



**Mackenzie Valley Land and Water Board**  
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### Staff Report

<b>Applicant:</b> Indigenous and Northern Affairs Canada – Contaminants and Remediation Division (INAC-CARD)	
<b>Location:</b> Giant Mine, NT	<b>Application:</b> MV2012L8-0010
<b>Date Prepared:</b> April 24, 2017	<b>Meeting Date:</b> May 4, 2017
<b>Subject:</b> Updated – Underground Work Stabilization Plan	

#### 1. Purpose/Report Summary

The purpose of this Report is to present to the Mackenzie Valley Land and Water Board (MVLWB/the Board) the updated Underground Work Stabilization Plan (Plan) as submitted by Indigenous and Northern Affairs Canada – Contaminants and Remediation Division (INAC-CARD) to satisfy Part H, item 3 of Water Licence (Licence) MV2012L8-0010.

#### 2. Background

- March 28, 2013 – Issuance of Licence MV2012L8-0010;
- September 19, 2013 – Initial Plan – Stage 1 approved;
- July 31, 2014 – Updated Plan – Stage 2 approved;
- June 4, 2015 – Updated Plan – Stage 3 approved;
- March 23, 2017 – Updated Plan – Stage 4 submitted;
- March 24, 2017 – Plan submission deemed complete and review commenced;
- April 12, 2017 – Reviewer comments and recommendations due and received;
- April 19, 2017 – Responses received;
- **May 4, 2017 – Submission presented to the Board for decision; and**
- January 31, 2019 – Licence Expiration.

#### 3. Discussion

##### Licence Requirements

Part H, item 3 of the Licence states,

The Licensee shall, 45 days prior to starting backfilling of stopes or chambers, construction of new bulkheads or repair of existing bulkheads in the Underground Work Stabilization Area, submit to the Board for approval a detailed **Underground**

**Work Stabilization Plan.** This plan shall contain the items as listed under Schedule 2, item 2.

Schedule 2, item 2 of the Licence states:

The detailed Underground Work Stabilization Plan referred to in Part H, item 3 shall include, but not be limited to, the following:

- a. A summary of the types of backfill material required which may be one or a combination of tailings paste, waste rock from mine development, or existing inert rock material on the surface (e.g., quarried rock);
- b. An estimate of the volume of each backfill material required;
- c. Details of the proposed methodologies for carrying out backfilling of the chambers and repairing/reinforcing bulkheads;
- d. Detailed plans to mitigate potential effects to the environment and issues related to tailings excavation including:
  - o Management of wet or frozen tailings if encountered;
  - o Ensuring acceptable grain size range of tailings as there can be no slimes used in making paste;
  - o Operational dust control (wetting of tailings during excavation and paste production using treated minewater);
  - o Operational water management (treated minewater usage associated with dust control and wash down of equipment);
  - o Cross-highway transport of tailings to temporary stockpiles (trucked or piped);
- e. Details on the process to collect, store, and treat "bleed" water from tailings pastes; and
- f. Spill contingency plans specific to the Underground Stabilization Work Area if the plans deviate from or add to the November 2012 General Contingency and Emergency Spill Response Plan prepared by Nuna/Deton Cho Joint Venture as submitted in the Accepted Application.

#### Submission Description

INAC-CARD has divided the requirements of the Underground Work Stabilization Plan into four stages, each with an associated submission, to assist with the timely completion of backfilling the underground workings, as follows:

- Stage 1: Field test program to determine the optimal paste tailings mix (approved September 19, 2013);
- Stage 2: Backfilling of B1-18 which was a non-arsenic stope (approved July 31, 2014);
- Stage 3: Fill the remaining arsenic stopes and chambers (approved June 4, 2015); and
- Stage 4: Backfilling of C5-09- the last remaining stope complex (current submission).

The current submission of the Plan was submitted March 23, 2017, for approval, and is for Stage 4 activities (attached). Stage 4 involves C5-09, which is the last remaining stope complex to be backfilled as part of the site stabilization plan. The C5-09 stope complex sits between the 3<sup>rd</sup> and the 5<sup>th</sup> levels of the mine, approximately 300 to 500 metres below the ground surface. It is approximately 150 metres wide and an average of 30-50 metres thick depending on the cross-section. C5-09 is the last stope left to backfill. Because of limited

access, alternative methods and strategies were necessary to understand its volumes and geometry. C5-09 is the largest area in the initial application that needed to be backfilled. There are other areas that will be backfilled but those will be addressed under the future reclamation water license.

