Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

Remediation Plan 101

Giant Mine Remediation Project

A Remediation Plan for Giant Mine was developed by INAC and its Technical Advisor, after extensive consultation with the general public, other government departments and industry experts. The Remediation Plan was subsequently vetted by an Independent Peer Review Panel. In 2007, the Remediation Plan for Giant Mine was submitted to the regulatory process in support of a water license application.

What is a Remediation Plan?

The Remediation Plan is the blueprint for cleaning-up the Giant Mine site to ensure that human health and safety and the environment are protected for the future.

Why do we need a Remediation Plan? What is the point?

The current state of Giant Mine is unacceptable. The site has been impacted by more than 50 years of gold mining and ore processing. Arsenic trioxide stored underground must be effectively managed to protect human health and safety, and the environment. The Remediation Plan explains how this will be done, and also describes general site clean-up activities on the surface.

What does the Remediation Plan cover?

The Remediation Plan covers the clean-up of the entire mine site, including the management of the 237,000 tonnes of arsenic trioxide dust currently stored underground, remediation of tailings ponds, and the demolition of buildings and other surface structures. More details are available on our website: www.giant.gc.ca

Is there anything the Remediation Plan doesn't cover?

The Remediation Plan was thoroughly reviewed by technical advisors and subject matter experts to ensure it addressed all the issues associated with cleaning up the mine site. It covers all surface and underground aspects of the clean-up of Giant Mine. It does not address future uses of the site after the remediation is completed.

Why can't INAC just go ahead with the remediation?

INAC needs to apply for a water license as part of the regulatory process first, and get approval for the Remediation Plan before the clean-up work can begin.

Remediation Plan 101

Who is the regulator for the Giant Mine Remediation Plan?

The Mackenzie Valley Land and Water Board (MVLWB) issues water licenses throughout the Mackenzie Valley under the *Northwest Territories Waters Act*. The MVLWB will provide an initial screening of the water license application – including the Remediation Plan – and decide whether to proceed with licencing, send the application back to INAC for further studies or review, deny the application, or refer it to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) for environmental assessment.

When will remediation of the site be finished?

We expect that the surface remediation may take five years to complete, while the complete freezing of the underground arsenic trioxide chambers and surrounding areas may take approximately 10 years to complete.

Will the remediation work remove all traces of arsenic trioxide from the area?

Most of the arsenic trioxide will stay safely sealed in the underground chambers behind concrete bulkheads and will be frozen. Any soils on the surface that are contaminated will be excavated and disposed of safely at the mine site.

Is the Remediation Plan a "safe" plan?

Yes. The Remediation Plan includes clean-up methods that have been successfully used at other contaminated sites across North America. Safety measures that were developed for other clean-up projects in North America have also been adopted for the remediation of Giant Mine.

Where can I get a copy of the Remediation Plan?

The Remediation Plan – along with all supporting documentation – is available through our public registry located on the 1st floor of the Waldron Building in Yellowknife. An Executive Summary of the Remediation Plan is also available through our website: www.giant.gc.ca

The Remediation Plan is a comprehensive plan with more than 40 supporting documents, including diagrams, tables, projections and illustrations. It forms a stack of binders nearly two feet high!

Giant Mine Remediation Joint Project Office

2nd Floor, Waldron Building, 5103 - 48th St., Yellowknife, NT X1A 1N5

Tel.: (867) 669-2426 Fax: (867) 669-2439 Email: giantmine@ainc-inac.gc.ca

QS-Y289-004-EE-A1 Cette publication est aussi disponible en français sous le titre : *Plan d'assainissement 101*

Northwest Territories

Canada

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

Summary of Communications Activities

Giant Mine Remediation Project

2007

Current as of June 1, 2007

Community Presentations

The Giant Mine Remediation Project Team presented an update on the Remediation Plan to Aboriginal community members from the Tlicho Government, the North Slave Metis Alliance, and the Yellowknives Dene First Nation.

Giant Mine Community Alliance

The Giant Mine Community Alliance (GMCA) visited Giant Mine for a surface tour, including the new Baker Creek bridge and creek diversion. The GMCA also resumed monthly meetings at the Giant Mine Remediation Project Office.

Mine Tours

The Assistant Deputy Minister of Indian Affairs and Northern Development, and the Regional Director General of Public Works and Government Services Canada, each received a guided tour of the mine site.

Media

A film crew from Pan Productions filmed at Giant Mine and conducted interviews for a potential CBC documentary. Various national and local newspaper, radio and television interviews were held with the Giant Mine Remediation Project Manager.

Technical Briefings

The Giant Mine Remediation Project Manager provided a technical briefing about the Remediation Plan to the staff of the Mackenzie Valley Environment Impact Review Board.

Website and Mall Display

The Giant Mine Remediation Project website was refreshed and re-launched. The Giant Mine Remediation Project mall display was removed.

2006

Technical Briefings

Members of the Mackenzie Valley Land and Water Board and the Mackenzie Valley Environmental Impact Review Board received technical briefings on the Remediation Plan. Briefings were also provided to City of Yellowknife Directors, participants and public at the annual Geoscience Forum, and members of the National Orphaned/Abandoned Mines Initiative.

Mine Tours

Staff from the Auditor General of Canada's office participated in a guided tour. Members of the Mining Association of Canada's Environmental Committee also received a tour.

Media

A reporter and photographer from the *Christian Science Monitor* received a tour, and *Canadian Geographic for Kids* filmed a show underground.

Giant Mine Community Alliance

The Giant Mine Community Alliance held a meeting to receive an update on the Remediation Plan.

2005

Announcements

Federal Minister of Indian Affairs and Northern Development, Andy Scott, and GNWT Minister Brendan Bell, signed a Cooperation Agreement between the two levels of government.

Federal Minister of the Environment, Stephane Dion, announced Federal Contaminated Sites Accelerated Action Plan funding for contaminated sites in Canada.

Summary of Communications Activities

Media

A CBC reporter and cameraman toured the new access ramp between the second and third levels of the mine. A *Yellowknifer* reporter received a guided surface tour, as did a *Toronto Star* reporter and photographer.

Mine Tours

Federal Minister of the Environment, Stephane Dion, and his staff toured underground to view the bulkheads on the arsenic chambers. INAC HQ Contaminated Sites Program staff and Giant Mine Community Alliance members received an underground and surface tour. Federal Contaminated Sites Accelerated Action Plan experts from Environment Canada, Fisheries and Oceans, and Health Canada also participated in a special surface tour with emphasis on planned remediation activities.

Technical Briefings

Media were invited to a technical briefing about the new Cooperation Agreement between the Government of Canada and the Government of the Northwest Territories.

2004

Giant Mine Remediation Project Team

The Giant Mine Remediation Project Team informed stakeholders and the media of INAC's decision to proceed with the Frozen Block method as the preferred long-term management alternative for the arsenic trioxide dust stored underground at Giant Mine.

Mine Tours

Underground and surface mine tours were provided to members of the Canadian Arctic Resources Canada executive, representatives of the Federal Contaminated Sites Accelerated Action Plan, Aboriginal elders from Dettah and N'dilo, members of the Yellowknife Chamber of Commerce, and members of the Board of Directors for Mining Watch Canada.

Giant Mine Community Alliance

The Giant Mine Community Alliance hosted a well-attended public information event and Open House in Yellowknife.

Community Presentations

The Giant Mine Remediation Project Team made a presentation to participants at the Geoscience Forum, and also to staff and students at St. Patrick's High School.

Public Meetings

Three information sessions were hosted for community members in Dettah.

2003

Between January and May 2003, the Giant Mine Remediation Project team hosted 20 public information sessions and presentations. Highlights are indicated below:

Community Presentations

The Giant Mine Remediation Project Team presented an information session to residents of Dettah and N'dilo. The Team was accompanied by members of the Independent Peer Review Panel, the Technical Advisor, the INAC Regional Director, and representatives of Environment Canada.

Mall Display

A large, multi-panel display unit was erected in Yellowknife's Centre Square Mall to present information on the Giant Mine Remediation Project. The display included a map of the mine site, a historical timeline, and the latest reports and information kits. A scale model of Giant Mine in a plexiglass case was also mounted on display.

Print Campaign

A print campaign ("You Asked, We Answered") was launched in local English and French-language newspapers. It focussed on answering commonly asked questions raised at public sessions.

Public Workshop

The Giant Mine Remediation Project team hosted a workshop to respond to public concerns and questions about the proposed long-term management alternatives. The workshop included members of the Technical Advisor group and of the Independent Peer Review Panel. The Giant Mine Community Alliance also hosted an evening session to solicit public feedback.

Community Presentations

The Giant Mine Remediation Project Team made presentations to, and received input from, community members of the Rotary Club International, the Catholic Women's League, and students and staff from St. Patrick's High School, Sir John Franklin High School and Aurora College.

Technical Briefings

Technical briefings were provided to members of the Legislative Assembly of the N.W.T., Yellowknife city councillors, Mackenzie Valley Environmental Impact Review Board staff, as well as members of the Mackenzie Valley Land and Water Board. Two briefing sessions were also held for INAC staff.

Giant Mine Community Alliance

The Giant Mine Community Alliance held its first public meeting.

Public Scoping

The Giant Mine Remediation Project Team met with residents and chiefs of N'dilo and Dettah to discuss their concerns about the mine and its future, as well as to table the results of the Technical Advisor's report and the Independent Peer Review Panel's comments.

Three scoping sessions were held with members of the Yellowknife Chamber of Commerce, the Giant Mine Community Alliance and representatives from local health and youth groups.

Public Workshop

INAC's Technical Advisor tabled its final report "Arsenic Trioxide Management Alternatives – Giant Mine" at a public technical workshop. The Independent Peer Review Panel also presented its assessment of the report.

2002

Website Launched

INAC launched the Giant Mine Remediation Project website: www.giant.gc.ca

Giant Mine Community Alliance

INAC established a community liaison committee: the Giant Mine Community Alliance. Its membership is composed of stakeholders from various community groups.

Technical Briefings

Technical briefings were provided to members of the Legislative Assembly of the N.W.T. and Yellowknife city councillors.

Open House

A three-day Open House was hosted for the general public.

Community Meetings

Six information sessions were held in N'dilo, Dettah and Yellowknife to exchange information and to respond directly to residents' questions and concerns.

2001

Mine Tours

Surface and underground mine tours were provided to Yellowknife city councillors, local media, and members of the Legislative Assembly of the N.W.T. Mine tours were also conducted for the media, the Commissioner for the Environment and Sustainable Development, and members of the Mackenzie Valley Land and Water Board.

Open House

A two-day Open House was held to update the public about the development of a management plan for Giant Mine's arsenic trioxide dust.

Summary of Communications Activities

Public Workshop

A public workshop was held in Yellowknife. Participants included technical experts, INAC representatives, federal and territorial regulators, and local stakeholders. This workshop was a key element in advancing the engineering, scientific, human health, and ecological risk considerations associated with the various management alternatives.

Public Scoping

Five scoping sessions were conducted in the communities of N'dilo, Dettah and Yellowknife, to assess their level of awareness and knowledge of the Giant Mine situation.

2000

Public Registry

A Public Registry was set up in the Giant Mine Remediation Project Office, on the 5th Floor of the Precambrian Building in Yellowknife.

Mine Tours

The Government of Canada's Federal Central Agencies toured Giant Mine.

1999

Technical Workshop

INAC hosted a technical workshop to build on the information determined from the 1998 workshop and subsequent research.

Public Information Event

A four-day Open House was conducted in Yellowknife by members of the Giant Mine Remediation Project Team to inform the public about plans for cleaning-up the mine site.

1998

Public Information Event

INAC hosted its first Open House for the general public.

Technical Workshop

INAC – in conjunction with Royal Oak Mines, Environment Canada, GNWT, and the City of Yellowknife – held technical meetings to review and discuss potential arsenic trioxide management options.

1997

Public Information Session/Technical Workshop

Environment Canada and Health Canada hosted a two-day public information session in Yellowknife to discuss the report on managing airborne arsenic from the Giant Mine roaster.

Giant Mine Remediation Joint Project Office

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QS-Y289-009-EE-A1 Cette publication est aussi disponible en français sous le titre :
Sommaire des activités de communication

Northwest Territories

Canada

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Key Stakeholders

Giant Mine Remediation Project

As a member of the general public, YOU have an important role to play in terms of the long-term remediation of Giant Mine. Your input at public hearings into the management alternatives for dealing with the arsenic trioxide helped Indian and Northern Affairs Canada (INAC) to narrow its focus to two options for further expert review and then to finally select the Frozen Block Method.

Meaningful consultation with local residents continues to remain a priority throughout this next phase of the project. We have prepared this brief overview of significant stakeholders and their roles in the remediation of Giant Mine for your understanding.

Indian and Northern Affairs Canada

Indian and Northern Affairs Canada (INAC) was assigned a caretaker role for the pre-existing condition of the site – including the underground arsenic trioxide dust – when Royal Oaks Mine went into receivership in 1999.

INAC is the lead federal government department for the remediation of Giant Mine and will be overseeing the remediation of the site to industrial standards.

