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

Water Resources Division
Nunavut Regional Office
Iqaluit, NU X0A 0H0

April 30, 2019

Richard Dwyer
Manager of Licensing
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PO Box 119
Gjoa Haven, NU X0A 1J0

CIDM # 1249248

**Re: 2AM-LUP1520 – Review of Lupin Mines Incorporated (LMI) Water Licence Renewal and Amendment Application and Final Closure and Reclamation Plan – Lupin Mine Property – Kitikmeot Region, Nunavut**

Thank you for the email notice received on March 29, 2019, regarding the opportunity to comment on the Renewal application for the Lupin Mine Property.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) has reviewed the water licence renewal application documents provided by the Nunavut Water Board (NWB) located on the Nunavut Water Board FTP site as it relates to Water Licence 2AM-LUP1520.

CIRNAC's comments are provided pursuant to its mandated responsibilities from the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

If you have any questions or require further information with respect to this matter, contact me at (867) 222-9278 or by email at ian.parsons@canada.ca.

Sincerely,

*Original signed by*

Ian Parsons
Regional Coordinator, Water Resources Division

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# Memorandum

To: Richard Dwyer, Manager of Licensing, NWB

From: Ian Parsons, Regional Coordinator, Water Resources CIRNAC, Nunavut Regional Office

Date: April 30, 2019

Re: **2AM-LUP1520 – Review of Lupin Mines Incorporated (LMI) Water Licence Renewal and Amendment Application and Final Closure and Reclamation Plan – Lupin Mine Property – Kitikmeot Region, Nunavut**

Applicant: Lupin Mines Inc. (LMI)
Project: Lupin Mine Project
Region: Kitikmeot

## BACKGROUND

The Lupin Mine Site is situated in Nunavut's Kitikmeot region, approximately, 285 km southeast of Kugluktuk, Nunavut, and about 400 km north of Yellowknife, Northwest Territories. The airstrip serving this Site is at 65° 46'00" N and 111° 14'41" W. The Site is on the western shore of Contwoyto Lake, approximately 60 km south of the Arctic Circle.

The mine property is currently owned by Mandalay Resources with the licensee of the site being LMI. The Lupin Mine was in operation from 1982 to 2005 with temporary suspensions of activities between January 1998 and April 2000, and between August 2003 and March 2004. The mine resumed production in March 2004 until February 2005.The site has remained in Care and Maintenance since 2005.

Currently LMI is actively closing their property as per their approved Interim Closure and Reclamation Plan (FCRP) under their water licence 2AM-LUP1520. Part of the renewal application is the review of their FCRP.

CIRNAC reviewed the documentation associated with the renewal application for adequacy and validation of security requirements for the Lupin site. Attached below are CIRNAC's comments and recommendations on the renewal application and the FCRP document.

On March 6th, 2019 CIRNAC submitted a technical Memorandum outlining issues, concerns and Information requests needed in order to complete the review of the renewal application. LMI responded, stating that they will address CIRNAC's issues, concerns and information requests through the technical review stage.

CIRNAC responded stating that they were satisfied with this approach. However, because our earlier concerns were not answered under the completeness review stage, CIRNAC anticipates that all previous concerns and requested information also attached to this letter will be provided at the technical review phase.

## A) FINAL RECLAMATION AND CLOSURE PLAN DOCUMENT

CIRNAC has provided comments based on the structure of the FRCP layout. CIRNAC has made comments on each section following the layout of LMI's document.

### EXECUTIVE SUMMARY

CIRNAC requires clarification from LMI for the following sections in the Executive Summary.

