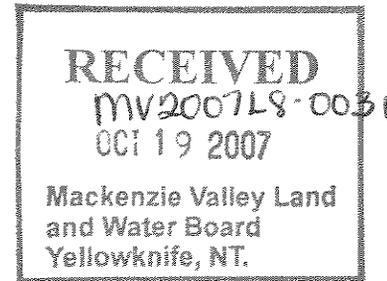




Box 1500
Yellowknife NT X1A 2R3

October 18, 2007

Mr. Willard Hagen
Interim Chair
Mackenzie Valley Land and Water Board
Box 2130
7th Floor - 4910 50th Avenue
Yellowknife, NT X1A 2P6



Dear Mr. Hagen:

On behalf of the Government of Canada and the Government of the Northwest Territories, we are pleased to submit this application in support of a Type "A" Water License to cover the remediation of Giant Mine and ongoing maintenance and monitoring of the site. The Water License application is accompanied by two annex reports as follows:

1. Remediation Plan and Supporting Documents; and
2. The report of the Independent Peer Review Panel on their review of the Remediation Plan and Supporting Documents

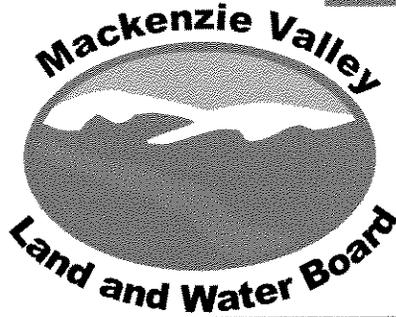
The Remediation plan was developed after extensive studies to determine the environmental condition of this abandoned mine site and with considerable public input from workshops, information sessions, site tours, and regular meetings with the Giant Mine Community Alliance. The Government of Canada and the Government of the Northwest Territories are committed to working together on the remediation of Giant Mine, and to commencing the remediation of this site as soon as possible to protect the public and the environment.

Should you require any additional information or have any questions, please contact Bill Mitchell, Manager of the Joint Giant Mine Remediation Project Office at (867) 669-2434.

Sincerely,

Trish Merrithew-Mercredi
Regional Director General
Northwest Territories

R.P. Bailey
Deputy Minister
Environment and Natural Resources



Mackenzie Valley Land and Water Board
 7th Floor - 4910 50th Avenue
 P.O. Box 2130
 YELLOWKNIFE NT X1A 2P6
 Phone (867) 669-0506
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APPLICATION FOR A NEW WATER LICENCE, AMENDMENT OF LICENCE, OR RENEWAL OF LICENCE.

Mackenzie Valley Land
 File: MV2007L8-0031
 OCT 14 2007

Application/Licence No:
 (amendment or renewal only) Application # KG/RM/Reg.

<p>1. Name and Mailing Address of Applicant</p> <p><u>Indian and Northern Affairs Canada</u></p> <p><u>P.O. Box 1500</u></p> <p><u>Yellowknife X1A 2R3</u></p> <p>Telephone: <u>(867) 669-2434</u></p> <p>Fax: <u>(867) 669-2439</u></p>	<p>2. Address of Head Office in Canada if Incorporate</p> <p><u>Indian and Northern Affairs Canada</u></p> <p><u>10D7 15-25 Eddy Street</u></p> <p><u>Gatineau QC K1A 0H4</u></p> <p>Telephone: <u>(819) 934-7514</u></p> <p>Fax: <u>(819) 934-9226</u></p>
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3. Location of Undertaking (describe and attach a map, indicating watercourses and location of any proposed waste deposits).

Latitude 62°30' N Longitude 114°22' W

Giant Mine is an abandoned and orphaned former gold mine located in Yellowknife, Northwest Territories, about five kilometres north of the city centre. The Giant Mine site (Site) lies along the western shore of Yellowknife Bay, an arm of Great Slave Lake. Figure 1.1.1. of the Remediation Plan shows the location of the site and the main physical features, including the open pits and tailings impoundments.

The mine is on Commissioners land, administered by the Government of Northwest Territories Department of Municipal and Community Affairs (MACA) and includes everything within the boundaries of former Lease L-3668T that was surrendered in 2005: subsurface mineral rights are under federal jurisdiction and have been withdrawn by Order in Council SI/2005-55 June 15, 2005.

The Undertaking is the clean up and remediation of an abandoned and orphaned highly contaminated mine site and must be commenced as soon as possible to protect human safety and the environment. Because of different jurisdictional responsibilities for the Giant Mine site,

Canada and the Government of the Northwest Territories (GNWT) signed a Cooperation Agreement on March 15, 2005 to cooperate and coordinate the care and maintenance of the Site and the implementation of the "Approved Remediation Plan". The term "Approved Remediation Plan" is defined in the Cooperation Agreement as the remediation plan for the Site which will ultimately have received all necessary regulatory approvals in addition to final government approval to finance and proceed with remediation of the Site. The Cooperation Agreement sets out the respective roles of the parties in relation to the surface and underground remediation of the site. A copy of the Cooperation Agreement is included as Supporting Document Q1 of the Remediation Plan.

Pursuant to the Cooperation Agreement, MACA established a Reserve, R662T in favour of the Indian and Northern Affairs Canada (INAC) that covers the same 949 hectare area as the former lease.

4. Description of Undertaking

A detailed description of the proposed Undertaking is provided in the Giant Mine Remediation Plan and Supporting Documents that are appended as Annex 1. The Remediation Plan has been reviewed by GNWT Department of Environment and Natural Resources and Federal Contaminated Sites Action Plan (FCSAP) expert departments, Health Canada, Environment Canada and Fisheries and Oceans Canada. A nine member Independent Peer Review Panel of experts has also reviewed the Remediation Plan and their report is included as Annex 2. During the development of the arsenic trioxide management alternatives, INAC organized numerous public workshops and information sessions. The Giant Mine Community Alliance meets regularly with the project team for updates on the project and to give feedback on any issues relating to Giant Mine that people have brought to them. In addition regular updates on the project are sent to residents via mail service and many groups have been given tours of the site to explain the planned remediation. Full details of these communications efforts are described in Supporting Document P1.

Giant Mine operated nearly continuously from 1948 until its closure in July 2004 during which time over 7 million ounces of gold were produced from underground and open pit mining. The mine was important to the development and economy of Yellowknife for over 50 years. The Undertaking is necessary because the site became orphaned before any restoration of the site had been completed.

The Undertaking covers both underground and surface components of Giant Mine as well as interim care and maintenance activities at the Site that will continue to be required for a period of time that will overlap the implementation of remediation. The main ecological and public safety concern at the site is the 237,000 tonnes of arsenic trioxide dust, a by-product of the ore processing that is now stored in 15 underground stopes and chambers. The Remediation Plan describes remediation of all surface components including tailings impoundments, buildings and infrastructure, pits and waste piles, miscellaneous surface openings, mine roads, areas of surface contamination and Baker Creek. The following paragraphs provide a summary of the proposed underground and surface components of the Undertaking. For more complete descriptions, please see Section 5 of the Remediation Plan.