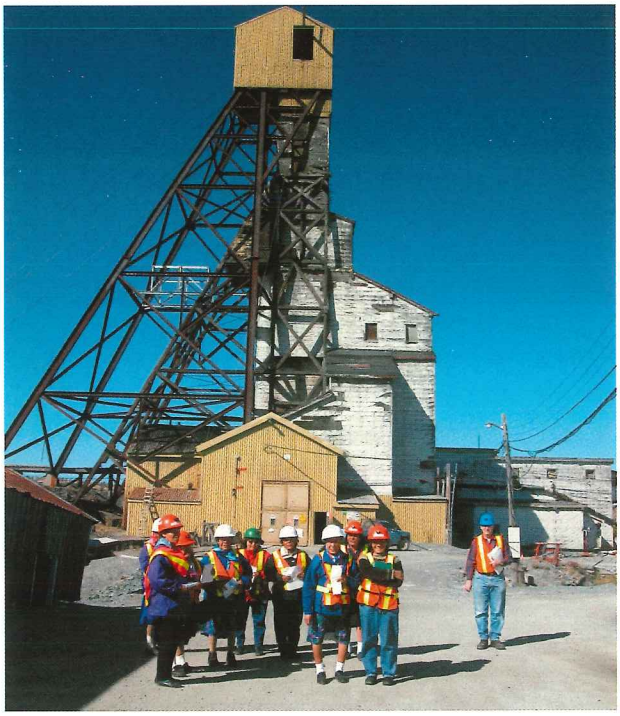
Other Federal Government Departments

Environment Canada, Health Canada, and the Department of Fisheries and Oceans, have all played a role in providing expert advice and assessment to INAC.

Public Works and Government Services Canada handles all contracting and procurement related to the care and maintenance contracts at Giant Mine.

Government of the Northwest Territories

The Giant Mine site is on Commissioner's Land and its administration falls to the Government of the Northwest Territories (GNWT). The GNWT will be engaged in the long-term development of the site after the remediation is complete, specifically the Department of Environment and Natural Resources, the Department of Transportation, and the Department of Municipal and Community Affairs.



Key Stakeholders

Giant Mine Oversight Committee

The Giant Mine Oversight Committee was struck in 2005 upon the signing of a Cooperation Agreement between the Government of Canada and the Government of the Northwest Territories (GNWT). It has equal federal and territorial representation, and is the means by which the two government departments make joint decisions about the remediation project.

The Regional Director General of INAC NWT Region and the Deputy Minister of Environment and Natural Resources (GNWT), provide strategic direction and guidance to the Giant Mine Remediation Project through the Oversight Committee.

City of Yellowknife

Giant Mine is within the city limits of Yellowknife. The Municipality of Yellowknife was granted a lease by the GNWT for the former Giant Mine townsite.

The City of Yellowknife also maintains a boat dock adjacent to Giant Mine, and plans to establish a NWT Mine Heritage museum on the former Giant Mine townsite.

Yellowknives Dene First Nation

The area surrounding Giant Mine is in the traditional territory of the Yellowknives Dene First Nation. The Yellowknives Dene First Nation is in the process of negotiating a land, resource and governance agreement with the Government of the Northwest Territories and the Government of Canada – known as the Akaitcho Process – which may deal with the loss of their traditional hunting and fishing grounds.

Giant Mine Community Alliance

The Giant Mine Community Alliance (GMCA) was established in 2003 to assist the public by sharing information about the project and relaying public concerns and issues about the remediation of Giant Mine.

GMCA members include the mayor of Yellowknife, representatives from the Yellowknife Chamber of Commerce, the NWT Mine Heritage Society, the Northern Territories Federation of Labour, and the North Slave Metis Alliance, as well as an Environmental Representative, a Health Representative and a representative from the general public. A representative from the Yellowknives Dene First Nation also participates in GMCA meetings as an observer.

SRK Consulting Engineers and Scientists Inc.

In 2000, SRK Consulting Inc. won an international competition to become lead technical advisor to INAC on the management of the arsenic trioxide dust. SRK Consulting is an independent, international consulting practice that employs leading specialists in science and engineering. SRK's reports were subject to an Independent Peer Review Panel.

Independent Peer Review Panel

An Independent Peer Review Panel consisting of nine recognized experts in the fields relevant to the remediation of Giant Mine was initially appointed in 2002 to provide technical review of the Arsenic Trioxide Management Alternatives Report and subsequently to provide technical review of the Remediation Plan for Giant Mine.

The Independent Peer Review members considered every aspect of the Remediation Plan, and provided concrete advice and analysis that was taken into advisement by INAC and incorporated into subsequent versions of the Remediation Plan for Giant Mine.

Key Stakeholders

Mackenzie Valley Land and Water Board

The Mackenzie Valley Land and Water Board (MVLWB) was created in 1998 under the *Mackenzie Valley Resource Management Act*. It regulates the use of land and waters, and the deposit of waste to provide for the conservation, development and utilization of land and water resources.

The MVLWB issues land use permits and water licences throughout the Mackenzie Valley under the *NWT Waters Act*, and has a key role to play in the regulatory process for the Giant Mine Remediation Plan.

Mackenzie Valley Environmental Impact Review Board

The Mackenzie Valley Environmental Impact Review Board (MVEIRB) is responsible for conducting environmental impact assessments and environmental impact reviews throughout the Mackenzie Valley. It maintains a public registry of all preliminary screenings conducted by Regulatory Authorities and makes recommendations to the Minister of Indian Affairs and Northern Development for rejection or approval of projects.

The Mackenzie Valley Land and Water Board (MVLWB) may opt to refer INAC's water license application and Remediation Plan for Giant Mine to MVEIRB for an environmental assessment.

Non-Governmental Organizations – Environment

Local environmental organizations such as Ecology North, the Canadian Arctic Resources Committee (CARC), and the Canadian Parks and Wilderness Society (CPAWS) have an important role to play to ensure that the government's process remains open and transparent.

With their singular focus on the environment, these Non-Governmental Organizations ask pertinent questions and ensure that all aspects of environmental impact have been carefully considered in the planning process.

Giant Mine Remediation Joint Project Office

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QS-Y289-008-EE-A1 Cette publication est aussi disponible en français sous le titre : *Intervenants clés*

Northwest Territories

Canada

(Engineering Mine Grid)

Mine North

4000 E

6000 E

8000 E

A1 Pit

A2 Pit

C1 Pit

B2 Pit

B1 Pit

B4 Pit

B3 Pit

B3 VENT PLANT

Brock Pit

BAKER CREEK

LEASE BOUNDARY

TOWNSITE

MINESITE

YELLOWKNIFE BAY
Great Slave Lake

POCKET LAKE

GAR LAKE

TRAPPER LAKE

TRAPPER CREEK

VEE LAKE ROAD

NORTHWEST POND

INGRAHAM TRAIL

GARBAGE DUMP

SUPERCREST Vent Shaft

SOUTH POND

CENTRAL POND

NORTH POND

POLISHING POND

SETTLING POND

TRP

TAILINGS PIPELINES

I.C.I. EXPLOSIVES PLANT

DAM 3D

UNSURVEYED LEASE BOUNDARY

10000 N

12000 N

14000 N

16000 N

18000 N

20000 N

Scale
0 500 1,000 Feet

Indian and Northern Affairs Canada / Affaires Indiennes et du Nord Canada

Giant Mine Remediation Project

MINESITE SURFACE PLAN

SCALE: NTS	Revision:
DATE: Sep. 10, 2003	Revision:
DRAWN BY: MSL	Revision:
UPDATED: Mar. 17, 2005	Revision:

File: S: \GMRP..\Surface\Surfmap2005.dwg

(Grille technique de la concession de la mine)

4000 E

6000 E

8000 E

Mine nord

Lac Gat

Lac Pocket

Limite du territoire de la concession

Fosse A1

Fosse A2

Ruisseau Baker

Fosse Brock

Fosse C1

Fosse B2

LOTISSEMENT URBAIN

Limite de la concession par rapport à l'élévation

CHEMIN DE DÉVIATION DU RUISSEAU BAKER

INSTALLATION DE VENTILATION

Fosse B1

Ruisseau Baker

ROUTE DU LAC VEE

LAC TRAPPER

Fosse B4

LAGUNE NORD-OUEST

SITE DE LA MINE

CHEMIN DE TRANSPORT DES RESIDUS MINIERS

Fosse B3

PISTE INGRAHAM

INSTALLATION DE VENTILATION B5

TERRAIN DE DECHARGE

Puits de ventilation SUPERCREST

BAIE DE YELLOWKNIFE
Grand lac des Esclaves

LAGUNE SUD

LAGUNE CENTRALE

TRP

LAGUNE TERTIAIRE

LAGUNE DE DECANTATION

ETP

LAGUNE NORD

BATIMENT D'ENTREPOSAGE DES EXPLOSIFS

Limite du territoire de la concession

LIMITE NON ARPENTEE DE LA CONCESSION

10000 N

12000 N

14000 N

16000 N

18000 N

20000 N

Echelle
0 500 1000 pieds

Indian and Northern Affairs Canada / Affaires Indiennes et du Nord Canada

Projet de restauration de la mine Giant

PLAN DE SURFACE DU SITE DE LA MINE

Echelle:	Revision:
DATE: 10 Septembre 2003	Revision:
Carte etablie par: MSL	Revision:
Mis a jour le: 17 Mai 2005	

Dossier: S:\GMRP..\Surface\Surfmap2007.dwg

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

Historical Timeline

Giant Mine Remediation Project

1935
- Burwash Yellowknife Mines Ltd. stakes 21 claims, including the future Giant Mine

1937
- Yellowknife Gold Mines Ltd. acquires Burwash's assets, which become part of a subsidiary – Giant Yellowknife Gold Mines Ltd. (GYGML)

1948
- June 3: first gold brick is poured
- Tailings deposited into Back Bay

1949-1951
- Airborne arsenic emissions estimated at 7,500 kg/day

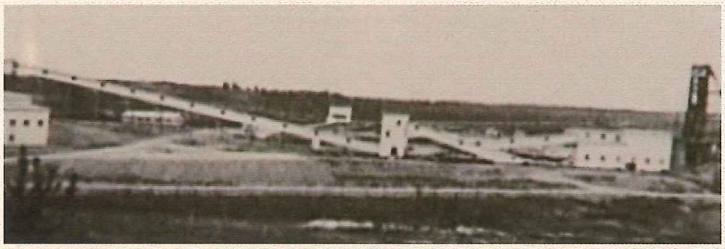
1950
- GYGML initiates first studies into arsenic in surrounding environment, leading to revised operations

1951
- Cold Cottrell Electrostatic Precipitator (ESP) installed to remove arsenic trioxide from roaster gases
- Arsenic emissions drop to 5,500 kg/day
- Arsenic trioxide dust pumped into mined-out storage chambers 80-250 feet below surface in permafrost

1952
- Mill processes 400 to 700 tons of ore per day

1953
- Tailings dam construction marks beginning of engineered tailings disposal

1955
- Hot Cottrell ESP installed to capture gold-bearing arsenic dust



Giant YK Mine/NWT Archives/N-2001-014

1957
- Tailings dam #2 is built
- Arsenic removal from tailings effluent commences

1958
- Mill processing rate increases to 1,000 tons per day
- Dracco baghouse facility constructed to collect arsenic trioxide dust

1959
- Airborne arsenic emissions drop to 200 – 300 kg/day

1962
- Arsenic trioxide storage moves to mined-out stopes located in permafrost zone

1967
- Improved tailings effluent treatment circuit commissioned

1970
- Commissioner's Lands Act proclaims surface land transfers to the Government of the Northwest Territories (GNWT), including Giant Mine site

1974
- Open pit mining begins

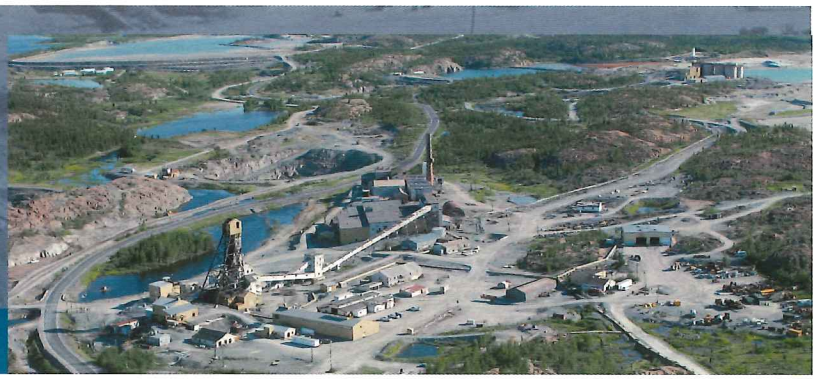
1981
- New tailings effluent treatment plant commences operation

1981-1986
- Koppers Corp. of Georgia, U.S.A. purchases 6,700 tons of arsenic trioxide dust from Giant Mine until the price drops ending Koppers Corp's purchases
- Regular inspection of storage chambers begins

1987
- Northwest Tailings Pond built to accommodate re-processed tailings

1990
- Royal Oak Resources Ltd. gains control of Giant Yellowknife Gold Mines Ltd.