#### Summary of Submission

Paste will be used to backfill the stope. It will consist of tailings, water, cement, fly ash, and inter/slag rock. The viscosity of the paste will vary dependent on its location of placement; high slump paste will be used when the majority of the fill is fluid, and low slump paste (more viscous) will be required where greater control is needed relating to placement. Preparatory work will be primarily centered near the B1 open pit. Excavation of tailings, processing, and temporary storage of materials for the paste backfill activities are planned to occur within the boundaries of the central tailings pond basin or in the on-site Norseman structure. Figures 1 to 3 (below) show three different locations/structures involved: Figure 1 is the temporary stockpile building (Norseman structure), Figure 2 is the stockpile concept, and Figure 3 is an example of the pathways for tailings excavation, processing, storage and haulage.



Figure 1 – Temporary Stockpile Building (CARD, 2017)

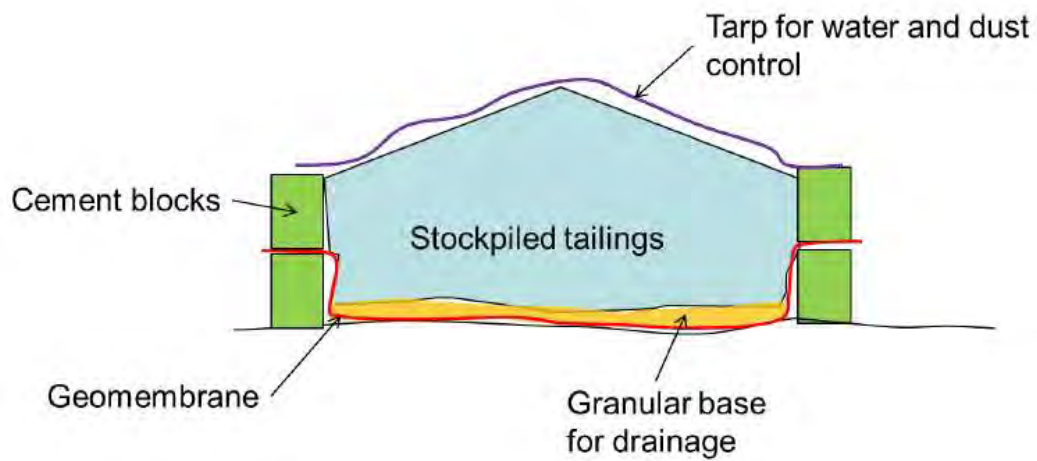


Figure 2 – Stockpile Concept (CARD, 2017)



Figure 3 – Example Tailings Excavation, Processing, Storage and Haulage Path (CARD, 2017)

Maintenance and rehabilitation of the underground workings may include the following activities:

- Rehabilitation of ground control systems in existing underground mine accesses using scaling and installation of new ground support;
- Rehabilitation of existing wooden latter ways to meet other regulatory requirements;
- Excavation and installation of ground support in short sections of new drifts;
- Installation of fresh air delivery and any new or upgraded electrical, water, and compressed air services to underground work areas; and,
- Installation and maintenance of a communication system between surface and the underground working areas.

Surface and underground drilling activities include the installation of borehole cameras, cavity monitors and paste backfill monitoring points (visual and electronic), as well as connection of some surface boreholes to underground pipelines for injection of paste.

Paste plant commissioning, paste mix design refinement, and test batching includes the following activities:

- Paste will be batched to mixer trucks and transferred to standard cement trucks;
- Water will be delivered by water trucks and in-line pumps to the mixer trucks;
- Chemical additives will be added depending on the application;
- Paste will be placed downhole using various methods including gravity feed, in-line pumps or with a pumper/boom truck; multiple setups may be running at the same time;
- Lines will be flushed at the end of each day with 1-2m<sup>3</sup> of treated minewater; and
- A final survey will be conducted as the paste reaches the monitoring borehole breakthrough position.

A quality assurance and quality control program will be in place, including slump and consistency testing, confined strength testing, visual confirmation through boreholes, remote camera monitoring, volumetric assessment checks, cameral monitoring surveys and void laser scans.

