

MAY 06 1985

WM-64/TJ/85/04/02

- 1 -

MEMORANDUM FOR: R. Dale Smith, Director  
Uranium Recovery Field Office

Leo B. Higginbotham, Chief  
Low-Level Waste and Uranium  
Recovery Projects Branch  
Division of Waste Management

FROM: Malcolm R. Knapp, Chief  
Geotechnical Branch  
Division of Waste Management

SUBJECT: REVIEW OF LAKEVIEW EA/RAP

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In accordance with your requests (TAR 85011), Ted Johnson has reviewed the environmental assessment (EA) and the remedial action plan (RAP) for the Lakeview site with respect to surface water hydrology and the design of erosion protection. Our questions and comments are enclosed. Based on our review, we conclude that the design, as presented, does not meet EPA long-term stability requirement as outlined in 40 CFR 192. The diversion ditches, particularly the east ditch, are susceptible to debris and sediment buildup, necessitating routine and frequent maintenance; a design which requires such maintenance does not meet EPA standards. In addition, the alignment of the ditches and the potential for erosion in the site area require additional design features to be provided. If you have any questions, please contact Ted Johnson x7-4490.

WM Record File

WM Project 64

Docket No. \_\_\_\_\_

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Original Signed By

Malcolm R. Knapp, Chief  
Geotechnical Branch  
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| DATE | : 85/05/03 | :  | : 85/05/3  | :  | : 85/05/7 | :  | : | : | : |

MAY 06 1985

1. Based on a review of the conceptual design presented in the RAP, there is a major deficiency in the design of the diversion ditch (East Ditch) that will be constructed upstream of the remediated pile. A qualitative examination of the design indicates that the ditch can become clogged with sediment and debris on a routine basis and will thus need frequent and regular maintenance. Based on the need for such maintenance, the EPA long-term stability criteria (40 CFR 192) will not be met by such a design. Because the location of the sediment buildup cannot be predicted and because the sediment buildup could be concentrated, we conclude that flows could be blocked at critical areas in the ditch, resulting in flows over the remediated embankment. However, EPA standards could be met by one of the following methods:
  - a. Move the remediated pile upstream, where little or no drainage area has to be intercepted by a diversion ditch.
  - b. Design the rock protection on the remediated pile to resist the runoff from the additional contributing upstream drainage area.

Alternately, if neither of the above methods are used to resolve the problem, additional information and analyses should be provided to document that potential blockage and sediment accumulation in the ditch will not be a potential problem.

2. Based on an examination of the site and of the information provided in the geomorphic analyses, it appears that significant gullying occurs in the immediate site area. Because of this, there exists a potential for concentration of runoff into the diversion ditches at one or more points (where such gullies would discharge flow to the ditch). It is therefore important to design the erosion protection in the ditch to resist the forces associated with concentrated flows which could enter the ditch perpendicular to the ditch alignment. It is also important that the design is capable of resisting the forces associated with significant energy dissipation directly in the ditch at a location where a potential gully could discharge into the ditch. Accordingly, the ditch design (all ditches) should be revised to account for the above phenomena. Provide the bases for all assumptions and calculations.

In addition, the geomorphic analyses indicate that potential head cutting of the existing gullies and channels in the site area could be a potential problem. Additional erosion protection should be provided to prevent the occurrence of head cutting and to provide transitions where the flows from the proposed diversion ditches discharge into existing gullies and channels. Accordingly, the diversion ditches and ditch transitions should be designed to protect the remediated pile from damage due to the erosion of existing channels and gullies. Detailed plans of the transitional ditches should be provided for review.

MAY 06 1985

2

3. Our review of the site plan indicates that the alignment of the East diversion ditch is not conducive to long-term stability. There are several locations where flows in the diversion ditch are directed toward the stabilized tailings. It appears that either (a) the ditch alignment should be revised such that flows are not directed toward the tailings at channel bends or (b) additional erosion protection should be provided at those locations where curvature is necessary. Revise the design accordingly, and provide the basis for all assumptions and analyses (EM 1110-2-1601 provides acceptable guidance for determining increases in shear forces at channel bends).
4. For the East diversion ditch, it appears that peak PMF flows may have been underestimated. This is principally due to the fact that critical combinations of drainage areas and times of concentration were not considered. Based on a qualitative examination of the site plan (as presented on Sheet 11 of 20 Calculation No. 346703050313-78), it can be seen that due to the shape of the drainage basin, there are several locations along the ditch where the drainage area is only slightly less than the total area at the ditch outlet, but the time of concentration (which was computed based on watershed length) is about half the time of concentration at the ditch outlet. This effectively doubles the peak flow in the East ditch, for example, at a point located about 900 feet southeast of Mt. Augur.

Accordingly, the design calculations should be revised to reflect the most critical combinations of drainage area and time of concentration in all the diversion ditches. Several points along each ditch should be checked, due to the shape of the watersheds draining into the ditches. In addition, changes may need to be made in the riprap design in the ditches to reflect the increased flow rates, as applicable.

5. Provide the basis for the 20% increase in rock size to account for durability or lack, thereof.
6. Our review of the rock protection for the sides of the tailings embankment indicates that the average rock size (D50) needs to be increased. This is principally due to the fact that the rock voids will be filled with soil and that a majority of the runoff will pass over, rather than through, the rock layer. This results in an increase in the flow velocities which must be designed for.

For flow over a rock layer, the Stephenson method (used for designing the rock on the sides) is considered to be less applicable than the Safety Factors method (which was used for the top). We conclude that a method such as the Safety Factors method should be used in lieu of the Stephenson method, since very little flow will pass through the rock layer. The rock should be resized accordingly.

MAY 06 1985

3

7. The methodology for determining rainfall distribution and intensities, as given in NRC Staff Technical Position Paper WM-8201, has been superceded by that given in the recently published Hydrometeorological Report (HRM) No. 55 (March, 1984). The NRC staff no longer endorses the methodology presented in WM-8201. WM-8201 was developed for use at active uranium mill sites, most of which are located in Wyoming, east of the Continental Divide. At the time of the development of WM-8201, reasonable guidance for rainfall distributions in that area was unavailable and/or questionable. WM-8201 was formulated to provide that type of general guidance, based on Corps of Engineers rainfall distributions. The recent publication of Hydrometeorological Report No. 55 has indicated that certain areas in Wyoming could be subject to rainfall intensities (especially of short duration) much greater than those given in WM-8201. As a result, the NRC staff intends to make appropriate modifications to WM-8201 to reflect the new data.

The modifications to WM-8201 will include recommendations to use the rainfall distribution guidance that is developed in the Hydrometeorological Report that is appropriate for a given region. These modifications will be applicable to UMTRAP sites in general. For the Lakeview site, in particular, the rainfall distributions developed from Hydrometeorological Report No. 43 should be used, since this represents the most current estimates of rainfall potential for this area of the United States. Further, in developing rainfall distributions using HMR No. 43, extrapolation of the data for time intervals less than 15 minutes will be necessary.