (e.g., migration of contaminated groundwater, interference with surface water movement);
- atmospheric issues (e.g., particulates, heavy metals);
- overall affected land footprint size of impoundment (including secondary/polishing ponds), related infrastructure (e.g., dams, saddle dykes), and access road;
- size of affected water body area (e.g., lake, stream) and watershed catchment boundaries;
- water quality issues;
- water quantity and storage issues;
- considerations related to climate change adaptation (e.g., changes in water management or stability of foundations in permafrost);
- impacts to fish and their habitats related to each alternative;
- impacts to aquatic plant and animal species and their habitats related to each alternative;
- Impacts to terrestrial plant and animal species related to each alternative;
- impacts to birds related to each alternative;

- impacts to species at risk and their habitats related to each alternative;
- potential for post closure/decommissioning recovery and rehabilitation related to these environmental vectors related to each alternative; and
- other factors considered significant by the project proponent and reviewers.

### **Technical Considerations for Alternatives Assessed**

The assessment of technical considerations needs to include the predicted impacts or risks associated with each tailings disposal alternative considered.

The assessment of technical considerations should include:

- containment structure designs (e.g., size, hydraulic capacity, construction materials, substrate, etc.);
- availability of construction material and volume requirements (e.g., quarry material for containment structures, access road and closure construction);
- possible use of impermeable or geo-textile liner for impoundments;
- diversion and other water control structures that may be required;
- potential for increased tailings deposition capacity (e.g., if likelihood of additional future development);
- feasibility of alternatives to managing tailings as a slurry, particularly thickened tailings, paste tailings, or dry stacking of tailings;
- transportation of tailings (e.g., from the mine site to the proposed TIA);
- chemical and physical characterization of tailings;
- design and construction of impermeable covers over wastes;
- ability to recycle tailings supernatant water;
- flexibility with regard to technical, operational and environmental uncertainties;
- proposed technologies and the advantages and disadvantages of the technologies considered, (e.g., proven technology used elsewhere or new);
- technical feasibility and risks (e.g.; unforeseen geotechnical conditions may require design modifications);
- unforeseen technical difficulties (e.g., in terms of foundation complexities for dams, etc.);
- risks associated with requirements for perpetual treatment or maintenance;
- post closure risks and uncertainties;
- rehabilitation of aquatic and/or land ecosystems, including timeframes; and
- other factors considered significant by the project proponent or the reviewers.

### **Socio-Economic Considerations for Alternatives Assessed**

The assessment of socio-economic considerations should include both the short term impacts of each alternative through the mine construction and operations phases of the mine life cycle, and the long term risks through the closure and post-closure phases.

The assessment of socio-economic considerations should include:

- capital costs;
- operational costs;
- closure costs;
- post-closure costs, including the costs of perpetual treatment/maintenance should it be required;
- fish habitat compensation and monitoring costs;
- economic risks and benefits;
- closure, post-closure plan risks where some form of perpetual treatment or maintenance is required;
- regulatory review and construction timeline costs;
- preservation of archeological/cultural sites;
- Aboriginal land rights;
- maintenance of traditional lifestyle;
- spiritual well being;
- perceived community response;
- ecological/cultural values (in the sense of natural capital value);
- use of fisheries resources;
- aesthetics;
- other uses such as recreation/tourism, industrial, etc;
- contracting opportunities, building community capacity;
- safety considerations;
- landowner opinion including governments';
- overall perceived socio-economic consequences, benefits and relative preferences; and
- other factors considered significant by the project proponent and reviewers.

### **Guidance on Comparative Analysis and the Selection of the Preferred Option**

All options should be identified prior to any in-depth analysis of feasibility. During the prescreening process it may become obvious that some options are not feasible for this project because of one or more key constraints. These options can be removed from further detailed analysis provided an adequate, well-documented explanation is presented as to why they are not feasible. In this manner, regulatory agencies and stakeholders will know that these options were initially considered but rejected for sound technical, economic or environmental reasons.

For all feasible options or alternatives under assessment, the proponent should explain and justify for all feasible options or alternatives under assessment the rationale used to evaluate or rank each option under the broad criteria categories in the context of environmental, technical and socio-economic considerations. The proponent will need to provide an overall comparative analysis of all options and a rationale supporting the preferred alternative, and be in a position to demonstrate that the preferred alternative makes sound environmental sense.



An example of a thorough methodology for evaluating alternatives is the use of Multiple Accounts Analysis (MAA). The process of MAA provides a clear, transparent and defensible framework that enables the relative ranking of various alternatives against set criteria. Through the options analysis and sensitivity analysis of the MAA process, regulatory agencies and stakeholders will be able to clearly identify the rationale presented by the proponent for the recommended use of the water body as a TIA.