



Giant Mine Environmental Assessment

IR Response

Round One: Information Request - Alternatives North #12

June 17, 2011

INFORMATION REQUEST RESPONSE

EA No: 0809-001

Information Request No: Alternatives North #12

Date Received

February 28, 2011

Linkage to Other IRs

Review Board IR #10

Date of this Response

June 17, 2011

Request

Preamble:

The DAR discusses placing a cover on the various tailings ponds on site, construction of gullies and drainage channels through the tailings, and some cut and fill work on the Northwest Pond. The DAR also states on page 6-57:

“Many areas that produce dusting problems cannot be reached due to the wet and soft nature of the tailings.”

This raises issues of trafficability on the tailings, or the ability to use equipment without the risk of it sinking. The highly erodible and toxic tailings also raise issues around how to design and maintain physical works to control drainage during the tailings cover placement and afterwards in perpetuity.

Question:

1. Please provide information on the trafficability of the various tailings ponds where cover placement and drainage works are to be constructed.
2. What if anything has been learned from the test plots on the Northwest Pond in relation to trafficability and cover design?
3. What special design and construction techniques will be adopted to avoid erosion and ice build up in or on any of the tailings remedial works?
4. Please describe the perpetual care requirements and costs for the covers, drainage channels, dams or other features that will form the remedial work on tailings.





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Reference to DAR (relevant DAR Sections)

DAR, s. 6.6 Tailings and Sludge

Reference to the EA Terms of Reference

ToR s.3.2.4 (8) Development Description

Response 1 Summary

Portions of the ponds are currently trafficable to light construction equipment. Primarily, the central portion of the North Tailings Pond and Northwest Tailings Pond are currently too soft for construction equipment. Dewatering the ponded water on the ponds should improve trafficability. Re-grading of the surface of the ponds will also help to improve the trafficability by pushing drier and coarser grained material to the soft areas. If the softer areas of the ponds still remain too soft for cover construction, a combination of construction in the winter and more aggressive drainage measures will be taken to allow the construction of the cover to be completed.

Response 1

Significant portions of the tailings pond areas are currently trafficable for light construction equipment meaning construction of a cover over these areas would be possible at this time. This includes most of the South and Central Tailings Ponds and large portions of the North and Northwest Tailings Pond areas (areas away from the permanently ponded water). Areas adjacent to and beneath ponded water are too soft for any construction equipment at present.

Once the surface water ponds in the North Tailings and the Northwest Tailings pond areas are drained as part of the remediation plans for the site, trafficability in all areas of the ponds would improve. A larger portion of the ponds will then be trafficable year round, which would include most or all of the South, Central and North Tailings Ponds. After the ponds are drained, all areas of the former ponds would be trafficable in the winter.

It is anticipated that the central areas of the Northwest Tailings Pond and North Tailings Pond (current water storage areas) will remain too soft for construction activities for several years, without extra efforts to drain and dewater the tailings and increase the trafficability of the surface of these areas. Re-grading is required for several reasons, including to achieve a more uniform surface slope on the ponds, to minimize erosion and infiltration, to prevent water ponding on the surface and to direct surface water flow to closure spillways to be developed at both sites.

The more trafficable areas will be the starting point for re-grading efforts on the ponds, as these areas will typically need to be excavated to a lower elevation to enable drainage in closure. Re-grading of the pond surfaces will help to increase trafficability by pushing drier and coarser material to the center of





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the ponds. Once re-grading is complete, the cover will be constructed on the more trafficable areas of the ponds, to help minimize dusting from these drier areas.

Based on information from investigation programs on the tailings containment areas, there are standard construction techniques that will be used that will allow re-grading efforts and construction of the tailings cover to be completed. These measures may result in the construction activities being carried out over several seasons in a staged construction approach.

Response 2 Summary

The three seasons of monitoring completed has yielded consolidation settlement data as well as ground temperature and moisture content data.

Response 2

The scope of the cover trials is to monitor the performance of the proposed cover configurations and the amount of consolidation settlement to be expected, which will allow for the optimization of the final cover design. The tailings cover test plots study was not intended to provide information about trafficability. The test plots were constructed in areas of the pond where trafficability was understood. Trafficability was investigated during field studies for preliminary design undertaken in March 2011 geotechnical investigations. The investigation report will be available prior to the technical sessions.

The first three seasons of monitoring (2008, 2009, and 2010) yielded consolidation settlement data as well as ground temperature and moisture content data. Estimates of tailings consolidation have not yet been generated. As described in Review Board Information Request #10 response investigations to advance the design are ongoing.

Response 3 Summary

Design and construction techniques that will be used to minimize erosion and build-up of ice include grading the tailings surface, channels and spillways to angles that minimize erosion while promoting water flow and preventing ponding of water. Vegetation in key areas will be promoted on the tailings cover to help reduce erosion. Channels and spillways will be constructed to a larger capacity than required for the discharges predicted from limited catchment area of the ponds to minimize the potential for water to spill over the sides of the spillway as a result of ice build up.

