



Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #01

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: City YK #1

Date Received

February 28, 2011

Linkage to Other IRs

YKDFN IR #17

Date of this Response

May 31, 2011

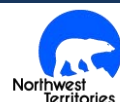
Request

Preamble:

The DAR discusses the remediation standards of the site and emphasizes that it will be remediated to the industrial standard. The Review Board determined that industrial soil remediation was acceptable as it was an improvement to existing soil quality and would not adversely effect the environment. Throughout the process the City has continued to emphasize the need to remediate the Giant Mine Townsite to the residential standard. This is the traditional use of the land since the mine was established and the City already has an overcapacity of industrial zoned land in the City. In addition to developed and undeveloped industrial zoned lands within the municipal boundaries, further industrial lands will be added as a result of the Con Mine Remediation. The City has negotiated with Newmont Mining to remediate a portion of those lands to the Residential Standard. Given the socioeconomic and environmental legacy of Giant Mine on the City and region, the City requests fuller analysis on an acceptable remediation standard for portions of the site be provided. From the City's reports and findings there is more than 50 years worth of industrial land in the City based on the two mines and existing industrial parks, and this is not reflected in the DAR's socioeconomic analysis.

Question

1. Please review municipal documents and provide an analysis of the economic, land use, and growth characteristics of Yellowknife to determine whether there is an overcapacity of industrial land available in the City.
2. Please address the economic and market viability of site redevelopment and reinvestment of the Giant Mine Townsite based on soil remediation to the industrial standard.
3. Please identify the land area of the site and the portion which the City has requested be remediated to the residential standard.





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4. Please have the GNWT explain the intentions of site remediation standards for the site, in particular the Giant Mine Townsite given the original use of this area and the Community's interest in encouraging viable redevelopment.
5. Please provide the cost breakdown differentiating the variation in costs for the remediation work of the Giant Mine Townsite for the residential versus the industrial standard.

Reference to DAR (relevant DAR Sections):

S.1.2.1 Purpose and Objectives

S.2.3.3 Page 2-5 Soil Remediation Standards

Summary

The discussion of remediation criteria for soils is outside the scope of the Environmental Assessment, EA0809-001. However, the Giant Mine Remediation Project Team (Project Team) will continue to work with interested parties to minimize impacts on the continued use of the marina and townsite.

Response 1

The economic feasibility of a possible future development by the City of Yellowknife is not part of the remediation activities within the Giant Mine Remediation Project (Remediation Project). Completing a study on the economic, land use and growth characteristics of a municipality does not fall under Indian and Northern Affairs Canada (INAC's) mandate for contaminated sites.

Response 2

The Remediation Plan was developed to assure adherence to the Government of the Northwest Territories (GNWT) industrial standards for arsenic. Queries on the economic and market viability of site redevelopment and reinvestment of the Giant Mine Townsite based on soil remediation to the industrial standard is not part of the Remediation Project and studies to support this type of analysis will not be undertaken by the Project Team.

Response 3

The Project Team is unaware of any previous request regarding the land area of the site and the portion which the City of Yellowknife wants be remediated to residential standards prior to this Information Request. The Remediation Project scope includes remediation to the GNWT's industrial standards. As part of ongoing community consultation, the Project Team will continue to gather feedback from interested parties on the implementation of the remediation plan, including soil criteria.





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Response 4

The Remediation Plan was developed to assure adherence to the GNWT's industrial standards for arsenic. Queries on the rationale for the development of the standard by the GNWT are not within the activities of the Remediation Project and should be asked directly to GNWT via other avenues.

Response 5

The Remediation Project is based on remediation of soil to the GNWT industrial standards, as per the GNWT's determination. Therefore, a cost analysis of remediating to the two standards (residential and industrial) was not required.





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Round One: Information Request - City of Yellowknife #02

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #02

Date Received:

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Linkage to Other IRs

YKDFN IR#4
Environment Canada #02
Alternatives North #02, 20
Review Board #9.2

Date of this Response:

May 31, 2011

Request

Preamble: The proposed conceptual tailings coverings suggest up to several hundred centimeters of cover potentially with geotextile fabric between tailings and coarse protective layer. The report indicates final design will be based on a cost-benefit analysis. Given the future public use of the site as passive and active recreation, the City has previously requested a sufficient coverage to ensure public health and safety. This was a key issue during the Con Mine Abandonment and Restoration Process and it was determined that Con Miramar (Newmont Mining) will provide specific cover over the tailings ponds. Given the plans to re-establish the tailings as recreation areas, the City is concerned that what is being considered may be insufficient to properly mitigate health and safety risks

Question:

1. Please review the design of the Con Mine site and elaborate on the rationale for the depth proposed at Giant Mine site. What factors are considered in the cost-benefit analysis to propose lesser depths than what has been proposed for Con Mine?
2. Please explain what factors should be considered in determining the proper coverings depth and what risks there are of contaminants being exposed based on insufficient coverings.
3. What are the health and safety risks to the public associated with insufficient covering depths or exclusion of geotextile fabric between the contaminants and the coverings?
4. How will the Project Team ensure that the vegetation which is planted will become established? What monitoring program will be in place to ensure the plant material is sustained and will





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survive? If plant material dies in first several years will the Project Team provide an assurance that additional material will be planted until all is well-established?

Reference to DAR:

DAR s.6.6.6 Tailings Covers

DAR, Table 14.2.1

DAR, Table 15.3.1

Reference to the EA Terms of Reference

ToR s. 3.2.4 (8) Development Description

Summary

Cover design is site specific.

The depth of each cover layer will be based on their functions. The requirement to support vegetation is expected to be the primary factor in determining the depth of the upper layer. The design of the lower layer is expected to come down to a choice between using run-of-quarry material with a wide range of sizes and using material that has been crushed or sorted to produce more uniform smaller size, with depth requirement arising directly from that decision.

Exposure of tailings is not expected to lead to broad human health and safety risks, but localized exposure could compromise some uses.

Where revegetation is implemented the Giant Mine Remediation Project will establish a monitoring program to assess the success of the reclamation activities on the mine site. Initially, the Project Team will develop a Revegetation Management Plan, as committed in DAR Table 15.3.1. The success of the revegetation objectives will be reported in the Status of the Environment Report (SOE). If any unanticipated impacts exist they will be addressed or, if required, the revegetation design will be changed.

Response – Question 1

Some of the design considerations that vary between Con Mine and Giant Mine tailings include:

- The tailings surface areas involved;
- The availability of cover materials;
- Tailings conditions (grain size, salinity, moisture content);
- Proximity to residential areas; and
- Proximity to surface drainage.





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These differences would be expected to lead to very different cover designs for the two sites. The Giant Mine covers are designed to meet the objectives to reduce windblown tailings and to isolate tailings from the environment. The cost-benefit analysis will take into account the differences between the two sites and the site specific objectives

It is widely agreed by experts in the field (SRK, 2009) that soil covers need to be designed on a site specific basis, and therefore that there is little value in detailed comparison of cover designs adopted at different sites.

Response – Question 2

Section 6.6.6 of the DAR explains the two-layer cover concept proposed for the Giant Mine. The upper layer will act as a clean surface for runoff, support vegetation, reduce infiltration, and support future uses of the area. The bottom layer will act as a robust physical barrier to prevent human or animal contact with tailings in the event that the overlying layer is damaged, minimize upwards wicking of arsenic from the tailings, and restrict the penetration of roots into the tailings.

The depths of each layer will be determined through further design, and may vary across the site.

Of the four functions for the upper layer, the one that is expected to be the most influential in the selection of depth will be the need to support vegetation. Support of vegetation is likely to require a minimum of 30 cm of soil, and more where a natural vegetation succession is the long-term objective. The thickness of the upper layer could vary within that range depending on differences in vegetation type and needs for final grading of the surface. Varying the upper layer depth across the site would also promote vegetation variability over the longer term.

The other functions of the upper layer could in theory be accomplished by thinner depths but their long-term performance will also be tied to vegetation success:

- Providing a surface for clean runoff could be accomplished by an upper layer as thin as practical construction methods would allow (about 15 cm). But long-term performance of that function will require that the soil be protected from erosion, and that will largely be accomplished by the vegetation.
- Reduction of infiltration could also be accomplished by even thin depths of surface layer needed to facilitate surface runoff, as long as there is sufficient vegetation to inhibit erosion. Storage of infiltrating water and subsequent evapotranspiration will also reduce infiltration. The thickness of soil needed to support evapotranspiration depends on the vegetation rooting depth.
- Future uses of the area will also be tied to vegetation. For example, areas designated for recreational walking or skiing would probably need an upper layer thick enough to support native vegetation.





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The three functions of the bottom layer could be accomplished by even the minimum practical construction depth. The selection of a design depth in this case is expected to be driven primarily by material availability, construction difficulty, and the associated costs. As discussed in Section 6.6.6 of the DAR, depths ranging from 15 cm to 100 cm are under consideration. The decision will come down to a choice between using run-of-quarry material with a wide range of sizes and using material that has been crushed or sorted to produce more uniform smaller sizes. The run-of-mine material would be less expensive to produce but would need to be placed in lifts that are deeper than the maximum boulder size. The processed material would be more expensive to produce but could be placed in much thinner lifts.