1. Section 5a): This section does not indicate permanent closure of the Access Ramp.
2. Section 5c): Appropriate reference for information on geochemical characterization.
3. Section 5d.1): Clarity on what the "treatment plant" references.
4. Section 5d.2): Further detail is required on the permanent closure spillways to be constructed through Dam 1A and J Dam.
5. Section 5d.3): Last sentence notes that if exposed tailings are encountered when pond water level is lowered, they will either be relocated and covered with 1 m of esker material. The rationale for this decision should be provided.
6. Section 5d.4/f(v): Given that 67% of PAG waste rock, additional assessment of ARD potential of mill site, airstrip access roads, and dams is required in the FCRP.
7. Section 5f(viii): This section should indicate that burning of residual fuel, and placing PHC impacted soils underground would need to be approved by the regulator. Furthermore, clear provisions should be discussed with respect to verification testing to confirm clean up. If an Human Health Environmental Risk Assessment (HHERA) is being done then it should be a DQHHERA and not a screening level RA as costed in the RECLAIM estimate.
8. Section 7: Amending the post closure monitoring from the current 25 years in the KP RECLAIM estimate to five years post remediation requires acceptance by the NWB.

### SECTION 2 PROJECT DESCRIPTION

**Section 2.1.2**: The discussion on Climate Change is limited to temperature rise of 1 degree Celsius over the next century. Ensuring climate change considerations are addressed in closure is critical to many aspects of the closure plan, particularly with respect to ARD potential of the PAG waste rock distribution around the site and tailings system closure components

CIRNAC Request**:** LMI should provide additional information to support 100 year Climate Change predictions

**Section 2.1.8**: States that 40% of seeps at mine/mill site complex sampled in 2005 were acidic (Morrow 2006).The section also indicates 67% of waste rock is PAG, and PAG samples were distributed throughout the site. Direct measurement of groundwater and seepage water confirmed ARD occurring (Golder 2017a). There is no information on general locations and elements of the sites that were sampled.

CIRNAC Request**:** LMI should provide additional clarification on the extent of the sampling and confirm their strategy to manage PAG issues on parts of the site that are located away from the Mill area.

**Section 2.3.2**: States that rip rap will be recovered and placed to stabilize dams and enhance embankment stability. The FCRP did not provide conceptual figures or further details on where the rip rap will be recovered from (quarry or from existing dams) or where it will be placed as part of the reclamation works.

CIRNAC Request: LMI should provide a conceptual plan for each location where rip rap is to be provided and details on the source of the rip rap.

## SECTION 4 PERMANENT CLOSURE and RECLAMATION

**Section 4.3.2**: Timelines provided in the revised table 14 are substantially different to those included in the July 2018 Final Closure Plan. The revised table shows the Closure Period being 2020 and 2021, whereas the July 2018 plan indicates the Closure Period as being 2019 and 2020.

CIRNAC Request**:** LMI should explain the change in final closure timelines.

**Section 4.3.2 Reclamation Objectives and Closure Criteria**: States that technical specification for engineered cover will be established. Without detailed specification of the cover, it cannot be assessed properly.

CIRNAC Request**:** LMI should provide cover specification details to enable proper assessment.

**Section 4.3.2.3 Synthesis of Preferred Activities into Reclamation Plan**:

(i) This section indicates that regrading of excavated depressions will be achieved by bringing in waste rock from perimeter areas. There is a Potential for the placement of PAG materials.

(ii) The sections also states that HHERA will be completed during final closure planning to develop site specific soil quality remediation objectives (see also section 6.2 which says HHERA is underway and is expected ready for review in July 2018).

CIRNAC Request**:** LMI should provide information on materials handling/management to avoid PAG materials. LMI should also provide evidence on how the HHERA assessment report results will be incorporated into the final closure plan..

**Section 4.3.2.3 Management and Accountability Structure**: States that a QA/QC document will be developed to verify remedial activities are implemented as planned.

CIRNAC Request**:** LMI should provide the QA/QC program (QA/QC document) that will be implemented during the implementation of the FCRP, to verify that the PHC soil clean-up work will be done in accordance with the site-specific standards established for the site in the HHERA or using NU regulations, and for the management of PAG concerns in the waste rock.

**Section 4.3.2.3 Uncertainties and Information Needs**: States that HHERA results may affect final soil volumes.

LMI Response: The HHERA study is planned to be conducted in the summer of 2019.

CIRNAC Comment: With this delayed timing of the HHERA it is difficult to see how LMI will incorporate the results into the FINAL closure Plan

CIRNAC Request**:** LMI should incorporate results of HHERA into the final closure plan.