Care and Maintenance

Care and maintenance activities have been required at the Site since Royal Oak Mines was assigned into receivership in 1999. Until 2005, care and maintenance was provided by Miramar Giant Mine Ltd. pursuant to the terms of a Reclamation Security Agreement with INAC. In 2004,

Miramar Giant Mine Ltd. gave the requisite notice of termination of the agreement and left the site in June 2005. Immediately thereafter in July 2005, the company was assigned into bankruptcy by the Supreme Court of the Northwest Territories and the Site is now considered to be orphaned.

INAC is actively managing care and maintenance and risk mitigation activities at the site under Section 39 of the NWT Waters Act to ensure protection of the public and the environment. Giant Mine represents a serious threat to human safety and the environment; consequently it is necessary to pursue active care and maintenance of the Site for an interim period of time that will extend well into the implementation phase of the Remediation.

Care and maintenance of the Site is currently provided by DetonCho/Nuna, a joint venture under contract to Public Works and Government Services Canada. Care and maintenance activities are required to keep the mine in environmental compliance with the Metal Mining Effluent Regulations (MMER). In addition, the contractor is contractually required to comply with the terms and conditions of the former water license with respect to Surveillance Network Program (SNP) monitoring of treated effluent discharge as well as regular SNP reporting requirements. INAC Waters and Environment Canada Inspectors regularly visit the site to check compliance, particularly during the period when effluent treatment is operating.

To prevent the possible harmful release of high levels of arsenic to the environment, the mine must not be allowed to flood to the level of the underground arsenic storage chambers. Therefore, care and maintenance activities primarily involve keeping the mine infrastructure associated with water management systems in good operating condition. This requires regular inspection and maintenance of underground pumping systems and water management facilities on surface including the ageing effluent treatment plant. Underground access for inspecting the underground mine water management system must be maintained. INAC is committed to meeting the standards established in the NWT Mine Health and Safety Act and Regulations. The "C" shaft should be maintained in good working condition and inspected regularly in accordance with the standards established by that Act. In addition, underground mine ventilation infrastructure must be maintained in good working condition.

In the past few years, risk mitigation activities have been undertaken as part of the care and maintenance to protect human safety and the environment. Examples are the removal of utilidors containing asbestos and fuel distribution pipelines, particularly in publicly accessible areas such as the public boat launch at the town site. Other risk mitigation activities include removal of leaking remnant oil product from all bulk fuel storage tanks no longer being used on the site. Deteriorating mill and assay lab chemicals have been collected, packaged and will be shipped for disposal as hazardous materials. As part of a general clean up of the underground mine, electrical equipment, used oil and old batteries have been retrieved from the mine equipment for reuse or recycling. Unsafe mine openings to the underground located near the town site have been permanently closed. A new underground dewatering system has been installed and a new bulkhead was constructed to augment an existing bulkhead on one of the arsenic storage chambers. Emergency situations of potential flooding of the mine by Baker Creek required emergency realignment of Baker Creek Reach 4 and the construction of a new B-2 pit dam adjacent to Reach 5 (Figure 5.8.1).

Until the new water treatment plant is constructed, reliance on the existing effluent treatment plant will present a high risk to the environment and there is an imperative due diligence requirement to proceed with a sense of urgency to construct a new water treatment plant that uses modern best available technology. In the meantime, it will be necessary to continue care

and maintenance activities for an interim period of time that will overlap with the implementation of the Remediation Plan. The water license should therefore contain provisions for this ongoing care and maintenance.

Arsenic Trioxide Dust (Remediation Plan Section 3.1 and 5.1)

Processing of the Giant Mine ore created arsenic trioxide dust as a by-product. Approximately 237,000 tonnes of the dust were produced and stored underground in ten purpose-built chambers and five mined-out stopes. The dust is about 60% arsenic. To prevent the release of arsenic into the groundwater around the mine, the Remediation Plan calls for the arsenic trioxide dust and the rock around each chamber and stope to be completely frozen and permanently maintained in a frozen state. The freezing will be accomplished by installing pipes below and around the chambers and stopes, and then pumping a coolant through the pipes to freeze the rock surrounding the chambers. The arsenic trioxide dust within the chambers will then be saturated with water and the saturated dust frozen along with the surrounding rock to create the "frozen block". The technology is similar to that used to freeze and create ice sheets for indoor hockey rinks. This technology has also been used to prevent groundwater inflows to other underground mines and, at a smaller scale, to isolate areas of contaminated soil.

Once the dust and the surrounding rock are completely frozen, the freezing system will be converted to thermosyphons. Thermosyphons are tubes filled with compressed carbon dioxide gas that act as completely passive heat pumps, *i.e.* they cool the ground without any input of energy. They are a proven technology and have been used to protect frozen ground throughout the north since the 1970s. Thermal analyses and tests carried out at the site show that, even under an assumption of extreme global warming, the thermosyphons will maintain frozen conditions in and around the chambers and stopes. The thermosyphons will operate indefinitely, with only periodic maintenance and occasional replacement being required.

Other Underground Mine Components (Remediation Plan Section 3.2 and 5.2)

Portions of the underground mine were backfilled with tailings and waste rock during the operation of the mine. Although concentrations of arsenic in these sources are hundreds of times lower than in the arsenic trioxide dust, their large volumes mean that they also have the potential to contaminate the surrounding groundwater. The only practical method to control that potential is to maintain a hydraulic capture system by collecting and treating water from the mine. All underground equipment and infrastructure will be removed or decontaminated prior to allowing the mine to flood, and all surface openings will be sealed. The contaminated mine water will then be extracted through a series of wells, piped to a new water treatment plant, treated to remove contaminants, primarily arsenic, and then discharged to Yellowknife Bay. Prior to discharge the treated water will be monitored to ensure that it meets MMER and Environmental Effects Monitoring (EEM) criteria as well as the requirements of the water license.

Open Pits and Waste Rock (Remediation Plan Section 3.3, 3.4, 5.3 and 5.4)

There are eight pits on the site, the physical dimensions of which are listed in Table 3.9 of the Remediation Plan. The B1 Pit will be backfilled to facilitate installation of the ground freezing system. Contaminated soils from other areas on the site will be placed in the portion of the B1 pit that will ultimately be within the frozen zone. Waste rock, quarry rock or non-hazardous demolition waste will be used to fill the remainder of the pit. The entire backfilled area will then be covered with soil and revegetated. Other pits can not be backfilled without creating added impacts because of the lack of clean backfill material. Those pits will be surrounded by berms or

fences to prevent inadvertent public access. There is no potential for acid mine drainage in the pits.

Tailings and Sludge (Remediation Plan Section 3.5 and 5.5)

There are approximately 13.5 million tonnes of tailings stored in impoundments constructed on the site. The South, Central, North and Northwest Tailings areas cover a total of about 95 hectares. In addition, water treatment sludges are stored in settling and polishing ponds covering an additional nine hectares. The chemical characterization of the tailings and water treatment sludge is described in Supporting Document B2 of the Remediation Plan. Both the tailings and the sludge contain arsenic. The large expanses of exposed tailings are subject to wind erosion when dry and, on windy days during summer months, give rise to significant airborne tailings dust. The Remediation Plan calls for the tailings and sludge areas to be covered with one layer of quarried rock and a second layer of fine-grained soil. The lower layer of quarried rock will act as a capillary break to prevent the upwards migration of contaminants from the tailings. The rock layer will also inhibit the downwards penetration of plant roots and will form a physical barrier that will prevent future erosion of the tailings. The upper layer of fine-grained soil will allow for revegetation. The surface of each tailings area will be graded and ditches and spillways will be constructed to limit erosion and to allow water to run off the cover without becoming contaminated.