1991
- Royal Oak Mines Inc. formed



Black & white photos courtesy of the Prince of Wales Northern Heritage Centre

Aerial overview picture courtesy of Paul Vescei

1992
- Explosion during labour strike results in deaths of nine miners

1997
- Indian and Northern Affairs Canada (INAC) along with Royal Oak Mines, Environment Canada, the GNWT and the City of Yellowknife, co-host a technical workshop to discuss management of arsenic trioxide at Giant Mine

1999
- Royal Oak Mines goes into receivership and Giant Mine is transferred to INAC
- INAC starts work on action plan to manage arsenic trioxide dust stored underground
- INAC sells Giant Mine assets to Miramar Giant Mine Ltd., a division of Miramar Mining Corporation. INAC takes on role of caretaker for pre-existing environmental liabilities on the property, including arsenic trioxide dust stored underground

2000
- SRK Consulting wins international competition to become lead technical advisor to INAC on the management of arsenic trioxide dust

2001
- Technical advisor completes report "Study of Management Alternatives – Giant Mine Arsenic Trioxide Dust"
- Public technical workshop held to review report
- Remediation work completed on former Back Bay tailings beach
- Miramar Giant Mine Ltd. submits an abandonment and restoration plan to the Mackenzie Valley Land and Water Board

2002
- INAC and community stakeholders appoint Independent Peer Review Panel to assess options for long-term management of arsenic trioxide dust
- Tier 2 human health and ecological risk assessments conducted to assess risks of current arsenic releases from the mine site, as well as potential future releases under various arsenic trioxide management alternatives
- Field testing initiated of deep thermosyphon

2003
- Independent Peer Review Panel tables its review of technical advisor's final report
- Technical advisor tables its final report "Arsenic Trioxide Management Alternatives – Giant Mine" at a public workshop in January
- INAC initiates extensive public communications campaign regarding management alternatives for Giant Mine
- Giant Mine Community Alliance is established and holds its first meeting
- The Giant Mine Remediation Project teams hosts a workshop in May
- INAC seeks approval to proceed with project description

2004
- INAC announces decision to proceed with the Frozen Block Method as the preferred long-term management alternative for storage of arsenic trioxide dust

2005
- INAC and the GNWT sign a Cooperation Agreement to work together on surface and subsurface remediation of Giant Mine
- Miramar terminates its obligations under the Reclamation Security Agreement. Giant Mine becomes an abandoned mine site
- Deton' Cho Nuna Joint Venture wins a contract to assume responsibility for interim care and maintenance of Giant Mine

2006
- A Remediation Plan for the immediate and long-term cleanup of the mine is developed by INAC's technical advisors and reviewed by independent experts

2007
- INAC submits the Remediation Plan along with a water license application to the Mackenzie Valley Land and Water Board
- Deton'Cho Nuna Joint Venture is awarded a multi-year contract for care and maintenance at Giant Mine

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QS-Y289-006-EE-A1 Cette publication est aussi disponible en français sous le titre : *Chronologie historique*

Northwest Territories

Canada

Affaires indiennes et du Nord Canada | Indian and Northern Affairs Canada

Chronologie historique

Projet d'assainissement de la mine Giant

1935
- La Burwash Yellowknife Mines Ltd. jalonne 21 claims, y compris la superficie de la future mine Giant

1937
- La Yellowknife Gold Mines Ltd. acquiert les intérêts de la société Burwash pour former la filiale Giant Yellowknife Gold Mines Ltd. (GYGML)

1948
- 3 juin : le premier lingot d'or est coulé
- On dépose des résidus dans la baie Back

1949-1951
- On estime les émissions atmosphériques d'arsenic à 7500 kg/j

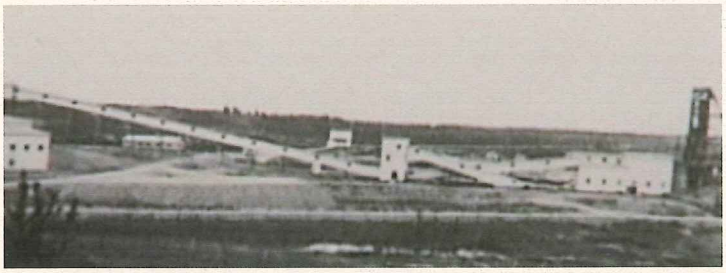
1950
- La GYGML entreprend les premières études sur l'arsenic présent dans le milieu ambiant, ce qui pousse la société à modifier ses techniques d'exploitation

1951
- On installe un dépoussiéreur électrique (ESP) à froid du type Cottrell afin d'éliminer le trioxyde de diarsenic des gaz de four de grillage
- Les émissions d'arsenic sont réduites à 5500 kg/j
- La poussière de trioxyde de diarsenic est acheminée par une pompe dans des chambres de stockage épuisées, situées dans le pergélisol, à une profondeur de 80 à 250 pieds

1952
- L'usine de la mine traite de 400 à 700 tonnes de minerai par jour

1953
- On construit une digue à stériles et emploie ainsi pour la première fois une technique d'élimination des résidus

1955
- On installe un ESP à chaud du type Cottrell afin de récupérer la poussière d'arsenic aurifère



La mine Giant/Archives T.N.-O./N-2001-014

1957
- On construit la deuxième digue à résidus miniers
- On amorce l'élimination de l'arsenic présent dans les effluents de résidus miniers

1958
- La capacité de traitement de l'usine atteint 1000 t/j
- On installe un dépoussiéreur à sacs filtrants du type Dracco afin d'éliminer la poussière de trioxyde de diarsenic

1959
- Les émissions atmosphériques d'arsenic sont réduites et se situent entre 200 et 300 kg/j

1962
- Le stockage du trioxyde de diarsenic s'effectue maintenant dans les gradins d'exploitation épuisés, dans les zones de pergélisol

1967
- Mise en service d'un circuit de traitement amélioré des effluents de résidus miniers

1970
- L'adoption de la Loi sur les terres domaniales entraîne le transfert des droits de surface au gouvernement des Territoires du Nord-Ouest, y compris les droits relatifs au site de la mine Giant

1974
- On entreprend les premiers travaux d'exploitation à ciel ouvert

1981
- Mise en service de la nouvelle usine de traitement des effluents de résidus miniers

1981-1986
- La société Koppers Corp. de Géorgie, aux États Unis, achète 6700 t de poussière de trioxyde de diarsenic à la mine Giant. La chute subséquente du prix interrompt les achats de la Koppers
- Les chambres de stockage commencent à faire l'objet d'inspections régulières

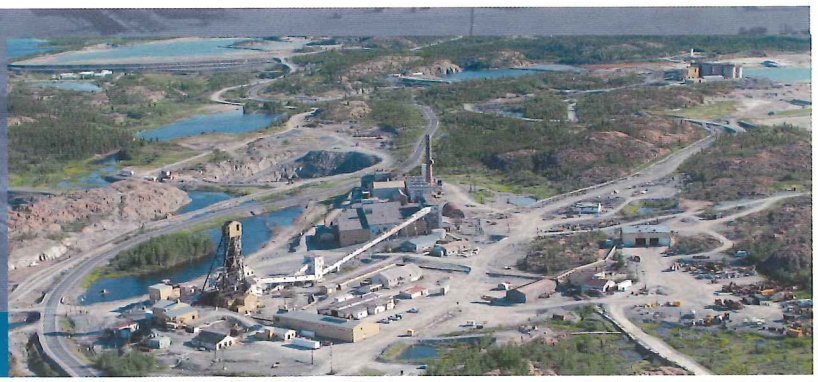
1987
- On construit le bassin nord-ouest afin d'y stocker les résidus ayant subi un traitement supplémentaire

1990
- La Royal Oak Resources Ltd. prend le contrôle de la Giant Yellowknife Gold Mines Ltd

1991
- La société Royal Oak Mines Inc. est fondée

1992
- Une explosion se produit pendant une grève et entraîne la mort de neuf mineurs

Photographies achromes utilisées avec la permission du Centre du patrimoine septentrional du Prince de Galles



Photographie aérienne du site utilisée avec la permission de Paul Vescei

1997

- Le ministère des Affaires indiennes et du Nord canadien (AINC), de concert avec la Royal Oak Mines, Environnement Canada, le gouvernement des Territoires du Nord-Ouest et la ville de Yellowknife, organise un atelier technique sur la gestion du trioxyde de diarsenic à la mine Giant

1999

- La Royal Oak Mines Inc. est mise sous séquestre et les droits de propriété de la mine Giant sont transférés au AINC
- L'AINC entreprend l'élaboration d'un plan d'action visant à gérer la poussière de trioxyde de diarsenic stockée sous terre
- L'AINC vend les intérêts de la mine Giant à la société Miramar Giant Mine Ltd., une filiale de la Miramar Mining Corporation. L'AINC devient alors responsable de la propriété, en matière de répercussions environnementales qui existaient déjà, y compris la poussière de trioxyde de diarsenic stockée sous terre.

2000

- La firme SRK Consulting remporte un appel d'offres international et devient le principal conseiller technique du AINC en ce qui a trait à la gestion de la poussière de trioxyde de diarsenic

2001

- Le conseiller technique du AINC termine le rapport intitulé « Study of Management Alternatives – Giant Mine Arsenic Trioxide Dust » (Étude des diverses méthodes de gestion de la poussière de trioxyde de diarsenic de la mine Giant)
- Un atelier technique public est tenu afin d'analyser ce rapport
- Des travaux de restauration sont exécutés sur l'ancienne plage à résidus miniers de la baie Back
- Miramar Giant Mine Ltd. soumet un plan d'abandon et de restauration du site minier à l'Office des terres et des eaux de la vallée du Mackenzie

2002

- L'AINC et des parties intéressées dans la communauté forment un comité indépendant d'évaluation par des pairs afin d'étudier diverses méthodes de gestion à long terme de la poussière de trioxyde de diarsenic
- On effectue des évaluations des risques de deuxième catégorie pour la santé et l'environnement afin de déterminer les risques actuels d'émissions d'arsenic sur le site de la mine Giant et les risques d'émissions futurs en fonction des diverses méthodes de gestion de la poussière de trioxyde de diarsenic
- Mise à l'essai, sur le terrain, d'un système de thermosiphons installé en profondeur dans la mine

2003

- Les membres du comité indépendant d'évaluation par des pairs déposent leur examen du rapport final du conseiller technique
- Lors d'un atelier public tenu en janvier, le conseiller technique dépose son rapport final intitulé « Arsenic Trioxide Management Alternatives, Giant Mine » (Méthodes de gestion du trioxyde de diarsenic à la mine Giant)
- L'AINC lance une importante campagne publique d'information sur les diverses méthodes de gestion du trioxyde de diarsenic à la mine Giant
- L'Alliance de la communauté de la mine Giant est formée et tient sa première réunion
- Les responsables du Projet de restauration de la mine Giant organisent un atelier en mai
- L'AINC soumet une demande afin d'obtenir une autorisation avant d'entreprendre la description du projet de gestion

2004

- L'AINC annonce sa décision d'adopter la méthode des blocs congelés comme meilleure mesure de stockage à long terme pour la gestion de la poussière de trioxyde de diarsenic

2005

- L'AINC et le gouvernement des Territoires du Nord-Ouest signent une entente portant sur l'exécution conjointe de travaux de restauration de la surface et du sous-sol de la mine Giant
- Conclusion de la période de responsabilité de la Miramar, en vertu de l'accord de garantie des activités de restauration. La mine Giant devient un site minier abandonné
- La coentreprise Deton'Cho Nuna obtient un contrat d'un an visant les responsabilités intérimaires d'entretien et de maintenance de la mine Giant

2006

- Élaboration d'un plan de restauration portant sur les travaux de nettoyage immédiats et à long terme de la mine Giant; examen du plan par des spécialistes indépendants

2007

- L'AINC présente le Plan de restauration, de même qu'une demande de permis d'utilisation des eaux, à l'Office des terres et des eaux de la vallée du Mackenzie
- La coentreprise Deton'Cho Nuna obtient un contrat pluriannuel pour l'entretien et la maintenance de la mine Giant

Bureau du projet commun d'assainissement de la mine Giant

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QS-Y289-006-FF-A1 This publication is also available in English under the title:
Historical Timeline

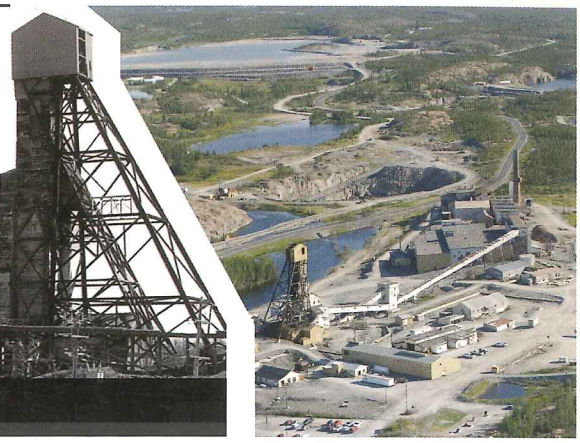
Territoires du Nord-Ouest

Canada

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

The Giant Update

Giant Mine Remediation Project



Giant Mine has played a significant role in Canadian history since 1948 when the first gold brick was poured. The Yellowknife mine was one of Canada's largest producers of gold, and one of the single biggest employers for Yellowknife residents until its closure. Now, more than 50 years later, it is time to remediate the mine site in a responsible and effective manner.

