



Alternatives North

March 24, 2013

Richard Edjericon
Chairperson
Mackenzie Valley Environmental Impact Review Board
Box 938
Yellowknife NT X1A 2N7

Dear Mr. Edjericon

Re: EA0809-001 [2008] Comments on Developer's IR Response to Review Board IR on Water Treatment at Giant Mine

Alternatives North (AN) is pleased that the Review Board issued the Information Request (IR) on February 8, 2013 seeking further details on water treatment options for the Giant Mine. This is a key issue raised throughout the Environmental Assessment and is the cause of significant public concern in relation to potential changes in water quality in Back and Yellowknife Bays and ice formation and ice thinning on Back Bay above the proposed diffuser.

AN is pleased to see that the Developer is now more seriously considering water treatment options and that improved water treatment may be achieved in a cost effective manner. However, we have reservations and concerns about the analysis presented in the IR response and believe that a full assessment of all the costs, benefits and impacts is still required.

Following receipt of the IR response, AN reviewed it and then requested a meeting with AANDC to discuss a number of issues. A meeting was held on March 21, 2013 where representatives of AN, City of Yellowknife, AANDC, Public Works and Government Services Canada and consultants to the Developer participated by phone. Although the meeting was helpful, several outstanding issues and concerns remain as follows:

- Errors in the IR Response;
- Other issues with the IR Response such as water treatment system design objectives, evaluation of the options, cost implications and significance determinations;
- No public engagement in the preparation of the response; and
- Concerns with robustness of overall project design and adaptive management.

Throughout this submission, AN makes recommendations, including binding measures, to deal with significant public concern and potential for significant adverse environmental impacts in relation to water treatment and the Developer's newly proposed option. To be clear, we are in no way advocating for further delays in this Environmental Assessment. It is time to bring this

process to a conclusion. Delays to date by the Developer have resulted in moves to exempt several parts of the original development, including the conveyor demolition and most recently, the Roaster Deconstruction and Underground Stabilization. This exempted work will now likely proceed without the public benefit of any measures that the Review Board may recommend, especially with regard to the need for community-based and independent oversight.

Errors in the IR Response

Issue

There appear to be several errors in the AANDC/GNWT response and in the AECOM report.

AANDC Response (Public Registry #637)

- Page 4, line 143 references Figure 3.6 and Figure 3.7 but there are no such figures in the AECOM report. We believe that these references are probably to the figures which should be labelled Figures 3.5 and 3.6 on pages 12 and 13 of the AECOM report.
- Page 5, line 191 reference to Section 3.6 in the AECOM report and states “The report also included as assessment of the constructed wetlands as a potential option for water treatment/polishing”. Section 3.6 in the AECOM report is the Financial Assessment of the Treatment Options. Section 3 of the AECOM report presents four options for water treatment and constructed wetlands are not amongst those options. We question whether the right version of the AECOM report was submitted. That being said, AN would welcome some serious analysis of perpetual care water treatment options that minimize human intervention requirements including low energy, reduced chemical use and reliance on natural systems. Constructed wetlands may offer some promise.

AECOM Report (Public Registry #638)

- Page 11, paragraph 3 references Figures 3.6 and 3.7 but no such figures exist in the report. We believe these should likely read Figures 3.5 and 3.6.
- Page 12, Figure 3.3 should be changed to read Figure 3.5.
- Page 13, Figure 3.4 should be changed to read Figure 3.6. As mentioned above, we question if the right version of the AECOM report was submitted as there is no discussion of constructed wetlands as a water treatment option.

Alternatives North’s Rationale and Conclusion

When Alternatives North questioned the inconsistency between the AANDC response and the AECOM report during the meeting on March 21, 2013, it quickly became apparent that the Developer had a different version of the AECOM report that contained a discussion on wetland treatment and a comparative table of various options. We requested this table and were provided a partial version by e-mail on March 22. We do not support keeping the public record open for an updated AECOM report but believe the work should be done as part of the ongoing project design and public engagement (see Recommendation 1 below).

Other Issues with the IR Response

Ammonia Treatment

AECOM 2013 page 3, second paragraph from bottom, states that 1.0 mg/L for ammonia is “generally considered non-toxic by the federal environmental regulators”. ***A reference should be provided for this statement.*** AECOM also states “For the basis of this report it is assumed that ammonia will be reduced to 1.0 milligram per litre (mg/L) in the treated water.” For Option 1 (proposed water treatment plant as described in the Developer’s Assessment Report) ammonia is predicted to be 1.5 mg/L (see Technical Sessions, Day 2 presentation, Public Registry #349, slide 36). We understand from the discussion on March 21 that the performance of Options 1-3 will be similar. ***The predicted performance for ammonia levels and other contaminants of concerns should be added to the AECOM report for the four water treatment options presented.***

Arsenic Design Objective for Water Treatment System

AECOM 2013, page 3 presents several arsenic removal objectives. During the discussion on March 21 it became clear that the Developer is of the view that the Canada Drinking Water Quality Guideline of 10 µg/L arsenic is the appropriate value to use as a discharge criterion for the Giant Mine water treatment system. This would be double the existing Canadian Council of Ministers of the Environment (CCME) arsenic guideline for the protection of aquatic life of 5 µg/L arsenic. While both these values are more protective compared to AANDC’s previous apparent adoption of the *Metal Mining Effluent Regulations* arsenic limits of 100 µg/L arsenic (see SENES 2002 as discussed below), ***AN believes the precautionary principle should prevail and AANDC should be aiming to design a water treatment system that adopts best practices and minimizes arsenic discharge to the lowest possible levels such as the arsenic CCME guideline for the protection of aquatic life.***

AECOM 2013, page 14, s. 4.2 Objectives, sets out three items of concern for development of the long term water disposal options. While we agree that quality of the treated water is a starting point, much of the public concern with water treatment at Giant is about potential for changes in water quality in Back and Yellowknife Bays given interactions of the effluent with local conditions such as sediments, currents, discharge point, ice cover and other matters.

Option 2—Ion Exchange

AECOM 2013 page 5, last paragraph, states “Theoretically, both the bio-filtration and ion exchange process proposed for this option should work successfully, but this needs to be verified with pilot testing prior to design and construction.” We understand from the discussion at the March 21 meeting that the Developer’s consultants have some confidence that it is possible to design such a system and that there are a number of arsenic removal systems using Ion Exchange in operation in the Yukon for groundwater. ***The Developer has agreed to provide data on Ion Exchange system performance including arsenic levels in the raw water and after treatment for the facilities in the Yukon.***

Option 3—Reverse Osmosis

AECOM 2013 page 6, last paragraph, mentions possible disposal of the Option 3 brine stream into the bottom of the mine. When Option 3 or Reverse Osmosis was discussed at the March 21 meeting, the Developer was of the view that there would be a closed loop and that the brine stream would eventually cause contaminant levels to rise in the underground water. AN also understands that it is possible to cut the brine stream volumes in half or more and in our view, a fuller assessment of Reverse Osmosis is warranted. ***AN recommends that the Developer conduct predictive modelling of underground mine water quality at Giant with and without a brine stream from Reverse Osmosis water treatment. AN also recommends that a pit be considered for disposal of the brine stream from Reverse Osmosis water treatment.***

Sludge Characterization and Disposal

AECOM 2013 page 9, Table 3-1 Summary of the Treatment Options, does not present any information about the residual sludge that will be produced from each of the options such as quantities generated, toxicity and whether any special handling or design for disposal is required (e.g., lined landfill with leachate control). The Developer should provide this information to allow for a better informed evaluation of the water treatment options. We understand from the discussion on March 21 that the major difference between Options 1 and 2 is that the used or spent arsenic absorption media from Ion Exchange will need to be handled with possible recharge or disposal. ***The Developer has agreed to provide further information on the characteristics of the used arsenic absorption media and its ultimate disposal.***

AECOM 2013 page 10, point 2.d., states “Residual sludge can be disposed at the local landfill at no cost”. At the March 21 meeting, the Developer made a clear commitment not to use the municipal landfill for disposal of any water treatment related waste. ***AN recommends that the Developer put its commitment not to use the landfill for water treatment waste disposal in written form.***

Selection of Preferred Water Treatment Option

Part of the IR issued by the Review Board on February 7 deals with the issue of costs—costs for construction and maintenance of water treatment options, and “implications to the overall project”. The issue of total project costs and any incremental costs for improved water treatment are within the scope of the IR, yet the Developer did not deal with the issue of water treatment option costs in a quantitative manner in relation to overall project costs. There was little, if any, discussion of affordability of any of the water treatment options in relation to the total project costs.

AECOM 2013 page 11, comments on the costing of the options states that the “other treatment options should be viewed as additional costs relative to Option 1, not absolute capital and operating costs”. While this approach was taken in point 2 about the additional costs for Option 2 above a regular Water Treatment plan, this is not how Options 3 and 4 are treated where the total costs are described.

Developer's Conclusion

AANDC Response, page 4, lines 139-140, the Developer concludes that Option 3 is not economically viable, even though the additional costs for Option 3 of \$66,500,000 or an extra \$50,500,000 over Option 2, is to be spread out over 100 years.

AANEDC Response, page 6, Option 3, the Developer rejects the Reverse Osmosis (Option 3) water treatment process in part because of the "significant financial costs" yet provides no evidence of its affordability. Option 3 would cost about \$50 million more than Option 2 (Ion Exchange) over a 100 year period.

Alternatives North's Rationale and Conclusion

The last cost estimate made available by the Developer during this proceeding indicated a total cost of \$449 million for implementation (see Appendix 1). AN recently received documents under an Access to Information request that state the federal Treasury Board approved a revised total project cost of \$903 million in March 2012 (see Appendix 2). With this revised project cost estimate, it is AN's position that Option 3 (Reverse Osmosis) is a much more affordable option than the Developer presents it to be and that further investigation is merited.