**Section 4.3.2.3 Monitoring, Maintenance, and Reporting Program**: States that the engineered cover (to risk manage arsenic impacted soils) will be monitored post closure and repairs made if and as needed. The section also indicates that groundwater and seepage will be monitored on completion of remedial works.
No information is provided on nature of performance monitoring.

CIRNAC Request**:** LMI should provide additional details on post closure monitoring program, and the groundwater and seepage monitoring.
**Section 4.3.2.3 Contingency Program**: This section states that if post-closure monitoring identifies significant deficiencies with the engineered cover a more robust cover could be implemented. This section also indicates that the Nunavut industrial land clean up criteria will be used.

CIRNAC Request**:** LMI should provide information on how this robust cover activity would be carried out post closure, and the specific official standards that will be applied for the reclamation/remediation works.

**Section 4.3.2.4 Underground Workings Contingency Program**:

(i) This section states that it may be necessary to pump water out of the crown pillars to the shaft. On page 13, it is noted that discharge to the environment may be considered as a contingency if water quality meets acceptable criteria.

(ii) There is no mention of an ice plug or permafrost related issue within the underground workings, and if there is, what approach will be used for mitigation in order to allow for disposal of PAG waste rock and PHC impacted soils into the underground.

CIRNAC Request**:** It is unclear whether surface discharge is an option only if shaft discharge is not possible and water treatment is not needed. LMI should clarify if surface discharge of treated mine water is considered an option. LMI should also clarify if ice/permafrost related issues have been investigated, and how any potential concerns will be mitigated in advance of the reclamation works.

**Section 4.3.2.7 Waste Rock - Project Description**: This section indicates 67% of 1,000,000 m3 are PAG and most of the WR was used for construction at Mill.

CIRNAC Request**:** The estimated PAG increase from less than 10% to 67% is a significant increase in PAG materials. LMI should provide any estimates on potential waste rock distribution across the property (e.g. mill areas, roads, dams, air strip, etc.).

**Section 4.3.2.7 Waste Rock – Possible Reclamation Options & Preferred Activities**: This section states that contouring and covering with a 1 m esker cover will result in minimal contact between water and the waste rock. It also states that the 1m cover will be partially frozen during spring freshet and infiltration through the cover will be small. About 1 million cubic meters of waste rock (67% PAG) are proposed to be left in place, sloped and contoured for drainage using a nominal 1 m of esker cover. Figure 10 provides conceptual outline of materials to be excavated from perimeter and outline of central consolidated area.

CIRNAC Request**:** (1) LMI should provide geochemical model of the proposed mill pile, and other features constructed of PAG waste rock (e.g. the airstrip, dams, roads) for current conditions and long-term climate change conditions. (2) LMI should provide estimates of contaminant loads released to the environment under these conditions. (3) LMI should provide confirmation that the current thermal monitoring program is sufficient

to address the issues relating to the waste rock, the TCA, and the proposed mill waste rock pile. (4) LMI should clarify the nature and extent of the excavation proposed.

**Section 4.3.2.7 Waste Rock – Contingency Program**: Figure 10 provides surface plan of proposed excavation and placement areas. The notes indicate that Figure 10 is an estimate, and the actual boundary will be based on field conditions. The section does not provide conceptual cross-section or details on potential slopes.

CIRNAC Request**:** LMI should provide conceptual sections illustrating proposed height of central waste rock, typical details of cover placement and the means by which the loss of fine grained soils from the esker cap into the waste rock will be mitigated.

**Section 4.3.2.8 Tailings Impoundment and Containment Systems - Project Description**:

**(i)** This section notes that when natural drainage is re-established and water is drawn down, it is possible that spilled tailings presently under water may become "exposed" and these tailings will either be covered in place with esker material or relocated to the TMA and eventually covered.

CIRNAC Request**:** Tailings are known to be acid generating and seepage will be acidic. It is not acceptable to leave unconfined tailings outside of the tailings dams even if covered by esker materials. LMI should provide justification for leaving exposed tailings outside of the tailings basin.