Site Water Management (Remediation Plan Section 5.7)

During and after the remediation, it will be necessary to continue collecting and treating any contaminated water on the Site. The Remediation Plan calls for a new water treatment plant to be constructed. The plant will utilize a well proven method of arsenic removal by oxidation followed by co-precipitation with iron. The plant will treat contaminated mine water pumped from underground. Contaminated surface water will also be collected and treated until monitoring data clearly show that the arsenic levels and other licensed parameters are low enough to meet license requirements and allow for direct discharge to the environment. Over the longer term, it is expected that water from the underground mine areas outside the frozen zones would continue to need treatment, and the new water treatment plant will remain in operation as required. Treated water from the plant will be discharged first into a holding facility to allow monitoring of the water quality and then routed via a diffuser system into Yellowknife Bay. Discharge to the Bay, rather than to Baker Creek, will allow year-round treatment of the extracted mine water. The year-round treatment will remove the current requirement to store large amounts of contaminated water on surface. It will also allow operation and maintenance of the water treatment and ground freezing systems to be carried out by a permanent year-round staff. The mine water management system will be operated with a large contingency storage capacity in the mine. In the event of a malfunction of the water treatment plant, water will be returned to underground storage.

Baker Creek (Remediation Plan Section 5.8)

Baker Creek has areas of significant sediment contamination. Of the six segments or "Reaches" of Baker Creek delineated on the site (Figure 5.8.1), Reach 4 of Baker Creek has already been cleaned up by removing all arsenic contaminated material within a new channel prior to the emergency diversion of this section of the Creek in 2006 as authorized by the Fisheries and Oceans Canada pursuant to ss. 35(2) of the *Fisheries Act* (Authorization No. YK-06-0063). The mitigation and compensation measures specified in the Authorization were complied with and INAC has completed the first year of a three year Monitoring Plan as specified in the Authorization.

New fish habitat constructed in this section of the creek is performing very well with successful grayling and other fish spawning based on fisheries performance monitoring carried out in spring and early summer, 2007. Options for dealing with the other areas of the Creek including possible removal of the most heavily contaminated sediments are under further investigation. However, continuing arsenic inputs, primarily from areas upstream of the site, will limit the level to which the creek sediments can be cleaned.

Contaminated Soils (Remediation Plan Section 5.10)

A number of surficial materials, from natural soils to tailings to mine rock are present in various areas of the site. An estimated 328,000 cubic metres of material is contaminated with arsenic at levels that exceed the GNWT criterion for industrial land use. An estimated 14,896 cubic meters of hydrocarbon contaminated material has been identified in areas that are mostly coincident with the arsenic contaminated areas. The Remediation Plan calls for contaminated soils and mine rock to be excavated and disposed of within the frozen portion of B1 Pit, which will subsequently be covered with non-contaminated material. Additional contaminated soils and spilled tailings will be excavated and moved into the most appropriate tailings or sludge impoundment areas prior to construction of the covers. Dust suppression and sediment control measures will be undertaken during all soil and rock excavation activities on site.

Buildings and Waste Disposal (Remediation Plan Section 5.11 & 5.12)

Over 100 buildings, supported by associated infrastructure and utilities, remain on the site. Many of the buildings pose a hazard to the public. The Remediation Plan calls for all buildings and infrastructure to be removed. Any arsenic-contaminated materials will be removed and placed underground in the empty chamber 15 that will also be within the frozen zone.

Post-Remediation Conditions (Remediation Plan Section 6)

After the remediation activities are completed, the site will consist of a small area that will need to remain under active management and institutional control, and a broader area of the Reserve that will be returned to the Government of the Northwest Territories. An actively managed area centered on the current C-Shaft, will allow for both maintenance of the ground freezing system and be the site of the water treatment plant for the long-term treatment of contaminated mine water. The remainder of the site will ultimately be available for alternate uses as deemed appropriate.

The remediation activities will decrease but not completely eliminate arsenic release from the site. In quantitative terms, after implementation of the Remediation Plan, the arsenic release from the site will decrease from the current level of approximately 624 kilograms per year to less than 402 kilograms per year. The current and predicted future arsenic releases are tabulated below. It is important to note that current arsenic release rates are maintained at existing relatively low levels because of current care and maintenance activities, primarily water management and effluent treatment. In the absence of the care and maintenance and proposed remediation measures, arsenic releases from the Giant Mine site could increase by many thousands of kilograms per year.

Sources of Arsenic to Baker Creek and Yellowknife Bay	Average Annual Flow (m³/yr)		Estimated Arsenic Release (kg/yr)	
	Current	After Remediation	Current	After Remediation
External to Mine Site				
Baker Creek Upstream of Giant Mine	7,100,000	7,100,000	220	220
Tributaries from west of Giant Mine	850,000	850,000	67	67
From Mine Site				
Current Effluent Treatment Plant	750,000	na	290	0
Runoff from Giant Mine Surface Facilities to Baker Creek	230,000	390,000	224	193
Direct Runoff to Yellowknife Bay	300,000	290,000	110	69
New Water Treatment Plant	na	370,000	na	140
Total from Mine Site	1,128,000	1,050,000	624	402
Total Inputs to Yellowknife Bay	9,230,000	9,000,000	911	689

The post-remediation arsenic release from the site and, equally important, sources external to the Site will mean that Baker Creek will continue to receive reduced inputs of arsenic. Ecological risk assessment calculations show that there will continue to be a potential for adverse effects on bottom-feeding fish and terrestrial animals living in the Baker Creek area. Human health risk assessment calculations indicate that arsenic intakes by humans will remain within the range estimated for other Canadians, and that there will be little risk of adverse health effects. There may, however, need to be some restrictions on future activities at the Site until monitoring programs can demonstrate that arsenic levels are within safe levels.

Monitoring and Reporting (Remediation Plan Section 7)

A monitoring plan for the Site during and after implementation of remediation is proposed in the Remediation Plan. It includes monitoring of groundwater, surface water, and air quality throughout the Site. Ground temperatures will also be monitored around the frozen arsenic trioxide chambers and stopes. It also includes regular monitoring and inspections of remaining pit walls, as well as the covers, ditches and spillways associated with the remediated tailings impoundments. The monitoring and inspections will allow post remediation performance to be compared to both predictions and license requirements. Monitoring reports will be prepared and submitted to the Mackenzie Valley Land and Water Board in accordance with license requirements. In addition, Giant Mine is subject to the Metal Mining Effluent Regulations of the Fisheries Act including periodic Environmental Effects Monitoring as specified under the Regulations.