AN is of the view that the additional costs for Option 3 of \$66,500,000 or an extra \$50,500,000 over Option 2, spread out over 100 years, merits a more detailed examination of the addition of a Reverse Osmosis process to reduce arsenic levels to the CCME guideline for the protection of aquatic life. *AN recommends that there should be a more detailed examination of a Reverse Osmosis process as it may allow arsenic levels in the effluent to meet the CCME guideline for the protection of aquatic life without the need for a mixing zone.*

Significance Determinations

AECOM 2013 page 20, last paragraph states that "ecological and human health risk assessments undertaken with reference to the direct discharge of treated effluent to Yellowknife Bay have shown that there is no significant residual risks". As AN stated in its Technical Report (Public Registry #482, pg 17), the risk assessment work "appears to be a loading analysis which is not the same as a far field model that should assess these factors and make predictions on water quality at various points and reflect any seasonal changes. It appears to AN, that far field modelling should be done to feed into a proper risk assessment, rather than as a substitute for such work." We understand from the discussion on March 21 that the Developer has contracted with consultants to carry out some field work this winter and that this has begun. Full analysis of the results is not expected until the fall of 2013. We remain concerned about the possible effects of treated mine water directly into Back Bay through an outfall. Lastly, *we note that treated effluent discharge from Option 2 (Ion Exchange) would still rely on a mixing zone to reach the CCME guideline for the protection of aquatic life.*

AECOM 2013 page 21, first point states "Option 2 – there would be no need to design for effluent dilution as the quality of the effluent at the "end of the pipe" would be non-toxic to even

the most sensitive species.” Although this matter was discussed at the March 21 meeting, AN would like further justification for this statement, which according to CCME should come in the form of either a site-specific risk assessment or discharge at or below the CCME guideline. ***Given that Option 2 will still result in arsenic levels in the effluent that are twice the CCME guideline for the protection of aquatic life, the Developer should carry out a Site-Specific Risk Assessment and/or develop a Site-Specific Water Quality Objective based on the aquatic species found in Yellowknife Bay or design a water treatment system to meet the CCME arsenic guideline for the protection of aquatic life.***

AECOM 2013, page 21, last paragraph states, “none of the potential water treatment and disposal options, including the current proposal, pose a risk of significant adverse effect to ecological species or to people now and into the future.” We acknowledge that arsenic levels have the potential to be improved with Option 2 over the current design. ***The consultants’ conclusion of no significant adverse impacts is not supported by any far field or thermal modelling or site-specific ecological risk assessment using the species present in Yellowknife Bay.***

Developer’s Conclusion

AANDC Response, page 3, lines 137-138, the Developer concludes that “all of the assessed options, including the current water treatment proposal, would not result in significant impact to the environment.”

AANDC Response, page 4, lines 154-157, although the Developer indicates a willingness to “revise the approach to water treatment”, no details or a timeline are provided on what the next steps or process will be for making this major change to the project.

AANDC Response, page 5, lines 187-188, states “While effluent would be released into Great Slave Lake using this approach, the impacts would be greatly minimized given the high standards that would be met.”

AANDC Response, page 5, lines 212-214, states “This outfall location [near shore] can also be easily defined and marked in order to effectively inform the public regarding safety issues related to ice thickness.”

AANDC Response, page 6, Option 2, the Developer has presented no evidence to support its conclusion that the effluent would be “non-toxic to even the most sensitive species” as discussed above.

Alternatives North’s Rationale and Conclusion

The Developer committed to carrying out far field water quality modelling with regard to the diffuser and thermal modelling of the diffuser operation with regard to ice thinning. It would be reasonable to expect to see some mention of progress on these commitments in the response but the Developer has not provided any update or new information. From the discussion on March 21, we understand that this work is finally under way. ***The Developer’s conclusion of no***

significant adverse impacts is not supported by any far field or thermal modelling or site-specific ecological risk assessment using the species present in Yellowknife Bay.

We note that treated effluent discharge from Option 2 (Ion Exchange) would still rely on a mixing zone to reach the CCME arsenic guideline for the protection of aquatic life.

In the absence of any further study, an on shore or near shore outfall is likely to be the cause of significant public concern due to impacts on ice formation and ice thinning. The same concerns were expressed regarding the potential impacts of the diffuser on winter use of Back Bay and public safety. ***Should the Developer wish to pursue a near shore outfall, further research and field studies on the impact of an outfall on ice formation will be necessary, including public engagement on options, assessment of risk and potential mitigation.***

As stated above AN does not accept the Developer's characterization or conclusions on risk and significance of impacts. There was no involvement of the Parties in the Developer's determination on risk or significance of impacts.

Recommendation 1.

As part of the Developer's commitment to public engagement in ongoing project design, the Developer should update the AECOM report to correct errors, provide the following:

- *A full comparative table for all the options;*
- *Ammonia objective and water treatment option ammonia removal performance;*
- *Further rationale for the selection of the arsenic design objective;*
- *Further information on Ion Exchange water treatment performance;*
- *Further consideration of Reverse Osmosis performance and brine stream options including predictive water quality modelling for underground and pit disposal;*
- *Sludge characterization and disposal including spent arsenic absorption media;*
- *Revised total project costs and the impact of water treatment options on such costs; and*
- *A more comprehensive determination of the significance of any impacts including further work needed to reduce uncertainties on water quality impacts through far field modelling, ice formation, ice thinning, mixing zone analysis and site-specific risk assessment.*

The updated report should be filed with the Review Board and distributed to all the parties by April 5, 2013.

No Public Engagement on Water Treatment Options

Issue

We are not aware of any public engagement that was initiated by the Developer with regard to the preparation of the IR response, including identification of the water treatment options, evaluation of the alternatives, assessment of risk, significance of impacts, possible mitigation or other matters.

Alternatives North's Rationale and Conclusion

We recognize the short period permitted for the preparation of the response but several of our questions and concerns may have been resolved had the Developer attempted some form of public engagement. We note that the Developer has committed to public engagement around The 2011 Baker Creek Assessment report (see AANDC Response, Public Registry #637, page 7, lines 278-280) but not the water treatment options.

We also note that in an undertaking to the Review Board during the public hearing (Public Registry #598), the Developer committed as follows (AN comments in bold red around the engagement commitments):

General process for arriving at a final engineering design:

1. Meet with Parties to discuss preferred approach to engagement and priorities on the four mine components. Engagement plan prepared based on discussions and provided to all Parties. Late fall 2012. **[meeting has not taken place, limited discussion on engagement at the two Environmental Management Systems Working Group meetings held since the public hearing, on December 13, 2012 and February 6-7, 2013, no overall engagement plan developed to date]**
2. AANDC to provide a state of knowledge report to all Parties on current designs for each of these four mine components as a means of ensuring all Parties, including AANDC, have the same base. Late winter 2013. **[not completed to date]**
3. Series of meetings and other forms of engagement in accordance with the engagement process decided upon in Step 1 to discuss objectives/measures of success for each of the four mine components. These discussions will also include refinements to design elements within the approved conceptual closure framework. Meeting outcomes will be recorded in meeting reports. Beginning in early spring 2013 and running until late winter 2014. **[some discussion on the framework for objectives and criteria but not completed to date for specific project components]**
4. Finalization of preliminary designs by AANDC and its design team that meet objectives/measures of success as appropriate for each of the four mine components. Beginning in early spring 2014 and running until late winter 2015.
5. Follow up workshops on designs with Parties. Workshop reports will be prepared and provided to the Parties. Spring 2015.
6. Final detailed engineered designs prepared by AANDC and its design team. Beginning in summer 2015.

The Developer clearly needs to fulfill these commitments. The Developer's actions in the preparation of this IR response and on the issue of ongoing project design are the cause of

significant public concern. This relates back to the lack of a “Social Licence” to carry out the development as detailed in the AN Technical Report (Public Registry #482, pages 7-11 and Appendix A). An Environmental Agreement offers the foundation for improving relationships and ensuring that commitments are actually carried out, as discussed in the Technical Report submitted by AN (Public Registry #482, pages 43-44). We stand by these recommendations and have made numerous other suggestions as to how to move forward including shifting project authority and personnel to Yellowknife (see AN Technical Report, Public Registry #482, Suggestion 3). A further binding measure is recommended here to ensure that there is ongoing public engagement in project design.

Recommendation 2.

The Review Board should make a binding measure as follows:

To reduce and avoid significant public concern with regard to public engagement, the Developer shall prepare a Public Engagement Plan in collaboration with the parties. The Plan shall include provisions for ongoing collaboration with the Parties to the Environmental Assessment with regard to project design, identification of alternatives, evaluation of alternatives and associated risk, mitigation measures and other agreed upon matters. The Plan should include provisions for ongoing and regular communications with the Parties such as a Working Group. The Plan should form a binding condition of any authorizations issued in relation to the Development, including any exempted work to the extent possible.

Robustness of Project Design and Adaptive Management

Issue

The Developer is proposing a major change in the Giant Mine Remediation Project, namely Ion Exchange water treatment and an outfall to replace a traditional water treatment plant with a diffuser, at a very late point in the Environmental Assessment. This raises issues around the robustness or adequacy of the Developer’s consideration of alternatives for water treatment and other major components of the project. As discussed above, there was no public engagement during the preparation of the IR Response.

Alternatives North’s Rationale and Conclusion

In order to place the Ion Exchange water treatment option into context for the Giant Mine, it is necessary to review the development of water treatment options. AECOM 2013, page 1, last paragraph states “This letter report is intended to answer the three key questions identified above and should not be read without the knowledge of the numerous background documents previously prepared for this project.” It would have been very helpful to have had these background documents referenced or listed in this document to allow readers to review the history and work to date on water treatment at Giant Mine. We request that this information be added to the report when it is resubmitted as discussed above in Recommendation 1.