**(ii)** The section also states that "*stability of all dams will continue to be assessed, and where required, for example on the downstream side of Dam 4, minor grading , rip rap placement, and backfilling may occur in response to recommendations provided by the TCA engineer of record*. "

CIRNAC Request**:** The ICRP in Section 6.5.3 stated that "*a major program of dam enhancement is planned during closure activities. The sides of all dams will be brought to at least a 2.5:1 slope by the addition of quarried waste rock. This will significantly enhance both stability of the dam and erosion protection of all dams.*" The current closure plan is a departure from the ICRP commitment. LMI should provide information supporting this material departure from the previous commitment to rip rap armor all dams to enhance stability and erosion protection.

**Section 4.3.2.12 Landfarm**: No significant concerns with the FCRP, however the RECLAIM estimate does not appear to have a cost to decommission the landfarm once

PHC impacted soils have been successfully treated or the material is placed underground.

**Section 4.3.2.13 Waste Management Systems - Project Description**: This section does not have a Project Description Section consistent with other. sections.

CIRNAC Request**:** LMI should add Project Description Section.

**Section 4.3.2.13 Waste Management Systems – Synthesis of Preferred Activities into a Reclamation Plan**: This section notes that to achieve natural drainage, two engineered riprap spillways will be constructed, along with a swale consisting of riprap on geotextile. No information is provided on the design of the spillways.

CIRNAC Request**:** LMI should provide the design basis for the spillways, and conceptual designs of the spillways.

**Section 4.3.2.13 Waste Management Systems –Contingency Program**: This section states that if water quality fails, construction of spillways will be deferred. Table 14 indicates spillways will be constructed in 2025. It is unclear if implications of deferring spillway construction beyond the stated period are considered with respect to final closure of the site.

CIRNAC Request**:** LMI should confirm timing of planned spillway construction, and consideration of the deferral in its cost estimate.

**Section 4.4 Material Balance**: No significant concerns. However on Table 17 the volume of demolition rubble (30,000 $m^3$) does not match what is described earlier in the FCRP document (55,290 $m^3$). This indicates an inconsistency in the reported numbers.

CIRNAC Request**:** LMI should provide consistency in the volume of demolition waste, including the waste being generated from the local bone yards, in all reports.

**Section 4.5 Schedule**: On the Table 14, only some activities have timelines for when they are expected to occur.

LMI Response: A revised Table 14 has been prepared and is attached to this document

CIRNAC Comment: CIRNAC notes that the timelines provided in the revised table are substantially different to those included in the July 2018 Final Closure Plan.

The revised table shows the Closure Period being 2020 and 2021 whereas the July 2018 plan shows the Closure Period as being 2019 and 2020.

CIRNAC Request**:** LMI should provide a rationale for the change in timeline for final closure.

## SECTION 5 MONITORING

The Phase 3 Passive Closure Period Monitoring is stated to be for a period of 5 years. The ICRP anticipated a closure phase annual monitoring period of ten (10) years, and post closure monitoring every three (3) years thereafter to the 25 year mark.

CIRNAC Request**:** LMI should provide a rationale to explain the basis for their proposed reduced monitoring period.

## SECTION 6 POST REMEDIATION SITE AND ENVIRONMENTAL CONDITIONS

**Section 6.1 Post Remediation Site Conditions**: LMI has not included any commitments to monitor site conditions, post remediation. These include, but are not limited to, water quality, waste rock seepage and Acid Rock Drainage (ARD), stability of esker cover, etc.

CIRNAC Request**:** LMI should provide information on post closure monitoring of site.

**Section 6.2 Post Remediation Environment Conditions /Post Remediation Risks to Human Health and Environmental Health**: This section notes commitment to HHERA being carried out. LMI has also indicated that the HHERA study is planned to be conducted in the summer of 2019.

CIRNAC Request**:** With this delayed timing of the HHERA it is difficult to see how LMI will incorporate the results into the FINAL closure Plan. The HHERA document has also not been provided. LMI should explain how the results of the HHERA will be incorporated into the final closure plan.

## SECTION 7 FINANCIAL SECURITY

Other general comments and questions are as presented for the financial security section.

