

February 25, 2002

Mr. William Paul Goranson, Manager
Radiation Safety, Licensing and
Regulatory Compliance
Rio Algom Mining Corporation
6305 Waterford Blvd., Suite 325
Oklahoma City, OK 73118

SUBJECT: AMBROSIA LAKE SUA-1473, LICENSE CONDITION 37M: POND #2 RUN-ON
AND RUN-OFF APRON DESIGN APPROVAL

Dear Mr. Goranson:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the Pond #2 Run-on and Run-off Apron Design as submitted by your letter dated October 10, 2001. License Condition 37M states that "a riprap filled toe trench shall be placed on the west side of Pond 2 where the existing steep slopes transition onto the flatter surface of Pond 2." Our review determined that this design complies with license requirements and meets the suggested design criteria of NUREG-1623, "Design of Erosion Protection for Long-Term Stabilization." A more detailed discussion is found in the enclosed Technical Evaluation Report.

You also provided qualification data for the rock that will be used at the site. This data (from 1991) shows that the rock is sufficient grade but should be re-qualified prior to placement at the run-on and run-off aprons. During re-qualification, a durability score should be assessed per NRC scoring criteria in NUREG-1623. If you choose to use material other than the current stockpile, it should also meet the NRC criteria. Good construction practices should be applied during rock placement and are discussed in NUREG-1623, Appendix F.

In accordance with 10 CFR 2.790 of NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," 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 document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

W. Goranson

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Should you have questions regarding this matter, please contact NRC project manager, Jill Caverly, at 301-415-6699 or by e-mail to JSC1@nrc.gov.

Sincerely,

/RA/

Melvyn Leach, Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Enclosure: Technical Evaluation Report

cc: Art Kleinrath, DOE-GJ
George Schuman, NMED Santa Fe

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OFC	FCLB		FCLB		FCLB		FCLB	
NAME	JCaverly *		JMuskiewicz *		Gjanosko *		Mleach *	
DATE	02/19/02		02/15/02		02/19/02		02/25/02	

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**TECHNICAL EVALUATION REPORT
AMBROSIA LAKE - POND 2 RUN-ON AND RUN-OFF APRON DESIGN**

DATE: January 28, 2002

DOCKET NO.: 40-8905

LICENSEE: Rio Algom Mining Corporation (Quivira Mining Company)

PROJECT MANAGER: Jill S. Caverly

TECHNICAL REVIEWER: Terry Johnson

SUMMARY AND CONCLUSIONS

In accordance with License Condition 37M of Source Material License SUA-1473, Quivira Mining Company (QMC) submitted to the Nuclear Regulatory Commission (NRC) a design for run-on and run-off aprons for Pond 2 at its Ambrosia Lake uranium facility. The NRC staff has reviewed the report and agrees that the design meets the requirements of 10 CFR Part 40, Appendix A.

TECHNICAL EVALUATION

QMC submitted, by letter dated October 10, 2001, a design for the run-on and the run-off apron at Pond 2. Source Material License SUA-1473 requires that "a riprap filled toe trench shall be placed on the west side of Pond 2 where the existing steep slopes transition onto the flatter surface of Pond 2." In accordance with this license condition, the design was submitted for NRC approval. Also, included with the design was the qualification data for the rock that is expected to be used for construction.

Calculation of the PMP

The licensee proposes that the design will be consistent with guidance in NUREG-1623, *Draft - Design of Erosion Protection for Long-Term Stabilization* which suggests that erosion protection be designed for a 1000-year project life as to minimize future maintenance. NUREG-1623 further suggests that a design based on the probable maximum precipitation (PMP) will satisfy the 1000-year longevity requirement. QMC used the PMP estimate from hydrometeorological reports (HR) for areas throughout the United States and derived a probable maximum flood (PMF). The PMP rainfall depth was calculated to be 9.5 inches using HR 55A. Staff review of the calculation indicates that the estimate is acceptable.

Run-On Calculations

A short but steep slope lies above the southwest portion of Pond 2 and discharges overland flows on the top of Pond 2. The Rational Method and a time of concentration of 2.5 minutes resulted in a peak PMF for the 250 ft long slope of 0.13 cfs/ft.