The following reports were reviewed by AN with regard to the development of water treatment options for Giant Mine:

SENES Consultants Ltd. 2002. Supporting Document 8. Engineering Studies Water Treatment. Prepared for SRK Consulting. (Public Registry #139, Developer's Assessment Report, Supporting Documents to the Giant Mine Remediation Plan).

SENES Consultants Ltd. 2005. Report on Water Treatment Update Giant Mine Remediation Plan. Prepared for SRK Consulting. (Public Registry #139, Developer's Assessment Report, Appendix B, Supporting Documents to the Giant Mine Remediation Plan, Document L1).

Developer's Assessment Report (DAR) 2010. (Public Registry #139), pages 6-69, 6-73 to 6-81.

The review of water treatment options for Giant Mine was described as follows in SENES 2002:

Under the Federal Metal Mines Effluent Regulation (MMER) the current effluent limit for arsenic is a monthly average concentration of 0.5 mg/L. This limit is based upon a review of best available technologies (BAT) completed by SENES Consultants Limited (1999). SENES reviewed operating data for Canada's best performing plants and determined that BAT for arsenic removal was iron addition. BAT plants produced average arsenic levels of 0.025 to 0.18 mg/L of arsenic with 95% of all monthly averages <0.4 mg/L.

Other technologies for arsenic removal include:

- precipitation with other alkali (e.g. lime, magnesia);
- sulphide precipitation (chemical and biological);
- passive treatment is anaerobic wetlands; and
- evaporation processes.

Other than for lime treatment, experience with most other processes is limited. Passive systems have potential for polishing but are not likely suited as primary treatment systems for high levels of arsenic. Biological systems have promise but again are most likely suited to lower strength applications. Evaporation has potential when solutions are concentrated as reagent costs for precipitation are prohibitive.

It is our understanding from the discussion that took place at the March 21 meeting, that Ion Exchange or absorption methods for water treatment are not new. Application to arsenic appears to have been researched and developed more thoroughly in the early 2000's following the US Environmental Protection Agency setting more stringent arsenic concentration limits for drinking water. Yet the Developer did not consider these approaches for water treatment at Giant Mine. SENES 2005 and the DAR 2010 adopted the approach from the earlier SENES reports without any apparent review of newer technologies such as Ion Exchange.

The issue of the Developer staying on top of new technology and research was a serious topic of discussion at the October 2011 Technical Sessions (Technical Session transcript for October 17, 2011, Public Registry #352, excerpts from pages 236-245):

Mr. TODD SLACK : ... in the presentation you talked about that resource -- or that there will be a ten year update to re-evaluate technologies. What commitment can INAC make to ensure that resources will be available for this process? And the reason I ask this is given the --the sum costs, and the sort of approach to future technologies that the proponent has taken here, you know, we -- we want to ensure that there's -- there's going to be the opportunity for a good faith evaluation.

(BRIEF PAUSE)

Ms. JOANNA ANKERSMIT: The Government of Canada is going to invest a significant amount of money in this project, and **it's our own due diligence, and in the best interest of everyone that we continue to stay abreast of the technology that's--that--and the information and research that's going on around this significant investment.**

....

Mr. KEVIN O'REILLY: I wanted to follow up on one of Todd's questions. And it's slide 18 in the presentation about assessing future technology with regard to arsenic treatment. And it's not on the slide. I think it's in response to the IR that was asked by the Board, not the one that we asked, because they wouldn't put a timeframe in -- in the answer to us, but in the response to the Review Board, they said that they would do this every ten years. Guess what? Ten years is up now, or will be next year, because I -- the assessment or review of the alternatives was done in 2002-2003, by SRK. So we're at the ten year point, actually next year. So is the—developer prepared to do another assessment next year, starting next year?

THE FACILITATION EHRLICH: And just for clarity, when that was described in response to the IR, did you mean every ten years from project approval or from the completion of the alternatives study nine years ago?

Ms. JOANNA ANKERSMIT: Thanks for the clarification. It's project approval that we're—**everyone around this table is pretty up-to-date on what's going on with the management of arsenic trioxide. No one in the world is looking at it more than us right now.** So once we get a project and we can implement a project that can protect the human health and safely and the environment, then we'll start to look at future research.

THE FACILITATOR EHRLICH: Kevin...?

Mr. KEVIN O'REILLY: Thanks. While I appreciate the passion of the response, I guess I'm a bit more—I—I want a reassessment every ten years. And that—if they want to provide that clarification now as to when the ten year clock starts ticking after they get approved, well, that's okay, but I think it's time probably to do another assessment now. And I may suggest though that when you do this—I guess it's not really clear who's going to do it. I understand the report—the results are going to be reported in the SOA report, state of the environment report. But I guess I'd like to

suggest that it be a much more collaborative approach than what was done last time around. I would suggest or propose that—that you put together a multi-stakeholder group that develops an RFP [request for proposals] that actually is involved in reviewing the information and so on, that it's not just left to the developer. And so I guess I'm suggesting a process for how that—that should happen, and I think it's probably time that we did it again now. If they want to comment on that, that's fine. I did have one other sort of follow-up as well.

...

Ms. JOANNA ANKERSMIT: Yeah, definitely look forward—that's the point, I think of the meetings on—**this week, is to hear your ideas, to give us an opportunity to talk about how we're going to work together. And like I said in my opening remarks this morning, we genuinely welcome people's constructive ideas for how—how we can work together and how we can have the best project possible. That's what we all ultimately want.**

It appears to AN there was a very serious failure of the Developer's adaptive management systems to review Ion Exchange or arsenic absorption methods of water treatment. This raises concerns for us around the robustness of the Developer's design and alternative selection to date and the overall adaptive management system for the development. The failure to consider Ion Exchange as a water treatment option reinforces our concern and positions as follows:

- community-based and independent oversight of the Giant Mine Remediation Project is essential (see AN Technical Report, Public Registry #482, pages 25-29); and
- ongoing research and development into more permanent solutions, including collaborative reviews, is required (see AN Technical Report, Public Registry #482, pages 30-32).

We recognize that Giant Mine represents a very complex set of remediation needs and that the Developer requires some flexibility in designing appropriate responses. However, major components of the Giant Mine Remediation Project have yet to be completed, as raised at the Public Hearing by Alternatives North (see AN Opening Remarks Presentation for the Public Hearing, slide 7 where it states “many aspects of this project are still conceptual” Public Registry #542) and the Review Board itself when it sought an undertaking at the public hearing on the design process (Public Registry #598). In our Technical Report (Public Registry #482, page 32) we stated the following:

AN is also seeking a firm commitment for a more collaborative approach to a technology review or re-consideration of alternatives in contrast to the approach taken during the development of the original Remediation Plan. ... AN is of the strong view that the Developers need to begin to characterize the GMRP as an interim solution. As the proposed alternative for managing the underground arsenic requires perpetual care, this needs to go hand-in-hand with a firm commit to an active, funded and ongoing research and development program. Without an adequate plan for perpetual care and management, including active research and development

into a more permanent solution, the GMRP is simply unacceptable to the community. Significant public concern remains over the lack of a commitment by the Developers to an active, funded and collaborative research and development program into more permanent solutions that minimize perpetual care requirements. In our view the best way to ensure that a research plan is developed and funded is to make it, part of a legally binding Giant Mine Environmental Agreement.

AN has strong concerns about the robustness or adequacy of the Developer's overall Giant Mine Remediation Plan and adaptive management system that appears to have failed to consider an alternative for a key component, water treatment, even in the face of significant public concern with water quality and ice formation and thinning in Back Bay. Ion Exchange, Reverse Osmosis and other water treatment options may not have emerged as viable alternatives without the Review Board's IR of February 2013. We recommend two binding measures to deal with these issues.

Recommendation 3.

The Review Board should make a binding measure as follows:

To prevent or reduce potential for significant adverse environmental impacts and to reduce significant public concerns over water treatment, a full assessment of the water treatment options be undertaken in collaboration with the Parties, including Ion Exchange and Reverse Osmosis. Should an outfall be chosen as a preferred effluent discharge method, research and field studies are to be conducted on the impacts of an outfall on ice formation and ice thinning, and mitigation measure, and that the Parties are fully engaged in this work, before it is carried out.

Recommendation 4.

The Review Board should make a binding measure as follows:

To prevent potential significant adverse environmental impacts from the Giant Mine Remediation Plan and to reduce significant public concerns over the robustness and adequacy of project design, the Developer shall cause to be carried out, an independent review of the preferred alternatives, technologies and mitigation measures for major project components including water treatment, pit closure, tailings cover, management of the underground arsenic, and disposal of contaminated soils and infrastructure. The review shall also consider the adequacy of the adaptive management systems in place and shall be made publicly available when completed. The Parties are to be fully engaged in this work which may be completed concurrently with detailed project design for licencing and permitting but no later than April 1, 2014.

Conclusion

AN commends the Review Board for the IR that was issued and the Developer for the work that went into its response. It appears there may be a better water treatment process but further study and analysis is needed, including engaging the Parties. It appears the Developer has selected Option 2 (Ion Exchange) with a near shore outfall. This method of water treatment and disposal will still have an unknown impact on ice formation and ice thickness in Back Bay and requires a mixing zone to meet the CCME arsenic guideline for the protection of aquatic life.

AN is of the view that the significant public concern with ice formation and ice thickness for the diffuser option will apply equally to an outfall area and its potential impacts on winter use of Back Bay and public safety. AN acknowledges that the environmental impacts from an Ion Exchange water treatment system and near shore outfall may be less than the proposed water treatment system and diffuser, but the significance of the impacts are unknown at this point.

We remain concerned with the lack of public engagement around the preparation of this IR response and the overall Giant Mine Remediation Project, including unfulfilled commitments made to date during this Environmental Assessment. The lateness of this major change in project design for water treatment raises serious issues around the robustness and adequacy of project design, and the Developer's adaptive management systems.

To deal with these uncertainties and potential for significant adverse environmental impacts and significant public concern, AN has offered four recommendations, including binding measures, as discussed above.

