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WMUR:JLK
Docket No. 40-8084
SUA-1119

Rio Algom Corporation
ATTN: Mr. M. D. Lawton
President
La Sal Route
Moab, Utah 84532

Gentlemen:

In your March 16, 1981 letter to R. Scarano, NRC, you requested permission to increase the operating level of the upper tailings pond from 6677 to 6679 feet above mean sea level. A document, entitled, "Report of Additional Geotechnical and Hydrologic Evaluation, Containment of PMF Series Within Tailings Disposal System, Lisbon Operations", dated March 4, 1981, was submitted with the letter. This submittal was requested by a July 25, 1980 letter from NRC to Rio Algom. License Amendment No. 3, issued on November 7, 1980, authorized a five-foot raise of the upper tailings dam and contained Condition No. 21, which restricted the operating level of ponded liquid in the upper pond to 6677 feet above mean sea level. This condition also required NRC approval of the Probable Maximum Flood (PMF) computations before authorizing an increase of the operating level of the upper impoundment.

The staff has reviewed the submittal and has a number of major questions about the PMF computations and the ability of the diversion ditch to handle the PMF (questions enclosed). Our concerns are sufficiently serious to request that you reevaluate the PMF calculations and the design of the diversion ditch in light of our questions. In an attempt to remedy the problems in a timely manner, I have arranged that Jeff Kotsch of my staff visit your facility during the week of May 11, 1981. Further, it may be advantageous for you to meet with us on the specific technical issues in Washington after you have had time to study the questions and possibly complete some of the necessary revised computations.

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Until such time that the appropriate information is provided and approved by the NRC, it is not possible to authorize an increase in the operating liquid level of the upper impoundment.

Sincerely,

Original signed by

Harry J. Pettengill, Section Leader
Operating Facilities Section II
Uranium Recovery Licensing Branch
Division of Waste Management

Enclosure:
Rio Algom Hydrologic Engineering
Questions

5/14/81 Revision No. 1

OFFICE	WMUR	WMUR					
SURNAME	JLKotsch:mb	HJPettengill					
DATE	5/15/81	5/15/81					

Rio Algom Hydrologic Engineering Questions
Diversion Channel Design
Docket No. 40-8084

1. Your recently-constructed diversion channel is not acceptable to prevent flood water from entering the tailings impoundment. As designed, the channel is subject to high-velocity flood flows, which could produce enough erosion to allow surface water to enter the ponds. These high velocities are caused principally by the overall steepness of the channel, and floods much smaller than the PMF can produce erosion and damaging velocities.

   If credit is taken for the channel in diverting flood flows, we require that erosion protection be provided for the right side (looking downstream) of the diversion channel, to assure the stability of the right bank. The side slopes should not be steeper than 1 Vertical on 2 Horizontal. The erosion protection will generally be required at those locations where the channel is cut in overburden soils, and particularly where an embankment has been constructed to confine flood flows. This erosion protection should be designed in accordance with Corps of Engineers EM 1110-2-1601, "Hydraulic Design of Flood Control Channels", and the gradation should be in accordance with ETL 1110-2-120, "Additional Guidance for Riprap Channel Protection". The alpha method (as discussed in EM 1110-2-1601) should be used to compute the design velocity, rather than use the average channel velocity. To account for turbulence, standing waves, and eddies, the factor of safety (also called non-uniform flow factor) should be at least 1.5 in those areas where the channels have transitions in width and changes in bottom slope. The riprap on the outside of channel bends should also be properly designed to account for increased shear forces at those locations.

   The water surface profiles (which determine the depth and velocity of flow at various points along the channel) should be computed by standard gradually varied steady flow analyses rather than by slope-area methods. This is important especially where the width and bottom slope of the channel change. In addition, hydraulic jumps should be located (if applicable) and the "stilling basin" areas properly designed.

2. Provide the rating curve, and the basis for its computation, for the earth channel spillway from Bisco Lake to the diversion channel. It appears that the maximum outflow with three feet of head on the crest should be greater than 68 cfs. Discuss the effects of submergence on the rating curve. If the flow in the diversion channel is deeper than in the spillway channel, water could back up the spillway channel, drowning the control at the spillway crest, thereby lessening its capacity.

3. Provide the flood routing computations for Bisco Lake.

4. Provide an analysis showing the peak PMF flows that occur at various points along the diversion channel as a function of drainage area, inflow tributaries, etc. It is evident that the flaw will not be the same along the entire length of the channel, and any increases or reductions in flow along the channel may be important in designing erosion protection and other hydraulic structures. Was the spillway flow from Bisco Lake added to the diversion channel flow?

5. Provide the flood routing computations for the upper tailings pond. Provide the rating curve for the CMP overflows and the basis for its computation.

6. At those locations where a road crosses the diversion channel, provide details of the bridge or culvert that will be used. In addition, a hydraulic analysis should be provided which determines the effects of the road crossing on the water surface profile. Backwater effects, in particular, are important because of potential overflow of the channel banks into the reservoirs.

7. In general, the use of the formula $Tc = \left[\frac{11.9L^3}{H}\right]^{.385}$ is acceptable for computing the time of concentration of peak flow during a precipitation event. However, the formula is normally used in general applications where tributary stream slopes are relatively flat. In the site area, this formula may not be conservative and the time of concentration may be considerably less than 43 minutes. This is due to the existence of several well-defined steep stream channels which exist in the upper portion of the drainage basin and flow generally northward toward the diversion channel. For cases such as this, the staff suggests that the time of concentration be computed using the "stream hydraulics" method found in the same reference that was used. Using this method, the actual velocity of flow in the watercourse should be computed. It is evident that the stream channels in the vicinity of N 607,000 E2,642,200 have an approximate slope of 3-5%; velocities in these streams will likely exceed 15-20 ft/sec during the PMF. Revise your calculations accordingly.

8. Provide the basis for the design of the erosion protection at the entrance and outfall locations of the CMP spillway pipes. Provide the thickness and the gradation of the rock to be used.

9. Provide your proposed site reclamation plan. If a diversion ditch is chosen to divert floods away from the abandoned tailings pile, the ditch must meet the same hydrologic criteria as the ditch used

during operation. It may be practical to design the same channel for both operation and reclamation. Any other diversion ditches must also meet the PMF criteria.