



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

PDR
WM-34

NOV 16 1979

Mr. Albert Hazle
Colorado Department of Health
Radiation and Hazardous Waste
Control Division
4210 East 11th Avenue
Denver, Colorado 80220

Dear Mr. Hazle:

Based on the May 17, 1979 Commission determination that the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 gave NRC concurrent jurisdiction over tailings in Agreement States, the NRC issued a general license to possess tailings. The general license was subjected to NRC reporting requirements as defined in 10 CFR 40. In conformance with those reporting requirements, Union Carbide notified NRC Region IV by letter dated September 17, 1979 of a possible tailings embankment problem at the Uravan uranium project in Montrose County, Colorado. In response to this letter of notification, NRC staff members, their consultants, and a representative of the State of Colorado conducted a site visit on October 30, 1979 in order to obtain information from Union Carbide as to the nature of the tailings embankment problem, to visually examine any damage which had occurred to the embankments, and to evaluate the corrective action which Union Carbide was pursuing.

As you know, Congress has recently passed an amendment to the UMTRCA of 1978 to make it clear that the NRC has no direct licensing responsibility over tailings materials in Agreement States for at least the three-year period following enactment of UMTRCA. Accordingly, we are hereby transmitting our observations and recommendations and urge you to take appropriate licensing actions. We will, of course, provide any technical assistance you might need in this matter.

During the site visit NRC and their consultants made the following observations:

Mill tailings from the Uravan operations are currently retained in two disposal areas (pond 2 and pond 3) at the Uravan site. The retaining dam embankments have been incrementally raised by building on the upstream face of the embankments. The crest heights of these dams are significant and approximately 140 feet high at pond 2 and 105 feet high at pond 3. Both ponds 2 and 3 have been constructed on high ground approximately 900 feet west of the town of Uravan which is located 500 feet below the dams along the San Miguel River.

1595 217

7912170022

At the time of our visit no tailings were being discharged into pond 2 and the existing liquid surface was several hundred feet back into the basin from the dam crest. Inactive dozers were parked along the northern top perimeter of pond 2 with visible signs of past construction activity. Previously deposited sand beach material had been pushed towards the crest to begin the next dam raise that was to be approximately 8 feet in height. Tailings slurry was being discharged at the western corner of pond 3, but the depth of liquids appeared small and at large distances from the existing dam crest.

Two separate areas of sloughing were observed on the downstream face of dam No. 2. The first area, a portion of the downstream slope approximately 80 feet wide at the intermediate berm level had slid towards the toe of the dam. This slide widened to approximately 200 feet at the toe of the dam. Evidence of seepage was visible on the downstream face of the dam at elevations just below the berm which was destroyed in the slide. Embankment and uncovered foundation materials in and adjacent to the slide area at the downstream toe were observed to be soft and wet and bubbling air in the seepage water indicated that there was flow under pressure at the toe of the dam. Based on visual inspection, the retention dam for pond 2 appeared to be unstable.

The second area of slope instability had occurred approximately 400 feet southwest of the first slide. The lower slope portion of the sludge pond, which is located at the base of pond 2 embankment, and had also experienced a slide. The width of the slide was visually estimated to be 30 feet at the top and 150 feet wide at the base. Indications of seepage in the higher portions of the approximately 45 foot high slide were visible. Our visual inspection of pond 3 retention dam did not reveal obvious areas of instability. Seepage was occurring on the downstream slope and resulting in a gradual wetting and softening of the slope face and toe area.

Union Carbide expects corrective action to stabilize the retention dams of pond No. 2 and pond No. 3 to be completed in two phases. The first phase is currently underway and is limited to measures to stabilize the sloughed areas on pond No. 2. This work was taking place at the first sloughed area just downstream of the toe of the embankment but had not progressed to the face of the dam. Gravelly drainage fill was being placed over a filter fabric specified as MIRAFLI 500 X. Union Carbide expects that remedial work on this first slide area and the second slide area described above will not be completed until the end of 1979. No work has begun on the second slide area. Phase II work is to be completed in 1980 along the embankments of pond 2 and pond 3 in areas not stabilized under Phase I work.

