

June 16, 1997

Mr. Marvin D. Freeman
Vice President
Rio Algom Mining Corp.
6305 Waterford Boulevard
Suite 325
Oklahoma City, Oklahoma 73118

SUBJECT: TAILINGS SETTLEMENT MONITORING AT LISBON FACILITY

Dear Mr. Freeman:

In response to your request dated January 28, 1997, we are modifying Source Material License No. SUA-1119 to remove the requirement for monitoring of tailings settlement. Rio Algom Mining Corporation provided data to support its conclusion that 90 percent of the expected settlement of tailings has occurred at its Lisbon facility.

The enclosed Technical Evaluation Report (TER) contains NRC's assessment of the licensing action and the recommended license change. Based on this assessment, LC 45.J has been deleted from the license and LC 52.A has been revised to show that it is complete. The license is being reissued to incorporate this change.

An environmental assessment for this action is not required since it is categorically excluded under 10 CFR 51.22 (c)(11), and an environmental report from the licensee is not required by 10 CFR 51.60 (b)(2).

Any questions should be addressed to Myron Fliegel, NRC's project manager, at (301) 415-6629.

Sincerely,

(Original signed by)

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 40-8084
Source Material License No. SUA-1119
Amendment No. 53
TAC L51504 - closed

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Enclosure: As stated

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TECHNICAL EVALUATION REPORT

DATE: June 13, 1997

DOCKET NO. 40-8084 LICENSE NO. SUA-1119

LICENSEE: Rio Algom Mining Corporation

FACILITY: Lisbon Mill

PROJECT MANAGER:

Myron Fliegel

TECHNICAL REVIEWER:

Daniel Rom

SUMMARY AND CONCLUSIONS:

By letter dated January 28, 1997, Rio Algom Mining Corporation (Rio Algom) submitted a request to delete License Condition 45.J (LC 45.J) of Source Material License No. SUA-1119. LC 45.J requires the licensee to implement a settlement monitoring program approved by NRC. Additionally, LC 52.A requires the licensee to submit for NRC review and approval, the settlement data that demonstrate that 90 percent of the expected settlement is complete. Rio Algom stated that the settlement monitoring data show that over 90 percent of the tailings settlement has occurred and that the monitoring program can be terminated. The staff has reviewed the data and concludes that over 90 percent settlement has occurred and agrees that the program can be terminated. The staff recommends that the license be amended to delete LC 45.J. and to show that LC 52.A has been completed.

DESCRIPTION OF LICENSEE'S AMENDMENT REQUEST:

By letter dated January 28, 1997, Rio Algom requested that NRC approve the termination of the Lisbon tailings settlement monitoring program. By letter dated March 18, 1997, staff requested additional information and documents to support Rio Algom's request. By letter dated May 13, 1997, the requested supplemental information was submitted. The support documents included survey notes and graphical plots of settlement readings at a scale which could be interpreted clearly. The basis for the licensee's request for termination of the program was the reported cessation of settlement for three successive quarters.

TECHNICAL EVALUATION:

In response to a request to provide support documents, Rio Algom submitted certified survey records for settlement measurements from six successive quarters, and a monitor survey map. The certification was signed and sealed by Timothy M. Keogh, a Utah-registered land surveyor. The settlement monument elevation data were plotted on a scale which provided sufficient clarity to evaluate settlement trends for the intervals in question. Rio Algom

indicated that certain data entry errors from individual surveys had been corrected in the current submittal.

License condition (LC) 45.J. states that "The licensee shall implement the settlement monitoring program in accordance with the submittals dated December 13, 1993, May 25, 1994, and April 3, 1995. The licensee will survey elevations at intermediate locations between monuments after evaporation is complete. If excessive settlement at or between monuments is determined to have occurred, additional grading will be provided or additional time for settlement will be allowed." The staff concludes that LC 45.J. has been appropriately implemented.

LC 52.A. states that "The licensee shall submit for NRC review and approval, the settlement data that demonstrate that 90 percent of the expected settlement is complete." Based on previous interpretations of measured embankment settlement for stabilized-in-place cells at Title II sites, the term "expected settlement" is construed to mean "indicated primary consolidation". Primary consolidation is traditionally evaluated on the basis of settlement vs. log of time curves. Although the graphs furnished by the licensee are based on settlement vs. time (as opposed to log of time), it is apparent by inspection that the 90 percent primary consolidation point has been reached. Thus LC 52.A. has been effectively met. As a result, the requirement in LC 45.J to monitor settlement, is no longer needed.