Monitoring of the performance of the cover will be included in the long term maintenance plans for the site, including monitoring for erosion damage to the cover and the condition of vegetation growing on the cover. Some repair of erosion and planting of vegetation is planned for in the long term maintenance plans.





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Response 3

The amount of water flowing over the tailings cover and through the drainage channels is predicted to be relatively small, as the catchment area is limited to the area of the ponds. The amount of ice build-up within channels is also expected to be relatively small, as water flow will decrease significantly under freezing conditions (there is no upstream source of water) and the spillways will be constructed with sufficient slope gradients to minimize build up of ice.

The pond surface and drainage channels will be graded to a range of slope gradients designed to minimize ponding of water in the channels and spillways. The channels would be developed to manage the flow of water at rates that would minimize erosion. Spillways and channels will be constructed larger than required for the predicted water flow to be able to accommodate ice build up without water spilling over the sides of the channels. The use of wide channels or step benches will reduce the risk of concerns with ice build up. Drainage outlets will have velocity controls, in the form of instream structures, installed to keep flow velocities low and minimize erosion in the outlet channels.

Vegetation growing on the tailings cover, in key areas, will be a significant component in limiting erosion. Other erosion protection measures, such as placement of coarse rock, will be constructed at key low points or at the proposed locations for drainage channels.

The cover and channels will be monitored for signs of erosion as part of the regular maintenance of the site. It is anticipated that some erosion of the cover will occur in the initial years after closure construction is completed but maintenance will be required to repair these areas. Maintenance will also be required to maintain the vegetation growing on the cover, especially in the first few years after construction. This maintenance is to be included in the maintenance plans and costs for the project.

If significant damage to the cover or vegetation on the cover as a result of motorised vehicles is noted, access for these vehicles may have to be restricted.

Response 4 Summary

The tailings facilities will be monitored and inspected on an ongoing basis. These monitoring and inspection programs will provide the information required to determine any repair activities that are required. The program will be initially defined for a set number of years, with the requirement that the monitoring and inspection program for the next period be determined prior to the end of the current period. It is anticipated that there will be a moderate amount of repair required in the first few years after construction, with declining requirements after this. It is also anticipated and in the budget for periodic, larger scale repairs or reconstruction.

Response 4

Perpetual care requirements for the tailings containment areas will consist of two main components, monitoring / inspection and as well as maintenance / repair. The monitoring and inspection program





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will be clearly defined for the first five years after construction and the requirements for further monitoring and inspection will be determined based on the results of those annual inspections. Monitoring will be done regularly, while an annual inspection will be carried out by a qualified geotechnical engineer. It is anticipated that the requirements for both monitoring and inspection will decline with time. Maintenance and repair activities will be mostly determined from the results of the monitoring and inspection program.

The monitoring program will include monitoring and potential replacement of instrumentation installed in the facilities (such as piezometers, monitoring wells, and similar instrumentation) and may include sampling and testing of water flowing from the tailings containment areas. The sampling and testing of water flowing from the tailings containment areas will include both seepage downstream of the dams, and water flowing through / over the facility spillways. The seepage will be pumped back into the ponds if unsuitable for direct discharge. It is expected that seepage volume will decline with time and improve in quality with time. The water flowing through the spillways will initially be discharged into the underground storage system until it is deemed suitable for direct discharge off site.

Inspection activities will include inspection of dams (while these inspections are deemed necessary), inspection of the tailings cover, vegetation on the cover, drainage channels and related spillways. These inspections will include visual observations and physical investigations where required. Physical investigation, if needed, would typically involve shallow test pits to monitor the performance of the cover, but may include deep investigations as required. Deep investigations would typically only be required if there is evidence of instability of one of the dams. Long term instability of the dams is less of a concern as the stability of the dams will increase with time as the ground water level within the tailings in the facilities decreases to a lower level as a result of draining the ponds.

It is anticipated that repair of the tailings cover and channels to be most intense in the first few years after construction. The expected areas that will need repair include filling in of settled areas, excavation and repair of areas where tailings may have migrated through the cover, repair of the cover due to erosion, reseeded or planting of vegetation, in key areas, including application of organics or fertilizer if required. Minor re-grading of channels may be required, or clearing of minor debris from within the channels.

Repair of the cover material and replacement of vegetation, in key areas, may be required in areas damaged by motorized vehicles, if access can't be restricted.

It is also anticipated that periodic larger scale repair or reconstruction may be required early in the post closure period and this is included in the average annual perpetual care cost noted below. It is anticipated that in time the risk of this being required decreases.

Costs for perpetual care, covers, drainage channels, dams and other associated works are currently being evaluated in preliminary design.