Giant Mine Community Alliance site tour

Water sampling of ponds during winter

In 2005, the Government of Canada and the Government of the Northwest Territories signed a 10-year Cooperation Agreement on the management and remediation of Giant Mine. Subsequently a remediation plan for Giant Mine was developed by INAC and its Technical Advisor after extensive consultation with the general public, other government departments and industry experts.

Remediation Plan

In 2007, the Remediation Plan for Giant Mine was submitted to the Mackenzie Valley Land and Water Board as part of a water license application. The Remediation Plan outlines the clean-up plans for the entire mine site, including surface remediation (demolition of buildings, tailings clean-up), and subsurface containment of the 237,000 tonnes of arsenic trioxide dust using the Frozen Block Method.

Implementation of the Remediation Plan will begin once the regulatory process is complete and the project receives final approval. It is anticipated that the site remediation, including the freezing of the underground chambers, could be finished within 10 years. Monitoring of the freeze plant and mine site will continue post-remediation.

The Remediation Plan and its supporting documents form a stack of binders nearly two feet high!

Surface Remediation

Raising the filter dyke between the settling and finishing ponds

Existing conditions at Giant Mine are described in the Remediation Plan. Issues such as the demolition of buildings, removal of contaminated soils, rehabilitation of Baker Creek, re-alignment of the highway, and tailing covers are addressed in the Remediation Plan. Remediation activities for the surface will ensure the site is usable by future generations for industrial purposes, while recognizing that portions of the site may be suitable for other land uses with appropriate restrictions, including traditional and recreational use.

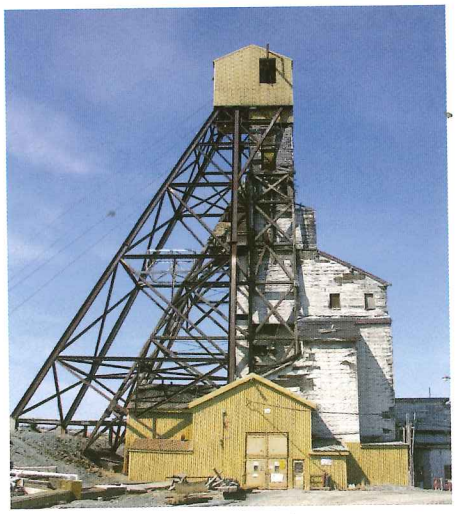
Some portions of the surface will require on-going land use restrictions – for example, hazardous waste areas.

Some parts of certain pits will also be fenced off, and there will be no public access to the freeze pipe areas.

The majority of surface remediation activities will take place over approximately a five-year period after the project is approved, followed by additional maintenance work and verification testing.

The mill conveyer is one of more than 100 buildings scheduled to be demolished at Giant Mine

Diversion of Baker Creek around C1 Pit



The C-shaft headframe is a familiar part of the Yellowknife landscape

Rehabilitation of Baker Creek

Throughout the active operating life of the mine, Baker Creek was diverted in several places to allow for the excavation of open pits for mining and the construction of tailings holding areas. During the early years of operation, sediments in Baker Creek were contaminated by the uncontained discharge of tailings, as well as by release of mining waste products prior to the construction of the water treatment plant.

The Remediation Plan identifies activities that will help restore Baker Creek as much as possible to an ecologically sound habitat. Water quality in the creek will improve once a new water treatment plant has been constructed and treated water is no longer discharged into the creek.

Because Baker Creek flows directly over the C-212 arsenic storage chamber, a diversion of the creek away from this chamber is required to allow construction of the freeze pipes. This section of the creek was a concern because of potential flooding of the mine due to increased water flow through a rock dam into the north end of the C-1 Pit, and into the underground mine.

As a result, INAC decided to proceed with the diversion of a small portion of Baker Creek as part of regular care and maintenance activities to mitigate the risk of flooding. The diversion was completed in the summer of 2006. INAC worked closely with the Department of Fisheries and Oceans to develop the design for the diversion and the new fish habitat in this section of Baker Creek. This work included removal of the low-level concrete dam to allow the upstream water to return to its natural level.

Construction of the Baker Creek diversion

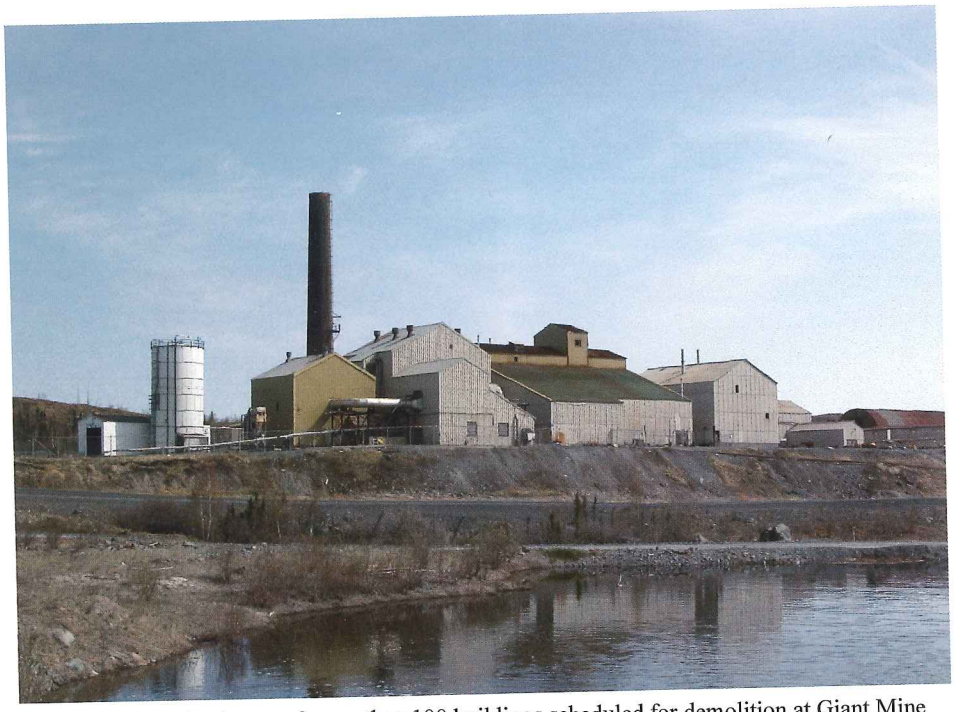

Placing bitumen liner in the new creek bed


Baker Creek in the summer

Additional changes to Baker Creek, including the development of lakes in some of the pits, may be possible in the future if water quality allows.

Buildings and Infrastructure

All of the buildings on the Giant Mine site that have no continuing function will be demolished. Several buildings on the site, such as the roaster complex, contain hazardous materials that could pose risks to site workers and the environment during the demolition stage. For this reason, strict safe work procedures based on industry-best practices for ensuring the safety of site workers, the public and the environment, will be followed. Hazardous materials and potential contaminants will be removed from the buildings prior to demolition, when this is safe and practical. The materials removed from the buildings before demolition, or recovered from the demolition debris, will be handled and disposed of according to industry-best standards.



The roaster complex is one of more than 100 buildings scheduled for demolition at Giant Mine

Removal of Mining Roads

Mining roads not required for maintenance and inspections at the site will be removed, and these areas will be planted with native vegetation to restore them as closely as possible to their natural state.

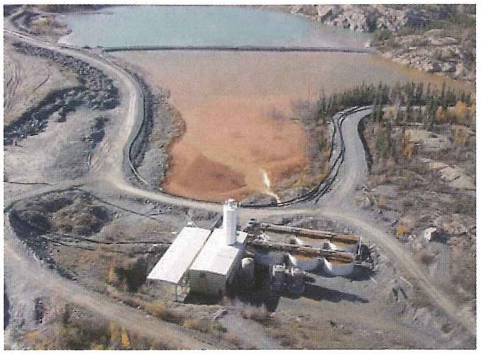
Open Pits

The B1 Open Pit will be backfilled and covered

There are eight open pits on the mine site, five of which are substantial in size. The B1 Pit will be backfilled to facilitate installation of the ground freezing system. Contaminated soils from other areas on the mine site will be contained in the portion of this pit that will ultimately be within the frozen zone.

Waste rock, quarry rock or clean demolition waste will be used to fill the remainder of the pit. The entire backfilled area will then be covered with soil and re-vegetated. The other pits will be surrounded by berms or fences to prevent inadvertent public access.

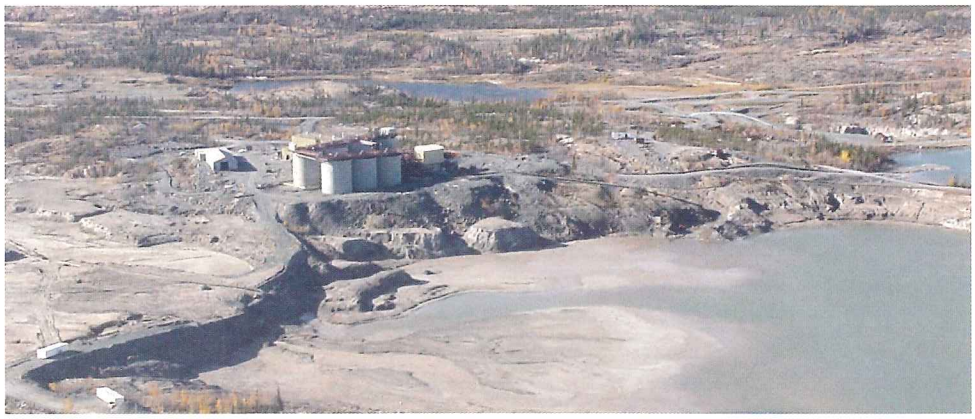
Water Management



The water treatment plant and ponds

A new water treatment plant will be constructed to treat contaminated water extracted from around the arsenic trioxide chambers and stopes. Contaminated surface water will also be collected and treated until monitoring data clearly shows that the arsenic levels are low enough to allow direct discharge. Over the longer term, it is expected that water from the underground mine areas outside the frozen zones may continue to need treatment, and the new water treatment plant will remain in operation as long as required.

Tailings



The north tailings pond and tailings reprocessing plant will be remediated

The tailings and sludge areas will be covered with one layer of quarried rock and a second layer of fine-grained soil. The lower layer of quarried rock will prevent contaminants from the tailings from moving upward and inhibit the downward penetration of plant roots. It will also serve as a final protective layer in the event that the soil erodes. The upper layer of fine-grained soil will allow revegetation and a variety of future uses for the site may be considered. The surface of each tailings area will be graded, and ditches and spillways constructed, to limit erosion and to allow water to run off the cover without becoming contaminated.

Tailings consist of finely ground rock (similar in size to sand particles), that are left over after gold has been removed from the ore.

Remediation Plan Objectives

- To manage the underground arsenic trioxide dust in a manner that will prevent the release of arsenic to the surrounding environment, minimize public and worker health and safety risks during implementation, and be cost-effective and robust over the long term
- To remediate the surface of the mine site to industrial standards under the *NWT Environmental Protection Act*, recognizing that portions of the site will be suitable for other land uses with appropriate restrictions
- To minimize public safety risks associated with contaminated buildings, mine openings and other physical hazards at the site
- To minimize the release of contaminants from the mine site to the surrounding environment
- To restore Baker Creek to a natural channel that is as ecologically sound as possible, given the natural constraints of hydrology and climate

Contaminated Soils

Throughout its 50 years of active mining operations, more than seven million ounces of gold were recovered from Giant Mine. The arsenic trioxide dust is a by-product of the gold production process when the mined ore was roasted to release the gold.

The majority of surface areas with a high level of arsenic contamination will be excavated, and where feasible, the highly-contaminated materials will be placed into the frozen zone that will be created by freezing the arsenic storage chambers and underlying stopes. Any remaining contaminated soils will be covered with clean material after excavation to a depth of two metres.

Removal of contaminated soil on the surface will commence after the demolition of the arsenic-contaminated roaster and associated buildings.

Stopes are large open cavities or voids left behind after miners have extracted the rock (ore).

Contamination by diesel fuel and/or fuel oil occurred in areas where fuel handling took place, with the highest concentrations located where bulk fuel storage tanks were situated. Many of the hydrocarbon contaminated areas co-exist with areas of arsenic contaminated soils and will be cleaned up at the same time.