We would be pleased to discuss these matters with the Developer, other parties and your staff in an effort to resolve the outstanding issues in a constructive manner.

Sincerely,



Kevin O'Reilly
Alternatives North

Attachments—Appendices 1 and 2

cc. Todd Slack, Yellowknives Dene First Nation
Adrian Paradis, A/Manager, Giant Mine Team, AANDC
Ray Case, Environment and Natural Resource, GNWT
Mark Heyck, Mayor, City of Yellowknife
Bob Bromley, MLA Weledeh
Willard Hagen, Chair, Mackenzie Valley Land and Water Board

APPENDIX 1. GIANT MINE REMEDIATION PROJECT COSTS

Terms of Reference (May 2009)

The Terms of Reference (Public Registry [116](#)) in Section 3.2.4 Development Description required the Developer to provide: “14. Estimated capital, operating, monitoring and maintenance costs (the latter presented by year for the life of the development).”

Developer’s Assessment Report (October 2010)

The Developer’s Assessment Report (Public Registry [139](#)) presented an estimate of total costs for the implementation phase at \$479,166,684 and estimated annual costs of \$1,910,000 in Tables 6.13.4 and 6.13.5.

Pre-Technical Report Workshop (June 2012)

The issue of the need for revised Giant Mine Remediation Project Costs was first raised at the June 27-18, 2012 Pre-Technical Report workshop held by AANDC after several requests from Alternatives North (see Public Registry documents [401](#), [430](#), and [431](#)).

Excerpts of the report from the Pre-Technical Session workshop (Public Registry document [461](#)) dealing with a revised cost estimate follow:

Cost Estimates for Frozen Block Methods pg. 13

Alan Ehrlich (MVEIRB): it is possible that the Board will want to know the cost of the project/ cost comparisons, and so be prepared to present some cost information at the Public Hearings.

Baker Creek pg. 31

Alan Ehrlich (MVEIRB): one of the advantages of knowing the overall cost is to know what kind of scale of activity you are looking at.

Joanna Ankersmit (AANDC): you have to be careful with costs because cost doesn’t always relate directly to scope. And I want to caution against comparing with the DAR, and using percentage of overall budget.

Cost Estimates pg. 31-32

Kevin O’Reilly (AN): we would like to see the cost estimates for the project, as we have not seen updated costs. I would like to know what the Baker Creek costs are and what the North Diversion option would cost, so we can compare.

Joanna Ankersmit (AANDC): please explain why this information is important to EA?

Alan Ehrlich (MVEIRB): we need to look at reasonable value and people want to make sure that if things are being proposed that reduce risk, it’s not off the charts in terms of cost. We’ve heard from the engineers that cost is a design criterion for things like mitigation measures and monitoring, so we want to

know what the economic values are compared to the risk values. It helps the board to understand how you made some of these choices if we can see the costs involved in factoring decisions about mitigating impacts. We need to understand how you look at considerations in your decision-making.

Joanna Ankersmit (AANDC): the project scope hasn't changed, and I don't understand how the costs have anything to do with this.

Kevin O'Reilly (AN): I want some assurance that the money is there. And I think that's fair to ask.

Joanna Ankersmit (AANDC): of course cost is a concern, but it hasn't changed the project.

Alan Ehrlich (MVEIRB): the project has certainly changed, and you described the cost before it changed, so it's helpful to know what the new costs are now, based on those changes.

Kevin O'Reilly (AN): I want to know what your figures are for Baker Creek, and you already have a rough estimate for the North Diversion, and if those are close, I think that may influence what we want to talk about at the Public Hearings. I want to see the North Diversion option on the table.

Daryl Hockley (SRK for AANDC): we can use the same estimates we made for the DAR and we can make new estimates, but there is a concern about releasing a new set of estimates. We can include some of the things Alan is asking for.

Alan Ehrlich (MVEIRB): I ask for this because you will need to be prepared for this to come up in the hearing. We're looking for rough numbers that help describe the amount of work in the project.

Cost Estimates pg. 32-34

Kevin O'Reilly (AN): is the developer going to provide a new cost estimate for the project, including Baker Creek?

Joanna Ankersmit (AANDC): I have a better understanding of what you're asking for, so we will go back and see what we can produce that will satisfy your needs while still working under what we are allowed to release.

Kevin O'Reilly (AN): if we get the cost estimates at the Public Hearing that is not helpful. I want them before the Public Hearing please. This is something I would consider asking the Board to make a ruling on.

Joanna Ankersmit (AANDC): Something will be provided in advance of the Public Hearing.

Pre-Hearing Conference (July 2012)

AANDC still had not filed an updated or revised set of cost estimates by the time the Pre-Hearing Conference was held on July 26, 2012 so Alternatives North again raised the issue and followed it up with an e-mail the following day (Public Registry [483](#)).

Public Hearing Filings (August 2012)

On August 10, 2012 AANDC and GNWT filed a number of documents in reply to the outstanding items raised at the Pre-Hearing Conference. In Appendix B of the covering letter (Public Registry [493](#)), AANDC provided updated cost estimates for the implementation phase that totalled \$449,615,993 in what appeared to be 2010 dollars. No explanation was provided for how the revised cost estimate was calculated but it was presented as an updated version of Table 6.13.4 from the Developer's Assessment Report.

Public Hearing (September 2012)

There was discussion of the issue of project costs at the Public Hearing in September 2012 as follows:

Public Hearing Transcript September 13, 2012 (Public Registry [578](#)) pgs. 146-148

ALAN EHRLICH (MVEIRB): Can you please describe what is the current implementation costs for the project and what is the current estimated annual maintenance and monitoring costs for the -- you know, the long haul after everything's frozen? I'm asking because I just want to be sure the information we have in the Developer's assessment report is not stale now at the time the Board is -- is approaching decision making.

JOANNA ANKERSMIT (AANDC): Just one second, Mr. Chair. I don't - I don't trust my own memory. So I just want to take a look at what we provided in the IR as the most recent.

ALAN EHRLICH (MVEIRB): Mr. Chair, if it's all right, I mean, even the IR was a while ago, would it be okay if tomorrow perhaps you brought in the -- that answer? I don't need it today especially. Tomorrow's got financial stuff in it.

JOANNA ANKERSMIT (AANDC): It doesn't sound like a complicat -- a complicated question, but it is because a lot of numbers get thrown around in this project, and how they are calculated, what they are calculated for has an impact. And so the reason you're -- you're seeing my caution related to throwing numbers out there is that different numbers are developed over time for different purposes. That isn't to be misleading. It's just the way a project of this nature... So there's a public -

- the Government of Canada posts its liabilities, and that's available on the internet. We also have implementation costs that develop over time. I think perhaps what you're getting at is there's a substantive investment that will be required for the implementation. And then the long-term costs are currently estimated at \$1.9 million annually, I believe, and I can confirm that number, but... There, I just did it. I threw out a number without checking, but... So it's a substantial investment now. And that will be very capital intensive. And then once the freeze takes place and once the remediation project is implemented, then we will see a sharp decline into a far more -- a far lower maintenance number over time.

Public Hearing Transcript September 14, 2012 (Public Registry [579](#)) pgs. 124-125 and 165-167

MS. JOANNA ANKERSMIT (AANDC): As I mentioned, funding for this project to date has been stable and consistent. The current approach has allowed us to effectively manage cost variations and ensure the protection of human health and the environment. This bullet speaks particularly to incidences that have happened on the site where we've had to take measures to ensure that remediation corrective measures were put in place. We've been able to do that in a -- in an effective manner with our existing funding mechanism. And it's important to know that ministers that are responsible for -- for funding decisions have been ware -- made aware of the ongoing costs in a -- in full costing. As the project advances that -- those costs are continually shared with -- for -- with decision makers. And we have spent, you know, to date 160 million. It -- it's a lot of money and --and it has been a stable source of funding to allow us to get to the plan that -- that's being reviewed through this process.

....

MR. ALAN EHRLICH (MVEIRB): Yesterday we talked a little bit about project costs. Today in your presentation you talked about expenditures spent and projected. What you propose now is a balance of costs and risks because you have to think about this stuff. And you've also talked about, you know, value for money in there. The question that was made clear yesterday was: What does this project cost? The answer was: It's very complicated, we'll try to come with it tomorrow. Now -- that would be now. What does this project cost?

(BRIEF PAUSE)

MR. ALAN EHRLICH (MVEIRB): And, specifically --Alan Ehrlich for the Review Board again -- we're wondering about the cost for the initial implementation phase and the annual ongoing costs for maintenance and monitoring.

(BRIEF PAUSE)

MS. JOANNA ANKERSMIT (AANDC): Thank you, Mr. Chair. The -- the implementation phase costs currently are -- are still estimated at the number that's been provided from 2010 which was \$449,615,993, and that is provided in the estimate of total costs for the implementation phase. And the ongoing -- did you ask for the ongoing costs?

MR. ALAN EHRLICH (MVEIRB): Well, before we get to the ongoing costs, so nothing you got out of the freeze optimization study or any engineering to date has changed the costs since 2010, if I understand you correctly. Is that fair to say?

MS. JOANNA ANKERSMIT (AANDC): It's not fair to say. You have to be -- like I mentioned yesterday, we're -- we're very cautious with -- the numbers have to be -- they have to be reviewed. There's a process that they need to go through, and it's -- it's quite inappropriate to be giving numbers that -- that haven't gone through that rigorous process. So I'm not trying to not answer your question. These are the best available reviewed numbers that would -- that would meet that cost estimation requirement.

MR. ALAN EHRLICH (MVEIRB): Okay. Thank you. And "yes" or "no": Is it correct then that \$1.9 million per year is your ongoing maintenance and monitoring cost still?

MS. JOANNA ANKERSMIT (AANDC): Yes. Joanna Ankersmit.

