

Underground Stabilization - Waste Management Plan

Preparation Date: October 22, 2012

Effective Date of Plan: Date of licence issuance

1.0 Introduction

1.1 Project Proponents and Summary

Aboriginal Affairs and Northern Development Canada (AANDC) is applying for a Type B water licence to undertake underground stabilization work on behalf of the Giant Mine Team consisting of AANDC and the Government of the Northwest Territories (GNWT), supported by the federal department of Public Works and Government Services Canada (PWGSC). While AANDC will ultimately be responsible for compliance with any water licence issued, the proposed deconstruction work will be conducted by private sector contractors procured through PWGSC.

The proposed underground stabilization work will mitigate the potential for failure of the underground stopes and chambers and migration of arsenic trioxide stored underground through the following actions:

- Repairing and reinforcing bulkheads;
- Increasing the support under arsenic trioxide chamber crown pillars by backfilling voids with lightly cemented tailings paste or cementitious foam; and
- Stabilizing non-arsenic trioxide filled chambers by backfilling with waste rock, surface sourced materials such as quarried rock, lightly cemented tailings paste, or cementitious foam.

1.2 Project Location and Site Description

The Giant Mine Site (the Site) is located approximately five kilometres (km) north of Yellowknife along Highway 4 (Ingraham Trail) as depicted in Figure 1. The Site is considered to include everything within the boundaries of the former lease (Figure 2) that was in place during the operational period of the mine (i.e. Lease L-3668T, now designated as Reserve R662T). Two impacted areas immediately outside the lease area are also considered to be part of the site. They are the Giant Mine “Townsite”, which was removed from the surface lease in 1999, and an area of historic tailings deposition along the shore of North Yellowknife Bay.

The Giant Mine is an abandoned mine that produced gold from 1948 until 2004, although from 1999 to 2004, gold ore was shipped off site for processing. The on-site processing of ore that occurred until 1999 created 237,000 tonnes of arsenic trioxide dust as a by-product. The arsenic trioxide dust, which is soluble in water, is stored underground in fifteen purpose-built chambers and mined out stopes. In addition to these features, other typical mining infrastructure exists on site including four tailings storage areas, eight open pits, 35 openings to the underground, and over 100 buildings. Project infrastructure is shown on Figure 3. Baker Creek flows through the length of the lease area and into Great Slave Lake.

The Site is currently under care and maintenance as the Giant Mine Remediation Project (GMRP) undergoes environmental assessment (EA0809-001). Care and maintenance activities adhere to the conditions set out in former Water Licence N1L2-0043 as much as possible.

Figure 1 – Location of Giant Mine and Surrounding Features

Figure 2 – Giant Mine Lease Boundary

Figure 3 – Project Infrastructure

1.3 Environmental Policy and Legislative Framework

All work carried out at the Giant Mine is being implemented within a framework of federal and territorial policies and guidelines. The most pertinent of these are as follows:

Federal Legislation, Policies and Guidelines

- Contaminated Sites Environment, Health and Safety Policy prepared by Aboriginal Affairs and Northern Development Canada (April 13, 2006)¹
- A Federal Approach to Contaminated Sites prepared by the Contaminated Sites Management Working Group (November 1999)²
- Northern Affairs Program Contaminated Sites Management Policy prepared by Aboriginal Affairs and Northern Development Canada (August 20, 2002)³
- Transportation of Dangerous Goods Act and Regulations;
- Canadian Environmental Protection Act:
 - Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulation
 - Interprovincial Movement of Hazardous Waste
 - Controlled Products Regulations
 - PCB Regulations
 - Ozone Depleting Substances Regulations
- Health Canada/Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS)
- Canada Labour Code Part II - Occupational Health and Safety

Territorial Legislation, Policies and Guidelines

- Government of the Northwest Territories Policy 53.01, Environment and Natural Resources Establishment Policy (March 29, 2005)⁴

¹ Referenced Policy can be found using the following link: <http://www.aadnc-aandc.gc.ca/eng/1100100035307>

² Referenced document can be found using the following link:
<http://publications.gc.ca/collections/Collection/EN40-611-2000E.pdf>

³ Referenced policy can be found using the following link: <http://www.aadnc-aandc.gc.ca/eng/1100100034643>

⁴ Referenced policy can be found using the following link:
http://www.enr.gov.nt.ca/_live/documents/content/53_01_Establishment_Policy.pdf