All of the layer depths that are under consideration are sufficient to minimize the risk of the tailings becoming completely exposed. The most aggressive form of erosion that is considered possible on the bulk of the tailings surface is damage from all-terrain vehicles. The use of rock in the lower layer of the cover is intended to prevent even that level of damage from penetrating through to the tailings. The risk of long-term erosion by surface runoff will be managed through the design and long-term maintenance of the water management swales and channels.

Response – Question 3

In the event that tailings were to become exposed, public health and safety risks could arise from direct exposure to arsenic in the tailings and from exposure to arsenic-contaminated runoff. Given the large area of covered tailings and the likelihood that tailings exposure would be localized, the public health and safety risks are not expected to be broadly significant.

But some conceivable uses of the area would certainly be compromised. An example from another site is illustrative. Areas of arsenic-containing tailings within the small town of Wells, BC, were covered and converted into a baseball park. However, the cover was either too thin or not sufficient in areal extent, and arsenic containing tailings have become exposed. A recent human health risk assessment predicted some level of risk to frequent recreational users of the park (SNC-L 2011).

The decision of whether to use geotextile fabric will be based on assessment of the physical interaction between the tailings and the lower cover layer. Fine-grained materials such as tailings can be transported upwards into coarser materials by water pressure and/or frost action. These effects will need to be assessed to determine which combinations of tailings properties, coarse layer properties and locations on the Giant Mine tailings could be at risk. An economic trade-off would then be assessed to determine whether to use geotextile or a coarse material with different properties.

Response – Question 4

Where revegetation is implemented the Giant Mine Remediation Project will establish a monitoring program to assess the success of the reclamation activities on the mine site. Initially, the Project Team





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will develop a Revegetation Management Plan, as committed in DAR Table 15.3.1, which includes studies to select species and define seeding, planting and fertilization requirements. Public consultation will also inform the Revegetation Management Plan

The results of the revegetation monitoring program will be incorporated into an annual report to the Mackenzie Valley Land and Water Board. The annual report will document the status of reclamation efforts on tailings covers and other mine site components. The objectives of the monitoring programs will be to evaluate the success of reclamation over time and to adjust or modify these measures where necessary to ensure the following:

- erosion control and slope stability;
- revegetation and sustainability of disturbed areas;
- site-specific reclamation measures;
- optimum species performance;
- noxious and restricted weed control; and
- re-establishment of habitat.

The success of the revegetation objectives will be reported in the SOE. The SOE is intended to verify Project impact predictions, determine the effectiveness of the mitigation measures and identify any unanticipated impacts that may arise from the Remediation Project. Further information on the SOE can be found in response to Alternatives North Information Request #20. If any unanticipated impacts exist they will be addressed or, if required, the revegetation design will be changed based on feedback from the Project Team's adaptive management program.

References:

SRK Consulting Inc. 2009. Mine Waste Covers in Cold Regions. Report for Mine Environment Neutral Drainage Program (MEND), February 2009.

SNC Lavalin Environment 2011. Progress Update on Wells Tailings Site Investigation and Risk Assessment. Memorandum to District of Wells from SNC Lavalin Environment Division, February 28, 2011.





Giant Mine Environmental Assessment IR Response

Round One: Information Request - City of Yellowknife #03

June 17, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: City of Yellowknife #03

Date Received

February 28, 2011

Linkage to Other IRs

YKDFN IR #24, 27
Alternatives North IR #03
Review Board IR #27

Date of this Response

June 17, 2011

Request

Preamble:

The DAR indicates the Project Team will seek all approvals needed to complete the work and lists the permits and authorizations required in Table 6.13.1. The table fails to include the City of Yellowknife's Development Permit which is governed by Zoning Bylaw 4404 or the City's Building Permit which is governed by Building Bylaw 4469.

All work within the City which significantly alters the grade of a site, demolishes buildings, or builds structures are required such permits. Significant work has been undertaken to date and no such permits have been applied for by INAC.

Question:

1. Why are the City of Yellowknife's bylaws excluded from the list of permits required and why have no such permits been applied for to date?
2. Will the Project Team be making application for works completed to date and what process will be established for ongoing work which falls under the City's Zoning Bylaw and Building Bylaw?

Reference to DAR (relevant DAR Sections)

DAR Table 6.13.1 Relevant Permits





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Round One: Information Request - City of Yellowknife #03

June 17, 2011

Reference to the EA Terms of Reference

s.3.2.2 Developer

Summary

With respect to a land use permits under the *Mackenzie Valley Land Use Regulations* (MVLURs), there is regulatory and jurisdictional uncertainty due to the outstanding joint determination required under s.98(2) of the *Mackenzie Valley Resource Management Act* (MVRMA). The Giant Mine Remediation Project Team (Project Team) believes that the jurisdictional certainty that would come with concluding the joint determination would help to clarify applicability of City of Yellowknife permits to the Giant Mine site and Giant Mine Remediation Project. There was no deliberate attempt by INAC to exclude City permitting under the City's Zoning and Building Bylaws.

Response

Questions 1 and 2 are answered together given their interconnected nature.

The Project Team is committed to satisfying all regulatory requirements and to ensuring that there is transparency and accountability regarding compliance and enforcement at the site. A list of permits and subsequent applications appearing in the Developer's Assessment Report Table 6.13.1 demonstrates that the regulatory regime is comprehensive, and that the Giant Mine Remediation Project is subject to terms and conditions, scrutiny and inspections under federal and territorial legislation.

With respect to land use permits under the MVLURs, there is regulatory and jurisdictional uncertainty due to the outstanding joint determination required under s.98(2) of the MVRMA. There was no deliberate attempt by the Project Team to exclude the City of Yellowknife permitting under the City's Zoning and Building Bylaws. Under that section, the Mackenzie Valley Land and Water Board (MVLWB) and relevant Territorial Minister are expected, in consultation with the local government, to jointly determine the extent to which the local government regulates the use of the land. Indian and Northern Affairs Canada believes that the jurisdictional certainty that would come with concluding the joint determination required by s. 98(2) of the MVRMA would help to clarify applicability of City of Yellowknife permits to the Giant Mine site.





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Round One: Information Request - City of Yellowknife #04

June 17, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #04

Date Received

February 28, 2011

Linkage to Other IRs

Date of this Response

June 17, 2011

Request

Preamble:

The section discusses what will be done or proposed to be done regarding water treatment, sludge management, discharging the treated water and arsenic impact on Yellowknife Bay in general terms, which doesn't alleviate the concerns of the City but in turn raises more concerns.

Question:

1. Please provide a description of the technology that is intended to be used to treat the contaminated water.
2. Please provide clarification by the statement "best available" does this mean the latest technology on the market or what is readily available in terms of delivery?
3. The DAR discusses the need for a small surface disposal facility to handle the sludge, please provide specifications for synthetic and natural cover materials and the sources for the natural materials.
4. Please provide information regarding water temperatures that will be discharged into Yellowknife Bay at any given time of the year. While reference is made regarding "Trapped Zones" will this discharge have any impact on the formation of ice or the quality of ice that eventually forms? Will any pilot projects be conducted to help determine the optimal design of the diffuser? If not, please provide justification as to why this wasn't given any consideration.
5. The DAR also neglects consideration that the City may revert to using Yellowknife Bay as its main water source, given this possibility and the fact that the Federal Government paid for the original submerged pipeline used to draw water from the Yellowknife River why wasn't the replacement of the existing pipeline included in this section or for consideration.





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IR Response

Round One: Information Request - City of Yellowknife #04

June 17, 2011

Reference to DAR (relevant DAR Sections)

S 6.8.5 Treatment Plant and Process
S 6.8.5 Sludge Management
S 6.8.6 Outfall Diffuser
S 6.8.7 Predicted Arsenic and Water Balance

Reference to the EA Terms of Reference

s 3.4.2 Human Health and Safety
s 3.5.2 Fish and Aquatic Habitat

Response 1 Summary

Conceptual descriptions of the preferred water treatment option are provided in Section 6.8 of the DAR and Supporting Document L1. As part of the detailed design phase, some refinements to the technical design are likely to occur. However, this is not anticipated to result in substantive changes to the treatment process or its performance.

Response 1

An overview of the water treatment process concept is presented in Section 6.8 of the DAR. As described therein, the preferred treatment option for this application was determined to be precipitation of arsenic with iron, separation and dewatering of the sludge by thickening and filtration, and disposal of the dewatered sludge in an engineered landfill. A conceptual process flow chart is provided in Figure 6.8.3. Background information on the selection of the preferred treatment option is presented in Supporting Document L1 (provided in Appendix B of the DAR). That document also includes further technical details regarding the preferred treatment option.

The Project Team is currently beginning the detailed design phase of the Remediation Project, which will include refinements to some of the technical details associated with the preferred treatment option. However, this is not anticipated to result in substantive changes to the treatment process or its performance (i.e., treatment efficiency).

