

Rio Algom Mining LLC

September 26, 2005

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ADDRESSEE ONLY

Mr. Gary Janosko, Chief
Fuel Cycle Facilities Branch, NMSS
Mail Stop T-8A33
U.S. Nuclear Regulatory Commission
Washington, DC 20850

**Re: License SUA-1473, Docket 40-8905
Response to July 21, 2005 Request for Additional Information for the
Soil Decommissioning Plan and The Closure Plan – Lined
Evaporation Ponds For Ambrosia Lake Facility (TAC No. LU0077)**

Dear Mr. Janosko,

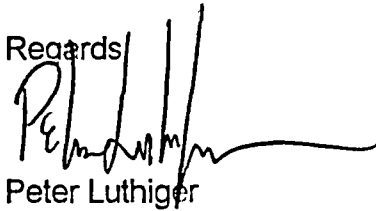
Rio Algom Mining LLC (RAM) has reviewed the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) concerning the decommissioning plan for soil and the lined ponds dated July 21, 2005 and provides this submittal in response to the RAI.

These responses address the outstanding questions that were discussed with your staff during conference calls on August 29, September 9, and September 13, 2005.

Mr. Gary Janosko
September 26, 2005
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Rio Algom would like to express their appreciation toward your staff for the extra effort that has placed on finalizing this licensing action. Please contact me if you have any questions or are in need of additional information related to this modification request.

Regards

A handwritten signature in black ink, appearing to read 'Peter Luthiger', with a long horizontal flourish extending to the right.

Peter Luthiger
Manager, Radiation Safety
and Environmental Affairs

Attachment: As stated

xc: J. Barto (NRC)
T. Fletcher
R. Jones (KM)
B. Lewis (Komex)
R. Nelson (NRC)
M. Raddatz (NRC)
File

RIO ALGOM MINING LLC AMBROSIA LAKE FACILITY

**LICENSE SUA-173
DOCKET AQ-8905**

RESPONSE TO NRC JULY 21, 2005 REQUEST FOR ADDITIONAL INFORMATION

September 26, 2005

The following responses address the outstanding questions that were provided within the July 21, 2005 RAI. Responses were developed following discussions with NRC staff during conference calls on August 29, September 9, and September 13, 2005.

NRC Request 1 to Response 1 – Pond 3 Cover

Provide a sampling plan for Pond 3, and indicate the size of the contaminated portion of Pond 3.

RAM Response

The final footprint of Pond 3 will encompass approximately 40 acres.

Rio Algom intends to determine the need for an engineered cover for Pond 3 as proposed within the June 15, 2005 Response to RAI. This will consist of performing radon flux testing of Pond 3 following placement of all contaminated soils requiring disposal and completion of final contour work for Pond 3. The testing will determine whether Pond 3 complies with the flux standard or exceeds the flux standard. These scenarios are discussed below.

Flux Complies With Standard

If the measured radon flux on Pond 3 is below regulatory standard of 20 picoCuries per square meter per second, no engineered cover will be proposed and Rio Algom will proceed with pond closure. This may include placement of a protective soil layer to facilitate placement of erosion protection. Placement of erosion protection will be in accordance with the plan previously approved by NRC.

As required by Criterion 6 of 10 CFR 40 Appendix A, Rio Algom will perform a gamma survey of the area to ensure direct gamma exposure is as low as reasonably achievable. The survey will be performed using the same scanning procedure that has been proposed for the windblown gamma survey data

collection methods (Section 8.1.2.2.1 of the Soil Plan). The survey will be performed following placement of erosion protection.

Flux Exceeds Standard

If the radon flux, averaged over the Pond 3 area, exceeds the regulatory standard of 20 picoCuries per square meter per second, Rio Algom will be required to construct a cover system to comply with 10 CFR 40, Appendix A, Criterion 6. This will entail characterization of the waste materials through soil sampling for use in developing the source term needed to determine cover design requirements. This sampling plan is described below.

Soil Sampling Plan to Determine Pond 3 Cover Design Requirements

This soil sampling plan will only be implemented in the event characterization is required to determine Pond 3 cover design requirements. The sampling plan will involve collecting soil samples from 50 locations uniformly distributed over the slopes and top surface of Pond 3. This sampling density will ensure a minimum of one sample location per acre.

Rio Algom will utilize existing soil sampling procedures to collect, prepare and ship samples for analysis. These procedures are reviewed and updated as needed in accordance with License Condition 16.