Hazardous materials stored in overpacks

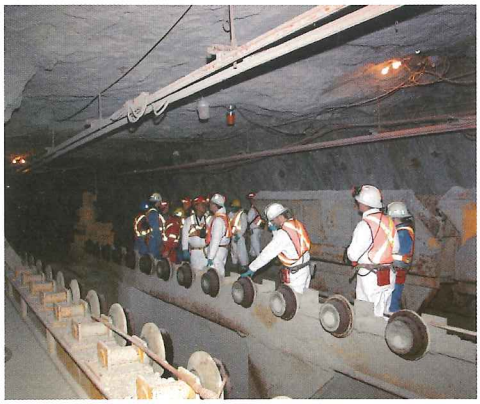
One of many on-site dumps at the Giant Mine

Deton'Cho Nuna Joint Venture workers on-site

Who is taking care of the Giant Mine site?

The Government of Canada has contracted Deton'Cho Nuna Joint Venture to provide the continued care and maintenance of the Giant Mine site. This northern-based, Aboriginal company is responsible for maintaining the mine in a partially de-watered and environmentally-compliant state. They are also responsible for operating the effluent treatment plant, performing risk mitigation work and services, protecting the public and performing site security.

Underground Remediation



An underground tour of the dump station at the 1500m level

Freezing of the arsenic trioxide chambers and stopes, and the rock surrounding them, is known as the Frozen Block Method. This method is fully described in the Remediation Plan, including the long-term monitoring of the chambers, stopes and rock.

The Frozen Block Method presents the lowest short-term and long-term risks, as well as low worker health and safety risks. Managing the arsenic trioxide dust where it is currently stored will avoid the potential worker health and safety risks associated with having to move or handle the toxic material.

The Remediation Plan also includes additional activities to deal with the removal of other underground contaminants such as lubricating oils, transformers, batteries and explosives.

Frozen Block Method

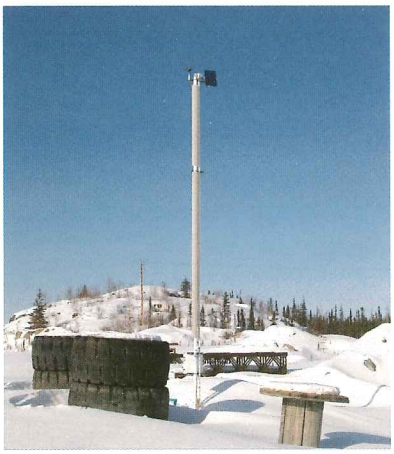
After community consultations, and based on recommendations of both the project's technical advisor and a panel of independent peer review experts, it was determined that the best option for dealing with the arsenic trioxide dust that is currently stored underground is to freeze it and the surrounding rock using the Frozen Block Method. This will result in the re-introduction of pre-existing permafrost conditions.

The Frozen Block Method involves freezing the ground under and around the arsenic trioxide dust stopes and chambers, creating a frozen rock barrier. This will keep any water from seeping into the arsenic storage areas and prevent any subsequent release of arsenic or arsenic-contaminated water. The interior of the frozen stopes and chambers will then be flooded and frozen to increase the thermal mass of frozen material. The blocks will be kept frozen over the long-term by using a freeze plant and thermosyphons which extract heat from the ground.

Implementation of the ground freezing is expected to take up to 10 years. During this time, accessible bulkheads of the arsenic storage vaults will be inspected on a regular basis. Ultimately all bulkheads will be included in the frozen zone.

Bulkheads are concrete plugs that will seal the passageway to the stopes after the workers have inserted the arsenic trioxide dust.

Thermosyphons



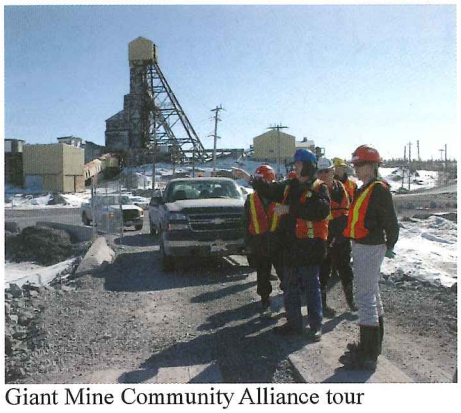
Thermosyphons are heat pipes used throughout the North to prevent ice-rich permafrost from melting below buildings and other infrastructures. Underground heat is released through the pipes to the surface.

Other Important Remediation Work

The Remediation Plan also includes the following activities at Giant Mine:

- Constructing a new water treatment facility using the best available technology for year-round treatment of contaminated mine water
- Constructing a water treatment sludge disposal facility (landfill) that will incorporate monitoring and collection systems to prevent discharge of contaminants from sludge
- Covering tailings to create a physical barrier over the tailings and to improve the quality of run-off water in order to eventually allow direct discharge to the environment
- Relocating the existing highway to allow for installation of freeze pipes and thermosyphons for ground freezing
- Removing mine roads that are no longer required and re-vegetating these areas to their natural state as much as possible
- Permanently sealing underground mine openings
- Backfilling the B-1 open pit to allow for freezing of chambers. Eventually some pits may also be flooded, or partially backfilled and flooded to form shallow pit lakes or wetlands

Air quality monitoring



Giant Mine Community Alliance tour

What Happens Next?

The regulatory process could take several years to complete. Once regulatory approvals are received, the Remediation Plan can begin to be implemented.

During this interim period while the project is under regulatory review, regular care and maintenance activities will continue at Giant Mine to protect public health and safety, and the environment.

Regular care and maintenance activities include:

- Engineering and scientific studies to assess tailings cover designs
- Monitoring of air quality and groundwater conditions
- On-going consultation and community information sessions in N'dilo, Dettah and Yellowknife on the progress of activities at Giant Mine

Care and maintenance, and environmental protection activities include:

- Backfilling of an open stope underneath the B208 arsenic chamber to provide stability to the bulkheads
- Pumping water from the underground mine to the surface storage ponds prior to water treatment
- Operating the water treatment system and discharging treated water during the open water season
- Monitoring and maintaining the tailings dams

Giant Mine Remediation Joint Project Office

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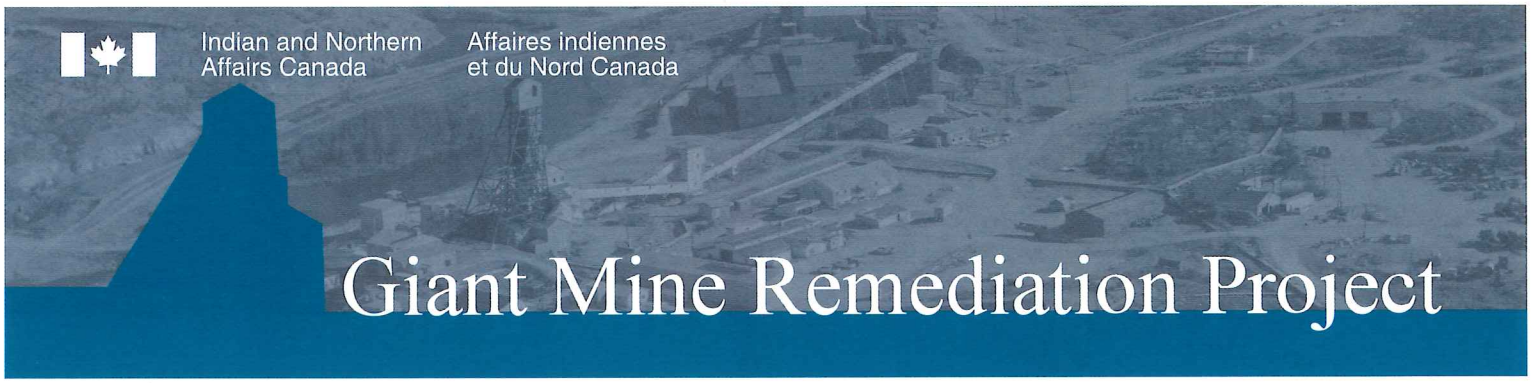
QS-Y289-005-EE-A1 Cette publication est aussi disponible en français sous le titre :
Mis-a-jour Giant

Northwest Territories

Canada



Remediating the Giant Mine Site

Giant Mine has played a significant role in Canadian history since 1948 when the first gold brick was poured. The Yellowknife mine was one of Canada's largest producers of gold, and one of the single biggest employers for Yellowknife residents until its closure.

Now, more than 50 years later, it is time to remediate the mine site in a responsible and effective manner. We welcome any questions you might have about remediation plans for Giant Mine. Please contact the Giant Mine Remediation Joint Project Office for more information, or visit our website: www.giant.gc.ca

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Highlights

Giant Yellowknife Gold Mines Ltd. went into production in 1948. The mine was operated continuously under different owners until 1999, when its owner at the time, Royal Oak Mines, was assigned into receivership. The mine was then transferred to the Government of Canada which immediately sold it to Miramar Giant Mine Ltd., after providing indemnification for the underground contamination.

Miramar Giant Mine Ltd. operated the mine until 2004, and provided care and maintenance at the mine site until 2005. Deton'Cho Nuna Joint Venture was subsequently awarded a contract to provide care and maintenance for the site, and continues to provide this service today after winning a multi-year contract.

In 2005, the Government of Canada and the Government of the Northwest Territories (GNWT) signed a 10-year Cooperation Agreement on the management and remediation of Giant Mine. The two governments agreed to work together to address both surface and underground aspects of the mine site clean-up.

In 2007, a Remediation Plan for Giant Mine, agreed upon by both Indian and Northern Affairs Canada (INAC) and the GNWT, was submitted to the Mackenzie Valley Land and Water Board as part of a water license application.

The Remediation Plan outlines the clean-up plans for the entire mine site, including the surface remediation (demolition of buildings, tailings clean-up), and the subsurface containment of the 237,000 tonnes of arsenic trioxide dust using the Frozen Block Method.

The regulatory board will now review and evaluate the Remediation Plan, and ultimately determine the next steps for the clean-up of the Giant Mine site. It is anticipated that remediation of the mine site could be completed within 10 years of receiving approvals.

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Projet d'assainissement de la mine Giant

Northwest Territories
Canada

www.giant.gc.ca

Affaires indiennes et du Nord Canada | Indian and Northern Affairs Canada

Projet d'assainissement de la mine Giant

L'assainissement du site de la mine Giant

La mine Giant a joué un rôle important dans l'histoire du Canada depuis 1948, année à laquelle on a coulé le premier lingot. La mine de Yellowknife a été l'une des plus grandes sources d'or au Canada, et l'une des plus importantes sources d'emplois pour les résidants de Yellowknife, et ce, jusqu'à sa fermeture.

Aujourd'hui, plus de 50 après, il est temps de restaurer le site minier de manière responsable et efficace. Nous répondrons aux questions que vous pourriez avoir concernant les plans d'assainissement de la mine Giant. Veuillez communiquer avec le Bureau du projet commun d'assainissement de la mine Giant pour obtenir de plus amples renseignements. N'oubliez pas de consulter notre site Web à l'adresse suivante : www.giant.gc.ca

Tél. : (867) 669-2426
Téléc. : (867) 669-2439
Courriel : giant@ainc-inac.gc.ca

Faits saillants

On a entrepris l'exploitation de la Giant Yellowknife Gold Mines Ltd. en 1948. Différents propriétaires ont exploité la mine sans interruption jusqu'en 1999, lorsque le propriétaire de l'époque, Royal Oak Mines, a été mis sous séquestre. La mine a été prise en charge par le gouvernement du Canada, qui l'a immédiatement vendue à Miramar Giant Mine Ltd., après avoir versé une indemnité pour la contamination du sous sol.

La société Miramar Giant Mine Ltd. a exploité la mine jusqu'en 2004 et s'est occupée du site jusqu'en 2005. Par la suite, on a attribué le contrat d'entretien et de maintenance du site à la société Deton'Cho Nuna Joint Venture, qui continue d'assurer ce service après avoir obtenu un contrat pluriannuel.

En 2005, le gouvernement du Canada et le gouvernement des Territoires du Nord-Ouest (GTNO) ont signé un accord de collaboration décennal relativement à la gestion et à la restauration de la mine Giant. Les deux gouvernements ont convenu de travailler ensemble pour aborder le nettoyage du site, tant en surface que sous terre.

En 2007, on a présenté à l'Office des terres et des eaux de la vallée du Mackenzie, dans le cadre d'une demande de permis d'utilisation des eaux, un plan d'assainissement de la mine Giant qu'avaient accepté des Affaires indiennes et du Nord Canada (AINC) et le GTNO.

Le plan d'assainissement décrit les plans de nettoyage pour l'ensemble du site minier, notamment en ce qui concerne la surface (démolition des bâtiments, assainissement des bassins de résidus) et les ouvrages de confinement souterrain contenant 237 000 tonnes de trioxyde de diarsenic. Pour ces derniers, on utilisera la méthode de congélation des blocs.

Le plan d'assainissement est soumis au processus de réglementation, conformément à la Loi sur la gestion des ressources de la vallée du Mackenzie. L'Office des terres et des eaux de la vallée du Mackenzie et l'Office d'examen des répercussions environnementales de la vallée du Mackenzie étudieront et évalueront le plan et, finalement, établiront le calendrier des prochaines étapes pour le nettoyage du site de la mine Giant. On s'attend à ce que la restauration du site soit terminée dans les 10 années suivant la réception des approbations.