Response 2 Summary

Best Available Proven Technology (or “Best Available Technology” – BAT as it is commonly labeled) takes into consideration a wide array of factors. These include: evidence of effective performance under similar conditions; availability of sufficient information to allow the system to be engineered; cost; and an ability to produce an effluent that is not acutely toxic.





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June 17, 2011

Response 2

The Wikipedia encyclopedia defines “Best Available Technology” (BAT) as a term that is applied with regulations on limiting pollutant discharges with regard to the abatement strategy. Similar terms are “best available technique”, “best practicable environmental option” or “best applicable proven technology”. Regardless of the descriptor used, the approach is often applied during the selection process for industrial technologies.

In the case of water treatment, a wide array of technologies exist that can be applied to treat contaminated waters, ranging from simple natural degradation ponds to advanced physical/chemical/biological treatment processes. Through the application of these technologies, it is possible in concept to achieve virtually any effluent quality desired, provided cost is not a constraint. An important factor in the selection of a treatment process is proven reliability under a range of operating conditions. For example, processes subject to chemical or biological upset and failure would not be considered BAT.

Factors that were relevant during the selection of the preferred water treatment option for the Giant Mine included:

- The full scale demonstration of the technology in treating mining wastewaters under northern climate conditions;
- The availability of reliable data on the performance of the treatment process. This provides an assessment of confidence in the ability of the technology to consistently meet a given effluent limit;
- An adequate technical basis to allow the system to be engineered;
- The system has reasonable capital and operating costs; and
- The technology train is capable of producing a non-acutely toxic effluent.

Response 3 Summary

The specifications for clay and synthetic liners are being evaluated during preliminary design, and will follow applicable guidelines. Cover materials will be obtained locally where available. It is expected that a combination of clay and liner will be used to build an engineered cap over the sludge cell.

Response 3

The specifications for synthetic and natural cover materials are currently being evaluated during preliminary design. The landfill will have a specific cell designated for sludge disposal.

There is a lack of clay soil / local materials at the Giant Mine site. Local clay sources are being investigated for the cover materials. It is expected that a combination of clay soil and liner will be used to build an engineered cap for the sludge cell.





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Response 4 Summary

Water discharge temperatures in the winter generally range from 2-8°C and the diffuser location will be deep enough as to have little impact on ice formation and quality. Modeling will be conducted on the diffuser to study the impact of discharge on ice formation. An ice thickness monitoring program will be put in place to verify modeled thickness. Operation modifications to prevent discharge during the ice formation period will also be considered.

Response 4

The winter water discharge temperatures should range from 2-8°C based on the temperature data of the mine water currently being discharged to the existing Northwest Pond. The average winter water discharge temperature to the Northwest Pond is 6°C. Assuming that the average winter water temperature is entering the plant at 6°C, the temperature will rise a couple of degrees due to the retention time within the process. Therefore, it is possible that the winter water temperature at the diffuser will be in the range of 8°C.

It is anticipated the diffuser will be located at a depth where there is little impact on ice formation and quality, and ice monitoring will be performed to confirm this. Should modeling show that ice formation is impacted, there are two options currently being evaluated:

- The location of the diffuser can be relocated to reduce or eliminate the impact. This may result in increased pipe length and insulation to prevent freezing.
- The plant operations can be modified to eliminate discharge during ice formation. This may include:
 - treating mine water only when it is safe to continuously discharge, resulting in a major change to equipment sizes and rapid short term changes to mine storage , or
 - year-round treatment with storage in a large retention pond during months when it is unsafe to discharge.

Response 5

Replacement of the City's drinking water intake is not within the scope of the Giant Mine Remediation Project. However, the Project Team will engage the City with respect to proposed diffuser locations, to ensure that the selection of a diffuser location does not affect the municipal water intake. The Preliminary design work for the diffuser is in progress and the City's input on site locations would be welcome at this time.





Giant Mine Environmental Assessment

IR Response

Round One: Information Request: City of Yellowknife IR #05

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: City of Yellowknife #05

Date Received:

February 28, 2011

Linkage to Other IRs:

YKDFN IR #21

Date of this Draft:

May 31, 2011

Request

Preamble

This section discusses the historical loading and sediment quality of Yellowknife Bay as well as the possible threat the arsenic contained in the sediment may pose. The last sentence, first paragraph on page 7-18 specifically states....."The arsenic in.....is considered to occur in a stable form provided.....conditions are maintained".

Question:

1. Have any studies or scenarios been generated to determine and/or predict how or what could change these conditions and what would happen if the conditions did change? Has any consideration been given how potential final uses of this area would affect the existing conditions and were any mitigating measures proposed to help ensure the current conditions continue?
2. Given the complexity and potential threat of the issue shouldn't other options including encapsulation been explored under this section or given due consideration?

Reference to DAR (relevant DAR Sections):

S.7.1.4.1 Local Study Area

Reference to the EA Terms of Reference

S.3.5.2 Fish and Aquatic Habitat

Response 1 Summary

The key factor that will determine the long-term stability of arsenic in the sediments of North Yellowknife Bay is the ongoing presence of oxidizing conditions within the water column. There are no





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circumstances under which current oxidizing conditions are likely to change in the future for those reasons provided in the answer below.

Response 1

The geochemical characteristics of the sediments in Baker Creek and Yellowknife Bay have been investigated on several occasions as discussed in Section 7.1.4 of the Developer's Assessment Report (DAR). Investigations carried out in North Yellowknife Bay (Golder 2005a) demonstrated that arsenic levels in sediments are elevated due to historic activities. However, sediment core test results and sequential extraction test data on sediment samples collected in 2005 and subsequent research (Andrade *et al.* 2010) indicated that the arsenic occurs in a stable form and will not be released into the water column as long as oxidizing conditions persist and the sediments remain submerged. Current conditions in the lake favour an "oxic layer" at the sediment water interface.

Preservation of the oxic layer in the upper horizon of the sediments in Yellowknife Bay is largely dependent on there being oxygen in the overlying water column year round. In large lakes such as Great Slave Lake situated in a northern setting, it is extremely unlikely that anoxic (oxygen deficient) conditions would develop for several reasons: i) the cold water temperatures experienced most of the year are not conducive to high rates of oxygen consumption; ii) the short summer season means the lake stratifies for only a short period of time; iii) the productivity of the lake is low hence the organic load that deposits on the sediment is low. Furthermore, in the case of Yellowknife Bay there are no significant sources of organic or nutrient input to the bay. The only real source of nutrients is sewage from the City of Yellowknife, which is treated and discharged to Great Slave Lake via a series of small lakes that flow southward and drain into south Yellowknife Bay well removed from the Giant Mine site and the area in Yellowknife Bay with elevated arsenic levels.

The discharge of treated minewater to the bay will have minimal effect on oxidizing conditions, as it contains very low levels of oxygen demanding substances. Additionally, it is not anticipated that the water level in Great Slave Lake will change substantially, even considering the long term effects of climate change.

As noted above, arsenic present in the sediments of Yellowknife Bay is anticipated to remain in a stable form as long as oxidizing conditions persist. The same conclusion applies to any future projects that result in the introduction of oxygen demanding matter (e.g., a fish processing plant), primarily because the magnitude of such changes would be insufficient to affect the overall oxidizing condition of North Yellowknife Bay.

In summary, there are no circumstances under which potential future uses of Yellowknife Bay would affect the current stability of arsenic in sediments. Furthermore, the Remediation Project is anticipated to result in indirect positive effects on the sediments of Great Slave Lake. Specifically, as shown in Table 8.4.3 of the DAR, a variety of measures will achieve a marked decrease in arsenic loadings to Yellowknife Bay relative to current conditions. Over time, the decrease in loading is anticipated to result in a gradual reduction of arsenic concentrations in surface sediments.

Notwithstanding the above conclusion, it is important to note that future projects (projects meaning those will require their own regulatory review, not recreational uses) will undergo an appropriate level of EA as part of regulatory approval processes. Depending on the nature of any interactions with the environment, those assessments will include an evaluation of sediment effects. It is reasonable to





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expect that mitigation requirements would also be put in place to ensure that the future projects do not cause significant residual effects.

Response 2 Summary

Activities to directly remediate sediments beyond the Site Study Area are not within the scope of the Remediation Project. However, the effects of historic activities on arsenic levels in Great Slave Lake sediments have been evaluated through field studies and the Human Health and Ecological Risk Assessment.

Response 2

The Site Study Area (SSA) represents the limits of the area in which historic contamination will be addressed by the Remediation Project. Therefore, consideration has not been given to actively remediating sediments within Great Slave Lake. Nonetheless, the effects of historic activities on arsenic levels in all environmental media throughout the SSA and Yellowknife Bay (which is in the Local Study Area (LSA)) were taken into consideration in assessing risks of exposure to both people and animals in all facets of the remediation investigations.