It is cautioned that the determination of primary consolidation by evaluation of settlement vs. log of time curve methodology was developed for relatively small and homogeneous soil samples tested in a laboratory environment. For this reason, it cannot be stated with certainty that the extrapolated field results for non-homogeneous deposits at Rio Algom guarantee that measurable settlement will not occur in the future. The results and evaluation are, however, in accordance with previously accepted methods.

RECOMMENDED LICENSE CHANGE:

The staff recommends that Source Material License SUA-1119 be amended to delete the requirement to monitor settlement and to show that the requirement to demonstrate 90 percent primary consolidation settlement has been completed.

Revised license condition 45 will read as follows:

45. The licensee shall comply with the following:

- A. DELETED by Amendment No. 24.
- B. A spillway channel shall be constructed in the left abutment of the lower tailings dam, as located in the licensee's April 10, 1992, submittal. The spillway shall have a 30-foot bottom width, 2H:1V side slopes and a crest elevation of 6645 feet.
- C. DELETED by Amendment No. 37.
- D. DELETED by Amendment No. 30.
- E. DELETED by Amendment No. 24.

- F. After heavy storm runoff, the licensee shall drain Bisco Lake back to an elevation of 6715 feet or less as soon as possible, but in no case longer than 30 days.
- G. Runoff from the upper tailings shall be diverted into the diversion ditch according to the methods described in the licensee's October 11, 1991, submittal.
- H. The evaporation pond on the upper impoundment shall be operated with a minimum freeboard of 2 feet in accordance with the licensee's August 15, 1990, submittal.
- I. The evaporation pond on the lower tailings pond shall be constructed in accordance with the licensee's February 3, and April 16, 1992, and February 24, 1993, submittals. The lower evaporation pond shall be operated with a minimum freeboard of 2 feet in accordance with the licensee's February 3, 1992, submittal.
- J. DELETED by Amendment No. 53.
- K. A construction report for the lower evaporation pond and as-built drawings of the upper and lower evaporation ponds shall be submitted to NRC within 3 months of completion of construction of the lower evaporation pond.

[Applicable Amendments: 13, 14, 17, 21, 24, 25, 28, 30, 37, 43, 46, 50, 53]

Revised license condition 52 will read as follows:

- 52. The licensee shall reclaim the tailings disposal area in accordance with the June 16, 1989, and March 4, 1992, submittals as revised by submittals dated August 16, 1989, March 13, August 14, and November 17, 18, and 20, 1992, and April 1 and 2, 1993, with the following exceptions.
 - A. The licensee shall submit for NRC review and approval, the settlement data that demonstrate that 90 percent of the expected settlement is complete - COMPLETE.
 - B. The licensee shall submit for NRC review and approval, data that confirm that the average depth of the stabilization layer below the evaporation ponds is equal to or greater than the average stabilization depth used in the modeling before constructing the remaining barrier.
 - C. The licensee shall submit to the NRC by January 1, 1994, a plan to verify that the in place cover has not experienced excessive erosion or defects after it has been demonstrated that settlement is complete and before the radon barrier is considered final. The proposed plan must include a field testing program which contains a method to ensure that the appropriate minimum depths of clay and silt are in place over the disposal area.