Groundwater will be monitored in the fifteen deep multilevel monitoring well systems, comprising 129 separate monitoring zones in total, that have already been installed around the mine. Each of these discrete zones will be monitored for piezometric levels every year during re-flooding

and for five years thereafter. Approximately 40 selected zones will be sampled for water quality annually during re-flooding and for five years thereafter. Fifteen existing shallow standpipes located around the mill area, the tailings impoundments, and the historic tailings deposition area below the South Pond (as shown in Figure 7.2.2 in the Remediation Plan) will be sampled annually during the remediation work and for five years thereafter. A reduced number of sampling points will be identified for long-term monitoring based on the understanding of the groundwater flow five years after the re-flood is complete

Section 7.3 of the Remediation Plan describes the long term mine water monitoring system that will be used to monitor geochemistry of the flooded mine. A total of 10 multilevel systems, similar to the fifteen existing wells noted above, will be installed to ensure that the mine water chemistry is properly characterized before flood levels are allowed to rise to the point where discharge to surface water bodies will occur. The locations of these monitoring holes are shown in Figure 7.2.1 of the Remediation Plan.

Surface water quality monitoring at the Site currently follows the Surveillance Network Program or SNP requirements set out in previous water licenses issued while the mine was operating. During and after remediation, the SNP will be modified to take into account the changes in surface water flow patterns. Proposed SNP monitoring stations are shown in Figure 7.1.1 of the Remediation Plan.

- Monitoring stations 43-05 (Baker Creek), 43-11 (Baker Creek), 43-16 (Trapper Creek) from the current SNP will continue to be sampled;
- The locations of station 43-01 (treated water discharge point) and 43-04 (raw water intake) will be relocated.
- New monitoring stations will be established to sample seepage from Dam 3 and 11, and surface runoff from the North Pond, Settling Pond, and Northwest Pond.

Monitoring of the new stations will start during the remediation and will be continued until the water quality is shown to be consistently acceptable for direct release to the environment.

All stations will be sampled at least monthly during open water seasons, and more frequently when remediation activities are occurring in the respective catchments. The proposed analyte list is tabulated in table 7.1 of the Remediation Plan.

Additional temporary stations will be established to monitor any water discharged from areas of active remediation or construction, including demolition areas, areas of contaminated soil removal, and tailings areas during regrading and cover construction, spillway construction sites, borrow pits and quarries. The sampling schedules will be established as part of final design. Analyte lists will focus on suspended sediments and other contaminants specific to each activity.

5. Type of Undertaking.

8. Miscellaneous - Abandoned Mine Site Remediation. The application is for a Type A water license for a sufficient period of time to cover the Undertaking, including interim care and maintenance, the implementation of the Remediation Plan, the transition to a new water treatment system and a period of ongoing maintenance and monitoring.

6. Water Use

To obtain water	<u>X</u>	Flood control	_____
To cross a watercourse	_____	To divert water	<u>X</u>
To modify the bed or bank of a watercourse	<u>X</u>	To alter the flow of, or store water	_____

Other (describe): X Mine water management and water treatment

During remediation, water usage will be mostly for preparing underground access and for drilling activities during installation of the freeze pipes. Some water will be required for dust suppression during demolition and other surface activities. A small amount of make up water will be required for the water treatment plant and although unlikely and dependent on the final design, water may be required for freeze plant cooling. Raw water required for the Undertaking will be initially drawn from the existing Great Slave Lake pump house at the Giant Mine town site and subsequently from a point further north in Yellowknife Bay. Potable water required for sanitation, and general housekeeping is currently supplied by truck from the City of Yellowknife and this arrangement will continue during remediation.

During the proposed remedial activities at Baker Creek, modification of the bed or bank of the watercourse may be necessary during any removal of contaminated sediments.

Diversion of water to the mine water treatment system through engineered drainage channels and spillways on and adjacent to tailings containment areas will be required to handle run off water from the tailings. The channels and spillways will be constructed to follow geomorphologic drainage patterns to the extent practical given the location of existing dams and pits on the Site. The spillways are sized to accommodate the probable maximum precipitation over a 24 hour period, falling on a ripe snow pack. Any contaminated water that continues to collect in various sumps around the roaster complex will be routed through the effluent treatment plant until its quality meets requirements for direct discharge. In addition, any water used in demolition that becomes contaminated will be collected and routed into a new water treatment facility that will be constructed near the location of the "C" shaft.

7. Quantity of water involved (litres per second, litres per day or cubic meter per year), including both quantity to be used and quality to be returned to source.

The volume of raw water required to be drawn from Yellowknife Bay of Great Slave Lake during remediation is estimated to be between 90 -180 m³/day. After remediation, the requirement for raw water is expected to decrease substantially to 20 m³/day or 7300 m³/year. This water will be required as "make up water" for the operation of the new water treatment plant and for possible cooling water for the active freeze plant. The source of the raw water will be Great Slave Lake; usage of this relatively small volume of water will have no impact on Great Slave Lake water levels.

Mine water is currently pumped from underground to maintain the water level in the mine below the 850 ft level and well below the arsenic chambers. The mine water is discharged year round to the surface at the Northwest Pond and is then treated seasonally from July to September in the existing effluent treatment plant. The total volume of treated mine water currently released from the effluent treatment plant during the two – three month discharge period is approximately

260,000 m³. The new water treatment plant is designed for year round operation and assuming that approximately the same amount of mine water will require treatment, it is estimated that future discharge volume of treated water will be approximately 700 - 1000 m³/day, although this volume might be greater in a year with higher precipitation.

Year-round treatment will remove the current requirement to store large amounts of contaminated water on surface. It will also allow operation and maintenance of the water treatment and ground freezing systems to be carried out by a permanent year-round staff.

Further details of the proposed water management measures can be found in Section 5.7 of the Remediation Plan. Details of the treatment process, reagent needs and an assessment of alternative discharge locations, diffuser designs, and resulting dilution efficiencies are provided in the Remediation Plan Supporting Documents. Details of predicted water and arsenic values can be found in Section 6.2 of the Remediation Plan.

8. Waste deposited (quantity, quality, treatment and disposal)

This Undertaking is a remediation project where waste and contaminated materials on the Site will be cleaned up. Estimated volumes of contaminated soils, demolition waste, and used machinery on the Site have been quantified. The arsenic trioxide dust will remain underground in the various stopes and chambers which will be frozen during the Undertaking. High arsenic waste from the roaster complex and any arsenic contaminated demolition materials will be placed in the existing empty chamber 15 and frozen.

As noted in section 7 above, it is estimated that approximately 700 - 1000 m³/day of treated water will be discharged to the environment.

Disposal locations within the Site are discussed in sections 5.10, 5.11 and 5.12 of the Remediation Plan.

The estimated volumes of different types of waste material are summarized in the table below.

Estimated Volumes of Material with arsenic above the NWT industrial guideline and requiring containment.

Type of Waste	Volume (m ³)	Volume (tonnes)	Disposal Method
Contaminated Soils (including arsenic and hydrocarbons and tailings that spilled outside of impoundment)	290,000		Contaminated soil: 60 000 m ³ to be placed in the frozen zone of the B1 pit and 117 000 m ³ disposed in tailings and/or sludge pond prior to cover emplacement. 113,100 m ³ of uncontained tailings covered or placed within existing impoundments
Tailings		13.5 million	Left in place; graded and covered with two layers of cover material (section 5.5)

Type of Waste	Volume (m ³)	Volume (tonnes)	Disposal Method
Waste Rock from roads not required for monitoring access after closure containing less than 340ppm Arsenic	38,000		Used for general fill as necessary
Demolition Materials Asbestos, Used Machinery, Building Rubbish	90,000		Preferred disposal of Hazardous process residues containing soluble arsenic from mill and roaster is in empty chamber 15 to be frozen Non hazardous demolition waste will be placed in B1 Pit outside frozen zone & or buried in tailings in the Northwest Pond before cover installation

9. Other persons or properties affected by this Undertaking (give name, mailing address and location). Attach a list if necessary.