Dust and drainage will be managed during tailings excavation and stockpiling. Additional spill containment material will available be on-site.

#### **4. Comments**

N/A

#### **5. Reviewer Comments**

By April 12, 2017, comments and recommendations on the Application were received from three reviewers:

- Department of Fisheries and Oceans (DFO);
- Environment and Climate Change Canada (ECCC); and
- Giant Mine Oversight Body.

Both DFO and ECCC did not have comments. The Giant Mine Oversight Body provided comments on the level of detail provided, project rationale, the compressive strength of the backfill, the schedule, closure objectives and criteria, and risk profile.

INAC-CARD responded on April 19, 2017. The Review Summary and Attachments (attached) present the concerns identified through the review of the Plan.

## **6. Security**

In accordance with section 94 of the *Mackenzie Valley Resource Management Act* (MVRMA), the federal government is not required to post security pursuant to section 71 of the MVRMA.

## **7. Conclusion**

Board staff conclude there are no outstanding issues or concerns with this submission.

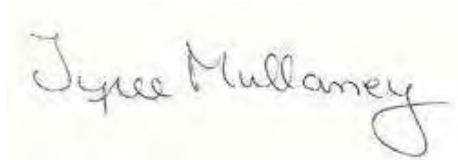
## **8. Recommendation**

Board staff recommend the Board approve the Updated – Underground Work Stabilization Plan as submitted by Indigenous and Northern Affairs Canada – Contaminants and Remediation Division to fulfill Part H, item 3 of Water Licence MV2012L8-0010.

## **9. Attachments**

- [Stage 4 Underground Site Stabilization Plan](#)
- Review Summary and Attachments
- Draft Decision Letter from the Board

Respectfully submitted,

A handwritten signature in black ink that reads "Tyree Mullaney". The signature is written in a cursive style and is centered on a light yellow rectangular background.

Tyree Mullaney  
Regulatory Specialist



### Review Comment Table

<b>Board:</b>	MVLWB
<b>Review Item:</b>	INAC-CARD - Giant Mine - Stage 4 Underground Site Stabilization Plan - MV2012L8-0010
<b>File(s):</b>	
<b>Proponent:</b>	INAC - Contaminants and Remediation Directorate
<b>Document(s):</b>	<a href="#">Stage 4 Underground Site Stabilization Plan</a> (1.8 MB)
<b>Item For Review Distributed On:</b>	Mar 24 at 07:50 <a href="#">Distribution List</a>
<b>Reviewer Comments Due By:</b>	Apr 12, 2017
<b>Proponent Responses Due By:</b>	Apr 19, 2017
<b>Item Description:</b>	<p>Indigenous and Northern Affairs Canada – Contaminants and Remediation Division – Giant Mine (INAC-CARD) has submitted Stage 4 of their Underground Site Stabilization Plan on March 23, 2017. This Plan is required by Water Licence MV2012L8-0010.</p> <p>Reviewers are invited to submit questions, comments, and recommendations on this submission using the Online Review System (ORS) by the review comment deadline specified below.</p> <p>All documents that have been uploaded to this review are also available on our public registry. If you have any questions or comments about the ORS or this review, please contact Board staff identified below.</p>
<b>General Reviewer Information:</b>	<p>In addition to this distribution, the items have been sent to the following organizations via fax:</p> <p>Fort Resolution Métis Council Trudy King (867)394-3322; Fieldworker.frmc53@northwestel.net;</p> <p>Hay River Metis Council Trevor Beck President (867)874-4472; hrmc@northwestel.net;</p> <p>NWT Metis Nation Tim Heron NWTMN IMA Coordinator (867)872-3586; rcc.nwtmn@northwestel.net;</p>
<b>Contact Information:</b>	<p>Jen Potten 867-766-7468 Tyree Mullaney 867-766-7464</p>