With regard to potential effects on the aquatic environment that might be associated with sediments in Yellowknife Bay, field studies have shown that the diversity and abundance of benthic communities has been impaired in some areas. However, data gathered on fish species has not shown an adverse effect on fish health or arsenic levels in fish tissue. Similarly, Human Health and Ecological Risk Assessments have determined that sediments in Great Slave Lake do not pose an unacceptable risk and that remediation of lake sediments is not warranted (as per Section 8.9 of the DAR and Supporting Document N1 in Appendix B of the DAR).





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IR Response

Round One: Information Request - City of Yellowknife #06

June 17, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #06

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Linkage to Other IRs

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June 17, 2011

Request

Given the enormity of the project, why wasn't the underwater video reviewed at the end of each day to determine the quality of video and whether or not it was useful? Please provide the proposed schedule to obtain additional video.

Reference to DAR (relevant DAR Sections)

s.7.4.2.1, Habitat

Reference to the EA Terms of Reference

s. 3.5.2 Fish and Aquatic Habitat

Summary

The underwater video was reviewed throughout the field study but was affected by environmental conditions (wave action). Available footage is sufficient to generally characterize the habitat in the vicinity of the proposed outfall locations. Additional video footage will be collected upon selection of the preferred outfall alignment, which is expected to occur before the end of the summer of 2012.

Response

The underwater video was reviewed on a regular basis throughout the implementation of the field program. However, wave action affected the stability of the sampling vessel. As a consequence, the depth of the video camera varied significantly. The variable depth of the camera limited the clarity of the image available at some locations along the proposed outfall alignments.

As noted in the Developer's Assessment Report (DAR), although environmental conditions affected video quality, the available footage is sufficient to develop general conclusions regarding fish habitat





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within the vicinity of the proposed alignments. The conclusions reached are consistent with other lines of evidence used to characterize conditions of the area (e.g., sediment sampling as described in Golder 2005a).

As indicated in Section 7.4.2.1 of the DAR, The Giant Mine Project Team (Project Team) has proposed collecting additional underwater video footage to verify the findings of the previous video. In this regard, the underwater video survey was conducted as a preliminary review of habitat along the three potential alignments. It was and continues to be the Project Team's expectation that additional video will be collected upon selection of the preferred outfall alignment, which is expected to occur before the end of the summer of 2012. In the event that unique habitat is identified along that alignment, a detailed review of potential impacts will be conducted and appropriate mitigation will be considered. If necessary, selection of alternate alignments will be considered and subjected to the same level of review.





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Round One: Information Request - City of Yellowknife #07

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #07

Date Received

February 28, 2011

Linkage to Other IRs

Date of this Response:

May 31, 2011

Request

Preamble:

The DAR outlines the four Environmental Subcomponents for evaluating community interests: Land Use, Visual and Cultural Setting; Socio-economic Conditions; Transportation, and Local Resources. Based on the remediation plan it is not adequately demonstrated that these issues have been integrated into a future land use framework for the site. It appears from the DAR that a piece-meal approach is being taken to addressing community interests by separating the remediation work stage, from the community-based future land use vision for the site. The concern is that without an integrated approach to addressing the remediation, restoration, land use and future redevelopment of the site, the Communities will bear the responsibilities, costs, and liabilities of inadequate remediation and infrastructure improvements.

Question:

1. Please provide an integrated land use plan for the site which reflects the Communities' interests and opportunities for siting residential, commercial, industrial, and passive and active recreation based on soil remediation, contamination levels, and proposed infrastructure.
2. Please provide a transportation plan for the site to demonstrate practical options for integrating existing and potential road networks, land uses, and pathways into the site.
3. Please comment on the heritage aspects of the Townsite in relation to the evaluation criteria of the community interests.
4. Please provide the potential restoration, redevelopment, or economic revitalization opportunities which might exist for the Communities regarding the future land use of the mine. What project innovation is being integrated into the site remediation process?

Reference to DAR (relevant DAR Sections):

S.1.2.1, #2 Purpose and Objectives

S.2.3.3 Soil Remediation Standards





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IR Response

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Summary:

The Giant Mine Remediation Project will provide a range of benefits for Aboriginal, local, northern residents. However, the creation of land use plan, transportation plan and heritage plans for the mine site are not part of the remediation activities. The Giant Mine Remediation Project Team (Project Team) will participate with the City of Yellowknife and other parties during the creation of these plans.

Response 1

The creation of an integrated land use plan of a possible future development of the mine site by the Project Team is not part of the remediation activities for Giant Mine. The Project Team can provide information and will participate in discussions with the City of Yellowknife and other parties in the development of an integrated land use plan for the mine site.

Response 2

The Project Team will work with other parties to ensure that transportation impacts are minimized on the site during site activities.

Response 3

Please refer to the City of Yellowknife IR #10 for a complete response.

Response 4

Through all of its contaminated sites projects, INAC strives to create positive social and economic impacts for the people in nearby communities. The range of benefits can include direct employment, support to local businesses through the procurement of goods and services, and training programs that help build the capacity of local residents and provide opportunities to obtain future work based on the new skills developed. The Project Team has committed to developing a Giant Mine Procurement Strategy to maximize economic opportunities in a fiscally responsible manner. The Giant Mine Procurement Strategy will build upon the principles laid out in the Contaminated Sites Program procurement strategy identified in Section 1.6.2 of the Developers Assessment Report (DAR).





Giant Mine Environmental Assessment IR Response

Round One: Information Request - City of Yellowknife #08

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: City of Yellowknife #08

Date Received:

February 28, 2011

Linkage to Other IRs:

YKDFN IR #03

Alternatives North IR #11

Date of this Response:

May 31, 2011

Request

1. Under the heading "Is Further Consideration Req'd? When?" in Table 8.4.2 for activity "Earthworks" the table indicates "yes" but only during the detailed design phase and in preparation of the environment management plan. Under the same heading for the activity "Discharge of Treated Minewater to Great Slave Lake" the table indicates "no". Given the sensitivity of Baker Creek and Yellowknife Bay, why wasn't establishing a long-term monitoring program to ensure there were no negative impacts created by the proposed activities given consideration? Do reports or studies exist that guarantee such activities will be successful with no adverse effects? If so, please provide copies.
2. Please provide confirmation based on the dewatering operations proposed that the intent of the remediation is to eliminate the formation of "pit lakes"?

Reference to DAR (relevant DAR Sections):

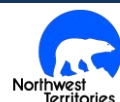
S.8.4.2.5 Residual Effects

S.8.4.3.2 Summary of Interactions

Reference to the EA Terms of Reference

S.3.5.2 Fish and Aquatic Habitat

Response 1 Summary





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #08

May 31, 2011

The Giant Mine Remediation Project is anticipated to result in overall improvements to the environment of Baker Creek. In particular, shifting the treated minewater discharge point from Baker Creek to Great Slave Lake will reduce chemical loadings to the creek. Although this may result in Baker Creek drying up during the summer months, this is not viewed as an adverse effect because flows within the creek will be returned to a more natural condition (both in terms of chemical quality and hydrology). A comprehensive monitoring program will be put in place to verify the performance of the Remediation Project in this regard as outlined in Table 14.2.1 of the Developer's Assessment Report (DAR).

Response 1

As indicated in Section 8.4.2.3 and Table 8.4.2, the remediation plan will result in a net improvement in hydrological conditions by returning Baker Creek to a more natural condition when the current practice of discharging treated minewater to the creek is stopped. However, it is recognized that short-term and minor adverse effects to hydrology could occur during construction activities unless effective mitigation is put in place (e.g., excessive sedimentation and/or erosion affecting flows in Baker Creek). The detailed design phase for Baker Creek and the Environmental Management Plans will be used to ensure that effective mitigation is put in place to limit the potential for such impacts.

With regard to the discharge of treated minewater to Great Slave Lake as opposed to Baker Creek, that activity will result in the deliberate (and positive) effect on the hydrology of Baker Creek. As indicated in Table 8.4.2, further consideration of this positive effect on hydrology is not considered necessary (i.e., because it is a positive effect, not adverse). Nonetheless, further consideration of potential effects on aquatic habitat and biota of changing hydrology is described in Section 8.7.2.3 of the DAR. Specifically, the elimination of the volumetric flows associated with the current treated minewater discharge to Baker Creek warrant consideration. This is particularly important during late summer months when, based on current conditions, the discharge of treated minewater often represents the majority of flow within the creek. As indicated in Table 8.7.2, it was concluded that flows associated with the current discharge to the creek are not relevant to Arctic grayling use of the creek as spawning habitat. A similar relationship is expected to apply to other spring spawners such as longnose and white suckers, and northern pike. However, there is a potential that benthic invertebrates, resident fish species (e.g., ninespine stickleback) and any species spawning late in the summer would be affected during years in which natural flows reduce to low levels following movement of the discharge point. This is not considered to be an adverse Project effect because the creek will be returned to a more natural condition.

To summarize, as indicated under the heading "Discharge of treated minewater to Great Slave Lake" in Table 8.7.2 of the DAR, residual adverse effects are not anticipated to be caused by shifting the treated minewater discharge point from Baker Creek to Great Slave Lake. However, the table also indicates that this issue will be evaluated further during the "Detailed design phase of Baker Creek".