- Government of the Northwest Territories Guideline for the General Management of Hazardous Waste in the NWT (February 1998)⁵
- Government of the Northwest Territories Guideline for Contaminated Site Remediation (November 2003)⁵
- Environmental Protection Act:
 - o Spill Contingency Planning and Reporting Regulations
 - o Guideline for Ambient Air Quality
 - o Guideline for the General Management of Hazardous Waste
 - o Used Oil and Waste Fuel Management Regulations
 - o Guideline for the Management of Waste Solvents
- Northwest Territories Mine Health and Safety Act

Taking into consideration the policies and documents noted above, the guiding principles applied to the Giant Mine Remediation Project are as follows:

- Within the Northern Contaminated Sites Program the health and safety of employees and protection of the environment are an overriding priority. Management is committed to doing everything possible to prevent injuries and to maintain a healthy environment;
- Meeting the overall AANDC objective to contribute to a safer, healthier, sustainable environment for Aboriginal peoples and northern residents by striving to preserve and enhance the ecological integrity of the environment;
- Meeting federal and AANDC policy requirements and legal obligations regarding the management of contaminated sites; and
- Providing a scientifically valid, risk management based framework for setting priorities, planning, implementing and reporting on the management of contaminated sites.

In addition to the general principles described above, the federal government has developed a comprehensive framework to guide the management of federal contaminated sites. Beginning in 1995, the federal government recognized the need for an efficient and consistent approach to dealing with contaminated sites. As a result, the Contaminated Sites Management Working Group (CSMWG) was established to promote common approaches to management and remediation of contaminated sites. This working group now operates under the Federal Contaminated Sites Action Plan (FCSAP) which serves as the framework under which all activities at the Giant Mine are implemented.

FCSAP is a cost-shared program that helps federal custodians to address contaminated sites for which they are responsible. The primary objective of this program is to address the risks that federal contaminated sites pose to human health and the environment and to reduce the associated financial liability. The program has the complementary objectives of supporting other socioeconomic outcomes, such as training and employment of Canadians and promotion of innovative technologies. Under FCSAP,

⁵ Referenced guidelines can be found using the following link:
http://www.enr.gov.nt.ca/_live/pages/wpPages/Waste_Management_Program_publications.aspx

each contaminated site progresses through a systematic procedure that leads from assessment through to remediation planning, remediation and, eventually, long term monitoring.

1.4 Purpose, Scope and Objectives of the Waste Management Plan

Appropriate waste management is key to minimizing impacts of a development on the environment and human health and safety, which is AANDC's overriding policy for work undertaken at the Giant Mine site. This waste management plan, which will become effective upon issuance of the water licence, details the guiding principles and procedures for waste management that will be adhered to during the proposed underground stabilization work.

The proposed waste management procedures align with the procedures currently utilized in the care and maintenance (C&M) program for the Site. The C&M program was founded on AANDC's commitment to adhere to the conditions set out in former Water Licence N1L2-0043 to the extent possible, including the umbrella waste management policy that all wastes are to remain on site unless they can be recycled at appropriate facilities at this time.

Since all wastes will remain on site unless they can be recycled, minimizing the amount of waste generated and reusing and recycling wastes wherever possible are very important. The proposed underground stabilization work will generate some wastes that must be disposed of, and secure locations and disposal methodologies that don't interfere with remediation options currently undergoing environmental assessment have been selected.

2.0 Waste Types and Management

2.1 Waste Types

The waste types that may be generated during the underground stabilization work are described below. An inventory of all wastes generated, including those stored at the Mobile Equipment Garage in preparation for off-site recycling and disposal and those wastes transported to the Northwest Pond Non-Hazardous Waste Area will be maintained. It should be noted that in May 2010, the Giant Mine Remediation Project was assigned Hazardous Waste Receiver Registration Number NTR000125 by the GNWT. The Giant Mine is also applying to the GNWT to be recognized as a hazardous waste generator.

The locations of waste management infrastructure are identified in Figure 3 and UTM coordinates are provided in Section 2.2 below.

1. Domestic refuse – Due to the close proximity of Yellowknife, a camp does not need to be established. This will limit domestic refuse to lunch remnants (food and paper or plastic food containers) brought to the site on a daily basis by crew members which will be temporarily disposed of in specially designated garbage bins located within the main office building only. This segregation is necessary to reduce the wildlife attractant potential of the domestic refuse. The refuse in the bins will be collected regularly and permanently disposed of in the Northwest

Pond Non-Hazardous Waste Area for immediate burial, as is currently done for all domestic refuse generated on the Site during care and maintenance operations (Figure 3).