**Underground**

Costs associated with the relocation of waste rock to complete a 3 m thick cover are too low as the material to be used in the construction of the cap will likely need to be excavated, hauled, placed and graded rather than simply dozed into place. This is particularly true if PAG rock issues are identified in the waste rock immediately adjacent the crown pillar. It is also unclear where any ice or water management costs are included as may be required in advance of the PHC impacted soil and PAG waste rock placement into the underground workings. Clarification is needed with respect to the basis for the costing.

CIRNAC Request: LMI should provide additional information on the basis for the costing.

**Tailings**

*Question 1*: How was the volume of 15,000 $m^3$ derived for the riprap to be placed on the M Dam?

*Question 2*: The time being allotted here seems low for the amount of work to be done however in the absence of a conceptual plan it is difficult to comments on this work item. How was the quantity of time derived for the grading of the M Dam? *Question 3:*There is little clarity on how the basis for the cost is related to the Cell 4 allowance. Is there a rationale for this costing?

*Question 4:* What is the basis for the number of thermal units to be installed and monitored? More information is required to confirm the count.

*Question 5:* Is there a plan in the FCRP to help the reviewer understand if there is sufficient number of thermistors on site to address future monitoring requirements for both the TCA and the PAG waste rock areas?

CIRNAC Request: LMI should provide additional information for clarity on the basis for the costing.

**Waste Rock**

(i) There is a lack of clarity on the basis for the volume of esker material required to cap the consolidated PAG waste rock.

(ii) The rate for the relocation of the waste rock is relatively low given the amount of work required. May consider using the rate for SC4L ($9.30/$m^3$).

(iii) How has the volume of PAG waste rock in the access roads and airstrip been accounted for?

(iv) The rate for the load, haul, dump/doze the impacted PAG waste rock should include for an additional $1.05/$m^3$ as the current rate only accounts for the load, haul and tip with no allowance for grading.

CIRNAC Request: LMI should provide additional information for clarity on the basis for the costing.

**Chemical**

(i) The rational for the decontamination costs for the oil, fuel and glycol systems is unknown. The cost seems low especially for the large diesel fuel tanks.
(ii) The asbestos abatement rates for the floor tile seem low given the level of effort, typically greater for the tile as compared to the vinyl sheeting. Would use the same rate for both pieces of work.
(iii) No costs provided for the burning of waste oil and/or residual fuel as the costs provided are for off-site removal. Also, the rate for the removal of waste oil and fuel should be the same given the level of effort required to consolidate, containerize, and ship off site for recycling or disposal.
(iv) The cost to complete the HHERA seems low given the need to complete a Detailed Quantitative HHERA.
(v) It is unclear where the verification sampling costs have been accounted for in the estimate.
(vi) Where is the cost to manage the 500 $m^3$ of PHC impacted soil currently in the landfarm?
(vii) Where is the cost to decommission the landfarm?
(viii) It is unclear where the costs are for the decontamination and decommissioning of above ground equipment has been included.

CIRNAC Request: LMI should provide additional information for clarity on the basis for the costing.

**Buildings**

Question 1: The production rate for the hoe ram to break the concrete floor seems high. What is the basis for the production rate?
Question 2: What is the basis for the consolidation of the boneyard cost?
Question 3: It is unclear where the Non-PAG waste rock that will be used in the capping of demolition waste will come from?
Question 4: The volume (30,000 $m^3$) of demolition waste does not align with the FCRP indicated volume of 55,290 $m^3$. Is there a rationale for this?
Question 5: What is the basis for the cost allowance to operate the landfill?

CIRNAC Request: LMI should provide additional information for clarity on the basis for the costing.

**Interim Care and Maintenance**

CIRNAC Request: The time period for ICM should be five years. LMI should update their closure cost estimate to include a time period of five years for their ICM.

**Post Closure Monitoring & Maintenance**

CIRNAC Request: The use of a discounted rate is not appropriate as the discounted rate is effectively equivalent to CPI and as such the two net out.

**Mobilization**

It is not clear why there are no costs assigned for the worker cross shift travel time and any associated costs with accommodations related to worker cross shifts (i.e. hotels in Edmonton or Yellowknife).

CIRNAC Request: These costs should be included in LMI closure cost estimate.

## B) CONCLUSION

CIRNAC has provided these technical review comments to facilitate information clarity, and discussions if required for the water licence application review.