March 19, 2007

Mr. Peter J. Luthiger, Manager
Radiation Safety & Environmental Affairs
Rio Algom Mining LLC
P.O. Box 218
Grants, NM 87020

SUBJECT: REVIEW OF RIO ALGOM MINING LLC'S AMBROSIA LAKE RECLAMATION PLAN FOR DISPOSAL OF POND SEDIMENTS AND ANCILLARY MATERIALS, TAILINGS CELL 2 EXPANSION REPORT FOR SOURCE MATERIALS LICENSE SUA-1473 (J00315)

Dear Mr. Luthiger:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the Rio Algom Mining LLC (RAM) Ambrosia Lake Reclamation Plan for Disposal of Pond Sediments and Ancillary Materials, Tailing Cell 2 Expansion Report, dated April 28, 2005. NRC staff is providing the enclosed request for additional information (RAI). Please provide a response or a schedule for responding to this RAI within 30 days of receipt of this letter.

If you have any questions, please contact me at 301-415-5869, or via email, to tgm@nrc.gov.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/reading-rm/adams.html.

Sincerely,

/RA/

Tom McLaughlin, Project Manager
Materials Decommissioning Branch
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 40-8905
License No.: SUA-1473

Enclosure: RAI

cc: Bruce Law, Rio Algom Mining LLC

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RIO ALGOM MINING LLC'S AMBROSIA LAKE RECLAMATION PLAN FOR DISPOSAL OF POND SEDIMENTS AND ANCILLARY MATERIALS, TAILINGS CELL 2 EXPANSION REQUEST FOR ADDITIONAL INFORMATION

Site and Material Characterization

1: Section 4, Page 1 of the Cell 2 expansion reclamation plan indicates that in 1982, "five borings were drilled at the approximate locations shown on the boring plan in Appendix A-1." There is no boring location plan in Appendix A-1. Provide a drawing that displays the locations of the 1982 borings drilled at the site of the Cell 2 expansion.

2: As an item for document correctness, note that the text (Section 4, Page 5) indicates that the results of the testing on Pond 4 sediments are found in Appendix B-1 (Rock Quality Testing), when they are actually in Appendix A-2.

Slope Stability

3: In Section 5, Page 2, Rio Algom states that the analytical method used for slope stability was the Bishop's Ordinary method using a circular failure surface, and that method was the "most appropriate." Provide additional discussion on the basis for, and considerations resulting in, selection of the Bishop's Ordinary Method using a circular failure arc as the method for analysis of static and pseudo-static slope stability. Include a discussion of the limitations of that method used and the effects of the analysis' assumptions on the resulting factors of safety, and how the limitations and assumption sensitivity/conservativeness are accounted for in the analysis.

Settlement

4: In Section 4, Pages 16, 17, and 18, Rio Algom mentions that it will be installing settlement plates at strategic locations. Provide additional drawings and discussion that gives details of the settlement monitoring, including how many plates will be installed and where they will be located. In addition, provide the amount of settlement that, when observed on the settlement plates, will indicate 90% of settlement is complete.

5: In Section 4, Page 16 (Section 4.5.3), Rio Algom indicates that in order to reduce the time of settlement (418 days) in the northeast area, a vertical drain system will be installed to reduce the settlement time in this area down to 93 days. No drawings are included for this aspect of the cell construction. Provide construction drawings of the vertical drain system planned for the northeast area of the cell.

6: In Section 4, Page 18, Rio Algom concludes (without explanation) that the calculated magnitude of settlement will induce horizontal movements within the cover that are within tolerable limits. Provide additional discussion in Section 4.5.6 (cover integrity) on the assumptions and analysis methods resulting in the conclusion that cracking of the cover due to differential settlement is not a concern.

Enclosure

Liquefaction

7: The liquefaction analyses in Appendix C-4 indicate factors of safety of 1.19 and 1.9 for the Seed and Idriss and Shear Wave velocity methods respectively. The text (Section 6, Page 3) indicates factors of safety of 1.1 and 1.2 for these same analyses. Address these discrepancies.

8: In addition, provide, in the text of Section 6, a discussion of the conservativeness of the various assumptions made in the liquefaction analyses, particularly for the Seed and Idriss method.

Design of Cover

9: Section 1.1 (project description) indicates that the cover will include a frost protection layer over the radon barrier. Section 9.3 (cover design) indicates that the cover will consist of 2-feet of Mancos Shale overlain by 0.5-feet of compacted alluvial materials. However, there appears to be no testing, calculation, or discussion related to the design requirements for the frost protection layer. Provide a sub-section in the cover design Section 9.0 that addresses the design of the frost protection layer and how it is adequate to protect the radon/infiltration barrier from frost damage.