2. Sewage and greywater – Crew members will use the washing and toilet facilities located at the Giant Mine office building. Sewage and grey water will be managed using the system currently in place under the care and maintenance program which involves directing the waste into the underground water management system. The sewer and grey water will be pumped into the underground system through a pipeline that is accessed at the UBC Portal. The waste water will then be pumped back to the surface through the main underground dewatering line on the 750 level and discharged into the Northwest Pond.
3. Spilled tailings or tailings paste – Any tailings spilled during transport or stockpiling or tailings paste spilled during paste manufacture or delivery to the underground workings will be scooped up and either returned to the source tailings pond or deposited into one of the larger, empty underground chambers that require backfill.
4. Unusable hardened cementitious foam – Although not expected to occur, if unusable hardened cementitious foam will either be combined with other inert bulk fill material to stabilize non-arsenic stopes or will be disposed of in the Northwest Tailings Pond Non-Hazardous Waste Area.
5. Mine development rock – Rock excavated in the underground workings to access bulkheads will remain underground as it will be used to bulk fill the non-arsenic chambers and stopes.
6. Used oil, lubricants, antifreezes, solvents, drained and rinsed chemical containers, and drained oil pails – Very little of this waste is expected to be generated during the underground stabilization work. However, if for unexpected reasons, any used oils or lubricants are generated during this work, they will be drained into steel and plastic drums called “lube cubes”. Any waste antifreezes or solvents that are generated during this work will be stored separately from the waste oils in drums placed on pallets. The lube cubes and drums will be labelled appropriately and stored on-site in an area northwest of the Mobile Equipment Garage (Figure 3). Drained and rinsed chemical containers and drained oil pails will be stockpiled within the Mobile Equipment Garage or other empty building. When a sufficient volume of products has been collected, usually once or twice a year, a recycling contractor inventories and retrieves the containers for off-site recycling in compliance with appropriate GNWT policies and regulations.
7. Spent non-hazardous consumables – Any cement, paper, clean wood, plastics, rubber waste, steel waste, or used air filters that are generated during the underground stabilization work will be collected regularly and permanently disposed of in the Northwest Pond Non-Hazardous Waste Area (Figure 3), as is currently done for all such waste generated on the Site during care and maintenance operations. Only non-hydrocarbon contaminated wastes are disposed of in the Northwest Pond Non-Hazardous Waste Area.

8. Materials exposed during tailings excavation – Excavation of tailings may expose items such as barrels, wood and scrap metal. Non-hazardous materials will be disposed of in the Northwest Pond Non-Hazardous Waste Area (Figure 3). Deleterious materials such as hydrocarbon contaminated materials will be containerized with appropriate labels and stored on-site in an area northwest of the Mobile Equipment Garage (Figure 3). Hazardous or potentially hazardous materials will be containerized, clearly labelled and stored on pallets in the Northwest Pond Hazardous Waste Area (Figure 3). The final disposal of the hazardous or potentially hazardous materials will be carried out in accordance with any applicable hazardous materials regulations and any conditions set in a Type A licence issued following completion of environmental assessment EA0809-001.
9. Used oil filters and oily rags – Since used oil filters and oily rags are contaminated with hydrocarbons, any such items that are generated during the work will be collected and stored in drums on-site in an area northwest of the Mobile Equipment Garage (Figure 3) for future off-site disposal in accordance with the main Type A licence that will be issued following completion of environmental assessment EA0809-001.
10. Hydrocarbon contaminated soils - Any soil that becomes contaminated as a result of hydrocarbon spills will be stored in sealed drums that are clearly labeled as hydrocarbon contaminated soil. Drums will be stored upright, placed four to a pallet, and transported to an area northwest of the Mobile Equipment Garage (Figure 3). These soils will ultimately be treated or disposed of along with all other similarly contaminated soils during implementation of the Remediation Plan for the Site, which is currently undergoing environmental assessment. The Emergency Spill Response Plan identifies the procedures for responding to hydrocarbon spills, including the need to set criteria for determining when clean up of a spill is considered complete (dependent on location of spill). For larger spills this may involve soil and/or water sampling for comparison against specific standards (e.g., GNWT Industrial Standards).
11. Arsenic contaminated materials – In the event of an arsenic sludge spill (includes arsenic in dust or powder form), arsenic contaminated materials such as contaminated soils or snow and disposable clothing (e.g., Tyvek suites and latex gloves) will be placed in sound, sealed, clearly labelled steel drums that will be securely strapped on pallets for storage in the Northwest Pond Hazardous Waste Area (Figure 3). The final disposal of these materials will be carried out in accordance with any applicable hazardous materials regulations and any conditions set in a Type A licence issued following completion of environmental assessment EA0809-001. The GNWT industrial standard for arsenic in soil (340 mg/kg) will be considered when setting criteria for determining when clean up of an arsenic sludge spill is considered complete.