With regard to the question "why wasn't establishing a long-term monitoring program to ensure there were no negative impacts created by the proposed activities given consideration?" this issue is dealt with extensively in Chapter 14 of the DAR which describes the comprehensive Environmental Monitoring program that will be established. The program will be used to: a) verify the conclusions





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Round One: Information Request - City of Yellowknife #08

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presented in the DAR that adverse effects are not anticipated; and b) identify any emerging adverse environmental trends so that appropriate actions can be taken. As shown in Table 14.2.1, Baker Creek will represent a major component of the program. The City of Yellowknife (as well as other interested parties) will be appraised of monitoring results through the issuance of publicly available reports.

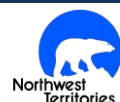
The IR also asks whether reports or studies exist that guarantee such activities will be successful with no adverse effects. As described in Section 7.4.3, a number of studies have been conducted over the last 10 years to characterize aquatic biota and habitat within Baker Creek. This includes multiple studies reviewing habitat usage within the realigned Reach 4 which have been provided as supporting documents to the DAR. The investigations carried out on Reach 4 demonstrated that Baker Creek can be successfully remediated to support Valued Ecosystem Components that use the creek.

Response 2 Summary

As described in the DAR, there is no intention to allow the formation of pits lakes. To ensure this is the case, the water level in the mine will be maintained below the bottom of the lowest chamber which is well below the base of all pits.

Response 2

Arsenic concentrations in minewater are anticipated to remain elevated for many years to come (as described in Chapter 6 of the DAR). Therefore, it was determined that it would be environmentally unacceptable to let the pits flood. On this basis, the mine will remain dewatered below the base of all pits and, as a consequence, the potential effects associated with the formation of pit lakes have not been evaluated in the EA. In the future, if INAC determines that the formation of pit lakes is desirable both from an operational and ecological perspective, separate regulatory authorizations would need to be obtained. Such authorizations would require appropriate consultation with interested parties.





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #09

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #09

Date Received:

February 28, 2011

Linkage to Other IRs:

Review Board IR #11

Alternatives North IR #07, 10, 12, 15, 22

Also linked to the INAC response to the Review Board fourth deficiency statement regarding funding certainty

Date of this Response:

May 31, 2011

Request:

Please provide legislation, decrees or parliamentary motions that guarantee the “walking away” scenario will not be allowed to occur.

Reference to DAR (relevant DAR Sections):

The DAR recognizes that elements of the project are to be managed in perpetuity.

- Temporal Boundaries, Section 3.4.2 – “It is recognized that the developer’s activities on site will continue in some form in perpetuity” (p. 3-6).
- Summary of Post-Remediation Conditions, Section 6.1.2 – “A new Water Treatment Plant will be constructed and will be operated year-round, potentially in perpetuity” (p. 6-4).
- Section 14 – “Some forms of monitoring are expected in perpetuity, particularly around the function of the thermosyphons and the treatment of water. Consequently, a system to establish standards, deliver programs and receive and evaluate monitoring results will also exist in perpetuity” (p. 14-1).
- Technical Advisor Studies, Section 6.2.2.1 – “It was concluded that the best in situ alternative was Alternative B3, isolating the arsenic trioxide dust in its current location by creating a block of frozen dust and rock, monitoring in perpetuity and, if necessary, maintaining isolation by periodic refreezing” (p. 6-7).





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May 31, 2011

- Hazardous Waste, Section 6.12.2 – “The new underground or new pit or quarry options would all require additional disturbance and would create a new source that would need to be managed in perpetuity” (p. 6-97).

Table 6.13.4 of the DAR presents a summary of estimated costs for the implementation phase of the Giant Mine Remediation Project, and Table 6.13.5 presents a summary of estimated annual costs over the long-term. This latter Table identifies the estimated cost for long term operations and maintenance as \$1.91 million per year. The DAR also states that INAC will seek the necessary Treasury Board approvals in order to obtain this long term funding.

Reference to the EA Terms of Reference:

Section 2.3 of the Terms of Reference (Temporal Scope) – “As the contaminant will continue to exist on the site, the risk of potential contamination may exist in perpetuity. To predict impacts in the future, assumptions must be made about future events and conditions” (p. 7).

Section 3.2.2 of the Terms of Reference requires the Developer to provide: “A description of project feasibility including financial feasibility. Include discussion of funding certainty for the development and related monitoring” (p.10).

Summary:

- The Governments of Canada and the Northwest Territories (NWT), in selecting the preferred remediation option, have recognized and accepted that the Giant Mine Remediation Project includes long-term care, maintenance and monitoring. There is no option to “walk away.”
- Long-term care, maintenance and monitoring are essential components of the remediation approach that will protect human and environmental health and safety and ensure the integrity of Canada’s investment.
- This long-term commitment will be reinforced through applicable permits, licences, and regulatory law.
- The Government is aware of the Giant Mine and is committed to meeting its obligations.
- However, the nature of the Canadian Federal Government governance process does not allow INAC, or any existing Parliament, to bind future Parliaments to specific priorities or “guarantees”.

Response:

The Giant Mine Remediation Project will not “walk away” from the site. The Governments of Canada and the Northwest Territories, in selecting the preferred remediation option for the site, have recognized and accepted that the Giant Mine Remediation Project includes long-term care, maintenance and monitoring. The DAR also states clearly that several elements of the project will be required to be addressed in perpetuity. Long-term care, maintenance and monitoring are essential components of the remediation approach at the Giant Mine site that will protect human and environmental health and safety and ensure the integrity of Canada’s investment. This long-term commitment will be reinforced through adherence to the Developer’s obligations under applicable licences, permits and regulatory law.





Giant Mine Environmental Assessment IR Response

Round One: Information Request - City of Yellowknife #09

May 31, 2011

With respect to a “guarantee” as requested in the question, under Canadian parliamentary democracy, Parliament cannot bind the actions of a future Parliament. As long as a Parliament or a Legislature is acting within its sphere of competence, it may promulgate any new law or amend or repeal any old law. The power to alter old laws remains constant even in the face of an old law declared to be unamendable. This power is codified in s. 42(1) of the federal *Interpretation Act*. Likewise, the *Financial Administration Act* provides that no expenditures may be made by government without a Parliamentary appropriation. It is therefore not possible to bind a future government or provide "legislation, decrees or parliamentary motions" to "guarantee" the actions of a future government.

It is also important to underscore the difference between the Government of Canada and a non-government proponent. The government of Canada is a democratic constitutional entity and is not at risk of disappearing, going bankrupt, or de-listing in the same manner as a private-sector corporation or other commercial actor.

The Giant Mine site is well known throughout Canada as one of the most contaminated sites under the responsibility of the Federal Government. There are aspects of the site that pose potentially significant risks to both human health and the environment. Given this high and public risk profile, the mine site has remained a government priority since the late 1990s when the Crown became involved. Since that time INAC, as the federal department responsible for the site on behalf of the Government of Canada, has allocated resources to effectively manage risks at the site while developing a remediation plan. Based on the significant investment to date, and the consistent priority given to the management of the risks at the Giant mine site, it is expected that this Project will remain a priority. The Government is aware of the Giant Mine and is committed to meeting its obligations.





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #10

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #10

Date Received

February 28, 2011

Linkage to Other IRs

City of Yellowknife #1, 7

Date of this Response:

May 31, 2011

Request

Preamble: The DAR recognizes the heritage value of the existing buildings and townsite and also mentions the Treasury Board Framework for Investment Planning in government program delivery in federal projects. The program identifies the protection of heritage, the environment, and sound stewardship as key objectives. Other sections of the DAR emphasize the need for incorporating traditional knowledge into the process. From the City's perspective, the integration of the heritage and traditional knowledge into the remediation process is essential and should be reflected in the Remediation Plan. While the Plan discusses the history of the mine and the traditional knowledge and heritage of the YKDFN, it does not demonstrate how these will be practically integrated into the remediation process and the future use of the site. In addition to a clear heritage preservation strategy the City believes that the opportunity to embrace the Giant Mine legacy and its opportunities for the future may be missed unless carefully incorporated into the process.

Question:

1. Please explain the heritage preservation strategy for the Giant Mine Townsite and what form of investment will be made to preserve or restore some of the existing site assets (i.e. heritage dwellings, buildings, Great Slave Cruising Club docking facility). When will this planning commence?
2. Please outline the heritage and traditional knowledge significance of utilizing the Giant Mine Townsite and waterfront as a place of residence, recreation, and business for the communities of Dettah, N'dilo, and Yellowknife. Will further analysis of this issue be provided along with meaningful consultation which engages the communities on how this will be practically pursued?





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #10

May 31, 2011

3. What opportunities for public education regarding the history and heritage of Giant Mine have been discussed by the Project Team? How will these be integrated into the site to reflect the legacy of the mine on the adjacent communities?

