Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Water Resources Division
Resource Management Directorate
Nunavut Regional Office
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Your file - Votre référence
2AM-LUP2032
Our file - Notre référence
GCdocs # 98188686

October 12, 2021

Mr. Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
sent via e-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada's Reply to LMI 2nd Response on Dome Design and Comments on the Dome Design Issued for Construction Drawings for water licence No. 2AM-LUP2032 – Lupin Mine Project

Dear Mr. Dwyer,

Thank you for your October 5, 2021 invitation for reply to Lupin Mines Incorporated's (LMI) August 6, 2021 2nd response to Crown-Indigenous Relations and Northern Affairs Canada's July 28, 2021 comments on Dome Design Issued for Construction Drawings.

Part 1 of this letter addresses LMI's responses on Crown-Indigenous Relations and Northern Affairs Canada's (CIRNAC) comments on the Part E, Condition 25 Dome Design and Part 2 provides CIRNAC's comments on the Dome Design Issued for construction drawings 19136158-0002-CM-0001_Rev 1 Proposed Waste Rock Dome (Dwg1), Drawing 19136158-0002-CM-0002 Rev 1 Proposed Waste Rock Dome Sections and Details (Dwg2) and Drawing 19136158-0005-CM-0001 Rev D titled Proposed Waste Rock Removal and Placement (Dwg3).

LMI's August 6, 2021 response:

- In Part 1, addressed comments a, b, d, e, f, g, and h. Comment (c) considered resolved at the moment;
- In Part 2, Drawing 19136158-0002-CM-0001_Rev 1 Proposed Waste Rock Dome (Dwg1), addressed comments a, c, d, e. Comment (b) considered resolved at the moment;

- All comments in Drawing 19136158-0002-CM-0002 Rev 1 Proposed Waste Rock Dome Sections and Details (Dwg2) were addressed; and
- In Drawing 19136158-0005-CM-0001 Rev D titled Proposed Waste Rock Removal and Placement (Dwg3), comments c, d, and e were addressed. Comments (a) and (b) remain outstanding.

Part 1

Reply to LMI's Specific Responses to CIRNAC Comments on Dome Design

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a) **Lack of detailed grading information on the top of "dome" –** LMI in response, states that the grading details are provided in issued for construction drawing 19136158-0002-CM-0001_Rev 1.

"As indicated in Note 7, the final elevation of the top surface will be varied to suit the actual volume of waste rock that is imported from elsewhere on the mill site; however, the design slopes of the surface will not be changed."

CIRNAC concerns were addressed.

b) **Lack of design information on storm / freshet flows –** CIRNAC requested that the design calculations for the design flow along with confirmation that the esker material on the dome cover can withstand the movement of this amount of water as it migrates to the surface water management chutes. Also, the design should identify the preferred surface water flow patterns that will be established on the top of the dome so as to confirm if reinforced swales (i.e., boulder or riprap lined channels) are required to move water to the respective chutes.

LMI in its response referred to the memo *"Supplemental information on the design of the dome and landfill" attached to the minutes of July 22nd technical meeting which demonstrates that the design flow of 1 m^3/sec. considerably exceeds the flow corresponding to a 100 year return of 5 minutes duration (0.39 m^3/sec.)*

CIRNAC concerns were addressed.

c) **Lack of protection against rill erosion on the long (30 to >100 m) 10% slopes -** CIRNAC in reply stated that it still has concern over the long-term erosion potential of the slopes, particularly if the perimeter berm is compromised over time, and requests the information outlined in the previous paragraph.

LMI, in its response claim that long term field experience has demonstrated that sheet flow will not cause erosion.

CIRNAC acknowledges LMI's experience at sites and accepts the response. Recognizing that long term monitoring will be required to ensure that erosion does not occur.

CIRNAC concern is considered resolved at the moment.

d) **Lack of runoff channels from discharge chutes –** LMI's response indicates that due to setting on top of the hill, runoff from chutes will naturally drain away from the toe of the waste rock cover slopes. Note 11 has been added to Drawing (Dwg) 19136158-0002-CM-0001_Rev 1 directing the Contractor to "*construct berms or ditches as necessary to direct flow from drainage chutes away from the toe of the dome fill*".

CIRNAC concerns were addressed.

e) **Potential for toe erosion from discharge chute runoff flows** – CIRNAC recommended that LMI provide technical information on the stilling basin design to support the statement regarding exit velocities and update Note 11 on Dwg 19136158-0002-CM-0001_Rev 1 to address the site conditions and grading requirements in the areas between the stilling basins.

LMI in its response, stated that: *"At the design flow of 1.0 m^3/sec, the calculated flow depth and velocity exiting the stilling basin are 0.312m and 0.99 m/sec. Design charts from the British Columbia Design Manual indicate that rip rap is not required for this velocity."* Note 11 was also updated.

CIRNAC concerns were addressed.

f) **Lack of specific notes addressing construction constraints that need to be addressed before cover placement –** CIRNAC requested that LMI provide a clear guidance on what is needed/expected with regard to dome package in relation to Note 1 which is viewed as broad statement and to confirm whether or not there is an expectation to "import" waste rock from other parts of the site. CIRNAC suggested the note be revised to remove the word "imported", if the waste rock is not coming elsewhere from the site.