1595 218

The construction to be performed in the stabilization program is essentially the same slope treatment for both Phase I and II. The treatment consists of laying a filter fabric over the lower downstream slope portion of the tailings embankment, placing a 5 foot minimum thickness gravelly drainage fill on top of the fabric and then constructing an outer zone of mine waste rock. The toe berm thus formed is intended to control seepage in the downstream slope and add weight at the toe for resisting potential embankment slides.

After examining the above situation and reviewing the Environmental Report for the Uravan uranium project, NRC makes the following comments and recommendations to the State of Colorado regarding the stability of the retention dams and corrective actions undertaken on ponds No. 2 and 3.

Comments on the Environmental Report:

If the corrective actions described in the preceding paragraphs were undertaken on the basis of the environmental report there is some question as to the effectiveness of the remedial action for the following reasons;

1. The applicability of the liquefaction analysis which is based on blow counts is questionable. The design approach used in the analysis was developed for conditions of level ground and clean sands which is significantly different from the conditions at the Uravan site.
2. The assessment of the static stability of the retention dams does not include the low strength of soft slimes.
3. "Undisturbed" samples of loose material were collected by the unacceptable practice of driving the sampler with a hammer.
4. The seismic analysis incorrectly used the drained shear strengths of the soil. Consolidated undrained triaxial shear test are more appropriate as specified in NRC Regulatory Guides 1.132 and 1.138.
5. The adopted design earthquake with the 200-year recurrence interval is considered a significant reduction in safety from the provisions of Regulatory Guide 3.11.
6. Field observations indicate that seepage lines within the embankment have developed at higher elevations than those surfaces assumed in the stability studies.

1595 219

Recommendations on Dam Stability:

1. Discharge of liquid or tailings into pond 2 area should be restricted until Phase I stabilization work is completed. Inspection of the completed work should be performed before pond 2 is authorized for additional tailings retention.
2. The applicant should be required to submit for approval information which demonstrates the chemical stability and permeability of the proposed filter fabric. A change in the specific gradation limits of the free drainage granular fill would be preferable in place of the filter fabric, if the changed gradational limits of the granular fill resulted in meeting filter criteria. To meet construction schedules, this information from Union Carbide should be submitted for evaluation not later than November 23, 1979.

In recognition of the existing instability of the pond 2 embankment and the threat of approaching severe winter conditions, which could stop stabilization work, it is recommended that construction should continue on a priority basis while pursuing an early resolution of the use of filter fabric and or possible modification in processing the drainage fill material.

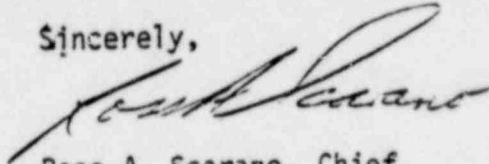
3. A license condition should be imposed which maintains sand beaches at a minimum of 200 feet from the crest of the dam for pond 2 and 150 feet from the crest of the dam for pond 3. This license condition should also require minimum freeboard heights of 10 feet from the crest of the dam for pond 2 and 12 feet from the crest of the dam for pond 3.
4. A license condition controlling the operation of liquid and tailings discharge from the dam crest should be required. To avoid raising the upper phreatic surface within the embankment to levels above those assumed in dam stability studies, the piezometers closest to the point of tailings discharge should be recorded at least every other day during spigoting operations. If recorded piezometric levels indicate elevations higher than those assumed in stability studies, the tailings discharge operation should be immediately stopped and the discharging operations should be moved to locations where piezometric levels had not been influenced by the previous spigoting operation.

An independent detailed safety evaluation on dam stability should begin immediately to determine the adequacy of the Phase I and Phase II work in providing a reasonable margin of safety for the remaining years of

1595 220

operation. We understand that recent work has been completed for Union Carbide by Acres American on Uravan dam stability, subsurface explorations, laboratory testing, embankment monitoring etc. We recommend that this information be obtained from Union Carbide as soon as possible and that an independent assessment of the overall stability of the retention dams for ponds 2 and 3 then be performed. This assessment should check conformance of the Uravan dams with NRC Regulatory Guides 3.11 and 3.11.1.

Sincerely,



Ross A. Scarano, Chief
Uranium Recovery Licensing Branch
Division of Waste Management

1595 221