Reference to DAR (relevant DAR Sections):

DAR, Page 1-27 and 1-28, Treasury Board Framework for Investment Planning – Assets and Acquired Services

DAR, Page 2-28 and 2-29, Use of Traditional Knowledge

DAR, Page 6-4, 6.1.2 Summary of Post-Remediation Conditions

Summary

Giant Mine was a significant part of Yellowknife's social and industrial history and deserves recognition for this role. The Giant Mine Remediation Project Team (Project Team) will work with interested parties to minimize impacts to heritage assets. However, the Giant Mine Remediation Project (Remediation Project) is a remediation development and will not be making any investments into the preservation of the existing heritage site assets given the significant environmental and/or safety risks associated with these buildings. Much of this Information Request is outside the scope of the Remediation Project.

Response

Giant Mine played a significant role in Yellowknife's social and industrial history and deserves recognition for this role. As part of the Project Team's consultation and engagement plans the historical context of the Giant Mine site is discussed and will continue to be provided in future consultations and engagements. However, much of this Information Request is outside the scope of the Giant Mine Remediation Project; those elements of the request that are included in the Project are discussed below.

In Chapter 8, Table 8.10.3 the Project Team committed to undertaking an archaeological and heritage assessment overseen by the Prince of Wales Northern Heritage Centre prior to the initiation of the remediation to determine the archaeological heritage potential. After the report is completed the Project Team will work with the parties to ensure that during remediation activities best efforts will be made to minimise impacts on heritage assets. This assessment will also assist the City of Yellowknife and other parties in any future educational programs they may initiate.

However, based on current plans, and the significant environmental and safety risks, the following buildings with potential heritage value will be demolished unless other parties (e.g., the NWT Mining Heritage Society or the City of Yellowknife) assume associated significant environmental and/or safety risks:

- House No. 217





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May 31, 2011

- House No. 168
- House No. 203
- House No. 206
- A-Shaft Head Frame
- A-Shaft Powerhouse and Hoist Room
- A-Shaft Commissary
- Recreation Hall

In the case of the A-Shaft Head Frame, the presence of the structure may impede a component of the Giant Mine Remediation Project (i.e., the sealing of the shaft). As a consequence, the Project Team anticipates that this structure will have to be demolished.

Should no arrangements be made with the City of Yellowknife or other parties to transfer environmental and/or safety risks to other institutions, the Project Team will:

- Work with interested parties to carry out photo documentation prior to demolition;
- Allow for the removal of contents that may be of heritage value (safety permitting); and
- Work with interested parties to facilitate the relocation of buildings off site.





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #11

June 17, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: City of Yellowknife #11

Date Received

February 28, 2011

Linkage to Other IRs

YKDFN IR #18
City of Yellowknife IR #05
Review Board IR #21

Date of this Response

June 17, 2011

Request

Question:

1. Please clarify in a map whether the water lots of the Cruising Club lease, boat launch and waterfront recreational area is included in the SSA.
2. Please indicate whether the removal of contaminants or other mitigation measures are considered as part of the remediation plan.
3. What risks, if any, exist regarding the disturbance of the contaminants in the bay area at the mouth of Baker Creek given the boat launch and mooring activities which are taking place?
4. Please indicate what public health risks are present with reference to the contaminants in the bay area near Giant Mine site given the waterfront recreational opportunities available to the public (i.e., swimming, boating).
5. What are the potential health and environmental risks if the City, private sector or third party (i.e. Great Slave Cruising Club) were to undertake construction which disturbs the lakebed, or if dredging is required to facilitate the development of a marina adjacent to Baker Creek? How will these risks be mitigated in the remediation plans?
6. Should the Communities and Great Slave Cruising Club be required to relocate the boat launch and marina development to another location as a result of contamination, will appropriate compensation be provided for the design, relocation and construction of a Marina at a new site? Please provide a review of costs associated with redeveloping the Town Site to include a marina versus relocation and construction at a new site.





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #11

June 17, 2011

Reference to DAR (relevant DAR Sections)

S.2.3.3 Limitations to the Scope of Assessment
S.3.4.1 Spatial Boundaries
S.6.7 Historic Foreshore Tailings

Reference to the EA Terms of Reference

S 3.4.2 Human Health and Safety
S 3.5.2 Fish and Aquatic Habitat

Summary

The water lots in question are located within the Site Study Area (SSA). However, the Giant Mine Remediation Project (Remediation Project) does not include activities to directly remediate sediments in Great Slave Lake, including those associated with the water lots.

Given the boat launch and mooring activities that are taking place, any incremental risks to humans or the aquatic environment associated with localized disturbances of contaminated sediments in Great Slave Lake will be very small.

The Remediation Project focuses exclusively on the remediation activities described in Chapter 6 of the Developer's Assessment Report (DAR). Future redevelopment projects, whether on land or water, are therefore beyond the scope of the Remediation Project and this Environmental Assessment (EA). As a result, detailed evaluations of the effects of future redevelopment projects were not done.

Relocation, and therefore compensation, required as a result of contamination is not within the scope of the Remediation Project or this EA.

Response 1

Figure 3.4.1 of the DAR shows the SSA drawn across a portion of the bay in the area of the Cruising Club and boat launch at the mouth of Baker Creek. However, remediation of the water lots is not included in the Remediation Project.

Response 2

The Remediation Project does not involve activities that will directly remediate contaminated sediments in Great Slave Lake. However, by reducing future arsenic loads to Great Slave Lake, the Remediation Project is anticipated to result in a long-term improvement of sediment quality. Please refer to the response for City of Yellowknife Information Request #05, Question 2, for additional details.





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #11

June 17, 2011

Responses 3 and 4

With regard to potential effects that disturbed sediments might have on people, a supplementary exposure assessment was conducted in response to Review Board Information Response #21, Question 2. As indicated in the response to that Information Request, various pathways were assessed to evaluate dermal exposure and inadvertent ingestion of sediment solids. These pathways were found to contribute negligibly to the total arsenic intake and associated risks.

In addition to low incremental risks to humans, it is unlikely that disturbances would result in significant effects to the aquatic environment. This conclusion is based on the assumption that the spatial extent of any sediment disturbances caused by mooring/recreational activities would be small and, as a consequence, mobilization of suspended sediments and/or arsenic would rapidly equilibrate within the receiving environment.

Response 5

The current project focuses exclusively on the remediation activities described in Chapter 6 of the DAR. Future redevelopment projects, whether on land or water, are therefore outside the scope of the Remediation Project and this EA. As a result, detailed evaluations of the potential effects of such redevelopment projects have not been performed. It is important to note that future projects will undergo an appropriate level of EA as part of regulatory approval processes. Depending on the nature of any interactions with the environment, those assessments will include an evaluation of sediment effects. Mitigation requirements would also be put in place to ensure that the future projects do not cause significant residual effects.

On this basis, any future projects that disturb sediments (whether contaminated or not) should be subjected to an appropriate level of review to determine whether adverse environmental effects are likely to occur, how they can be mitigated and whether any residual effects are likely to be significant. Parties are also referred to the response to YKDFN Information Response #18, Question 1, that discusses the question of redevelopment on the historic foreshore tailings area.

Response 6

Relocation, and therefore compensation, required as a result of contamination is not within the scope of the Remediation Project or this EA.



Giant Mine Environmental Assessment IR Response Template

Round One: Information Request - City of Yellowknife #12

May 31, 2011

INFORMATION REQUEST RESPONSE TEMPLATE

EA No: 0809-001

Information Request No: CityYK #12

Date Received

February 28, 2011

Linkage to Other IRs

City of Yellowknife IR #10
Alternatives North IR #5.2

Date of this Draft:

May 31, 2011

Request

Preamble:

As noted in the Giant Mine Plan (2006) and in the minutes of the Yellowknife Heritage Committee, the City maintains an interest in preserving a number of the heritage buildings in the Giant Mine Townsite. The City has conducted several inspections of these buildings and it is evident that a number of the buildings have environmental issues (i.e. asbestos, black mould, lead paint) and that others are significantly dilapidated. Based on some 20 structures within the Townsite the City has considered to preserve and restore 4-5. Significant investment is required to address the structural and environmental issues to bring these buildings up to code so that they may be fit for occupancy.

Question:

1. Please elaborate on whether funding is available to deal with the structural and environmental issues of targeted buildings within the Townsite.
2. Please elaborate on what environmental and structural analysis has been provided on these buildings or will be provided as part of the remediation process.

Reference to DAR (relevant DAR Sections):

s. 6.11.4 Buildings to Remain on Site





Giant Mine Environmental Assessment

IR Response Template

Round One: Information Request - City of Yellowknife #12

May 31, 2011

Reference to the EA Terms of Reference

s. 2.1 Scope of Development

Summary

Should the City of Yellowknife or the NWT Mining Heritage Society not assume the liability, the buildings will be demolished as outlined in the Remediation Plan in section 5.11 and Developer's Assessment Report (DAR) section 6.11. .