The Remediation Plan includes the Giant Mine town site now leased to the City of Yellowknife. All the houses in the town site are vacant and most are scheduled for demolition. Planned work should not affect public access to the town site boat launch or to the facilities of the Cruising Club and the Mine Heritage Museum.

In a broader sense, the Undertaking will beneficially affect the people of Dettah, Ndilo and Yellowknife by ensuring that future arsenic releases from the site are minimized to protect human health. Beneficial impacts to the environment around the mine and the communities would also result from the Undertaking. For instance wind borne dust from the tailings ponds and other parts of the Site would be eliminated by the proposed tailings remediation.

While the Undertaking is underway, it is recognized that there will be short term impacts to people traveling on the existing highway and to the environment. Mitigation measures were developed based on a comprehensive evaluation of environmental impacts likely to occur from the proposed Undertaking as described in the next section.

In addition, Canada's public interest is well served by the clean up of this contaminated site and the Undertaking will tie in with the overall goals and objectives of the Federal Contaminated Site Action Plan.

10. Predicted environmental impacts of Undertaking and proposed mitigation.

Because the Giant Mine site is severely impacted from over 50 years of mining activity, the Undertaking will promote general improvement of the Site environment. Most importantly, the Undertaking will result in a substantial reduction of arsenic released from the Site as well as providing control over the risk of future increases in arsenic release.

Environmental and resource impacts of the proposed Undertaking on ground and surface water, land, vegetation and fauna were evaluated. For this purpose, a comprehensive environmental impact matrix was prepared to document potential impacts of the proposed Undertaking using the Leopold matrix methodology. The detailed environmental impact matrix is included as Supporting Document Q4. The matrix considered the possible short term impacts likely to happen during the undertaking as well as longer term ecological, aesthetics and culture, and socio-economic impacts. The matrix is then used to determine appropriate mitigation measures for each possible environmental effect and it can be further used to determine any residual affect. Appropriate mitigation measures will be put in place for each element of the remediation to ensure that potential impacts of the Undertaking can be reduced to levels that will be indistinguishable from normal background levels.

Supporting Document Q5 describes a similar assessment of the potential for cumulative impacts.

Ecological and human health risk assessments were carried out to provide insight as to the level of risk that would be presented by the Site after implementation of the remediation activities. The ecological and human health risk assessments and the conclusions that can be drawn from the study are fully described in Supporting Document N1.

After consulting with the staff at the Prince of Wales Museum it was concluded that there are no known archaeological resources within the Giant Mine site that would be impacted by the Undertaking. Some buildings located in the former Giant Mine Town site are of interest to the local mine heritage society and will not be demolished.

11. Contractors and sub-contractors (names, addresses and functions). Attach a list if necessary.

The Site has been under care and maintenance effectively since 1999 when Royal Oak Mines was assigned into receivership. Care & Maintenance activities at the Site are currently performed by Deton'Cho/Nuna, a joint venture Aboriginal and Northern Company. Contracting for implementation of the Remediation Plan will commence when licensing is completed and the necessary government financial approvals have been received from Treasury Board.

The care and maintenance activities must overlap with the remediation activities for several years or at least until the new water treatment plant has been commissioned. The water license should therefore contain provisions for this interim care and maintenance.

12. Studies undertaken to date. Attach a list if necessary.

Extensive studies of the Site have been completed to characterize the existing environmental conditions of the Site and many are included as supporting documents to the Remediation Plan. Studies completed at Giant Mine are listed separately at the end of this document with a brief description of each study.

13. Proposed time schedule.

Start date: 2010 or earlier. The Undertaking should commence as soon as possible as a due diligence measure to protect human health and the environment.

Completion date: 2020 - The implementation phase of the Undertaking will take approximately 10 years, however long term maintenance and performance monitoring will be required for an indefinite period of time.

Depending on contractor availability it is anticipated that most major surface activities would be completed over a period of 5 years. The ground freezing would be substantially complete 9 -10 years after implementation. The Undertaking would then enter a long term monitoring and maintenance phase as described in section 7 of the Remediation Plan.

Remediation should commence as soon as possible because there are numerous risk elements on surface and underground at Giant that can not be effectively mitigated before the Undertaking is implemented. Timely implementation will also minimize the impact of continued arsenic load to the creek and lake.

Name (print): Kate Hearn

Signature: 

Title (print): Director
Contaminants & Remediation
INAC, NWT Region

Date: October 19, 2007

Please make all cheques payable to "Receiver General of Canada"

FOR OFFICE USE ONLY

Application Fee Amount: \$ _____ Receipt No: _____

Water Use Deposit Amount: \$ _____ Receipt No: _____

Attachment per Section 12: List of Studies

The following is a list of studies relative to Giant Mine including a brief description of the study:

Sediment Investigation of Baker Creek

December 7, 2006

A sediment investigation of Baker Creek in support of the Giant Mine Remediation Project's all inclusive Remediation Plan to be submitted to the Mackenzie Valley Land and Water Board for review and approval. The purpose of the investigation was to carry out a detailed assessment of the physical and geochemical properties of the sediment in Baker Creek and Baker Creek Pond within the Giant Mine surface land lease area.

Prepared by Jacques Whitford

Fish Salvage Channel Relocation Baker Creek

Aug 8, 2006

The objective of the Baker Creek fish salvage was to observe the dewatering process and capture trapped fish so they could be rescued from desiccation and released live, downstream, outside of the dewatered pond.

Prepared by Golder Associates Limited

2005 Surveillance Network Program Report

March 27, 2006

This report was required as per the terms and conditions of the former water license that was held by Miramar Giant Mine Ltd. Giant Mine Miramar Limited maintains the Surveillance Network Program (SNP) currently comprised of 18 SNP sampling stations.

Prepared by Ron Connell

Air Quality Monitoring at Giant Mine Site – Yellowknife

June 2005

An air quality-monitoring program was devised and carried out during the summer of 2004 to establish a baseline for the fugitive emissions from the tailings areas and other disturbed areas at the minesite. This report provides details of the monitoring program, the results and discussion of the findings.

Prepared by Senes Consultants Limited

Environmental Assessment Giant Mine

June 23, 2005

An assessment of existing surface environmental conditions at the Giant minesite, and in particular to make a comparison to the site conditions noted during a baseline assessment conducted in October 1999.

Prepared by Golder Associates

Arsenic Trioxide Management Project Description - Progress Report

Year 2000 to 2004

A detailed progress report for Arsenic Trioxide Management Project. The report describes activities undertaken, and progress made during the reporting period.