LMI in response, modified Note 1 to include that: *"Engineer's approval of cleanup is required before waste rock or cover materials are placed."* Also, confirmed that: *"No waste rock is being imported from elsewhere on the site, only from the tan coloured areas around the mill that are shown on Figure 10 in the approved*

FCRP." The word "imported has been deleted from the notes in Rev 2 of the dome drawings.

CIRNAC concerns were addressed.

g) **Failure to show where materials to be removed prior to cover placement are located –** LMI indicated that the location of contaminated materials are shown on Dwg 19136158-0005-CM-0001_Rev D.

CIRNAC concerns were addressed.

h) **Failure to show locations of shaft, crown pillar area that will be buried under the dome –** LMI in response states that locations of shafts, crown pillar area buried under the dome have been added to Dwg 19136158-0002-CM-0001_Rev 1.

CIRNAC concerns were addressed.

Part 2

I. **Drawing 19136158-0002-CM-0001_Rev 1 Proposed Waste Rock Dome**

a) **Concrete Foundations -** CIRNAC recommended that LMI add the outlines of all slabs and foundations that will be buried within the dome to the site Dwg and where applicable to the sections.

LMI in response, stated that: *"Outlines of the building foundation slabs have been added to the Drawing 19136158-0002-CM-0001_Rev 2".*

CIRNAC were addressed.

b) **Length of Embankment -** CIRNAC recommended that LMI review the design to confirm that esker material will not migrate during high intensity rainfall events and provide written confirmation that fine grained materials will be washed out of the embankment cover esker material.

LMI in its response claim that long term field experience has demonstrated that sheet flow will not cause erosion.

CIRNAC acknowledges LMI's experience at sites and accepts the response. Recognizing that long term monitoring will be required to confirm the performance of esker materials during high intensity rainfall events. There is a possibility that the dome embankment could erode during the post closure monitoring period.

CIRNAC concern is considered resolved at the moment.

c) **West Zone Crown Pillar Cover and Note 4 -** CIRNAC recommended that LMI revise the Dwg and notes to ensure that the additional capping materials are placed as appropriate prior to placement of the cover.

LMI in its response, stated that: *"The capping over the backfilled west zone crown pillar will be integrated into the overall dome landform. It is expected that most of the settlement of the backfill in the crown pillar will occur before the dome is brought to its final grade. The following sentence has been added to Note 4 of Dwg 19136158-0002-CM-0001_Rev 2. "Place an additional ridge of waste rock to allow for settlement if so directed by the Engineer."*

CIRNAC concerns were addressed.

d) **Stilling Basins -** CIRNAC recommended that LMI amend the stilling basin design to provide additional detail in order to confirm a positive drainage of water from the stilling basins away from the toe of the dome embankment.

In response, LMI stated that: *"The recessing of the stilling basins into the original ground is based on similar designs used successfully at other northern sites. The reverse slope at the end of the stilling basin is more effective at containing the hydraulic jump within the stilling basin as opposed to a stilling basin built on top of original ground. Note 11 has been modified on Dwg 19136158-0002-CM-0001_Rev 2 to read, "Construct ditches or berms as necessary to direct flow from drainage chutes and general runoff away from the dome fill."*

CIRNAC concerns were addressed.

e) **Drainage at the Toe of the Embankment -** CIRNAC recommended that LMI provide additional drawing notes to provide guidance to the contractor as well as to the program stakeholders on how surface water will be directed away from the toe of the dome embankment. Consideration should be given to placing coarser material or armouring at the toe of the dome embankment.

In response, LMI stated that: *"The original ground surface adjacent to the toe of the dome is currently obscured by existing waste rock. As discussed above, a Golder geotechnical engineer will be on site later in the summer to verify that adequate drainage is achieved by "field fitting" to the original ground surface adjacent to the toe of the dome. Note 11 has been modified on Dwg 19136158-0002-CM-0001_Rev 2 to read, "Construct ditches or berms as necessary to direct flow from drainage chutes and general runoff away from the dome fill."*

CIRNAC concerns were addressed.

II. Drawing 19136158-0002-CM-0002 Rev 1 Proposed Waste Rock Dome Sections and Details

a) Berm Construction - CIRNAC recommended that LMI clarify berm construction materials .

LMI in response, stated that: *"The perimeter berm is to be constructed of zone 1 esker material. The intention is that a 350 mm thick layer of zone 2 erosion protection on geotextile be placed at the bevelled end of the perimeter berm at the entrance to each of the chutes."*

CIRNAC concerns were addressed.

b) Drainage Chute Typical Profile – Stilling Basins - CIRNAC recommended that LMI clarify the design of the stilling basins if native rock is found at the toe of the chute discharge location.