Response to Access to Information Request (February 2013)

In response to an Access to Information Request, AANDC provided a number of documents in February 2013 to Alternatives North (see Attachment 2). One of these documents is titled "Giant Mine Remediation Project Progress Report #3 (2011-12)" dated September 1, 2012. This document was apparently sent to the federal Treasury Board pursuant to funding approvals. On pages 8-9 of this document there is a section with the heading "Total Project Costs and Liability Estimates" and a portion reads as follows:

As of 2011-2012, the total estimated indicative cost for the project was \$903,535,080 (This cost is indicative and is based on existing knowledge/projections. Future estimates will have a higher degree of certainty based on improved detail and knowledge.). This revised estimate was established as part of the development of the Site Stabilization Plan and the Amended Preliminary Project Approval that was approved in March 2012 [by the federal Treasury Board]. This is an increase from the previously reported total cost of \$682,916,000. Although the scope of the project has not changes, the increase in estimated costs occurred as a result of the normal

progression through the preliminary phases of a remediation project (i.e. increased site information and detail obtained over time), as well as a series of other factors including:

- 1) Inflation and escalation (e.g. labour rates, equipment costs);
- 2) The need to provide additional years of care and maintenance (~\$10M/year);
- 3) The need to address urgent and unforeseen risks (e.g. the Site Stabilization Plan); and
- 4) The expansion of the Freeze Optimization Study as part of Canada's Economic Action Plan (i.e. increase from \$3M to \$21M).

...

There is a potential for the total project cost estimates to increase over time. The increase in costs could occur due to the need to urgently address unanticipated risk events. Costs could also increase as a result of the completion of the engineering designs as these will provide significantly more detail for overall project planning.

The increase in the estimated total project costs has resulted in an associated increase in estimated environmental liability. As reported in the Federal Contaminated Sites Inventory, the estimated environmental liability associated with the site as at March 31, 2012 is \$707,839,072. This is an increase from the liability reported as at March 31, 2011 of \$617,927,824. The total project cost estimates includes the cost of all activities that are within the scope of the project (e.g. remediation, care and maintenance, regulatory approvals). The estimated liability excluded the costs that have already been incurred.

Conclusion

As a new cost of \$903.5 million was approved by Treasury Board in March 2012, it is not clear why there is a discrepancy with the information AANDC continued to provide to the Review Board as late as August and September 2012.

Even if the funds spent to September 2012 (\$160 million) are added in to \$449 million implementation, this total still falls far short of the Treasury Board approved cost estimate by almost \$300 million.

APPENDIX 2. DOCUMENT OBTAINED UNDER ACCESS TO INFORMATION

Sept. 1, 2012 Giant Mine Remediation Project Progress Report #3 (2011-12)

Submitted to Federal Treasury Board



Affaires autochtones et
Développement du Nord Canada

Aboriginal Affairs and
Northern Development Canada

*Access to Information and Privacy Directorate
Ottawa, Ontario
K1A 0H4*

Facsimile: (819) 953-5492

Your file Votre référence

Our file Notre référence

A-2012-01239 / CF

FEB 08 2013

Mr. Kevin O'Reilly
P.O. Box 444
Yellowknife, Northwest Territories X1A 2N3

Dear Mr. O'Reilly:

This is further to your request under the *Access to Information Act* for:

“” Briefing notes, e-mails, note book entries and documents related to any communications between the AANDC Minister's office and the AANDC Contaminated Sites Program on the Giant Mine from January 1, 2012 to present. Such records are likely to held in Gatineau at the Contaminated Sites Program office and the Minister's office.””

Enclosed you will find the Final package of records that respond to this request. You will note that some information has been withheld from disclosure pursuant to sections 18(b), 18(d), 21(1)(b), 21(1)(c) of the *Act*. A copy of these sections of the *Act* is enclosed for your information.

Please be advised that you are entitled to submit a complaint to the Information Commissioner for Canada concerning the processing of your request within 60 days of the receipt of this letter. In the event that you decide to avail yourself of this right, your notice of complaint should be addressed to: Place de Ville, Tower B, 112 Kent Street, 7th Floor, Ottawa, Ontario, K1A 1H3.

Canada

Do not hesitate to contact Cameron Fraser at 819-953-9357 who will be pleased to address any concerns or questions you may have regarding this matter.

Yours sincerely,

A handwritten signature in purple ink, appearing to read 'Kent Daniel Glowinski', with a large, sweeping flourish underneath.

Kent Daniel Glowinski
A/Director
Access to Information and Privacy Directorate

Encl.:

Giant Mine Remediation Project
Progress Report #3 (2011-2012)



September 1, 2012

Department of Indian Affairs and
Northern Development

GIANT MINE REMEDIATION PROJECT
PROGRESS REPORT #3 (2011-2012)

Executive Summary

The Government of Canada continues to effectively manage the significant risks associated with the Giant Mine site. Although changes to legislation prevent the circumstances similar to the Giant Mine contamination from happening again, the site is highly contaminated and will remain the responsibility of the Government of Canada. To address the significant site contamination, the Giant Mine Project Team continues to engage national and world-class experts to help develop the most effective and efficient remediation plans. Based on extensive analysis and third-party review, the remediation plan for the site relies on proven and reliable approaches that use known technology in a unique way.

In 2011-2012, significant progress was made on a number of fronts. The Project Team developed and began the implementation of a Site Stabilization Plan. This plan was developed to address the most urgent health, safety and environmental risks at the site. Some of the most immediate site risks have already been addressed (e.g. access prevention, improvements to Baker Creek). In addition, significant progress has been made on the Freeze Optimization Study. Preliminary findings have been positive and the study has already identified a number of efficiencies and cost-saving measures that are expected to be incorporated into the final design. In total, the project spent \$22,054,922 in 2011-2012.

The project continues to manage a series of risks and challenges including evolving on-site conditions, delays in the regulatory process, and securing long-term funding. In addition, the estimated total project cost has increased. Although the scope of the project has not changed, the increase in estimated costs has occurred as a result of the natural progression of costs over the phases of a remediation project as well as other factors including inflation and escalation (e.g. labour rates, equipment costs), the need to provide additional years of care and maintenance, the need to address urgent and unforeseen risks (e.g. the Site Stabilization Plan), and the expansion of the Freeze Optimization Study. To mitigate these potential risks and challenges, the Project Team continues to proactively work on a number of fronts. This involves the continual improvement of governance and management practices while working to adopt industry best practices in the management of major projects.

Introduction

Pursuant to the *Department of Indian Affairs and Northern Development Act*, the Department of Indian and Northern Affairs Development (DIAND) is responsible for the management of Crown lands in the North on behalf of the federal government. Historically, when mines in the North were abandoned and if the owner was insolvent, the responsibility for remediation rested with DIAND on behalf of the Government of Canada. This was the case for the Giant Mine. After the most recent owner, Royal Oak Mines, went into receivership in 1999, the Giant Mine was transferred to DIAND. It is important to note that a series of changes have been made to Resource Management Legislation and Policy across the North to ensure that circumstances similar to the Giant Mine will never happen again. As an example, DIAND established the Mine Site Reclamation Policy for the Northwest Territories. Under the authority of the *Territorial Lands Act* and the *Northwest Territories Waters Act*, the reclamation policy informs the mining industries of its responsibilities for mine closure, site reclamation, and post-closure monitoring that must be fulfilled prior to the site being returned to the Crown. Until then, the financial securities required by both the mine's water licences and surface lease are retained, in order to minimize and reduce the risk that the Crown would be left with unfunded liabilities.

The Giant Mine is one of the highest priorities in the Federal Contaminated Sites Inventory. The site is an abandoned gold mine located within the boundaries of the city of Yellowknife, Northwest Territories. The mine produced gold from 1948 until 1999, and ore for off-site processing from 2000 until 2004. The site operators used a high temperature roasting process to extract the gold that created arsenic trioxide dust as a bi-product. There are approximately 237,000 tonnes of this dust stored on site in 15 underground chambers. There is a significant risk for the mine to flood as a creek crosses directly through the mine site, overtop of the arsenic chambers and adjacent to mine openings. The site also has 16 million tonnes of arsenic-contaminated tailings stored in tailings ponds as well as underground mine water, industrial buildings and surface soil that are all contaminated with arsenic. In addition, the site has a number of health and safety risks related to the open pits, the declining state of the remaining buildings, as well as the remaining openings to the underground mine.

While working to address the significant risks at the mine site, the Giant Mine Remediation Project strives to meet the following four objectives:

- (1) minimize public and worker health and safety risks;
- (2) implement an approach that is cost-effective and robust over the long term;
- (3) minimize the release of contaminants from the site to the surrounding environment; and
- (4) remediate the site in a manner that instils public confidence.

Based on these objectives, the Project Team has worked to develop an effective remediation plan that will address the significant health, safety and environmental risks at the mine site. This involves continuous engagement with national and world class experts in a variety of specialized fields relevant to the project. To address the arsenic trioxide stored underground, Technical Advisors were engaged to assess 56 potential alternative approaches.¹ A more detailed examination was then conducted on 12 of the most viable approaches based on cost, risk of arsenic release over the short and long term as well as the risk to worker health and safety. The Frozen Block Method was determined to be the most suitable approach. The Frozen Block Method would involve leaving the arsenic underground and creating a frozen barrier around the chambers to prevent water from coming into contact with the arsenic trioxide dust. The suitability of the proposed approach was confirmed by an Independent Peer Review Panel. The panel consists of nine of the country's top engineers and scientists in key disciplines relevant to the project. To address the remaining site risks associated with the underground and the surface, the Technical Advisor developed a conceptual design. This work was then advanced to the preliminary design stage by a Specialized Design Team comprised of two global companies (AECOM and Golder Associates) that have extensive experience related to mining and remediation. These designs were then reviewed by Independent Technical Experts.² Overall, the final remediation plan relies on proven and reliable approaches while using known technology in a unique way (i.e. freezing the underground chambers).