Response

The Giant Mine Remediation Project (Remediation Project) includes the removal of buildings and infrastructure as part of the Remediation Project. To date only visual inspections of the buildings in the town site have taken place. Prior to the demolition of buildings, an environmental assessment will be undertaken and the contaminated materials will be dealt within as described in section 6.11.3 of the DAR. Structural assessments of the buildings, and bringing buildings identified by the City up to code for potential occupancy, are not activities contemplated by the Remediation Project.





Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #13

June 17, 2011

INFORMATION REQUEST RESPONSE TEMPLATE

EA No: 0809-001

Information Request No: City of Yellowknife #13

Date Received

February 28, 2011

Linkage to Other IRs

Date of this Response

June 17, 2011

Request

Preamble:

In 2008 the City completed a report entitled Northwest Territories Science and Technology Park Yellowknife Facility which looked at the business case for the establishment of a Northern Science and Technology Centre. The Centre was envisioned to promote research and development relating to environmental stewardship, traditional knowledge, and northern approaches to innovative technology based on partnerships with various levels of government and organizations. A portion of the Facility was envisioned to be constructed around the Con Mine site which has the potential to attract investment based on the brownfield redevelopment potential and the geothermal district that is currently being pursued by the City. The City is currently in the process securing funding for a \$60 million investment for a district geothermal system that will draw energy from Con Mine for distribution to buildings in the Downtown core.

Based on the significant financial investment which INAC is making in this project, the City sees incredible potential for training and education, economic development, and innovation to be major components of the remediation project. The DAR discusses INAC's emphasis on promoting positive social and economic impacts for communities in all its contaminated sites projects through employment training, supporting local business, economic opportunities for First Nations, and so on. While this is identified in the Plan, there is no clear strategy as to how this will be achieved or how the local communities will be engaged. It appears that the opportunities for leveraging socioeconomic benefits will be diminished if these strategies are not fully considered by the Communities during the remediation planning stages.

Question:

1. Based on the City's interest in the redevelopment potential of the Giant Mine site and the innovative technology which is being applied to freeze in place the arsenic trioxide, please elaborate on whether value-added benefits or innovative synergies have been explored with regards to economic development opportunities, building innovation, or training and education.



Giant Mine Environmental Assessment

IR Response

Round One: Information Request - City of Yellowknife #13

June 17, 2011

2. Please outline what training and education opportunities or research and development opportunities exist with reference to the Giant Mine remediation plan and the City's plans for a Northern Science and Technology Centre as outlined in the Northwest Territories Science and Technology Park Yellowknife Facility. Which opportunities exist for the immediate term (i.e. 5-10 years) and which opportunities existing for the long-term (i.e. 10-50 years)?
3. Please identify what local organizations have been approached with reference to economic developing, education or building innovation opportunities. What organizations might be approached to mobilize capacity in this area?
4. Please elaborate on what process is in place for the Communities to be engaged so that the socioeconomic benefits of the Giant Mine Remediation process are maximized.
5. Please elaborate on what visitor education and access will be provided on site with regards to the legacy of Giant Mine, the remediation process, and the innovative technologies employed.

Reference to DAR (relevant DAR Sections)

S. 1.6.2 Socio-Economic Opportunities
s. 1.7.3 Policies and Guidelines

Summary

To the extent possible of federal and territorial policies the Giant Mine Remediation Project Team (Project Team) will support economic development opportunities, innovation and training.

The Giant Mine Remediation Project (Remediation Project) is expected to generate considerable employment and business activity for local firms, and the Project Team is planning to access Government of Canada seed funding for worker training as part of the project.

The Project Team is familiar with the Northwest Territories Science and Technology Park - Yellowknife Facility. Discussion with the City on collaboration opportunities have to include other federal government agencies as such initiatives represent the broader Government of Canada interests in the North.

The Project Team delivered an Industry Day information session on September, 14, 2010 on the Remediation Project and the associated contract opportunities. The forum attracted 71 individuals from local northern and Aboriginal businesses, as well as southern firms from across Canada. Public Works and Government Services Canada (PWGSC) requested suppliers to submit their Company Profiles. As a result 21 Company Profiles were submitted to the Project Team. An additional Industry Day information session was held for the Yellowknives Dene First Nation on October 25, 2010 and another was held on May 31, 2011 for the Łutsel K'e Dene First Nation. The Project Team has contacted other First Nations



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including the Tlicho Government, Northwest Territories Métis Nation and North Slave Métis Alliance to conduct additional Industry Day information sessions.

The Project Team regularly conducts tours of the mine site which include presentations on the past and current state of the site as well as technologies used in the Remediation Project.

Response 1

To the extent possible of federal and territorial policies the Project Team will support economic development opportunities, innovation and training.

Response 2

The remediation of Giant Mine is expected to generate considerable employment and business activity for local firms in the 5-10 year time frame. In the longer term, up to 50 years, some opportunities will continue and be linked to operation and maintenance of facilities (e.g., the Water Treatment Plant), and environmental monitoring. The Government of Canada typically provides seed funding for worker training as part of these remediation projects; the Project Team is planning to use such an approach.

The Project Team provided input during the development of the Northwest Territories Science and Technology Park - Yellowknife Facility and thus is familiar with the recommendations relevant to Giant Mine (e.g., research and development in block freezing and general mine remediation; source of geothermal energy; host site for mining and mine remediation training programs). The Project Team is open to discussions of collaboration and support regarding the City's initiative, NWT Science and Technology Park - Yellowknife Facility. These discussions will have to include other federal government agencies as such initiatives represent the broader Government of Canada interests in the North (e.g., Northern Strategy; plan for CHARS; HRSDC training and skills development initiatives; other federal sources of funding; etc.).

Responses 3 and 4

The Project Team delivered an Industry Day information session on September, 14, 2010 on the Remediation Project and the associated contract opportunities.

The objectives of Industry Day were:

1. to increase local awareness of the Remediation Project and the anticipated work;
2. to provide the Project Team with information on industry capacity in terms of local Contractor and Aboriginal capabilities, manpower and resources, heavy construction and specialized equipment, unique skills and support services, material and product suppliers, equipment rentals, rental accommodations, and training programs; and
3. to inform the Procurement Strategy for the Remediation Project.





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To promote Industry Day a notice was posted on MERX (<http://www.merx.com>) on July, 20, 2010 and advertised across Canada. Additional ad's were placed in News North, Yellowknifer, L'Aquilon on September 6, 2010 and thirty second radio spots on CBC Radio, CKLB-Native Communications Society and Radio Taiga. Industry Day notices was also posted on the Government of the Northwest Business Incentive Program (BIP) website (<http://www.iti.gov.nt.ca/iea/bip/index.htm>). In addition, the Yellowknives Dene First Nation, Tlicho Government, Akaitcho First Nation, North Slave Métis Alliance and Northwest Territories Métis Nation were notified about Industry Day and the MERX postings. In case of the Tlicho Government the notification also fulfilled Comprehensive Land Claim Agreements require the Federal Government place public notices for contract information sessions related to MERX postings.

The forum attracted 71 individuals from local northern and Aboriginal businesses, as well as southern firms from across Canada. PWGSC requested suppliers to submit their Company Profiles. As a result 21 Company Profiles were submitted to the Project Team.

Company Participating in Giant Mine September 2010 Industry Day in Yellowknife, NT

Company	Company Location
Det'on Cho Corporation J.V. Profile	Yellowknife, NT
Northern Industrial Sales	Yellowknife, NT
WESA Inc.	Yellowknife, NT
Ron's Auto Service Ltd.	Yellowknife, NT
Tlicho Eng. & Env. Services Ltd.	Yellowknife, NT
ARKTIS SOLUTIONS	Yellowknife, NT
Break-Away Drilling & Blasting	Yellowknife, NT
Denesoline Corporation	Lutsel K'e, NT
ROWES Construction Ltd.	Hay River, NT
PCL Const. Management Inc.	Edmonton, AB
Kiewit Infrastructure Group	Edmonton, AB
Nelson Env. Remediation Ltd.	Edmonton, AB
SUMMIT Env. Consultants Ltd.	Calgary, AB
Clean Harbors	High River, AB
HAZCO Environmental Services	Winnipeg, MB
Quantum Murry LTd.	Richmond, BC
SLR Consulting (Canada) Ltd.	Victoria, BC
Mindecom Ind Constructors Ltd.	Sudbury, ONT
North American Const (1993) Ltd.	Morrison, ONT
C.M.J. Consultants Inc.	Shawinigan, PQ
Flat Iron Heavy Civil Inc.	Victoria, BC
Morgan Construction Ltd.	Calgary, AB





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Subsequently, Industry Day information sessions were held for the Yellowknives Dene First Nation on October 25, 2010 and for Łutsel K'e Dene First Nation on May 31, 2011. The Project Team has contacted other First Nations including the Tlicho Government, Northwest Territories Métis Nation and North Slave Métis Alliance to conduct additional Industry Day information sessions.

The Project Team has committed to holding further Industry Day information sessions in the DAR, Table 13.13.2 Looking Forward: The Consultation and Engagement Plan. Additional community meetings, public sessions and information sessions will be held to inform Aboriginal, local and northern businesses about the opportunities the Remediation Project has and inform the Project Team about local resources.