## Comment Summary

INAC - Contaminants and Remediation Directorate (Proponent)				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	General File	<b>Comment</b> ( <a href="#">doc</a> ) Cover Letter <b>Recommendation</b>		Noted.
Department of Fisheries and Oceans: Angie McLellan				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	Stage 4 Underground Site Stabilization Plan	<b>Comment</b> DFO reviewed the Stage 4 Underground Site Stabilization Plan and has no comment. <b>Recommendation</b> None		Noted.
Environment and Climate Change Canada: Emily Nichol				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	General	<b>Comment</b> ECCC has completed a review and has no comments at this time. <b>Recommendation</b> Not applicable.		Noted.
Giant Mine Oversight Body: Kathy Racher				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	Version Control	<b>Comment</b> The document link provided is not a final version of the workplan. Sections of the report appear to be in draft and/or from a prior version of the workplan. GMOB has therefore reviewed the MSWord version which was posted to the on- line registry on February 6th, 2017. <b>Recommendation</b> MVLWB or the proponent to confirm which document version is to undergo review.	<b>Apr 19:</b> The proponent is confirming that the version posted to the MVLWB registry on 31-Mar-17 is the version that should be reviewed.	Proponent response is satisfactory.
2	Level of Detail	<b>Comment</b> The workplan generally complies with the requirements as specified in Part H, Item 3 of t MV2012L8- 0010. However, as stated in	<b>Apr 19:</b> The level of detail provided in the work plan is consistent with all previous plans submitted and approved by the MVLWB.	The Water Licence does not require the submission of the engineered designs for Board



		<p>Item 3, the workplan is to present a detailed plan for review, consistent with the items as listed under Schedule 2, item 2. GMOB considers the workplan to be conceptual only as it presents minimal engineering design details.</p> <p><b>Recommendation</b> Prior to initiating construction, the proponent should submit detailed engineering designs / specifications for approval.</p>	<p>Detailed engineering designs and/or specifications are typically not reviewed by Board staff. The project does keep the Land Use Inspector apprised of work before, during, and after construction and they have the opportunity to discuss water usage and/or waste management at those points in time.</p>	<p>approval. The Board has not requested them in the past.</p> <p>In working with the Inspectors, Board staff are kept up to date on the activities on site. The Giant Mine Team also informs Board staff of the activities and provides constant updates.</p>
3	Project Rationale	<p><b>Comment</b> With regard to C5-09, INAC's request for extension of water licence MV2012L8-0010 (January 29, 2016) states: "Project engineers were convinced at that time that stabilization of the stope complex could still be monitored and it was reprioritized for backfilling during the overall remediation plan and could be removed from the SSP.". The Project Team accepted this recommendation until the Independent Peer Review Panel (IPRP) challenged the appropriateness of deferring the backfilling of C5-09. GMOB has not been given an opportunity to review the different rationales presented by the Project engineers or the IPRP.</p> <p><b>Recommendation</b> The proponent should present the rationale for proceeding with the backfilling of C5-09 during the SSP (i.e., as opposed to deferring implementation until the overall remediation plan). The rationale should clearly address the differing</p>	<p><b>Apr 19:</b> Further investigation and analysis of the C5-09 stope complex over the past couple of field seasons has indicated that this void should be filled as soon as possible at least up to the 425 Level and monitored, versus just monitoring. Although a very low risk of happening, these recent assessments of the stope complex demonstrate that if existing fill were to leave lower stopes under C5-09, there is the possibility that the walls and back of C5-09 in an unsupported state could start to cave. If this were to happen, its possible that it could impact Chamber 9 (one of our arsenic stopes), as well as the existing crown pillar. Therefore by backfilling this stope and continuing with our monitoring program we will continue to reduce the already low risk of this event.</p>	<p>Proponent response is satisfactory.</p>