10: Portions of the cover are addressed in various sections of the documentation (Section 7.0 - erosion; Section 9.0 - radiation protection), but nowhere is the entire cover addressed or displayed. Provide discussion of the cover design in its entirety and schematics showing all the various layers and their thicknesses for the top and side slopes of the cell.

Construction Considerations

11: Provide additional discussion of the volumes of the various materials comprising the cell, including (1) the volume of contaminated material from the Section 4 and Pond 9 areas and how it will fit in the volume planned for the Cell 2 expansion, and (2) the volumes of Mancos shale and Alluvial materials available at the borrow area, and comparison to the needed volumes of these materials for the cover.

Disposal Cell Hydraulic Conductivity

12: In Section 8 Page 1, Rio Algom discusses the permeability of the compacted Mancos Shale radon/infiltration barrier. With regard to the hydraulic conductivity of the disposal cell, provide a comparison of the hydraulic conductivities of the planned cover and the old existing cover that will now be at the base of the expansion cell and a discussion of any potential for water buildup within the cell (bathtubbing). Also provide a discussion of where all the additional seepage from settlement will go, given the old infiltration barrier cover on the bottom of the cell.

13: Provide a discussion of any field testing (for the Cell 2 expansion cover or any previous similar covers) to verify the ability to construct a 10^{-7} cm/sec cover using the available Mancos Shale.

Pond 2

14: The D_{50} rock sizes specified in the gradations do not represent the minimum D_{50} to be placed. For example, on Fig 7.3, where the required D_{50} for the rock apron is 7.8 inches, the minimum D_{50} specified on the drawing is approximately 7.1inches. If these specifications are followed, it would be possible to place rock with D_{50} of 7.1 inches, resulting in undersized rock. It is recognized that there are some conservative factors in the rock size and that the D_{50} in most cases will exceed 7.1 inches as a result of placement, however it is important to have a specification that is correct. (Please note that the gradations specified for the 9.2-inch rock on Fig 7.2 are not acceptable but the specifications for the 12" rock for the new channel along Pond 3 appear to be acceptable)

15: Provide the gradations for the 3-inch rock for the side slopes and/or the 1-inch rock for the top slope. If rock has already been placed, provide the results of the gradation tests and explain if there are conservative factors in the design and/or placement.

16: Additional information is needed to evaluate the quality of the proposed rock and the ability of the quality assurance (QA) and quality control (QC) programs to effectively produce rock that is representative of the rock that has been tested and approved. RAMC should discuss how acceptable rock will be identified and how unacceptable rock will be avoided as part of the QA/QC procedures for rock production.

Typically, variability of rock in the quarry can result in rock that may not be as durable as that which was tested. To resolve this potential issue, RAMC should describe the lithologic variability of the rock sources and identify features adverse to rock durability and resistance to weathering. Variability is also the basis for selecting representative samples for durability tests and petrographic analysis. RAMC should discuss how representative samples were, and will be, obtained. Potential adverse features could include mudstone/clay interbeds, conglomerate/calcrete beds, bedding planes, or fractures that could be vulnerable to freeze-thaw and potential reduction in rock size. Explain how the such features above, below, or adjacent to the limestone will be able to be avoided in producing high quality rock.

<u>Pond 3 / Rio del Puerto (RDP) Re-design</u>

17: It is not clear if the rock protection currently proposed for Ponds 4, 5, and 6 and the new RDP channel (and the immediate overbank areas) are capable of providing protection for channel velocities and overbank velocities produced by a PMF. From the information currently available, it appears Ponds 4, 5, and 6 were designed only for sheet flow, not flood flows on RDP. The new channel is designed to resist lateral erosion, but a strong technical basis is needed to determine if channels/gullies could form in the overbank directly above Ponds 4, 5, and 6, and to determine if rock sizes in the channel and overbank areas are sufficiently large at critical locations all along the length of the channel.

To resolve this issue, RAMC should provide the detailed hydraulic analyses developed using water surface profiles models, such as HEC-RAS. RAMC should provide the computed channel and overbank velocities and how these velocities were used to assess the need to further protect (1) the main RDP channel, (2) Ponds 4, 5, and 6, and (3) the slopes of Ponds 1 and 3. Details should also include the basis for the use of appropriate parameters such as Manning's n values, flow concentration factors, overbank shear stresses, hydraulic jumps, non-uniform flow factors, hydraulic transitions, riprap design methods, correction factors, and other technical parameters.