A contract laboratory will be used for sample analysis for Ra-226 and Th-230. In addition to sampling for radiological characteristics, representative samples will be collected for the purposes of determining geotechnical characteristics of Pond 3. Results of the radionuclide and geotechnical testing will be evaluated and used in the computer code RADON to determine cover requirements.

NRC Request 2 to Response 2 – Pond 10

Analyze at least 15 of the archived samples for Ra-226. Also, indicate which of the 1994 sample data are for surface samples (table on pages 8-11 of the response).

RAM Response

The table presenting the Pond 10 soil data that was provided within Rio Algom's June 15, 2005 submittal includes a column (3rd column in table) indicating the sample depth for each table entry. From the table, 31 samples were collected in the 0"-6" layer and 26 samples were obtained from the 6" – 12" depth. These depths represent the depth within the pond following completion of excavation and prior to placement of cover material.

Rio Algom has forwarded 18 archived soils samples from Pond 10 to a contract laboratory for analysis of Th-230 and uranium concentration.

NRC Request to Response 7 – Site Characterization and Alternate Criteria

This issue (*Site Characterization and Alternate Criteria*) should be discussed in a telephone call with RAM after staff reviewed the RAM response to Comment 6

RAM Response

As described within a September 15, 2005 email correspondence from Ms. Julia Barto, NRC Project Manager for the Ambrosia Lake site, previous RAM submittals responding to this question have adequately addressed NRC RAI requests.

RAM will document in the Final Status Survey Report the known depths and radiation levels of areas where the Alternate Release Criteria are applied.

NRC Request to Response 13 – Sampling in Trenches and Section 4 Ponds

Provide additional justification for the number of soil samples and types of analyses (ratios examined) to be performed for the Section 4 Ponds.

RAM Response

RAMs July 15, 2005 submittal addressed the trench sampling.

With the commencement of pond sediment consolidation activities in July 2005, field observations have provided a preliminary indication that the consolidation and excavation activities will likely result in excavation of most if not all of the mine drainage impact areas located below the lined pond footprint. Field observations indicate that the existing soil materials in the area were utilized as a borrow source in the construction of the ponds. Spot gamma radiation surveys have provided information that appears to support this observation.

Based on this information, RAM believes that confirmation of successful remediation the Section 4 Pond area can be conducted in the same manner as the windblown areas through gamma surveying combined with soil sampling as described within the Soil Plan. The gamma survey will delineate hot spots and soil sampling will determine the source of the hot spot, primarily by the presence or absence of Th-230.

Utilizing this verification methodology at the Section 4 Pond area will result in over 150,000 individual gamma readings being obtained and in excess of 300 soil samples being collected and evaluated to determine the effectiveness of the remediation work at the Section 4 pond area.

Soil analyses will be for Ra-226, Th-230, and U-total. The primary determining factor to differentiate pond impacts from mine impact will be the Th-230 concentration. If Th-230 is elevated in relation to the other radionuclides, the source of the contamination is likely pond related and will be delineated for additional excavation. If evaluation of the Th-230 concentration cannot identify the source, U/Th-230 and U/Ra-226 ratios will be examined.

Within Section 4.4 of RAMs January 2005 Relocation Plan for Lined Evaporation Ponds (version 0.1) that was subsequently approved by NRC in June 2005, RAM proposed the use of an acid test on the soils to assist in determining whether the soils below the ponds have been impacted by pond solutions. Since the pond solutions were low pH (<1 s.u.), seepage would have neutralized any calcium

carbonate present in the underlying soils. This simple test may be used as a tool by the construction crews for excavation control.

NRC Request to Response 13 – Quality Assurance Plan

Arrange for a telephone call with NRC staff to discuss this issue (*Submission of a complete QAPP*).

RAM Response

As discussed during a teleconference between RAM and NRC, the following information is provided to address NRCs request.

Attachment 1 within RAMs Soil Plan submitted to NRC on January 19, 2005 described the quality assurance program planned to be implemented for the soil decommissioning project. Elements of the QAPP will included organization, planning, and scoping (project objectives); design of data collection including training (sampling design); implementation of operations including documents and records (sampling execution and sample analysis); assessment and response (review); and assessment of verification of data usability (assessment of data quality).

RAM continues to believe that it is premature to develop a description of QA/QC activities for planning, design, and implementation of the final status survey until the final survey plan is approved.