		perspectives of the Project engineers and the IPRP.		
4	Compressive Strength of Backfill	<p><b>Comment</b> Section 4.6.2 indicates that the cemented paste backfill must have a minimum 28-day compressive strength of 100 KPa, and contain a minimum 1% binder by weight. In contrast, in a follow-up to the March 6, 2017 Meeting with Interested Parties, the Project indicated there is a 3.5 MPa compressive strength specification specific to this stope complex. The rationale for the significant increase in required compressive strength has not been presented in the Workplan.</p> <p><b>Recommendation</b> The proponent should present the rationale for the required compressive strength of the backfill for C5-09. The rationale should present the justification for any differences between the required backfill compressive strength for C5-09 as compared to the backfill placed in other chambers/stopes that have been filled through the SSP.</p>	<p><b>Apr 19:</b> Further investigation and analysis of the geometry of stope complex has determined that there is likely benefit, from a risk reduction of rock collapse basis, in designing the backfill so that the middle layer of the backfill plug is more durable and resilient thus the requirement for a higher compressive strength specification than other areas of the stope complex where backfill will be delivered.</p>	Proponent response is satisfactory.
5	Schedule	<p><b>Comment</b> INAC's request for extension of water licence MV2012L8-0010 (January 29, 2016) states that backfilling was scheduled to begin in October, 2016. However, in a follow-up to the March 6, 2017 Meeting with Interested Parties, the proponent indicated its intention to have a backfilling contract in place by late summer 2017. On this basis, GMOB has concluded that the backfilling of C5-09 has already "slipped" by</p>	<p><b>Apr 19:</b> Changes to the overall schedule for this work are outside the requirements as specified in Part H, Item 3 of MV2012L8-0010. The complexity of the C5-09 stope, and the necessity to develop an appropriate response to the risk are the main factors that have impacted the original schedule. INAC would be happy to meet with the GMOB to discuss in more detail the factors that</p>	Proponent response is satisfactory.

		<p>approximately nine months relative to the schedule that was included in the water licence extension application. Further, GMOB notes that the extended licence is 3-years longer than the original licence. The schedule performance of the SSP to date is inconsistent with the designation of the SSP as an emergency per Section 119 of the Mackenzie Valley Resource Management Act.</p> <p><b>Recommendation</b> The proponent should present a detailed analysis of factors that have contributed to the duration of the SSP being significantly longer than anticipated. The analysis should also identify and proactively mitigate potential additional delays.</p>	<p>contributed to the duration of the SSP being longer than originally anticipated.</p>	
6	Section 5 - Closure Objectives and Criteria	<p><b>Comment</b> GMOB has assumed that all backfilling included in the SSP is permanent and that no further remedial measures will be required to stabilize the backfilled voids. However, the workplan states: "The goal of the proposed work outlined in this USWP - Stage 4 is to reduce the risks of possible mine instability in the short term. When long-term closure objectives for the underground portion of the overall project are set, additional enhancements or backfilling of the areas may be required.". The Project Team has not yet developed final closure objectives and criteria for the site, nor have plans been developed to conduct all required underground stabilization / closure.</p>	<p><b>Apr 19:</b> There should never be an assumption of permanency when dealing with a mine closure. The site will continue to be subject to changing natural environmental conditions related to freezing, thawing, ground movements and potential degradation of rock and/or backfill. Whether these changes necessitate further action to mitigate potential future risks will be determined through ongoing monitoring and assessment. The purpose of this submission is to have this work plan approved to continue with work necessary to mitigate the current ongoing risks of potential rock collapse within the C5-09 stope complex, not necessarily to implement a final remediation solution.</p>	<p>Proponent response is satisfactory.</p>

		<p><b>Recommendation</b> The proponent should indicate future potential changes / enhancements that may be required to fully stabilize / close the voids that will be filled during the SSP program. The Proponent should indicate when the full underground remediation plan will be available for review.</p>	<p>The full underground remediation plan will be developed in conjunction with the overall remediation plan that will be subject to review through the pending water licence process for the GMRP.</p>	
7	Risk Profile	<p><b>Comment</b> The SSP was initiated to urgently mitigate risks that were deemed unacceptable. While GMOB agrees that the work completed to date has reduced the risks associated with the site, the risk reductions achieved through the implementation of the SSP have yet to be quantified.</p> <p><b>Recommendation</b> The proponent should provide an updated risk profile for the site to demonstrate the risk reductions achieved by the implementation of the SSP program.</p>	<p><b>Apr 19:</b> The SSP was initiated to mitigate immediate risks that were deemed unacceptable. The GMRP has an extensive risk management process that is updated on an annual basis, and reviews are completed on a quarterly basis to ensure that all treatment activities are taking place in a timely manner. An updated risk register will be provided as part of the 2016-17 Annual Report to be submitted to Giant Mine Oversight Board. In addition risks to the project will be discussed with Stakeholders as part of the Quantitative Risk Assessment as per Measure 5 of the Report of Environmental Assessment.</p>	<p>Proponent response is satisfactory.</p>