LMI stated that: *"It will not be necessary to construct/excavate a stilling basin into a bedrock outcrop. Note 10 has been added to Dwg 19136158-0002-CM-0001_Rev 2 to clarify this. It reads, "This stilling basin shall be deleted if the chute ends on a bedrock outcrop." As a field fit, berms of zone 2 erosion protection would be extended to laterally contain the hydraulic jump over the bedrock surface."*

CIRNAC concerns were addressed

c) Drainage Chute Typical Profile, Section Entrance to Drainage Chute – Non-woven Geotextile – CIRNAC recommended that details and/or notes should be

provided to ensure that the non-woven geotextile is placed, covered, and anchored as appropriate.

LMI stated that: *"The non-woven geotextile is to be placed on the top of the esker material to act as a filter between the esker material and the overlaying zone 2 erosion protection. There is no need to anchor the geotextile. The friction between the geotextile and the esker material is adequate to resist any movement for the profile and side slope angles. Any geotextile that daylights above surface is redundant."*

CIRNAC concerns were addressed.

d) Esker Cover at Toe of Rock Dome Slope - CIRNAC recommended that LMI Provide:

- Notes on any requirements necessary prior to placing materials on original ground along the toe of the dome slopes.
- Technical assessment supporting that the toe of slope does not require some form of toe stabilization to mitigate long term erosion potential along the toe.

LMI stated that: *"It is necessary to prevent any concentrated flow along the toe of the dome cover. To this end, note 11 has been modified on Dwg 19136158-0002-CM-0001_Rev 2 to read, "Construct ditches or berms as necessary to direct flow from drainage chutes and general runoff away from the dome fill."*

CIRNAC concerns were addressed.

III. Drawing 19136158-0005-CM-0001 Rev D titled Proposed Waste Rock Removal and Placement

a) Contaminated Soil to be Excavated - CIRNAC recommended that LMI provide the inferred boundaries and depths of the contaminated soils to be excavated.

LMI in response, made reference to the Golder 2017 Site Environmental Assessment updates which provides approximate estimated dimensions of the contaminated areas.

CIRNAC does know the status of closure works, but if all contaminated soils have been removed, CIRNAC would expect that LMI has records of actual extent of soil removal that can be shown on a drawing.

CIRNAC concern remain outstanding.

b) **Area Cleared for Waste Rock Removal -** CIRNAC recommended that LMI provide details on the order and schedule of construction activities related to the removal of materials from areas cleared for waste rock removal, placement of contaminated materials underground and debris as approved underground, filling of surface openings (shafts, vents, portal, waste rock excavation and relocation, cover placement planned for 2021).

LMI in its response, pointed out that the black outlined area A,B,C and D on Dwg 19136158-0005-CM-0001 Rev D are areas where no contamination were found in either of the Environmental Site Assessments.

Detailed schedule of construction activities related to the removal of materials from the waste rock, placement of contaminated materials underground and debris as approved underground, filling of surface openings (shafts, vents, portal) waste rock excavation and relocation, cover placement planned for 2021 was not provided. CIRNAC has not been provided with any of the Field Communications where instructions/further details have been provided to the contractor on site with respect to this work. It would help CIRNAC and its inspectors to see this information so as to understand what instructions have been provided to the contractor in this regard.

CIRNAC concerns remain outstanding.

c) **Portal Area and Landfill Area Mounds at Closure –** CIRNAC recommended that LMI provide plans and sections of the Portal Area and Landfill Areas for review.

LMI in response, stated that the landfill drawings were provided as an attachment alongside the minutes of July 22nd technical meeting and committed to providing the drawing for the portal area when available.

CIRNAC concerns were addressed.

d) **Crown Pillar and Mine Openings -** CIRNAC recommended that LMI add labels and notes as appropriate to identify surface openings.

LMI is committed to adding the labels for the crown pillar and mine openings to the future revision of Dwg 19136158-0003-1.

CIRNAC concerns were addressed.

e) Drawing Notes - CIRNAC recommended that :

- Note 3 requires more detail to clarify that the final design for the closure of the portal opening will be done based on a topographic survey of the area once any demolition works are completed.
- Note 5 should clarify where the demolition debris from the removal of the surface main shop is to be placed and how the capping work is to be done. The concrete pad underlying the structure will need to be punctured to accommodate surface water drainage through the pad (given this area is outside the footprint of the dome structure it is inferred that the breaking of the main shop pad would be done later post-completion of the dome structure).
- The location of the crown pillar (as defined by the bold black and purple/pink lines should be defined in the legend.

LMI in response, committed to providing a separate drawing for the portal area when available. It further stated that*: "Like all demolition debris, the debris from the machine shop is to be placed in the landfill and then caped as per Dwg 19136158-0001-CM-0002_Rev 1. All parties recognize that an opening needs to be left to receive this debris and rock and esker will be stockpiled for final capping. Note 7 applies to the machine shop as well as all other slabs outside of the purple area. As documented by FC-GOL-009, the punctured slabs are then to be covered with 0.3 m of esker material."*

CIRNAC concerns were addressed.

CIRNAC appreciates the opportunity to participate in this review. If there are any questions, please contact me at (867) 975-4738 or vincent.okonkwo@rcaanc-cirnac.gc.ca

Sincerely,

Vincent Okonkwo
Senior Environmental Assessment Specialist