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QS-Y289-012-FF-A1 This publication is also available in English under the title:
Giant Mine Remediation Project

Territoires du Nord-Ouest | Canada

www.giant.gc.ca

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

Executive Summary – Giant Mine Remediation Plan

Giant Mine Remediation Project

Prepared for INAC by SRK Consulting Inc., lead Technical Advisor to the Giant Mine Remediation Project

Overview

Giant Mine is located in Yellowknife, Northwest Territories, and produced gold from 1948 until 1999. After the mine owner went into receivership in 1999, the mine was transferred to Indian and Northern Affairs Canada (INAC). Immediately thereafter, INAC entered into an agreement by which Miramar Giant Mine Ltd. took ownership of the property. Under that arrangement, the mine continued to operate, with the gold ore shipped off-site for processing from 1999 until 2004. Mining ceased in July 2004 and INAC again took on the site one year later, after an orderly transition. The surface land lease was returned to the Government of the Northwest Territories. INAC is looking after the site, and has contracted Deton'Cho Nuna Joint Venture to continue the required maintenance and environmental management activities.

This document presents a Remediation Plan for the Giant Mine site. The plan was prepared for INAC by its Technical Advisor (SRK Consulting Inc.), and reviewed by an Independent Peer Review Panel. Under a Cooperation Agreement between the federal and territorial governments, the Government of the Northwest Territories also contributed to the development and finalization of this plan.

Included in the document is a history of the mine, a description of current site conditions, a review of the state of the surrounding environment, details of the proposed remediation activities, an assessment of the post-remediation conditions, a monitoring plan, and a project schedule. More than 40 supporting documents provide detailed accounts of scientific and engineering studies. The remainder of this Executive Summary will focus on the proposed closure and remediation activities, and their expected effects on the local environment.

Arsenic Trioxide Dust

Processing of the Giant Mine ore created arsenic trioxide dust as a by-product. Approximately 237,000 tonnes of the dust was produced and stored underground in 15 purpose-built chambers and mined-out stopes, which are step-like parts of the mine where minerals are extracted. 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.

The freezing will be accomplished by first installing pipes below and around the chambers and stopes, and then pumping a coolant through the pipes. The technology is similar to that used to create hockey rinks. It 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 1970's. 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. The thermosyphons will operate indefinitely, with only periodic maintenance requirements and occasional replacement.

Executive Summary – Giant Mine Remediation Plan

Other Underground Mine Components

Portions of the underground mine have been backfilled with tailings and waste rock. Although the 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 collect and treat groundwater from the mine area. All underground equipment and infrastructure will be removed or de-contaminated 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, and then discharged to Yellowknife Bay.

Open Pits and Waste Rock

There are eight pits on the site, five of which are substantial in size. The B1 Pit will be backfilled to facilitate installation of the ground freezing system. Contaminated soils from other areas on the site will be in the portion of the pit that will ultimately be within the frozen zone. Waste rock, quarry rock or clean demolition waste will be used to fill the remainder of the pit. The entire backfilled area will then be covered with soil and revegetated. The other pits will be surrounded by berms or fences to prevent inadvertent public access.

Tailings and Sludge

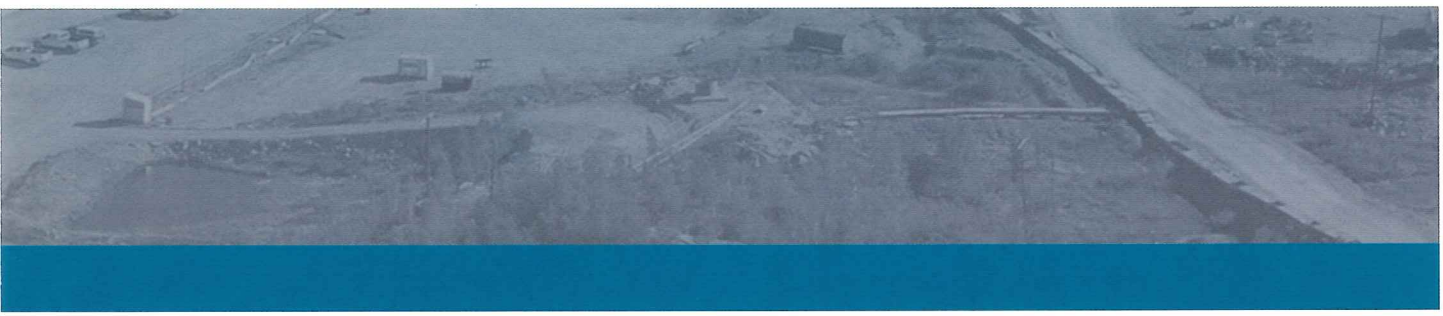
There are approximately 16 million tonnes of tailings stored in ponds constructed on the site. The south, central, north and northwest tailings areas cover a total of about 95 hectares. In addition, water treatment sludges are stored in settling and polishing ponds covering an additional nine hectares. Both the tailings and the sludge contain moderate amounts of arsenic. The tailings are subject to wind erosion when dry, and could also be directly taken up by animals looking for salt.

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 prevent the upwards migration of contaminants from the tailings, and inhibit the downwards penetration of plant roots. It will also serve as a final protective layer in the event that the soil is removed by erosion.

The upper layer of fine-grained soil will allow for revegetation and future recreational or traditional use of the site. The surface of each tailings area will be graded, and ditches and spillways constructed to limit erosion and to allow water to run off the cover without becoming contaminated.

Site Water Management

During and after the remediation, it will be necessary to continue collecting and treating any contaminated water. The plan calls for a new water treatment plant to be constructed. The plant will be used to treat contaminated water extracted from around the arsenic trioxide chambers and stopes during and immediately after the ground freezing. Contaminated surface water will also be collected and treated until monitoring data clearly show that the arsenic levels are low enough to allow direct discharge. Over the longer term, it is expected that water from the underground mine areas outside the frozen zones may continue to need treatment, and the new water treatment plant will remain in operation as required.



Effluent from the treatment plant will be discharged 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 the 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.

Baker Creek

Baker Creek has areas of significant sediment contamination. Also, the current alignment poses a risk of flooding into the C1 Pit and the connected underground workings. The Remediation Plan calls for diversion of the creek into a new channel around the areas where it poses a risk to the underground workings. Options for dealing with the contaminated sediments are under further investigation. Options include removal of heavily contaminated sediments, and diversion of the creek to uncontaminated areas. However, continuing arsenic inputs, primarily from areas upstream of the site, will limit the level to which the sediments can be cleaned.

Contaminated Soils

A number of surficial materials, from natural soils to tailings to mine rock, are present in various areas across 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. Areas of hydrocarbon contamination are also present, but largely overlap 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.

Buildings and Waste Disposal

More than 100 buildings, supported by associated infrastructure and utilities, remain on the site. Many of these 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 in the empty chamber 15. The public highway through the site will be relocated to keep traffic away from the demolition, soil cleanup and ground freezing activities. Options for the new highway alignment are being discussed with the GNWT Department of Transportation.

Post-Remediation Conditions

After the remediation activities are completed, the site will consist of a small area that will need to remain under active management, and a broader area that is available for other uses. The actively managed area will be centered around the current C-Shaft, and will allow for both maintenance of the ground freezing system and long-term treatment of contaminated mine water. The remainder of the site will include areas along the current highway corridor that will be available for industrial use, open pits surrounded by rock berms or fences, and broad areas of covered tailings. The tailings areas, in particular, are expected to be open to broader uses after the Remediation Plan has been fully implemented.

The remediation activities will decrease but not completely eliminate arsenic releases from the site. In quantitative terms, the arsenic releases from the site will decrease from the current level of approximately 500 kilograms per year to less than 200 kilograms per year. In the absence of the proposed remediation measures, arsenic releases from the Giant Mine site could increase to many thousands of kilograms per year.

The post-remediation arsenic release from the site and, equally importantly, areas upstream, will mean that Baker Creek will remain contaminated with 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 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

A detailed plan for monitoring the site during and after implementation of the Remediation Plan has been developed. It includes sampling and analysis of groundwater and surface water, air quality monitoring, environmental effects monitoring, and monitoring of ground temperatures within and around the frozen arsenic trioxide chambers and stopes. It also includes regular inspections of remaining pit walls, as well as the covers, ditches and spillways associated with the remediated tailings impoundments. The monitoring will be sufficient to 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.

Schedule

Remediation of the Giant Mine site, as outlined in this plan, will require approval pursuant to the *Mackenzie Valley Resource Management Act*. It is anticipated that this Remediation Plan will be submitted to the Mackenzie Valley Land and Water Board in 2007, as part of a water license application.

Throughout the licensing process, INAC intends to continue public consultation on the Remediation Plan. Reviews by the regulatory agencies (or Boards) will also have formal requirements for public input. The schedule of the water licensing process will ultimately be determined by the regulatory agencies.

Once the licensing process is complete, the project will be presented to the Treasury Board for final funding approval. Final engineering design of the approved remediation measures will commence at the same time.

The major surface remediation activities should be mostly completed within five years; and the ground freezing should be substantially completed within 10 years. Maintenance of the ground freezing system would continue indefinitely, as would mine water treatment and long-term monitoring.

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QS-Y289-002-EE-A1 Cette publication est aussi disponible en français sous le titre :
Résumé – Plan de restauration du site de la mine Giant

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Independent Peer Review Panel

Giant Mine Remediation Project

Independent Peer Review Panel experts answer questions at a public information session in Yellowknife

Background

After conducting extensive research and preparing its reports, Indian and Northern Affairs Canada (INAC) needed to know that the recommendations of its Technical Advisor – SRK Consulting Inc. – were sound.

Therefore INAC brought together an Independent Peer Review Panel (IPRP) of nine recognized experts whose qualifications and experience collectively cover the fields relevant to the Remediation Plan – namely geotechnology, mining, mineral processing and environmental engineering, toxicology, hydrogeology, risk assessment, and public health.

The IPRP reviewed both the *Report on Arsenic Trioxide Management Alternatives* and the *Remediation Plan for Giant Mine* and provided expert feedback to INAC.

Who is on the IPRP?

The membership of the Independent Peer Review Panel was based partly on suggestions from stakeholder communities and the local public, who recommended individuals able to provide independent expert technical review. The names, credentials and professional resumes of the nine experts are available in the IPRP Report.

What did the IPRP conclude about the Remediation Plan for Giant Mine?

The IPRP unanimously supported the approach described in the Remediation Plan, and encouraged INAC to proceed with its application for a water license.

Where can I get a copy of the IPRP Reports?

Both IPRP Reports – *Report on Arsenic Trioxide Management Alternatives* and *Report on the Remediation Plan for Giant Mine* – are available through the Public Registry.

What did the IPRP say about the Frozen Block Method?

"Artificial freezing has been used for several decades and on various projects to provide efficient impervious barriers to water flows (McArthur River Mine, large shaft drilling, etc.). Furthermore, detailed thermal analyses given in Supporting Document J1 provide strong support to the proposed remedial plan and to its feasibility to achieve the desired objectives. IPRP reviewed these analyses and agrees with the conclusions presented in SDJ. Finally, it is worth stressing that the proposed remedial plan also includes an exhaustive and comprehensive monitoring program during and after freezing is complete, together with a series of

contingency measures. These measures can be readily implemented in case of poor performance, either during initial freezing or in the long term. They include replacement of defective components, installation of additional freeze pipes, extension of active and/or hybrid freezing."

What did the IPRP say INAC did well?

"The IPRP commends INAC on important recent activities undertaken for purposes of the Remediation Plan, such as dam safety inspections; a comprehensive dam safety review; tailings and sludge water balance; tailings and sludge properties; and of course, cover design, construction and long term reclamation maintenance."

"The executive summary and main text of the Final Draft Report are effective in communicating the current environmental conditions that are important to the Remediation Plan. The documents provide a clear and concise description of the key surface and subsurface hydrological, hydrogeological and geochemical aspects of the Remediation Plan for Giant Mine."

Members of the Independent Peer Review Panel participate in an underground tour of Giant Mine

What were the IPRP's official conclusions?

1. Based on the Panel's review of the Final Draft Report, the Panel unanimously supports the approach described in the Remediation Plan and encourages INAC to proceed with the plan into the regulatory approvals process.
2. The work produced by INAC and their Technical Advisor is of high quality using state of the art methodology and has adequately defined existing conditions at the Giant Mine site for purposes of developing the Remediation Plan at this stage. The IPRP understands that a detailed engineering phase will commence once the project is approved.
3. The Remediation Plan as described will, in the long term, provide protection of human and ecosystem health.
4. Stability concerns within the mine may compromise the Remediation Plan if not dealt with in a timely fashion e.g., arsenic Chamber 208.
5. A number of recommendations on specific items have been included within the text but they do not alter the basic conclusions regarding the viability of the Plan from a technical perspective.
6. The objective of integrating the original sub-surface and surface remediation plans for the Giant Mine has been adequately achieved for present purposes of the proposed integrated Remediation Plan.

