



PO BOX 1500
YELLOWKNIFE NT X1A 2R3

NT 783704

November 30, 2015

Distribution List

Water License MV2012L8-0010 – Advanced Underground Site Stabilization Plan – Request for Extension to January 31, 2019

The Giant Mine Remediation Project Team will be requesting approval from the Mackenzie Valley Land and Water Board (MVLWB) to extend the current Site Stabilization Plan (SSP) Water License MV2012L8-0010 to January 31, 2019 in order to complete the C5-09 stope stabilization. The Project Team will be requesting the MVLWB to approve the use of structural foam as part of the backfilling plan under Part H, Conditions Applying to Construction, Item 3. Additionally, the Project Team will be requesting a new condition allowing related products to be used with seven days' notice. This will allow operational flexibility for backfill contractors. The condition states:

- At least seven days prior to the use of any chemicals that were not identified in the complete application, the MSDS sheets must be provided to an Inspector and the Board.

The Project Team will be hosting a meeting on January 6, 2016 to discuss the extension request of the water license and will give a presentation to interested parties outlining the reasoning for requiring such an extension. Written comments on the extension are requested by January 13, 2016. The Project Team will then apply to the MVLWB for an amended licence.

As of the end of October 2015, extensive progress has been made in completing the targeted underground stabilization work associated with this water license. The following bullets outline these underground elements that were to be stabilized and a brief update as to their status of completion:

- **Arsenic filled stopes and chambers B2-08 and B2-12/13/14 (Including all associated bulkheads)** – Both B2-08 and B2-12/13/14 arsenic stopes/chambers were completely filled with cemented paste backfill by mid-October 2015. As per Schedule 1, Item (o), an “As-built Statement of Risk Mitigation” letter will be

stamped by a professional engineer by March 2016 that will confirm the mitigation efforts associated with these stopes.

- **Non-arsenic filled stopes B3-06, B3-10mid (formerly described as B2-02/18) and C5-09/C3-12** - Both B3-06 and B3-10mid non-arsenic stopes/chambers were completely filled with cemented paste backfill in August 2015. As per Schedule 1, Item (o), an “As-built Statement of Risk Mitigation” letter will be stamped by a professional engineer by March 2016 that will confirm the mitigation efforts associated with these stopes. *Non-arsenic filled stope C5-09/C3-12 is discussed in detail below.*
- **Non-arsenic filled stopes A3-70, B1-18/19, B2-18/19, and B3-01/3-02** - Both A3-70 and B1-18/19 non-arsenic stopes/chambers were completely filled with cemented paste backfill by mid-September 2015. As per Schedule 1, Item (o), an “As-built Statement of Risk Mitigation” letter will be stamped by a professional engineer by March 2016 that will confirm the mitigation efforts associated with these stopes. Further geotechnical assessment data gathered since the issuance of this water license has allowed for the risk profile associated with non-arsenic stopes B2-18/19 and B3-01/3-02 to be lessened to the point where the immediate risk of rock failure in these stopes is minimal. It was therefore not required to backfill these stopes as part of the current SSP and will become part of the final underground stabilization for remediation.
- **Non-arsenic stopes A2-01 and B1-43** – A geotechnical risk drilling program completed this past summer concluded that the risk profile associated with non-arsenic stope A2-01 and B1-43 has decreased to the point where the immediate risk of rock failure in these stopes are minimal. It was recommended that these stopes be included into the annual stope monitoring program, however there is no requirement to backfill these stopes as part of the current SSP and will become part of the final underground stabilization for remediation.

The remaining immediate risk mitigation described in the December 19, 2012 application is the C5-09 / C3-12 stope complex. Below is a summary of work conducted to date on these items.

The C5-09 / C3-12 stope complex is made up of several interconnected partially backfilled stopes that lie under and adjacent to arsenic stope C2-12 and arsenic chambers 9 and 10. The area is commonly described as the C5-09 Complex in most of the project literature. This stope is also connected to deeper stopes (7-12, 9-12, 11-9, 12-8) that have been reported by the mine operators to be backfilled with general waste rock fill. Please see figures in Golder, 2014 attached to this letter for more information.

Stope C5-09 was originally almost full of un-cemented waste rock fill, however during a visual inspection of the stope in 2007, it was noted that a significant amount of fill had been lost from the stope through settlement to lower areas of the mine. Subsequent inspections observed fill in the 575 and 750 Levels where material had flowed out of draw points. There is evidence that fill from this stope may have travelled lower than the 750 Level, but levels below this are flooded and not accessible for inspection to confirm.