- D. The licensee shall provide an analysis of the results of the testing program required in Section C above to verify the design conditions with respect to radon attenuation. The analysis shall be provided for NRC review and approval.
- E. When using a nuclear gauge, the comparison between the sand cone apparatus and each nuclear gauge shall be within 2 percent of the dry density and 1 percent of the moisture content for any additional material that is placed and for verification testing of the material that is currently in place.
- F. The licensee shall provide a revised erosion protection design in accordance with the following conditions. The revised design shall be submitted for NRC review and approval by December 31, 1994.
- (1) The licensee shall consider the potential for high flow velocities in the soil portion of the lower dam spillway channel. If erosion of the soils under these conditions could adversely affect the radon barrier material or the stability of the dam, the erosion protection design shall be revised accordingly.
 - (2) The licensee shall revise the riprap design of the swale on the surface of the upper tailings considering a flow concentration which is based on the contributing drainage area.
 - (3) The licensee shall revise the design of the erosion protection proposed for the toe of the upper dam to provide a more gradual transition between the upper dam outslope and the reclaimed surface of the lower impoundment.
 - (4) The licensee shall review the design of the erosion protection proposed for the toe of the lower dam by considering the potential for erosion and scour of the toe due to high velocities in the adjacent unnamed tributary. If the riprap does not extend to the anticipated scour depth or is not of sufficient size, the riprap shall be redesigned.
 - (5) The licensee shall review the design of the rock aprons proposed for the undisturbed drainage areas north of the tailings impoundments. The riprap shall be redesigned as appropriate to be of sufficient size to resist flood flow velocities and shear stresses produced in the natural channels upstream of the aprons.
 - (6) The licensee shall consider the potential for sediment deposition in the diversion channels and document by analyses that the channels will either store or flush out the expected sediment load. If the channels will store the sediment, the licensee shall demonstrate by analysis that increases in water levels or in channel velocities due to sedimentation will not adversely affect the riprap or the flood carrying capacity of the channels. Alternately, the diversion channels should be redesigned to accommodate the expected sediment load.

- (7) The licensee shall analyze the effects of natural tributary inflows into the diversion channels. If the shear forces and velocities produced in the natural channels exceed the diversion channel design values, the channel and riprap design shall be revised to consider tributary inflows.
 - (8) The riprap layers proposed for the surfaces of the tailings shall be at least 3 inches thick if quarried rock is used. Alternately, if the licensee can demonstrate that layers of lesser thickness can be properly designed and placed, such layers may be acceptable. In addition, if rounded rock is placed, such as rock from alluvial sources, it shall be oversized as recommended in the Staff Technical Position (STP) on Erosion Protection (NRC, 1990).
 - (9) The licensee shall analyze the effects of bends and curvatures in the diversion channels and revise the riprap design to account for the greater shear forces. Alternately, the licensee shall submit analyses to justify that the current riprap design is adequate.
 - (10) The licensee shall perform rock durability and gradation testing at the frequency recommended in the Staff Technical Position (STP) on Testing and Inspection (NRC, 1989) with the exception that if rock quantities for any size riprap are 5000 cubic yards or less, two gradation tests at the $\frac{1}{3}$ and $\frac{2}{3}$ points of placement are acceptable.
 - (11) The licensee shall perform tests to verify that the bedrock formation in the lower dam spillway and diversion channels is sufficiently competent to resist erosion. Erosion resistant bedrock shall be determined by refusal of a power auger drilling vertically, using a carbide steel bit. Tests will be performed on a maximum of 20-foot centers. Alternatively, if the licensee can document that the bedrock is massive and relatively uniform, testing on 50-foot centers shall be acceptable.
 - (12) The licensee shall provide a program for inspecting the filter and riprap layers to assure proper sizing and gradation. The program shall include a procedure for measuring the thicknesses of the in place rock on a minimum 50-foot grid system and at any and all locations that do not appear (visual inspection by experienced engineers) to meet the specifications.
- G. All of the reclamation plan requirements shall be incorporated into a single document and provided to the NRC no later than 3 months after NRC approval of the erosion protection design. This document shall contain only the plans and specifications that will be used to construct the reclamation plan.
- H. A completion report including as-built drawings, verifying that reclamation of the site has been performed according to the approved plan, must be provided within 6 months of the completion of construction. The report must also include summaries of results of the quality assurance and control testing to demonstrate that the approved specifications were met.

[Applicable Amendments: 4, 6, 7, 8, 44, 47, 53]

ENVIRONMENTAL IMPACT EVALUATION:

The staff has determined under exclusions contained in 10 CFR 51.22 (c) (11) that further environmental documentation is not required for this amendment. The amendment is administrative, recognizing the completion of an activity. Therefore, an environmental assessment by this office for the proposed action is categorically excluded under 10 CFR 51.22 (c) (11), and an environmental report is not required by 10 CFR 51.60 (b) (2).

REFERENCES:

Letter from Marvin D. Freeman to Joe Holonich, January 28, 1997.

Letter from Joseph J. Holonich to Frank Fossey, March 18, 1997.

Letter from Marvin D. Freeman to Joe Holonich, May 13, 1997.