Prepared by Giant Mine Remediation Project

Giant Mine Site Soil Arsenic Assessment, Yellowknife NT

September 29, 2004

A literature review was conducted to consolidate all data on arsenic in soil at the Giant Mine. Based on the results of the review, additional shallow auger drilling and test pitting was conducted to supplement the existing data and to refine contaminated soil volume estimates. Prepared by Golder Associates

Arsenic Concentration and Speciation in Fishes from Back Bay near Yellowknife

Aug 3, 2004

The main objective of this study was an evaluation of arsenic speciation in different fish species common to Back Bay in order to later evaluate whether consumption of such fish could pose a risk to human health. The assessment would include an evaluation of arsenic forms and concentration in the liver, muscle and GIT, and an investigation of whether there were gender-related differences in arsenic accumulation in different fish species.

Prepared by Simone de Rosemond

Use of a Fluorescent Dye to Assess Potential Groundwater Connections between the B1 Pit and B208 Stope, Giant Mine

April 2004

Based on observations of lows in the underground mine, which indicate a rapid response to freshet conditions and the relatively impermeable soils in the vicinity of the of the two ponds, inflows via the B1 pit were identified as the most likely source for inflow to the B208 stope. A tracer study was proposed to establish whether seepage percolating into the bottom of the B1 pit contributes to water entering the B208 arsenic stope.

Prepared by SRK Consulting

Characterization of Soil and Groundwater in the Calcine and Mill Areas, Giant Mine

March, 2004

A shallow auger drilling program was implemented to obtain information on the quantity and geochemical properties of the calcine, and data on soluble arsenic concentrations in the vicinity of the mill.

Prepared by Indian and Northern Affairs Canada and SRK Consulting

Ecological Investigations at the Giant Mine

December 12, 2003

Ecological investigations were completed on the Giant Mine surface lease area to provide an accurate description of the existing aquatic vegetation, an accurate description of the existing terrestrial vegetation and an accurate description of existing muskrat utilization within Baker Creek.

Prepared by Jacques Whitford Environment Limited

Giant Mine Underground Arsenic Trioxide Management Alternatives Moving Forward: Selecting a Management Alternatives

July 2003

A workshop on selecting a management alternatives for the underground arsenic trioxide dust at the Giant Mine was held on May 26 and 27, 2003. This was the fifth stakeholder workshop focusing on the management alternatives. This session brought people together to provide additional public and stakeholder perspectives on moving forward with the selection of a management approach to be submitted by INAC to the regulatory boards.

Prepared by Terriplan Consultants

Recommendations Regarding the Acquisition of Environmental Baseline Data in Support of the Preparation of an Arsenic Trioxide Management Project Description

May 2003

In order to ensure that sufficient "baseline" environmental data is available to support the preparation of the environmental component of the detailed Project Description, (KHS) Environmental Management Group Ltd. was contracted to review existing data and provide recommendations with regard to the acquisition of additional data that might be required to prepare the Project Description.

Prepared by (KHS) Environmental Management Group Ltd.

Giant Mine Underground Arsenic Trioxide Management Alternatives

March 2003

A workshop on the alternatives for future management of the underground arsenic trioxide dust at the Giant Mine was held on January 14 and 15, 2003. The current workshop presented the results and conclusions of the Technical Advisor and the Independent Peer Review Panel and provided a forum for further dialogue with participants.

Prepared by Terriplan Consultants

Review by the Independent Peer Review Panel of SRK's Final Report - Arsenic Trioxide Management Alternatives

March 2003

This report covers findings of the Independent Peer Review Panel formed by the Department of Indian and Northern Development to carry out a technical review of the work of a team headed by SRK Consulting Inc.

Prepared by Independent Peer Review Panel

An Examination of Arsenic Contamination in the Roaster and Gas Handling Complex at the Giant Mine Mill

February, 2003

Roaster and gas handling facility are the main focus of this study, all equipment having potential to contain arsenic in significant amounts was examined and selected samples of material were taken for arsenic analysis.

Prepared by Northwest Consulting Limited

Final Report - Arsenic Trioxide Management Alternatives

December 2002

A decision was made to appoint an independent Technical Advisor to assist INAC in developing a plan for the long-term management of arsenic trioxide dust stored underground at the mine. One of the key objectives set for the Technical Advisor was to analyze a wide range of options and recommend a limited number of alternatives for further consideration by INAC and other stakeholders. This report and the supporting documents present the results of studies to achieve that objective.

Prepared by SRK Consulting

Biological Sampling at Baker Creek 2002

November 22, 2002

The goal of this study was to collect additional data from Baker Creek for ecological and human health risk assessments being carried out. Samples collected include surface water, sediment, benthic invertebrates and fish.

Prepared by Dillon Consulting Limited

Groundwater Monitoring System Installation Report

June 2002

This report describes the design and implementation of a monitoring system to collect data on the groundwater conditions around the Giant Mine. The purpose of the monitoring system is to assess the hydrogeological conditions in the bedrock mass on the periphery of the site, outside of the mined "envelope" that will dominate by flow in the tunnels and mine workings.

Prepared by SRK Consulting

Biological Sampling at Baker Creek - Summary Report

April 02, 2002

The goal of this study was provide an initial assessment of antimony, arsenic, copper, nickel and zinc levels in surface water, sediment, and aquatic vegetation in Baker Creek.

Prepared by Dillon Consulting Limited

Developing Options and Recommendations to Establish and Operate a Giant Mine Community Liaison Committee

March 2002

INAC is setting up a Giant Mine Community Liaison Committee to act as a communications bridge with the public in Yellowknife on abandonment and reclamation.

Prepared by GeoNorth Limited

Environmental Assessment Yellowknife Bay Tailings

March 2002

This study assessed the biogeochemical conditions associated with the near-shore area of the submerged tailings. The results of the effort were used to evaluate various management strategies for the submerged tailings.

Prepared by Golder Associates

Awareness Testing: Findings from Focus Groups on Giant Mine and the Arsenic Trioxide

January 2002

INAC's Communication Directorate sponsored five focus groups to evaluate the public's understanding of, and concerns about the status of the Giant Mine and the arsenic trioxide dust.

Prepared by Lutra Associates Ltd.

Final Abandonment and Restoration Plan

September 26, 2001

This report presents the Final Abandonment and Restoration Plan for the Giant Mine. The Plan is submitted to comply with Water Licence No. N1L2-0043 that is effective from June 30, 1998 to June 29, 2003 and the December 14th, 1999 Reclamation Agreement between Miramar Giant Mine Ltd. and the Department of Indian and Northern Development.

Prepared by Golder Associates Ltd.

Giant Mine Hydrogeology Experts Group Meeting #2

September 26, 2001

This report summarizes the proceedings and recommendations resulting from a meeting of hydrogeologic experts convened in Vancouver, British Columbia, on June 19 and 20, 2001. The meeting was held to (i) to review new hydrogeologic work undertaken at Giant Mine since March, 2000; (ii) to identify hydrogeologic issues/concerns and information gaps/needs associated with new work, with a proposal to reflood the mine to the 750 ft level and with deep reburial of arsenic dust at the site; and (iii) to provide direction for future hydrogeologic studies

to support decisions for closing and remediating the site.
Prepared by Duke Engineering & Services Inc.

Sources of Water and Arsenic in Mine Waters Giant Mine

September 20, 2001

This report interprets geochemical and environmental isotope data collected at the Giant Mine as part of the hydrogeological investigations for the arsenic trioxide management study.
Prepared by Dr. Ian D. Clark, University of Ottawa

S/S Studies of Arsenic-Containing Mine Dust and Mine Fungus Identification

September 13, 2001

Research and testing on the effects of temperature on bitumen and arsenic trioxide dust mixing and monitoring the long term leaching characteristics of bitumen/dust monoliths.
Prepared by Dr. Bill Cullen, University of British Columbia.