The project first obtained a Preliminary Project Approval of \$35,122,000 in 2006. The approval was sought to maintain environmental, health and safety compliance at the site and establish a preliminary design for the remediation project in order to develop detailed cost estimates. Due to urgent on-site work and the unexpected requirement of a full environmental assessment process, an amendment was sought to the original Preliminary Project Approval. In May 2009 the project obtained a revised Preliminary Project Approval of \$105,027,000 to address these changing circumstances. This approval was intended to cover the period from 2009-2010 until 2013-2014.

Circumstances related to the project continued to change which altered the project timeline and the capacity to meet the objectives outlined in the revised Preliminary Project Approval. The change in the budget and timeline were caused by: (1) the increased complexity and extended timeline for the environmental assessment/regulatory process that resulted in additional costs for

¹ Based on an international competition, the Technical Advisors were established as a multidisciplinary team that was led by SRK Consulting Inc. and SENES Consulting Limited. Both are large companies with extensive experience in a wide range of fields relevant to the Giant Mine Remediation Project including mine waste geochemistry, mine reclamation, water treatment and risk assessment.

² Independent Technical Experts are consulting companies that have detailed expertise in key areas relevant to the project such as tailings, surface water and demolition. Examples of the companies acting as Independent Technical Experts include Stantec and Brodie Consulting Ltd.

annual care and maintenance; (2) the unexpected deterioration of site conditions that required urgent work to address high-risk elements through the Site Stabilization Plan; and (3) the expansion of the Freeze Optimization Study as a part of Canada's Economic Action Plan from \$3 to \$21 million. These factors resulted in the Project Team seeking and obtaining approval for an Amended Preliminary Project Approval of \$324,520,864 in March 2012. Annex 1 provides a list of the existing and projected dates associated with the project spending authorities.

Project Overview

The overall approach to the Giant Mine Remediation Project is divided into four major phases. The first phase was project assessment (i.e. initiation and identification). This phase began in 1999 when DIAND became involved with the site and lasted until 2006. During this time a series of activities were completed including the gathering of information to understand all of the risks and complexities of the site, the identification of the overall remediation approach and the provision of general care and maintenance.

The second and current phase is referred to as project definition. This phase is now projected to last from 2006 until 2017. It is during this phase that the detailed remediation plan is being developed and the environmental assessment is expected to be completed. The Freeze Optimization Study and the engineering designs are also expected to be completed. As a result of urgent and unforeseen risks, the Project Team recently developed a Site Stabilization Plan. This plan addresses urgent health and safety risks and includes addressing several remediation elements that were intended to be completed in the third phase of the project. This includes the collapse of the Mill Conveyor, the stabilization of the underground and the demolition of the Roaster Complex, as well as a series of other smaller immediate risk elements (e.g. A1 Pit Ditch Upgrade, B1 Pit Wall Stability, Mill Cladding and Access Prevention). The project time line has been revised to accommodate the implementation of the Site Stabilization Plan.

The third major phase is referred to as project implementation. This is the phase in which the remainder of the significant remediation work will be completed. This includes the freezing of the underground chambers, addressing remaining flood risks, remediating surface materials and infrastructure as well as securing pits and mine openings. This phase is now projected to take place between 2017 and 2025, and represents the majority of activity and expenditures associated with the project.

The final phase of the project is monitoring and maintenance. This is the longest phase of the project which is projected to begin in 2025 and to last in perpetuity. This phase has the lowest level of activity, but will include elements such as post-

remediation adaptation, water treatment, long-term monitoring and infrastructure renewal as required.

Annex 2 provides an overview of the project timeline.

Expenditures for 2011-2012

The Project Team tracks expenditures across seven categories of activities. These categories include: care and maintenance; regulatory approvals; site investigations and assessment; site remediation; community consultations; monitoring; and project management. The following provides a description of the progress and expenditures for 2011-2012. Annex 3 provides a summary of the expenditures in each category.

Care and Maintenance: Care and maintenance activities at Giant Mine are required in order to protect human health, public safety and the environment. Basic care and maintenance activities for 2011-2012 included: 24-hour site security, environmental compliance monitoring, water management (pumping and treatment), dust suppression from tailings areas, heating of buildings, mine ventilation, as well as the continual inspection of bulkheads and dams.

A number of measures were also taken to address some of the immediate risks on the site. This work was identified as urgent under the newly developed Site Stabilization Plan. The work completed in 2011-2012 included:

- A1 Pit Ditch Upgrade;
- Inadvertent Access Prevention;
- Final Lift on B2 Dam;
- Securing Cladding on Infrastructure;
- Securing of the C-Shaft;
- Improvement of B1 Pit Wall Stability; and
- Mandatory Improvements to Baker Creek.

For 2011-2012, the care and maintenance activities totalled \$10,522,717.

Care and maintenance activities have been ongoing since DIAND assumed site responsibility and will continue throughout the regulatory approvals process and will be phased out as implementation of the remediation plan progresses.

Regulatory Approvals: The primary activities in 2011-2012 related to regulatory approvals included completing several of the final steps of the environmental assessment. In June 2011, the responses were submitted for the first round of information requests. The Project Team responded to a total of 315 individual questions, with the majority focused on several highly technical elements of the

remediation plan. In October 2011, the Project Team participated in the Technical Sessions for the environmental assessment. Lastly, the Project Team submitted responses to the second round of information requests in February 2012. The second round included a total of 89 individual questions.

As a result of these activities, a total of \$2,390,286 was spent towards the Regulatory Approvals process in 2011-2012.

The Project Team is currently preparing for the Public Hearings that are scheduled for September 10 – 14, 2012. The hearings are one of the final steps of the environmental assessment that is currently projected to be completed in 2013 - 2014. Following its completion, the remediation plan (with required modifications based on the environmental assessment) will be resubmitted to the Mackenzie Valley Land and Water Board to obtain the required water licence. Approval of the water licence is expected between 2015 and 2017.

Site Investigations and Assessment: Based on the completion of the first phase of the project (i.e. site assessment), the majority of the site studies have already been conducted. Given that the current baseline environmental condition of the site is well understood, no money was spent on investigations in 2011-2012.

Going forward, there is the potential for future site investigations and assessments being required as part of the regulatory approvals process and/or for preliminary engineering or detailed designs for the remediation specifications.

Site Remediation: A series of activities were completed to support the remediation of the site including:

- Mitigation/Risk Response Report on Baker Creek;
- Investigations/Preparations in support of the forthcoming demolition of the Roaster Complex;
- Preparation of Preliminary Design Reports for several elements of the project;
- Independent Expert Review of Design Reports; and
- Progress on the Freeze Optimization Study.

The Freeze Optimization Study made progress in a number of areas, including the identification of preliminary efficiencies that are expected to be incorporated into the final design of the freezing approach. The freezing system for the test chamber that is currently being studied has been operational since early March 2011. Over the course of 2011-2012, testing was completed on the operation of the different installed freezing systems: fully active freezing; hybrid freezing in active mode; and hybrid freezing in passive mode (i.e. thermosyphons only). The findings to date have allowed for the development of 2-D and 3-D computer models that will be used to help optimize the design for the larger chambers with

more complex and irregular shapes. Tests were also conducted on the use of different freeze pipe diameters. This testing is critical as larger pipes are more expensive to drill. Preliminary findings were encouraging as they showed that there was not any difference between the operations of the larger or smaller diameter freeze pipes. Lastly, the ground around the freeze pipes was found to cool more rapidly than previously expected, due primarily to the thermal properties of the rock being better than anticipated. The preliminary findings from the study have been positive and are expected to allow the team to design and implement a more efficient and cost-effective freezing system. Work on the Freeze Optimization Study will continue and a report on the design guidelines is expected in 2012-2013.

As a result of the above listed activities, a total of \$4,095,614 was spent on site remediation in 2011-2012.

Community Consultations: Due to the size, scope and profile of the project, ongoing consultations and information sharing with stakeholders are critical components of the remediation effort. In 2011-2012, a wide range of activities were completed, including:

- Monthly meetings of the Giant Mine Community Alliance;
- Monthly meetings with the staff of the City of Yellowknife;
- Meetings of the Yellowknives Dene First Nation Giant Mine Advisory Committee;
- Environmental Management System Working Group meetings;
- Workshops on long-term care and independent oversight that allowed for further engagement;
- Community meetings (Dettah, Yellowknives Dene First Nation, Ndilo, Back Bay Community Association);
- Site tours; and
- General public information (e.g. newspaper column, newsletters, fact sheets, website updates).

In total, the project spent \$197,649 on consultations in 2011-2012. It is expected that community consultations will be an important and increasing component of the project going forward.

Monitoring: There are a variety of ongoing monitoring programs used to establish the baseline conditions of the site. These include water sampling (including groundwater), air quality monitoring, ground temperature monitoring related to the Freeze Optimization Study as well as all other monitoring requirements outlined in the *Fisheries Act*, Metal Mining Effluent Regulations and Environmental Effects Monitoring as well as the *NWT Mine Health and Safety Act* and Regulations.

As the majority of the basic monitoring activities are accounted for under care and maintenance, only \$82,401 was reported under the monitoring category for 2011-2012.

Project Management: Project Management includes the general administration and salary costs of the Giant Mine Remediation Project Team as well as Public Works and Government Services Canada (PWGSC) personnel assigned to the project. Project management includes the management of a variety of issues related to the current operation and the future remediation of the site. This includes ongoing communication with the site operator and numerous contractors that complete work on the site for the Department. Annex 4 provides an overview of the Giant Mine Governance Framework.

As a part of Project Management, the Project Team continued to implement measures to further improve the governance and management of the Giant Mine as a "Major Project". This included implementing an integrated approach to risk and contingency management to plan for, and control uncertainty. This also involved the implementation of a "Stage Gate Approach". This is an industry best practice that assigns fixed deliverables to each of the major phases of the project. The Project Team is committed to the continual improvement of the management and governance practices for the project.

A total of \$4,766,256 was spent on Project Management activities in 2011-2012.