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Comité indépendant d'évaluation par les pairs

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Arsenic Trioxide Management

Giant Mine Remediation Project

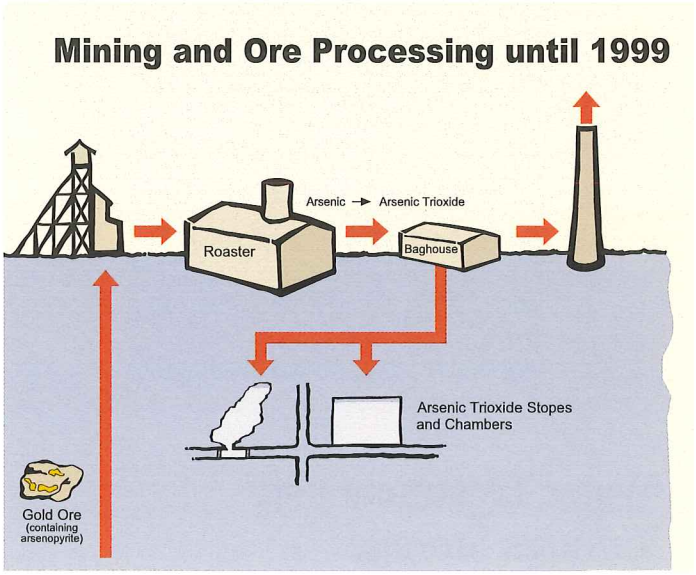
Mining and Ore Processing

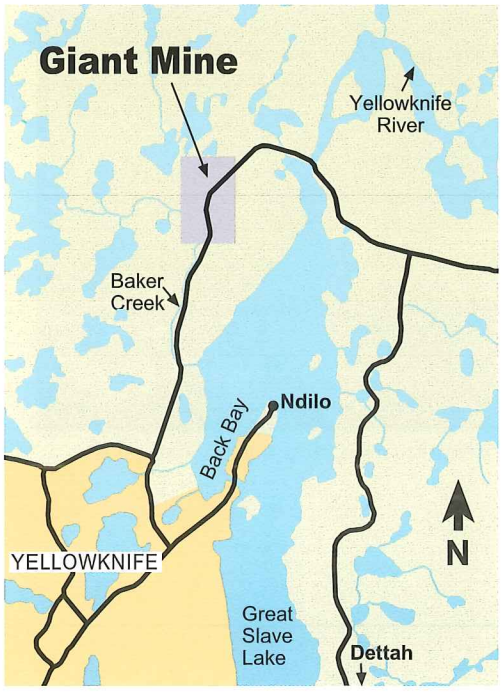
Gold ore at Giant Mine was rich in arsenopyrite. To extract gold from the ore, a roasting process was used. This process created arsenic trioxide dust (As203), a highly toxic substance. Most of the dust was collected and pumped underground into 10 chambers and five mined-out stopes at the site.

Currently, there are 237,000 tonnes of arsenic trioxide dust stored underground at Giant Mine. This is equivalent to seven 11-storey office buildings.

Other sources of arsenic in the Giant Mine area include tailings, waste rock, underground mine workings and contaminated soils.

All ore processing at Giant Mine ceased in 1999.



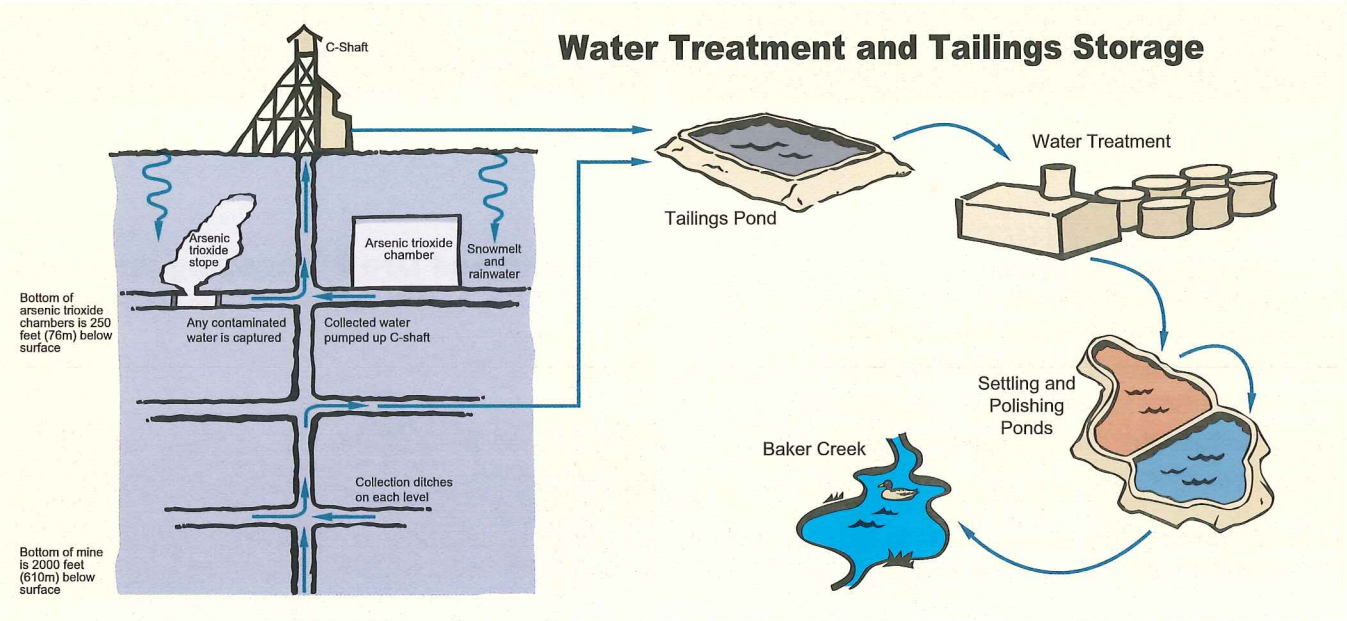


Giant Mine Site

Giant Mine is located within the municipal boundaries of the City of Yellowknife, on the shores of Great Slave Lake, about five kilometers from the downtown area. Ndilo and Dettah, two First Nations communities, are located approximately 2.5 kms and 9.8 kms from the site.

The Giant Mine site covers 2,345 acres (949 hectares), with mine workings reaching a depth of 2,000 feet.

View of the central buildings at the Giant Mine site in Yellowknife, NWT



Water Treatment and Tailings Storage

Water entering the mine is pumped out to the tailings ponds on the surface. During the summer, this water is pumped to the on-site water treatment plant to remove arsenic and other contaminants. The treated water is transferred to the settling pond where the remaining contaminants settle to the bottom of the pond. The last step is the polishing pond. When water quality in the polishing pond meets the regulatory requirements set out in the mine's water licence, it is released into Baker Creek.

All water released into the natural environment from Giant Mine meets or exceeds water quality standards set out in its water licence.

Working on the split dyke between the settling and polishing ponds at Giant Mine

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QS-Y289-001-EE-A1 Cette publication est aussi disponible en français sous le titre :
Gestion du trioxyde de diarsenic

Northwest Territories

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Affaires indiennes et du Nord Canada

Frozen Block Method

Giant Mine Remediation Project

The Frozen Block Method was selected for the long-term management of the arsenic trioxide dust at Giant Mine after extensive research and peer review with industry experts, and in consultation with local residents.

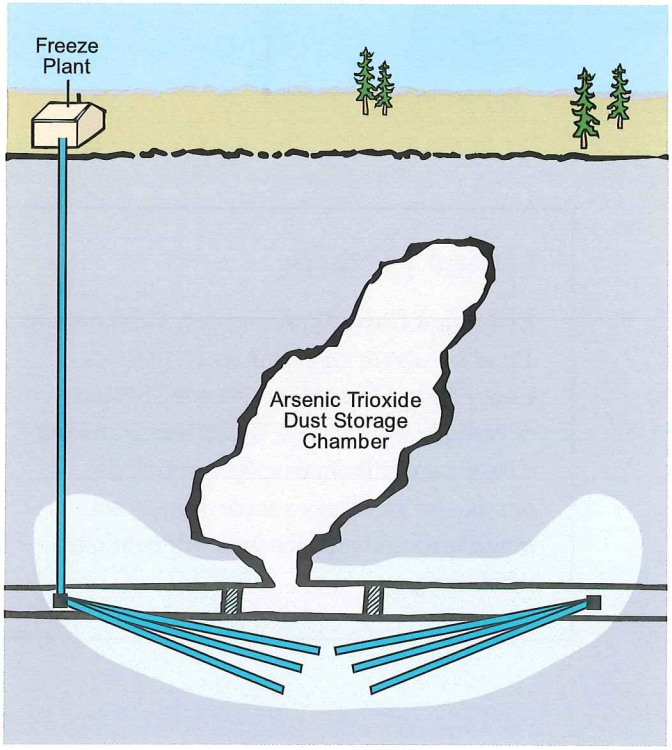
It will take approximately 10 years to fully implement the Frozen Block Method at Giant Mine. Global warming and climate change were taken into account in the decision to use the Frozen Block Method, and detailed thermal analysis concludes that this method will continue to work for Giant Mine, even with an increase of several degrees in regional mean temperature.

Step One

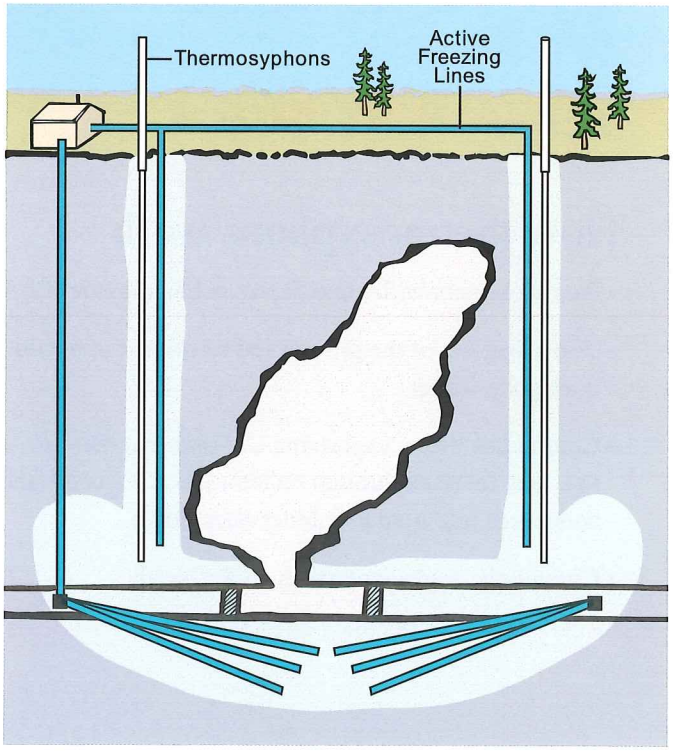
Drill holes in the rock and under the stopes and chambers. Install pipes into the holes. Connect the pipes to a freezing plant on the surface. Circulate a super-cooled liquid through the pipes, which freezes the rock and any nearby water under the chambers and stopes.

Step Two

Drill vertical holes alongside the chambers and stopes, and insert pipes into the holes. Circulate super-cooled liquid from the freezing plant through the pipes to freeze walls around the stopes and chambers. Steps One and Two form a secure cup-like shape of frozen rock around the arsenic chambers, which prevent water circulation. Install thermosyphons to aid in the freezing process and maintain the frozen area.



1) Freeze under chamber

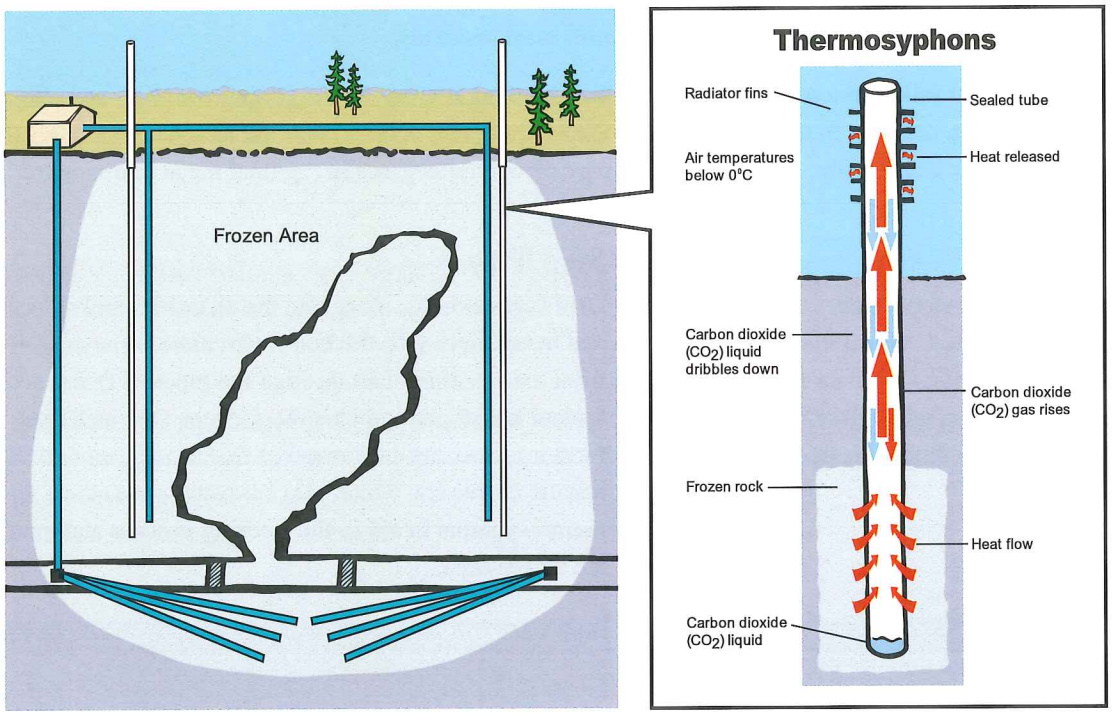


2) Freeze surrounding the chamber

Frozen Block Method

Step Three

Water is added to slowly fill the cup-like shape. The freeze plant continues to operate until the entire contents of the "cup" are frozen, including the arsenic chambers. This prevents any water from entering or exiting the chambers.