Response 5

Giant Mine is a significant part of Yellowknife's social and industrial history and deserves recognition for this role. The Project Team regularly conducts tours of the mine site which include presentations on the past and current state of the site as well as technologies used in the Remediation Project. Please refer to the Project Team's response to City of Yellowknife Information Request #10 for more information.





Giant Mine Environmental Assessment IR Response

Round One: Information Request - City of Yellowknife #02

May 31, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: CityYK #02

Date Received:

February 28, 2011

Linkage to Other IRs

YKDFN IR#4
Environment Canada #02
Alternatives North #02, 20
Review Board #9.2

Date of this Response:

May 31, 2011

Request

Preamble: The proposed conceptual tailings coverings suggest up to several hundred centimeters of cover potentially with geotextile fabric between tailings and coarse protective layer. The report indicates final design will be based on a cost-benefit analysis. Given the future public use of the site as passive and active recreation, the City has previously requested a sufficient coverage to ensure public health and safety. This was a key issue during the Con Mine Abandonment and Restoration Process and it was determined that Con Miramar (Newmont Mining) will provided specific cover over the tailings ponds. Given the plans to re-establish the tailings as recreation areas, the City is concerned that what is being considered may be insufficient to properly mitigate health and safety risks

Question:

1. Please review the design of the Con Mine site and elaborate on the rationale for the depth proposed at Giant Mine site. What factors are considered in the cost-benefit analysis to propose lesser depths than what has been proposed for Con Mine?
2. Please explain what factors should be considered in determining the proper coverings depth and what risks there are of contaminants being exposed based on insufficient coverings.
3. What are the health and safety risks to the public associated with insufficient covering depths or exclusion of geotextile fabric between the contaminants and the coverings?
4. How will the Project Team ensure that the vegetation which is planted will become established? What monitoring program will be in place to ensure the plant material is sustained and will





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survive? If plant material dies in first several years will the Project Team provide an assurance that additional material will be planted until all is well-established?

Reference to DAR:

DAR s.6.6.6 Tailings Covers

DAR, Table 14.2.1

DAR, Table 15.3.1

Reference to the EA Terms of Reference

ToR s. 3.2.4 (8) Development Description

Summary

Cover design is site specific.

The depth of each cover layer will be based on their functions. The requirement to support vegetation is expected to be the primary factor in determining the depth of the upper layer. The design of the lower layer is expected to come down to a choice between using run-of-quarry material with a wide range of sizes and using material that has been crushed or sorted to produce more uniform smaller size, with depth requirement arising directly from that decision.

Exposure of tailings is not expected to lead to broad human health and safety risks, but localized exposure could compromise some uses.

Where revegetation is implemented the Giant Mine Remediation Project will establish a monitoring program to assess the success of the reclamation activities on the mine site. Initially, the Project Team will develop a Revegetation Management Plan, as committed in DAR Table 15.3.1. The success of the revegetation objectives will be reported in the Status of the Environment Report (SOE). If any unanticipated impacts exist they will be addressed or, if required, the revegetation design will be changed.

Response – Question 1

Some of the design considerations that vary between Con Mine and Giant Mine tailings include:

- The tailings surface areas involved;
- The availability of cover materials;
- Tailings conditions (grain size, salinity, moisture content);
- Proximity to residential areas; and
- Proximity to surface drainage.





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These differences would be expected to lead to very different cover designs for the two sites. The Giant Mine covers are designed to meet the objectives to reduce windblown tailings and to isolate tailings from the environment. The cost-benefit analysis will take into account the differences between the two sites and the site specific objectives

It is widely agreed by experts in the field (SRK, 2009) that soil covers need to be designed on a site specific basis, and therefore that there is little value in detailed comparison of cover designs adopted at different sites.

Response – Question 2

Section 6.6.6 of the DAR explains the two-layer cover concept proposed for the Giant Mine. The upper layer will act as a clean surface for runoff, support vegetation, reduce infiltration, and support future uses of the area. The bottom layer will act as a robust physical barrier to prevent human or animal contact with tailings in the event that the overlying layer is damaged, minimize upwards wicking of arsenic from the tailings, and restrict the penetration of roots into the tailings.

The depths of each layer will be determined through further design, and may vary across the site.

Of the four functions for the upper layer, the one that is expected to be the most influential in the selection of depth will be the need to support vegetation. Support of vegetation is likely to require a minimum of 30 cm of soil, and more where a natural vegetation succession is the long-term objective. The thickness of the upper layer could vary within that range depending on differences in vegetation type and needs for final grading of the surface. Varying the upper layer depth across the site would also promote vegetation variability over the longer term.

The other functions of the upper layer could in theory be accomplished by thinner depths but their long-term performance will also be tied to vegetation success:

- Providing a surface for clean runoff could be accomplished by an upper layer as thin as practical construction methods would allow (about 15 cm). But long-term performance of that function will require that the soil be protected from erosion, and that will largely be accomplished by the vegetation.
- Reduction of infiltration could also be accomplished by even thin depths of surface layer needed to facilitate surface runoff, as long as there is sufficient vegetation to inhibit erosion. Storage of infiltrating water and subsequent evapotranspiration will also reduce infiltration. The thickness of soil needed to support evapotranspiration depends on the vegetation rooting depth.
- Future uses of the area will also be tied to vegetation. For example, areas designated for recreational walking or skiing would probably need an upper layer thick enough to support native vegetation.





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The three functions of the bottom layer could be accomplished by even the minimum practical construction depth. The selection of a design depth in this case is expected to be driven primarily by material availability, construction difficulty, and the associated costs. As discussed in Section 6.6.6 of the DAR, depths ranging from 15 cm to 100 cm are under consideration. The decision will come down to a choice between using run-of-quarry material with a wide range of sizes and using material that has been crushed or sorted to produce more uniform smaller sizes. The run-of-mine material would be less expensive to produce but would need to be placed in lifts that are deeper than the maximum boulder size. The processed material would be more expensive to produce but could be placed in much thinner lifts.

All of the layer depths that are under consideration are sufficient to minimize the risk of the tailings becoming completely exposed. The most aggressive form of erosion that is considered possible on the bulk of the tailings surface is damage from all-terrain vehicles. The use of rock in the lower layer of the cover is intended to prevent even that level of damage from penetrating through to the tailings. The risk of long-term erosion by surface runoff will be managed through the design and long-term maintenance of the water management swales and channels.

Response – Question 3

In the event that tailings were to become exposed, public health and safety risks could arise from direct exposure to arsenic in the tailings and from exposure to arsenic-contaminated runoff. Given the large area of covered tailings and the likelihood that tailings exposure would be localized, the public health and safety risks are not expected to be broadly significant.

But some conceivable uses of the area would certainly be compromised. An example from another site is illustrative. Areas of arsenic-containing tailings within the small town of Wells, BC, were covered and converted into a baseball park. However, the cover was either too thin or not sufficient in areal extent, and arsenic containing tailings have become exposed. A recent human health risk assessment predicted some level of risk to frequent recreational users of the park (SNC-L 2011).

The decision of whether to use geotextile fabric will be based on assessment of the physical interaction between the tailings and the lower cover layer. Fine-grained materials such as tailings can be transported upwards into coarser materials by water pressure and/or frost action. These effects will need to be assessed to determine which combinations of tailings properties, coarse layer properties and locations on the Giant Mine tailings could be at risk. An economic trade-off would then be assessed to determine whether to use geotextile or a coarse material with different properties.

Response – Question 4

Where revegetation is implemented the Giant Mine Remediation Project will establish a monitoring program to assess the success of the reclamation activities on the mine site. Initially, the Project Team





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will develop a Revegetation Management Plan, as committed in DAR Table 15.3.1, which includes studies to select species and define seeding, planting and fertilization requirements. Public consultation will also inform the Revegetation Management Plan

The results of the revegetation monitoring program will be incorporated into an annual report to the Mackenzie Valley Land and Water Board. The annual report will document the status of reclamation efforts on tailings covers and other mine site components. The objectives of the monitoring programs will be to evaluate the success of reclamation over time and to adjust or modify these measures where necessary to ensure the following:

- erosion control and slope stability;
- revegetation and sustainability of disturbed areas;
- site-specific reclamation measures;
- optimum species performance;
- noxious and restricted weed control; and
- re-establishment of habitat.

The success of the revegetation objectives will be reported in the SOE. The SOE is intended to verify Project impact predictions, determine the effectiveness of the mitigation measures and identify any unanticipated impacts that may arise from the Remediation Project. Further information on the SOE can be found in response to Alternatives North Information Request #20. If any unanticipated impacts exist they will be addressed or, if required, the revegetation design will be changed based on feedback from the Project Team's adaptive management program.

References:

SRK Consulting Inc. 2009. Mine Waste Covers in Cold Regions. Report for Mine Environment Neutral Drainage Program (MEND), February 2009.

SNC Lavalin Environment 2011. Progress Update on Wells Tailings Site Investigation and Risk Assessment. Memorandum to District of Wells from SNC Lavalin Environment Division, February 28, 2011.