Total Project Costs and Liability Estimates

As noted, the Giant Mine is one of the highest priorities in the Federal Contaminated Sites Inventory. Funding for the remediation of the site is provided by the Federal Contaminated Sites Action Plan (FCSAP). As of 2011-2012, the total estimated indicative cost for the project was \$903,535,080.³ This revised estimate was established as a part of the development of the Site Stabilization Plan and the Amended Preliminary Project Approval that was approved in March 2012. This is an increase from the previously reported total estimated cost of \$682,916,000. Although the scope of the project has not changed, the increase in estimated costs occurred as a result of the normal progression through the preliminary phases of a remediation project (i.e. increased site information and detail obtained over time), as well as a series of other factors including: (1) inflation and escalation (e.g. labour rates, equipment costs); (2) the need to provide additional years of care and maintenance (~\$10M/year); (3) the need to address urgent and unforeseen risks (e.g. the Site Stabilization Plan); and (4) the expansion of the Freeze Optimization Study as a part of Canada's Economic Action Plan (i.e. increase from \$3M to \$21M).

³ This cost estimate is indicative and is based on existing knowledge/projections. Future estimates will have a higher degree of certainty based on improved detail and knowledge.

The current total project cost estimate is an indicative cost estimate based on existing knowledge and projections of costs. Future cost estimates, such as those that will be included in the Effective Project Approval submission that is projected to be sought in 2017, will have a higher degree of certainty based on the improved level of detail that occurs as a result of progress on the project (i.e. improved planning and project definition).

There is a potential for the total project cost estimates to increase over time. The increase in costs could occur due to the need to urgently address unanticipated risk events. Costs could also increase as a result of the completion of the engineering designs as these will provide significantly more detail for overall project planning.

The increase in the estimated total project costs has resulted in an associated increase in estimated environmental liability. As reported in the Federal Contaminated Sites Inventory, the estimated environmental liability associated with the site as at March 31, 2012 is \$702,839,072. This is an increase from the liability reported as at March 31, 2011 of \$617,927,824. The total project cost estimates includes the cost of all activities that are within the scope of the project (e.g. remediation, care and maintenance, regulatory approvals). The estimated liability excludes the costs that have already been incurred.⁴

Annex 5 provides an overview of the total expenditures for 2011-2012 as well as the projected expenditures until the end of the Amended Preliminary Project Approval in 2016-2017. Annex 6 outlines the contracts awarded for the definition phase of the project, organized by category.

Project Risks / Challenges

Due to the complexity of the site, there are a number of challenges and risks associated with the Giant Mine Remediation Project. The following section describes the risks associated with the site that were identified during 2011-2012 as well as the approach that the Project Team is taking in order to mitigate and manage these challenges.

Evolving On-Site Conditions: The constantly evolving and deteriorating site conditions remain a risk to the project costs and timeline. Since taking responsibility for the site, the Project Team has experienced a number of unanticipated events (e.g., Baker Creek, B1 Pit Depression). The Project Team is now working to address the highest risk elements on the site through the

⁴ For further information on remediation liabilities please refer to the Treasury Board of Canada Secretariat document entitled "Remediation Liabilities Related to Contaminated Sites: A Supplement to the Financial Information Strategy (FIS) Manual". <http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=20888§ion=text>

implementation of the Site Stabilization Plan. This includes addressing immediate risks (e.g., access prevention, B1 Pit Wall Stability) as well as the advanced remediation of larger scale risks (e.g., Mill Conveyor Demolition, Underground Stabilization and Roaster Complex Demolition). The site operators also continue to conduct routine inspections on a wide-range of site elements to detect and manage potential risks. DIAND and PWGSC continue to re-evaluate and manage site issues through ongoing risk management practices.

Delays in the Regulatory Process: The Project Team continues to work through the final stages of the regulatory process. Public Hearings are scheduled for September 10 – 14, 2012 and the environmental assessment is currently projected to be completed in 2013-2014. The approval of the water licence is projected to be completed between 2015 and 2017. The Project Team is currently working towards meeting these time lines. Given the complexity and the high level of interest in the project, there is the potential for stakeholders participating in the environmental assessment to delay the regulatory process. This was demonstrated by the requirement for the Project Team to respond directly to more than 400 individual information requests. To address these risks, the Project Team has invested significant time and effort working with stakeholders on outstanding issues. The Project Team also continues to work in an open and transparent manner in order to reduce the risk of any potential regulatory delays.

Following its completion, the remediation plan (with required modifications based on the environmental assessment) will be resubmitted to the Mackenzie Valley Land and Water Board to obtain the required water licence. Approval of the water licence is expected between 2015 and 2017.

Securing Long-Term Funding: Due to the long-term nature of the Giant Mine remediation project, stakeholders continue to publicly demand the confirmation of long-term stable funding for the project. In particular, concerns are being raised regarding the final and longest phase of the project – monitoring and maintenance. As noted, this is the longest phase of the project and includes critical elements such as water treatment, long-term monitoring and infrastructure renewal as required. To address this issue, the Project Team continues to work with stakeholders on critical issues related to this issue, including the long-term care of the site. The Project Team continues to highlight the strong track record of the government on the management of the site, and the significant investments that have already been made. Going forward, the Project Team will work to support the development and approval of the third phase of the Federal Contaminated Sites Action Plan for 2014-2015 that would secure funding until 2019-2020. In addition, the Project Team will begin the preliminary steps of working to secure a source of funds for beyond 2019-2020.

Project Costs and Expenditures: As a result of the normal progression through the early phases of a remediation project, as well as a series of unanticipated

events, the expenditures and costs associated with the project have increased over time. These increases in costs have occurred despite the fact that the scope of the project has remained unchanged. Going forward, there is the potential for the total project cost estimates to increase. This could occur as a result of additional unanticipated events at the site as well as the completion of the engineering designs as a part of the Project Definition phase. Detailed costs will be developed based on the completed engineering designs and included when the Project Team seeks Effective Project Approval. In addition, the operational requirements of the project (e.g. procurement) may require the re-profiling of the funds outlined under the Amended Preliminary Project Approval from one year to the next. The project is working to address the overall management of costs in two primary ways. First, the Project Team continues to work with world class experts and consulting companies to verify an effective and efficient remediation approach. This includes working to identify ways of optimizing processes and reducing costs (e.g. the Freeze Optimization Study). Second, the Project Team continues to implement a series of Major Project best practices in project management and governance. Part of this effort includes ensuring a rigorous control system responsible for managing the scope, schedule and budget.

Looking Ahead

For 2012-2013, the Project Team is expected to focus on completing the final phases of the environmental assessment. This includes the Public Hearings that are scheduled for the fall of 2012. The Project Team will also continue to implement the Site Stabilization Plan. This is expected to include some advance remediation work such as the demolition of the Mill Conveyor, as well as some initial preparatory work to begin the demolition of the Roaster Complex.

To increase awareness and understanding of the complexities of the site, the Project Team will also continue to provide site tours to Ministers, senior officials and others (e.g. Aboriginal and Community Leaders, local media). For example, the Commissioner of the Environment and Sustainable Development of Canada toured the mine site on April 11-12, 2012. See Annex 7 for a copy of the letter that was sent to DIAND following the tour. The letter notes that the remediation plan is guided by "technical rigour" and that there is a demonstrated commitment to the continuous improvement of management practices.

Conclusion

In 2011-2012, significant progress has been made on the Giant Mine Remediation Project in a number of areas. The Project Team developed and began the implementation of the Site Stabilization Plan that was designed to address the urgent health, safety and environmental risks at the site. Recent efforts included mitigating several of the most urgent site risks and making

significant and positive progress on the Freeze Optimization Study. The Project Team also continues to work through the final stages of the environmental assessment process. While the project does face a series of challenges and potential risks, the Project Team continues to take all measures necessary to proactively manage and mitigate these issues.

ANNEX 1 – GIANT MINE REMEDIATION PROJECT SPENDING AUTHORITY DATES

Spending Authority	Date	Expenditure Authority	Estimated Total Project Costs
Original Preliminary Project Approval	June 2006	\$35,122,000	\$348,000,000
Revised Preliminary Project Approval	May 2009	\$105,027,00	\$682,916,00
Amended Preliminary Project Approval	March 2012		

s.18(b)

s.18(d)

ANNEX 2 – GIANT MINE REMEDIATION PROJECT TIMELINE*

Phase 1 Project Assessment	Phase 2 Project Definition	Phase 3 Project Implementation	Phase 4 Monitoring and Maintenance
1999 – 2006	2006 – 2017	2017 – 2025	2025 & Beyond**
<ul style="list-style-type: none"> • Site Assessment • Care and Maintenance • Identify Remediation Approach 	<ul style="list-style-type: none"> • Remediation Plan • Developers Assessment Report • Environmental Assessment (2007 - 2013) • Site Stabilization Plan*** (2011 – 2016) • Freeze Optimization Study • Complete Engineering Designs and Regulatory Process (2015 – 2017) • Care and Maintenance 	<ul style="list-style-type: none"> • Full Site Remediation and Close-Out • Freeze Underground Chambers • Address Flood Risk from Baker Creek • Remediate Infrastructure and Surface Materials • Secure Pits and Mine Openings 	<ul style="list-style-type: none"> • Post-Remediation Adaptation • Water Treatment • Long-Term Monitoring • Infrastructure Renewal as Needed

* The overall timeline has been revised to reflect recent changes to the project including the development of the Site Stabilization Plan and the extension of the regulatory process.