Giant Mine Bulkheads Assessment

September 2001

An assessment of the physical strength of the bulkheads which seal of the arsenic storage chambers. Using the original bulkhead design information, as well as information collected during underground inspections, SRK evaluated the stability of the structures under variable conditions.

Prepared by SRK Consulting

Underground Arsenic Trioxide Management Alternatives Workshop

June 11-12, 2001 - August 2001

A workshop on the future management of the underground arsenic trioxide dust at the Giant Mine, specifically addressed the nature of the Arsenic trioxide problem and identified actions that should be considered to properly manage the material. The workshop presented the results of work undertaken over the past two years.

Prepared by Terriplan Consultants Ltd. and IER - Planning, Research and Management Services.

Study of Management Alternatives Giant Mine Arsenic Trioxide Dust May 2001

This report and the supporting documents present results from the first phase. The specific objectives of the work reported herein were to: quantify the environmental and human risks; select representative management alternatives; prepare pre-feasibility level designs and cost estimates for the management alternatives; and analyze environmental, human health, technical and financial risks associated with each of the management alternatives.

Prepared by SRK Consulting

Prioritization of Demolition Sequence for Site Rehabilitation of Miramar Giant Mine

March 2001

This report has been produced to provide a review of demolition estimates and a schedule of progressive demolition based on the closure activities at the Giant Mine Site. The report identifies some of the known hazards associated with the various structures and some recommendation guidelines to be followed in order to cope with these hazards throughout the demolition process.

Prepared by Golder Associates Ltd.

Characterization of Arsenic in Solid Phase Samples Collected on the Giant Mine Townsite

2001

The goal of this study was to employ a variety of analytical and mineralogical techniques in order to characterize the form in which arsenic is present in the soil, as well as its bioavailability.

Prepared by Environmental Sciences Group (ESG).

Royal Military College of Canada

Assessment of Back Bay Tailings Deposit, Giant Mine

January 2001

A geochemical and physical assessment of the tailings material currently located within Back Bay, prior to assessing the methods of mitigation and reclamation of the tailings deposit.

Prepared by EBA Engineering Consultants Ltd.

Arsenic Concentration on the Giant Mine Mill Site

December 2000

Report on work carried out on the Giant Mine Mill Site in September 2000. Analysis of data was limited to a discussion of the total arsenic concentrations found on the property.

Prepared by Royal Military College of Canada for INAC

Environmental Study of Arsenic Contamination from the Giant Mine

November 2000

A scientific study was carried out to assess the levels of arsenic found from the Giant Mine property. The study was conducted by the Environmental Sciences Group (ESG).

Prepared by Royal Military College of Canada for INAC

Giant Mine Hydrogeology Experts Meeting

November 30, 2000

This report summarizes the proceedings and recommendations resulting from a meeting of hydrogeologic experts convened in Calgary, Alberta, on March 2000. The meeting was held to review existing work; to solicit expert opinion; and to provide directions for future work.

Prepared by Duke Engineering & Services Inc.

A review of Arsenic Disposal Practices for the Giant Mine

September 2000

A literature review was carried out to obtain information about arsenic disposal practices in the mining-metals industry and about the long-term stability of the disposed arsenic compounds.

The information was analysed and evaluated to determine the applicability of current arsenic disposal technologies to the Giant Mine.

Includes four separate appendices - Technical papers on arsenic disposal.

Prepared by CANMET

SRK Senior Technical Session, Giant Mine Arsenic Trioxide

August 2000

To review the current state of knowledge about the arsenic trioxide dust; identify methods and develop alternatives for managing the arsenic trioxide dust; identify the information needed; and design & prioritize investigations to acquire the needed information.

Prepared by SRK Consulting

Waste Battery Consolidation at Giant Mine

June 2000

A report on waste batteries scattered at several sites throughout the mine property.

Prepared by Deton'Cho Corporation

Waste Oil Characterization at Giant Mine

June 2000

A waste oil report for the initial reclamation. An inventory of waste oil barrels is included.

Prepared by Deton'Cho Corporation

PCB Investigation at Giant Mine

April 2000

Assessment to determine if soil and transformers at suspect locations on the Giant Mine site meet GNWT Remediation Guidelines for PCBs.

Prepared by Deton'Cho Corporation

Giant Mine - Geotechnical Assessment

April 2000

Assessment of the geotechnical conditions of arsenic stopes and chambers, surrounding areas and excavated tunnels. Appendices includes: Table of bulkheads; Photo catalogue of accessible bulkheads; and 3D stope modelling.

Prepared by SRK Consulting

Cement and Bitumen Stabilization

March 2000.

A study using cement and bitumen for stabilizing the toxic mine dust.

Prepared by Dr. Bill Cullen, University of British Columbia

Groundwater Monitoring Report

March 9, 2000

Surface water and mine water sampling at selected sites at the Giant Mine. The objectives of this water sampling program were to: characterize the late-summer chemical and isotopic composition of surface waters and groundwaters; compare current data to previous data; and establish the framework for continued monitoring of surface water and groundwater quality.

Prepared by Fracflow Consultants Inc.

Recovery and Purification of Arsenic Oxide - Giant Mine

January 2000.

A production investigation of pure arsenic using water leaching-crystallization and re-sublimation techniques.

Prepared by CANMET

Construction and Calibration of a 3D Numerical, Flow and Transport Model

December 22, 1999

Development of a three-dimensional groundwater transport model of Giant Mine to understand and evaluate how water flow through the mine and arsenic trioxide storage vaults if the mine pumps were shut off and the mine allowed to flood. Complements the hydrogeological work done in 1998.

Prepared by Fracflow Consultants Inc.

Giant Mine Arsenic Trioxide Technical Workshop

November 1999

A workshop to develop a common understanding of the arsenic trioxide problem at Giant Mine, provided a forum to develop and apply arsenic management options.

Prepared by Dillon Consulting Ltd.

Baseline Environmental Report

November 1999

A baseline assessment of existing surface environmental conditions at the Giant Mine and Nicholas Lake exploration site.

Prepared by Golder Associates

Giant Mine Environmental Site Assessment and Cost Estimate

November 1999.

A non-intrusive environmental site assessment and reclamation cost estimate of the surface and underground components of the Giant Mine site. The report presents the environmental risks associated with the site and includes a cost estimate for the mine clean-up.

Prepared by Deton'Cho Corporation

**Participants Workshop Material - Giant Mine Arsenic Trioxide Technical Workshop
June 22, 23, 24, 1999.**

Workshop agenda, purpose & objectives, work items and selected references.

Produced by Dillon Consulting Ltd.

Evaluation of Two Pyrometallurgical/Selective Sublimation Technologies for Processing Crude Baghouse Dust at Giant to Recover Gold Values and Produce a Marketable Arsenic trioxide Product: WAROX Process and El Indio Process

June 1999

A comparison study of the two processes for recovering gold and marketable arsenic from crude baghouse dust produced and stored at the Giant Mine.