2.2 Waste Management Infrastructure

The infrastructure required for the waste management system is described below and shown on Figure 3. Electronic mapping is currently based on a unique grid system called the Giant Mine Remediation Grid System but plans are being developed to convert to a more standard system. AANDC commits to

providing electronic data in accordance with the MVLWB's *Standards for Geographic Information Systems (GIS) Submissions* when it becomes available.

1. Northwest Pond Non-Hazardous Waste Area (UTM Zone 11V, 636209.750 mE and 6935448.28 mN) – A disposal site for non-hazardous waste has been operated at the north end of the Northwest Tailing Pond since the pond was commissioned in 1987. Food wastes, paper, wood, plastics, rubber and steel waste, and used air filters are placed in the Northwest Pond Non-Hazardous Waste Area.

While tailings disposal was active, the waste was covered with tailings discharged from the Mill. Shortly after the Mill shutdown and tailings were no longer produced, the accumulated waste was pushed out onto the dry tailings to form a berm, effectively creating a landfill site contained by Dam 22B on the north side and the circumference of the berm on the south side. Exposed wastes are regularly leveled and capped with waste rock.

Seepage from the Northwest Pond and remediation of this area are discussed under the section on the Northwest Pond Hazardous Waste Area below.

2. Northwest Pond Hazardous Waste Area (UTM Zone 11V, 636333.20 mE and 6935194.37 mN) – A hazardous waste area located at the west end of the Northwest Tailings Pond was designated by the previous mine operator for hazardous waste handling soon after the tailings pond was commissioned in 1987. Initially, the area was designated as a disposal site for wastes such as asbestos containing materials and arsenic contaminated materials. The arsenic contaminated materials included steel process equipment with arsenic scale, used bags from the arsenic trioxide baghouse, and personal protective equipment. The waste materials were initially dumped at the site, without the intent of recovery for disposal elsewhere. At some point in the early 1990's, the function of the site changed from disposal to storage, after which, sealed drums of waste were placed upright on solid ground so that they could be easily recovered later. This practice remains in effect today.

From 2000 through 2004, a substantial clean up of this site was completed in several phases. Drums of waste that were not originally marked with the type of contained waste were opened and inspected. Several waste samples were collected and analysed. Drums containing arsenic contaminated materials (principally baghouse bags, clothing, and scale cleaned from process equipment), were placed in plastic over-pack containers, stacked on pallets at a new site nearby, and covered with plastic. Damaged and corroded drums containing arsenic contaminated materials were also collected and placed in over-pack containers. Asbestos containing materials were also identified and collected in this process. An asbestos disposal landfill was created nearby by excavating a trench in dry tailings in the Northwest Pond, placing the waste in the trench, and backfilling it with tailings.

Remedial options for the Northwest Pond and associated hazardous and non-hazardous waste areas will be implemented under the Remediation Plan for the Site, which is currently undergoing environmental assessment.

At this time, water within the Northwest Pond seeps directly into the underground workings where it is captured by the underground water management system, treated using the existing water treatment facility and pumped back to the Northwest Pond. Any water seeping through Dam 22B is captured on the downstream side of the dam, sampled to monitor chemistry and pumped directly back to the pond. Pumped water volumes are monitored using a flow metre. Additional monitoring of the facility includes annual inspections of the tailings dams and five year dam safety reviews.

3. Mobile Equipment Garage Laydown Area (UTM Zone 11V, 636176.41 mE and 6932596.05 mN) – The large, accessible space located to the northwest of the Mobile Equipment Garage is being used as a laydown area for storing liquid and solid waste materials until they are either taken off site for recycling or until final disposal methods are approved through the Type A licensing process to occur following completion of environmental assessment EA0809-001. Storage containers are appropriately labelled and inventoried. In the event of a spill, the procedures described in the Emergency Spill Response Plan provided under Tab XX in the application package will be followed.