3) Chamber frozen in solid block

How thermosyphons work

- Passive system with pressurized carbon dioxide (Co_2)
- Takes heat out of the ground and releases it into cold air during the winter
- Continuous cycle: vaporizing Co_2 into gas, rises to top, heat released through radiator fins, CO_2 cools and condenses into liquid, dribbles back down
- Commonly used successfully in the North

Other Details

Estimated Cost: Approximately $200 million
Time Involved: Approximately 10 years
Long-Term Operation: Once the block is effectively frozen solid, it will remain frozen with the air of thermosyphons which do not require an energy source. Long term monitoring and maintenance will continue indefinitely.

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QS-Y289-003-EE-A1 Cette publication est aussi disponible en français sous le titre :
La méthode des blocs congelés

Northwest Territories
Canada

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Surface Remediation

Giant Mine Remediation Project

Background

Several years of extensive technical and scientific research, and consultation with the public (including governments and other groups concerned about the mine site), have led to the proposal of surface remediation activities to protect the safety of local residents and the environment.

Remediation activities will minimize the release of contaminants from the mine site to the surrounding environment. The surface of the site will be remediated to industrial guidelines as outlined in the *NWT Environmental Protection Act*, with recognition that portions of the mine site may eventually be suitable for other land uses with appropriate restrictions.

Contaminated Soils

Contaminated soils will be excavated and disposed of within the frozen portion of B1 Pit, which will then be covered with non-contaminated material. Additional contaminated soils and spilled tailings will be excavated and moved into the most appropriate tailings or sludge area, and covered, along with the existing tailings and sludge.

Rehabilitation of Baker Creek

Clean-up activities include stopping the current discharge of treated water into the Baker Creek and creating a diversion channel away from the arsenic chambers. Rehabilitation of the creek channel will also encourage habitat development, and help restore Baker Creek to a condition that is as ecologically sound as possible, given the constraints of hydrology and climate.

Highway Diversion

A portion of Highway 4 will be relocated away from the arsenic chambers to avoid interference with surface facilities required for ground freezing.

Baker Creek will be diverted and rehabilitated as part of the Remediation Plan.

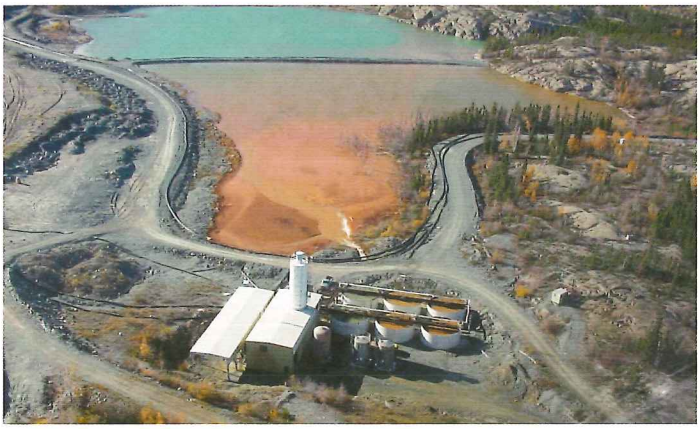
Water Management

A new water treatment plant will be constructed to treat contaminated water extracted from around the arsenic trioxide chambers and stopes – step like parts of the mine where minerals are extracted – during and immediately after the ground freezing. Contaminated surface water will also be collected and treated until monitoring data clearly shows that the arsenic levels are low enough to allow direct discharge. Over the longer term, it is expected that water from the underground mine areas outside the frozen zones may continue to need treatment, and the new water treatment plant will remain in operation as long as required.

Open Pits

There are eight open pits on the mine site, five of which are substantial in size. The B1 Pit will be backfilled to facilitate installation of the ground freezing system. Contaminated soils from other areas on the mine site will be contained in the portion of the pit that will ultimately be within the frozen zone. Waste rock, quarry rock or clean demolition waste will be used to fill the remainder of the pit. The entire backfilled area will then be covered with soil and re-vegetated. The other pits will be surrounded by berms or fences to prevent inadvertent public access.

Surface Remediation



An aerial overview of the Effluent Treatment Plant, polishing and settling ponds at Giant Mine

The Assay Office at Giant Mine is one of more than 100 buildings on site scheduled for demolition

Tailings

The tailings and sludge areas will be covered with one layer of quarried rock and a second layer of fine-grained soil. The lower layer of quarried rock will prevent contaminants from the tailings from moving upward and inhibit the downward penetration of plant roots. It will also serve as a final protective layer in the event that the soil erodes. The upper layer of fine-grained soil will enable vegetation to grow and a variety of future uses for the site may be considered. The surface of each tailings area will be graded, and ditches and spillways constructed, to limit erosion and to allow water to run off the cover without becoming contaminated.

Removal of Mining Roads

Mining roads not required for maintenance and inspections at the site will be removed, and these areas will be planted with native vegetation to restore them as closely as possible to their natural state.

Buildings and Infrastructure

More than 100 buildings, supported by associated infrastructure and utilities, remain on the mine site. Many of these buildings pose a hazard to the public. The Remediation Plan calls for all buildings and infrastructure without an identified existing or future use, to be removed and disposed of according to industry-best practices. Any arsenic-contaminated materials will be removed and placed in the empty chamber 15 and frozen underground at that time.

When will this work be done?

The regulatory process could take several years. Once regulatory approvals and licensing by the Mackenzie Valley Land and Water Board under the *Mackenzie Valley Resource Management Act* (MVRMA) are completed, the Remediation Plan can then be implemented.

It is anticipated that surface remediation could be completed within five years of receiving approvals. During this interim period, regular care and maintenance activities will continue at Giant Mine to protect human health, public safety and the environment.

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QS-Y289-010-EE-A1 Cette publication est aussi disponible en français sous le titre :
Travaux de restauration de surface

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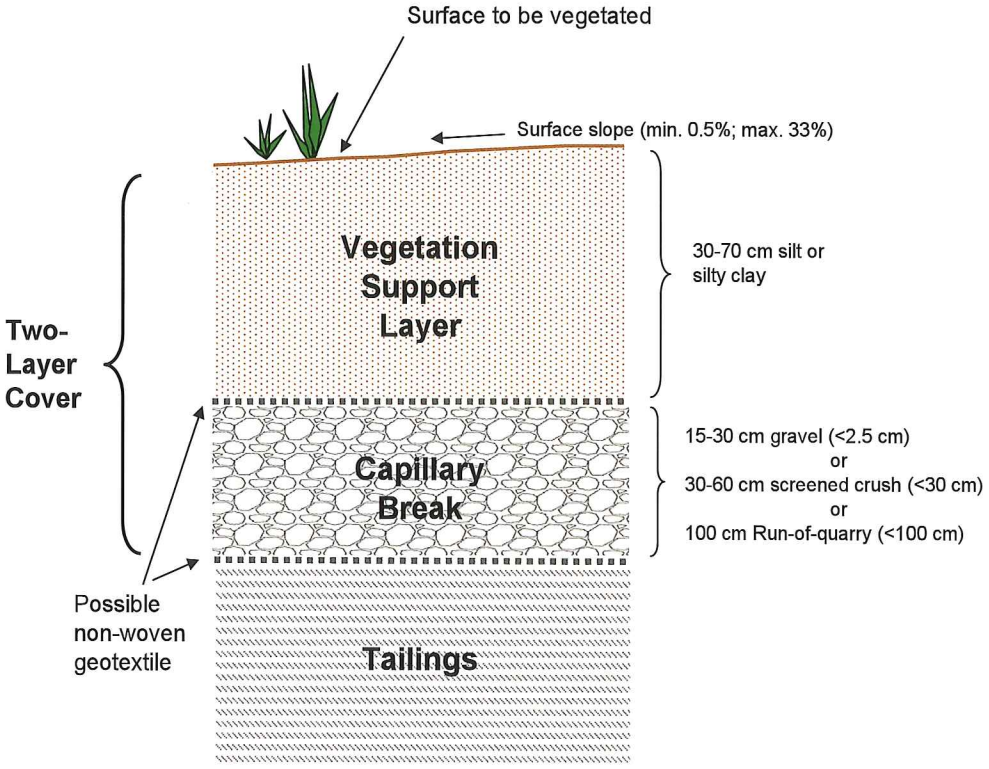
Tailings Remediation

Giant Mine Remediation Project

What are tailings?

Tailings are milled and finely crushed rock leftover after the process of separating the gold from the ore bearing rock.

There are approximately 13.5 million tonnes of tailings stored in ponds constructed on the surface at the Giant Mine site. The south, central, north and northwest tailings ponds cover a total of about 95 hectares. In addition, water treatment sludge is stored in settling and polishing ponds covering an additional nine hectares. Both the tailings and the sludge contain moderate amounts of arsenic. They are subject to wind erosion when dry, and could also be directly taken up by animals looking for salt.



History of tailings at Giant Mine

The depositing of tailings on the surface of Giant Mine started in 1948 and continued until 1999. From 1948 to early 1951, a relatively small amount of tailings were deposited at the edge of north Yellowknife Bay on Great Slave Lake. Subsequently, tailings were deposited directly into natural lakes, behind earth dikes, and in the engineered tailings impoundments (forming the current north, central, south and northwest ponds on the Giant property). Mill tailings were also placed in the underground mine as backfill in mined-out areas. Water treatment sludge has been deposited over the tailings behind Dam 1 starting in approximately 1983, and every summer since. A separation dike was constructed in the mid 1980s, resulting in the present day configuration of separate settling and polishing ponds.

How will the tailings be remediated?

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 prevent the upwards migration of contaminants from the tailings, and reduce the downwards penetration of plant roots. This layer will also act as a physical and protective barrier against the removal of tailings by erosion.

The upper layer of fine-grained soil will allow for re-vegetation and future recreational or traditional uses of the site. The surface of each tailings area will be graded, and ditches or spillways constructed to limit erosion and allow water to run off the cover without becoming contaminated.

Tailings Remediation

Why remediate the tailings?

The Giant Mine Remediation Plan calls for the remediation of the surface of the mine site to the industrial standards set out in the *Environmental Protection Act*; with a specific focus on minimizing the release of contaminants from the site to the surrounding environment. To meet this objective, the tailings and sludge pond surfaces will need to be covered.

The specially-constructed cover will create a physical barrier between the tailings/sludge and people making use of the remediated surface, prevent dust release and direct physical exposure to tailings, and prevent the inadvertent exposure of plants, animals and people to the arsenic contained in the tailings and sludge.

The cover will also prevent: the contamination of clean surface water through direct contact with tailings; surface water from wicking arsenic salts upwards; and vegetation from establishing roots in the tailings and sludge.

Finally, the cover and its ditches or spillways will ensure clean surface water runoff and the establishment of self-sustaining vegetation for aesthetic purposes.

What will the tailings ponds look like post-remediation?

The covered tailings areas will be re-vegetated to fit in with the surrounding landscape; however the ponds will still be recognizable as they will be relatively flat with gentle drainage slopes. The remediated tailings ponds may be available for various recreational uses – snowmobiling, hiking – once the vegetation has become well established.

The GNWT's Department of Municipal and Community Affairs is examining options for future land use at Giant Mine.

Will the remediated tailings ponds be safe?

Yes. The tailings and sludge covers will be inspected annually for five years or until vegetation is fully established and erosion rates are found to be consistent with those naturally-occurring in the local environment. Any run-off water from the tailings covers will be monitored to ensure that is not contaminated.

How long will it take to remediate the tailings ponds?

The remediation of the surface of the Giant Mine site – including demolition and removal of more than 100 buildings – is expected to be completed within five years of the implementation of the Giant Mine Remediation Plan.

The remediation of the sub-surface contamination using the Frozen Block Method is expected to take considerably longer.

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