** This phase is expected to last in perpetuity.

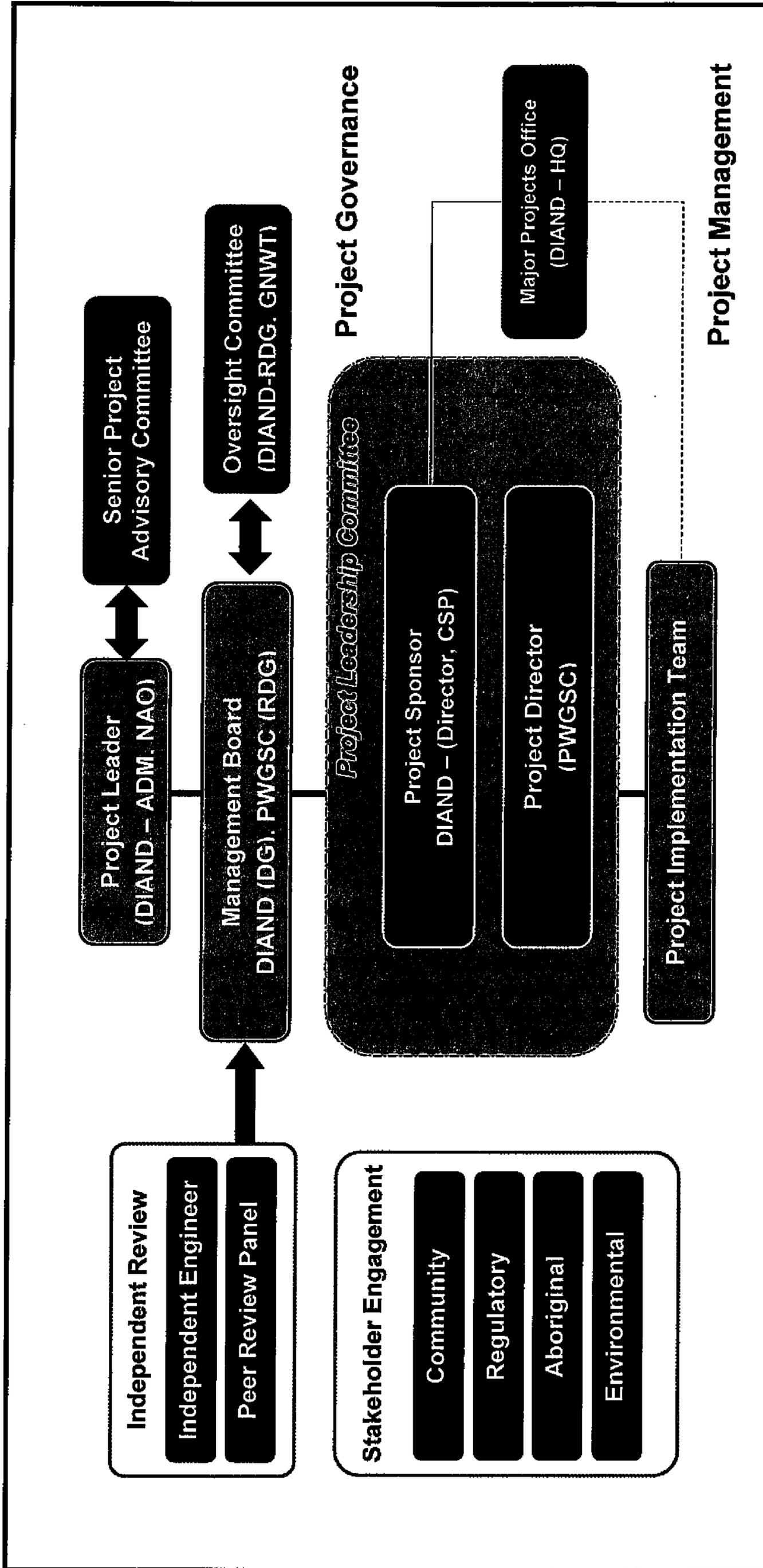
*** As described in the report, the Site Stabilization Plan was developed in order to address urgent health and safety as well as environmental risks at the site and brings forward several key activities that would have previously been implemented in Phase 3.

ANNEX 3 – 2011-2012 EXPENDITURES BY CATEGORY

Category	Actual Expenditure*
Care and Maintenance	\$10,522,717
Regulatory Approvals	\$2,390,286
Site Investigations and Assessments	\$0
Site Remediation	\$4,095,614
Community Consultations	\$197,649
Monitoring	\$82,401
Project Management	\$4,766,256
Total	\$22,054,922

* Figures may not add to total due to rounding.

ANNEX 4 – Giant Mine Governance Framework



**ANNEX 5 – ACTUAL AND PROJECTED EXPENDITURES FOR THE GIANT MINE
REMEDICATION PROJECT 2008 – 2013***

Fiscal Year	Actual Expenditure	Projected Expenditures[‡]
2006-2007	\$14,385,447	
2007-2008	\$10,752,398	
2008-2009	\$11,699,608*	
2009-2010	\$31,113,287**	
2010-2011	\$24,582,427***	
2011-2012	\$22,054,922****	
2012-2013		
2013-2014		
2014-2015		
2015-2016		
2016-2017		

s.18(b)

s.18(d)

* The expenditures reported for 2008-2009 have been revised downward from the previously reported total of \$11,726,343. This change was made as a result of an improvement in financial reporting practices within the Project Team and the number is consistent with those provided in the 2012 Amended Preliminary Project Approval.

** This includes \$10,500,000 in funding that was received as a part of Canada's Economic Action Plan.

*** This includes \$10,500,000 in funding that was received as a part of Canada's Economic Action Plan.

**** The actual expenditures for 2011-2012 are higher than the previously projected amount of \$18,958,539. The increase in expenditures occurred as a result of unanticipated immediate risk mitigation work as a part of the Site Stabilization Plan (~\$1M), the additional technical support engaged to develop the Site Stabilization Plan (~\$700k), and the higher than expected level of effort required for the environmental assessment information requests and technical hearings (~\$1.6M).

‡ The projected expenditures for the remaining years of the project definition phase have increased significantly over previous forecasts. The primary reason for this increase is related to the need to address urgent health and safety risks through the Site Stabilization Plan. This plan brought forward the advanced remediation work originally scheduled for the implementation phase of the project (e.g., Roaster Complex Demolition, Underground Stabilization, and Mill Conveyor Demolition). As required, the Project Team may need to re-profile the funds for future years depending on the capacity to implement the project as planned. Factors such as procurement or the short summer construction season can alter the timing of activities and shift work from one year to the next. The projected expenditures shown do not include the Goods and Services Tax, Accommodation or the Employee Benefit Plan. These project expenditures align with the "Operating & Maintenance" line from the Project Cost Breakdown table in Appendix A (p.56) of the 2012 Amended Preliminary Project Approval Treasury Board Submission.

ANNEX 6 – CONTRACTS ALLOCATED TO THE GIANT MINE REMEDIATION PROJECT

Contractor	Date Awarded	Expiry Date	Contract Value	Amount spent in 2011-2012
Care and Maintenance				
Deton'Cho Nuna Care & Maintenance EW702-110050	July 1, 2011	March-2013	\$15,137,803	\$5,128,521
Deton'Cho Nuna Interim Care & Maintenance EW702-113650	April 1, 2011	June 30, 2011	\$2,483,054	\$1,714,573
Tlicho Land Transport Ltd. Civil Work EW702-121008	March – 2011	December - 2014	\$1,562,671	\$894,965
Regulatory Approvals				
SENES Environmental Assessment and Information Request Support EW699-122375	January – 2011	March – 2013	\$751,539	\$146,986
Site Remediation				
SENES (Call-up) Construction Management Advisory EW699-103691	March - 2010	September - 2013	\$968,583	\$174,952
AECOM (As and When) Mining Engineering EW699-070200	July - 2009	March – 2013	\$10,675,000	\$4,551,936
SENES (Call-up) Tech. Design Support EW702-104265	March - 2010	September - 2013	\$361,563	\$1,885
Project Management				
DXB Project Management EW702-111905	December - 2009	March - 2014	\$1,388,230	\$403,465
Total			\$33,328,443	\$13,071,283*

* This number does not equate to the total expenditures for 2011-2012 as shown in Annex 3 & 4 as it represents only contract expenditures and excludes all other costs (e.g. salaries, etc.).

**ANNEX 7 – LETTER TO DIAND FROM THE COMMISSIONER OF THE ENVIRONMENT AND
SUSTAINABLE DEVELOPMENT CANADA**



Commissioner of the Environment and Sustainable Development of Canada
Commissaire à l'environnement et au développement durable du Canada
Office of the Auditor General of Canada - Bureau du vérificateur général du Canada

24 April 2012

Ms. Janet King
Assistant Deputy Minister
Aboriginal Affairs and Northern Development Canada
Northern Affairs
10 Wellington Street
Gatineau, Quebec K1A 0H4

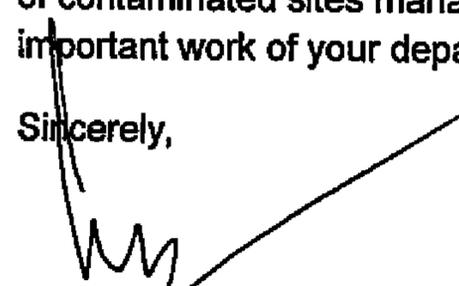
Dear Ms. King,

The reason for this letter is to convey my sincere thanks for the support your colleagues at AANDC extended to me during a recent visit to Giant Mine in Yellowknife, April 11-12, 2012. I also wanted to acknowledge the professionalism, commitment and depth of knowledge of the AANDAC officials with whom I met over two days, notably Michel Nahir and Joanna Ankersmit.

Given the complex and changing challenges which this site poses over the long-term, I was impressed both by the technical rigour that has guided the current plan, as well as the ongoing commitment of your department to public engagement and transparency, continuous management improvements, as well as the strong collaboration that exists between AANDC and Public Works officials in support of this site's management.

I will be presenting a report to Parliament on May 8th, 2012 that will examine the broader issue of contaminated sites management, and I hope to have the chance to convey to Parliament the important work of your department and its dedicated officials.

Sincerely,



Scott Vaughan
Commissioner of the Environment and Sustainable Development

cc: Michel Nahir
Joanna Ankersmit