Enclosure

Guidance provided in NUREG-1623, Appendix D, Section 6 was used to size a run-on apron. The NRC staff reviewed this aspect of the design and agreed that it was an acceptable use of the guidance. The discharge of 0.13 cfs/ft resulted in a rock D_{50} of 2.9 inches. Quivira has a stockpile of rock with a D_{50} of 3.2 inches which will be more conservative and therefore acceptable for use in the apron. The width and depth of the apron were also determined using NUREG-1623. A gravel filter of thickness 0.5 ft and a rock D_{50} of 1.0 inches was designed to prevent scour beneath the apron. The depth of the rock-soil matrix for the apron was calculated to be 0.8 ft.

Run-Off Apron

The south side of the Pond 2 embankment requires a run-off apron to prevent scour from incising the slope along the tailings during extreme run-off events. The design of this apron took into account the effects of run-off for Pond 2 and also the effects of the PMF passing through the Montanosa Mesa drainage. Run-off from Pond 2 can be divided into two distinct subareas. The first, a 105 acre area includes natural slopes along the west side of the pond and northeastern section of the pond. A second smaller catchment of 12.7 acres includes natural slopes and the southwest corner of the pond.

Calculations for the 105 acre area determined the time of concentration to be 14 minutes. The 15 minute incremental rainfall amount from HR 55A was determined to be 6.5 inches and a peak discharge of 2316 cfs was calculated using the Rational Method. A unit flow of 2.32 cfs/ft and an average 14.7 percent slope resulted in a riprap of D_{50} of 12 inches. The slope was adjusted to 10 percent so that rock with a D_{50} of 9.2 inches would be acceptable and would not require the same placement techniques of the larger stone and steeper slope. Gradation of the stone will follow standards developed by the Corps of Engineers.

For the smaller subarea, a time of concentration of 6 minutes and a six minute PMP depth of 4.6 inches was calculated. A peak flow of 0.93 cfs/ft was determined using the Rational Method. Using a peak unit flow and a 12.9 percent slope, a rock size was determined to be D_{50} of 6.1 inches. The rock size was conservatively increased to 9.6 inches to coincide with the rock specified for the other subarea.

The review of the effect of the PMF along the Montanosa Mesa drainage system is necessary because run-off from this event will be in contact with the tailings pond. The Montanosa Mesa PMP depth was calculated at 9.45 inches for a 3.7 square mile basin. A curve number from a previous study was used in the Corps of Engineers software and Soil Conservation Services methods to develop a hydrograph and then route it through the pool and diversion channel. This analysis determined that the maximum velocities for the PMF would be less than 8 fps and that no rock protection would be required to prevent erosion from the PMF alone. Therefore, the run-off apron design need only be based on run-off entirely from Pond 2. The staff has reviewed the run-off design and agrees that the contribution from the Montanosa Mesa drainage will not affect the long-term stability of the design.

Other Considerations

The dimensions of the riprap aprons have been determined using methods suggested in NUREG-1623. Generally, the aprons are wider than the required $15(D_{50})$ and the depth was determined to be at least $3(D_{50})$. The report also states that the aprons will have a slope to the downstream edge with a minimum of two percent or at least a slope that matches the natural ground.

Also mentioned in the report are construction practices including: 1) placing the rock in lifts no thicker than one foot, 2) backfilling the voids between rock with a one to one mixture of native soil and filter gravel, and 3) compacting the backfilled riprap using vibratory methods to ensure material fill voids. The NRC staff agrees that the rock should be placed in small lifts but has no requirement for backfilling voids between the rocks or using a vibratory compaction methods. The staff suggest that NUREG-1623, Appendix F be referred to for riprap placement techniques.

REFERENCE

Design Report - Pond 2 Erosion Protection Ambrosia Lake Mill, New Mexico submitted by letter dated October 10, 2001 from William Paul Goranson (Quivira Mining Company) to Melvyn Leach (Nuclear Regulatory Commission).