Prepared by Serena Domvile of Domvile & Associates

Review of Mining Methods Applicable to the Recovery of Baghouse Dust stored Underground at Giant Mine, Yellowknife, NWT.

March 1999

This report summarizes mining and transportation methods that could be utilized to remove the arsenic trioxide dust. It reviews previous mining proposals and provides additional alternatives.

Prepared by Robertson, B.

Tailings Management Plan

January 1999

The report outlines the proposed tailings management plan for the next five years of operation at Giant Mine.

Prepared by Golder Associates Ltd.

Arsenic Technology Review – Update

January 1999

A summary of three most viable management scenarios: Off Site Disposal, Treatment and On Site Disposal, and Refining & Marketing.

Prepared by Dillon Consulting Ltd.

Water License #N1L2-0043

June 30, 1998

Royal Oak Mines (Renewal Expiry Date - June 29, 2003).

NWT Water Board grants Royal Oak Mines Inc. to use water in accordance with the conditions specified in the License.

Prepared by Northwest Territories Water Board.

Giant Abandonment and Restoration Plan

December 1998

This document is intended to meet the Abandonment and Restoration reporting requirements for both the water license, under the authority of the NWT Water Board, and for the Surface Lease (No. L-3668T), under the authority of the Government of the Northwest Territories.

Prepared by EBA Engineering Consultants Ltd. and Royal Oak Mines Inc.

Preliminary Hydrogeological, Geochemical, and Isotopic Investigations at Giant Mine

June 1998

A preliminary hydrogeological study required in support of INAC's intervention on the application submitted by Royal Oak Mines Inc. for renewal of the water license.

Prepared by Fracflow Consultants Inc. & Dr. J.J. Gibson

Yellowknife - Back Bay Summer Water Quality Monitoring Program (September 1992 to June 1995)

April 1998

Investigation of the Yellowknife-Back Bay area in follow up to the August 1992 to March 1994 water, sediment and fish study in the same area. The focus of this study was to gather water quality data with additional sampling locations.

Prepared by F.J. Jackson

Giant Mine - Arsenic Trioxide Management.

A special study of the arsenic trioxide storage chambers. A review of arsenic chemistry, mine conditions, and emerging technologies. Current practice - storage and handling of arsenic trioxide. Options for permanent abandonment.

Prepared by Royal Oak Mines Inc. March 1998

Evaluation of Surface Contamination Data

March 1998

An evaluation of surface contamination data at Giant Mine to identify potential gaps in the existing database and assist in the development of a site specific remediation criterion for arsenic.

Prepared by EBA Engineering Consultants Inc.

INAC Intervention for Giant Mine Water Licence Renewal Public Hearing

January 1998

A brief description of the environmental screening process conducted under the Canadian Environmental Assessment Act (CEAA), followed by a summary of the District Water Resource Officer's Compliance Report, and analysis of the major conditions of the current Water License.

Prepared by INAC

Public Hearing for Royal Oak Mines Giant Mine

January 1998

Northwest Territories Water Board called the Public Hearing on January 28, 1998.

Questions and Comments included in this report.
Prepared by Northwest Territories Water Board

Arsenic Trioxide Management Feasibility Study

October 1997

An assessment on the current market, technology and feasibility for managing arsenic trioxide currently stored underground at the Giant mine site.

Prepared by Dillon Consulting Limited. (includes separate appendices)

Arsenic Trioxide - Surface Storage and Handling: Project Scoping Document

December 1997

A brief synopsis of Royal Oak's existing and proposed arsenic trioxide management plan. This document describes a management strategy for the long term handling of arsenic trioxide bearing dusts.

by Royal Oak Mines Inc. & EBA Engineering Consultants Ltd.

Reclaim: Version 3.1: Mine Reclamation Cost Estimating Model, Generic Guide

November 1997

RECLAIM was developed as a tool for government agencies, mining companies, and others to estimate the cost of mine reclamation. It is sufficiently comprehensive and flexible to provide a forecasting tool to meet most reclamation situations.

Prepared by Brodie Consulting Ltd.

Giant Mine Closure Cost Estimate

November 1997

An assessment of the technical and financial aspects of closing the mine, including various arsenic management options.

Prepared by Brodie Consulting Ltd.

Giant Mine Arsenic Trioxide Management: Technical Meeting Proceedings

October 1997

The meeting was organized to provide a venue for government agencies to develop a sound technical understanding of viable options for the ultimate management of arsenic trioxide.

(Includes separate appendices)

Prepared by Dillon Consulting Limited

Workshop on Controlling Arsenic Releases into the Environment in the Northwest Territories. Final Workshop Report

October 1997

A workshop was held to obtain advice and guidance on controlling arsenic releases into the environment. The workshop was designed to bring together representatives of aboriginal peoples, labour, industry, non-governmental organizations, and government agencies to develop recommendations related to releases of arsenic.

Prepared by MacDonald Environmental Sciences Ltd.

Application for Renewal of Water License N1L2-0043

August 1997

Supporting Documentation. Royal Oak Mines Inc.

Yellowknife - Back Bay Study on Metal and Trace Element Contamination of Water Sediment, and Fish

November 1996

Six species of fish were analysed for eight heavy metals. In addition to the metal analyses, a final section summarizes the following: an estimate of the annual loading of metals by Royal Oak Mines Inc. (Giant Mine) and Miramar Con Mine; and a description of shoreline for the two bays likely to be impacted by the future expansion of the City of Yellowknife.

Prepared by Jackson, F. (INAC), Lafontaine, C. (DFO) & Klaverkamp, J. (Freshwater Institute)

Socio-economic Analysis of Three Management Options to Reduce Atmospheric Emissions of Arsenic from Gold Roasting

September 1996

This report has been prepared to provide information to a federal government Task Force that was established to respond to the determination by the Ministers of Environment and Health that arsenic is a "toxic" substance under the Canadian Environment Protection Act (CEPA). This study provides a socio-economics analysis of three proposed management options.

Prepared by Resource Futures International

Guide Document on Arsenic: Sources, Fate, Analysis, Toxicology and Regulations.

May 1996

A reference document on arsenic, covering its properties, methods for detection and speciation, toxicology and fate, as well as the current regulations controlling its release to the environment. It covers a comprehensive overview of the issues and current practices associated with arsenic.

Prepared by Seacor Environmental Engineering

Arsenic Emission Control from Pyrometallurgical Operations

February 1996

An assessment on current state-of-the-art air pollution control technology used in controlling arsenic releases from pyrometallurgical operations, including gold roasting.

Prepared by W.R. Hatch Engineering Ltd.

An Investigation of Atmospheric Emissions from the Royal Oak Giant Mine

June 1993

The objective of the investigation was to measure pollutant levels resulting from arsenic and SO₂ emissions from the roaster stack and to determine the degree of impact these pollutants may be having on vegetation.

Prepared by GNWT, Yellowknife, NWT.

Arsenic and its Compounds

1993

CEPA, Priority Substances List Assessment Report. An assessment on arsenic and its inorganic compounds.

Prepared by Environment Canada & Health and Welfare Canada.

Task Force on Arsenic - Final Report

1977

A study of possible arsenic poisoning in Yellowknife, NWT. The report includes all short- term and long-term ill effects of arsenic exposure.

Prepared by Canadian Public Health Association Yellowknife, NT