Since 2007, various stability assessments, hazard assessments, risk assessments, and mitigation/remediation plans for the C5-09 stope complex have been documented by the Giant Mine Remediation Project. The assessments were included in the original water license application under Tab 9 and have been included for consistency in this package. These assessments generally concluded that there was a heightened concern regarding the stability of the C5-09 complex since the loss of this fill and should be considered for inclusion in the SSP, however the project could potentially achieve a reduced risk rating if they were to monitor the stope complex on an on-going basis until it could be backfilled.

A re-assessment (Golder, 2012) of the stability of stopes adjacent to arsenic stopes and chambers in 2012, including C5-09, concluded that in its current state, the stope is predicted to be stable, however if additional fill were to leave the stope, conditions could deteriorate. Also, due to the large size of the void (~87,000 m³), coupled with the geotechnical characteristics of the rock mass, any rock failure could propagate rather quickly. Project engineers were still 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 as one of the last stopes to fill due to the fact that it could be monitored (Golder 2011b). The Project accepted this recommendation until several of the Independent Peer Review Panel (IPRP) experts challenged the project team's position of backfilling the stope after the overall site remediation had started. The IPRP specifically challenged the position that the monitoring would provide suitable warning to implement a proposed "rapid" response of cemented paste, backfilling the stope through pre-drilled delivery boreholes. They recommended that the C5-09 stope complex continue to be monitored with the possibility of backfilling prior to remediation once a suitable design for backfill material and procedure for placement was in place. Therefore, it would remain part of the current SSP (Brodie Consulting, 2014).

In June of 2015, additional project scoping definition centered on clarifying mine re-flooding scenarios that led to the assertion that the mine will likely re-flood at some point in time and mine water fluctuations of unknown frequency and magnitude will occur. This has led to the requirement, as suggested by the IPRP, for a more robust mitigation approach to the backfilling of C5-09. Ideally, the newly placed backfill could withstand the loss of existing fills below, however it will require an engineered solution that may require placement of a structural backfill including foam, or the strengthening of existing fills, at a narrow stope span location, commonly referred to as a choke point. It is also

preferable to backfill this complex stope prior to implementation of the full-scale freeze program, which also aligns with IPRP guidance.

Therefore, additional assessments of the complicated excavated mine geometry and the location and type of existing stope fill material with associated stability assessments are required to assess the feasibility of developing this engineering solution for this stope. If the approach is deemed feasible, the amount and type of the backfill and any other required enhancements such as the installation of additional ground support or grouting of existing fill material can then be determined.

All of this required assessment work began in the Fall of 2015 and is currently underway, with an eventual design and path forward on stabilizing C5-09 anticipated for the Spring of 2016. As the current SSP water license will expire on March 31, 2016, the project will require an extension of the license through to January 31, 2019 to allow for this complicated design (by March 2016), procurement (April – September 2016), engagement and MVLWB approval of the new work plan (August – October, 2016), implementation (October 2016 – March 2018), and mitigation work and close out reporting in order to complete the SSP (March 2018 – January 2019). Given the complexities associated with C5-09 the Project Team is requesting an additional year (2019) be added as contingency for implementation and monitoring. The requested dated coincides with existing SSP reporting requirements for semi-annual reports. In the event that this additional year is not required the Project Team will submit a final report prior to expiry of the licence and request that the licence be cancelled.

We look forward to discussing the extension request. If you have any questions or require additional information or clarification, please contact Adrian Paradis by telephone at 867-669-2425 or by email at Adrian.Paradis@aandc-aadnc.gc.ca or Katherine Ross at telephone at 819-934-9223 or by email at Katherine.Ross@aandc-aadnc.gc.ca.

Sincerely yours,



Adrian Paradis
Regulatory Manager
Giant Mine Remediation Project

Encl.

Cc: Katherine Ross, Integration Manager, Giant Mine Remediation Project
Chris MacInnis, Manager, Engineering, Giant Mine Remediation Project
Tyree Mullaney, Regulatory Officer, MVLWB

References

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2. Golder Associates Ltd., 2011b. Investigation, Mitigation, and Monitoring of Known High Risk Underground Openings, Giant Mine Remediation Project, prepared for Public Works and Government Services (PWGSC); December 20, 2011. AECOM Doc. No. 313-UG-13-MEM-003-Rev1_20111220
3. Golder Associates Ltd., 2012. Review and Update of Arsenic Stope and Chamber Stability Assessments - Giant Mine Remediation Project. Report prepared for PWGSC; October 5, 2012. AECOM Doc. No. 313-UG-13-RPT-0004-Rev3-20121005; GAL Doc. No. 090
4. Golder Associated Ltd., 2014. C5-09 Stope Complex Void Backfilling Conceptual Mitigation Plan Revision 0 – January 24, 2014