The primary reason for this concern is that the survey plan provided in the Soil DP contains significant boundaries or conditions that must be known in order to develop this procedure. Two primary conditions are the gamma guideline and the clean-up levels for Th-230 and uranium. The gamma guideline and the clean-up levels have considerable impact on decisions regarding planning, design, and implementation of the final status survey, and therefore associated QA/QC activities.

RAM also has concerns over the inclusion of specific procedural documents as a component of a licensing action. The ability for RAM to amend and update procedural documents that were part of a licensing action becomes constrained and may require a licensing action to allow any changes to occur. This would result in needless delays in implementing any modifications to the QAPP that were necessary.

Once the Soil DP is approved and all boundary conditions needed to develop an effective QAPP are established, RAM will develop the QAPP for the Soil Plan as authorized by License Condition #16. This QAPP will also be reviewed and updated as needed pursuant to Condition #16.

NRC Request to Response 16 – Earlier Requests for Information

Involve the appropriate DOE and NRC staff in a telephone call to discuss this issue (*amount of contamination that will remain if the requested alternate release criteria are approved*).

RAM Response

As discussed during a teleconference between RAM and NRC, the following information is provided to address NRCs request.

RAM intends to utilize alternate release criteria (ARC) as recommended by NRC for certain areas at the site where RAM has demonstrated that remediation techniques are neither technologically or economically feasible. Assessment of the potential groundwater impacts associated with ARC determined that the remaining constituent mass within soils does not pose a threat to human health and the environment due to a mitigating combination of hydrological and geochemical conditions in alluvial materials, as described below.

Hydrologic Processes

As demonstrated by a calibrated MODFLOW model prepared in support of the Application for Alternate Concentration Limits in the Alluvial Materials at the

Quivira Mill Facility, Ambrosia Lake, New Mexico (Rio Algom, 2001), the Tres Hermanos Sandstone acts as a drain from alluvial materials. Groundwater moves relatively slowly through alluvial fine-grained sandy silts and silty clay, but not at all through the highly plastic clay shale of the underlying Mancos Formation. However, Tres Hermanos Sandstone interbeds within the Mancos Shale have generally higher hydraulic conductivity than alluvial material, allowing flow to enter these bedrock units preferentially. Seepage entering alluvial sediments is diverted into Tres Hermanos subcrop where it flows northeast, downdip, until it drains down mineshafts and vent holes into the hydrologic depression created by over 40 years of mine pumping in the valley.

As described within the ACL application, hydrogeologic modeling indicates that upon cessation of the existing corrective action plan, the Alluvium will return to its premining unsaturated state in less than 100 years and the bulk of the alluvial materials will be dewatered within 65 years. As water levels subside within the Alluvium, this ever increasing depth to groundwater removes much of the potential for transport of stored constituent mass because unsaturated flow is a less effective transport mechanism than fully saturated flow.

Geochemical Processes

Geochemical conditions provide an additional level of protection. The presence of more than ten percent calcite in aquifer materials and observations concerning the distribution of redox conditions in the Alluvium (Rio Algom, 2001) indicate the presence of abundant reductive and neutralization capacity in the alluvial material, which will act to limit the migration of constituents from any of the multiple sources in the Ambrosia Lake area.

Geochemical modeling using conservative parameters (Rio Algom, 2001 and related documents) indicates that there will be a reduction in constituent concentrations in groundwater over time and over distance from the source due to natural attenuation by alluvial material. The geochemical model used describes constituent transport by the processes of advection and dispersion. Reversible sorption processes are simulated by modifying advective and dispersive processes with a retardation factor that reduces the highest concentration seen at any location and slows the velocity of the solute pulse.

Another important factor is that the geochemical model is conservative because no credit has been taken for the many non-reversible processes that are known to occur in geochemical environments, which are similar to the alluvial material and/or in changes to geochemical conditions that occur along a flowpath in soils under and around western uranium mill tailings facilities. Neutralization of low pH solutions causes many metals to be removed from groundwater by precipitation of a variety of mineral phases, and reductive processes cause Eh-sensitive constituents to be removed as oxide minerals (for example, uranium) or sulfide minerals (pyrite, etc.).

In summary, ARC at Rio Algom's mill does not pose a threat to human health and the environment due to a mitigating combination of hydrological and geochemical conditions in alluvial materials including:

1. The alluvium will return to its pre-mining unsaturated state thereby eliminating the transport mechanism;
2. Natural attenuation processes including advection, dispersion, reduction and precipitation reduces constituent concentrations in groundwater over time and over distance from the source;
3. The remaining constituent mass within soils is contained within the proposed long term care boundary to be deeded to the US Department of Energy.