

STATE OF NEW MEXICO NATURAL RESOURCES DEPARTMENT WATER RESOURCES DIVISION

> S.E. Reynolds, State Engineer Bataan Memorial Building Santa Fe, New Mexico 87503 (505) 827-2526

Stowart.



April 30, 1980

Mr. Tom Hill Director of Tailings Management United Nuclear Corporation Post Office Box 3951 Albuquerque, New Mexico 87190

Certified-Return Receipt Requested

Re: File No. 3346

Dear Mr. Hill:

Herewith for your consideration is a copy of Donald T. Lopez', P.E. April 29, 1980 memorandum to me on his review of the request to increase solution levels at the Churchrock Mill Tailings impoundment area, United Nuclear Corporation, Churchrock, New Mexico. I concur with the statements contained in his memorandum.

Please let me know if further discussion would be helpful.

Sincerely,

S. E. Reynolds State Engineer

By

F. R. Allen, Chief Technical Bureau

FRA*pat Enclosures

cc: Stanley Crout Tom Baca Robert Booth Gale Billings

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MEMORANDUM

April 29, 1980

TO: F. R. Allen, Chief, Technical Bureau

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FROM: Donald T. Lopez, P.E., Water Resource Engineer

SUBJECT: Review of request to increase solution levels at the Churchrock Mill Tailings impoundment area, United Nuclear Corporation (UNC), Church Rock, New Mexico, File No. 3346

On April 23, 1980, Mr. Tom Hill of UNC and Mr. Gale Billings of Science Applications, Inc. (SAI) met with Mr. Fred Allen, Mr. Jim Whiteman and myself of the State angineer's Office to discuss the above request. At the meeting, Mr. Hill stated that UNC had decided not to proceed with the reconstruction and raising of the north portion of the starter dam between about station 44+00 to the north abutment at about station 65+00. I consider this to be a major modification of the plans and specifications approved by the State Engineer on January 29, 1980.

Mr. Hill also stated that after completion of the breach repair and the dikes surrounding the central pond area to elevation 6980, Mr. Robert D. Booth, P.E., will be terminated as the registered engineer in charge of construction and tailings deposition at the UNC tailings dam. Mr. Hill's April 22, 1980 letter to Mr. Allen proposes that "Discharge of liquids and tailings will be under the supervision of the Mill Manager and freeboard readings will be included in the weekly report." In addition, Attachment 2 to the letter states "For stability enhancement of the peripheral earthen dikes, the deposited solid tailings may be allowed to reach elevations on the interior of the dikes in excess of 6980', with the solution level not to exceed 6975'." Mr. Hill indicated that the tailings deposition would be similar to a conventional US method tailings dam construction with a DS slope of the tailings sands at the

angle of repose (1.5 horizontal to 1 vertical or steeper). The cross dikes and the main dam (central area) would thereby serve as starter dams for this construction method. This concept would be a significantly different method of tailings impoundment than the three previous submittals approved by the State Engineer (April 1976, April 1979, and January 1980). Mr. Hill stated the revised method of tailings containment would allow approximately 160 days of operation and would provide a transition period to operation with lined evaporation ponds for long term storage (20 years).

I have reviewed the UNC letter and attachments thereto and offer the following comments:

1. Secondary Containment Plan - The tailings solution equalization plan (attached to Mr. Hill's April 22, 1980 letter) does not assume that the northern cross dike would breach and release tailings and liquids from the central pond and borrow pits 1 and 2 into the northern pond area. The northern cross dike is a 14-foot high clayey fill dike built on a foundation of extremely low density tailings about 300' in length and varying in depth up to 40'. The plan should assume that the northern cross dike would breach without the southern cross dike breaching.

The plan assumes that the southern cross dike would breach without the northern cross dike breaching, therefore a release of tailings /sands and liquids from the central pond as well as liquids from borrow pits 1 and 2 would be released into the secondary containment area in the south pond. The southern cross dike is a 15-foot high clayey fill dike built on a foundation of extremely low density tailings about 1000 feet in length and varying in depth to 40'.

Certification by a registered professional engineer in New

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Mexico that adequate secondary containment is at all times provided is required. The certification must be based on engineering analyses of the release of the tailings and liquids from the central pond and borrow pits 1 and 2 into only the northern pond area and into only the southern pond area. The secondary containment areas should have enough freeboard after the tailings release to protect against the PMF or (5) feet whichever is greater.

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In lieu of assurance of secondary containment, assurance by a professional engineer registered in New Mexico that the cross dikes meet State Engineer stability criteria would be acceptable. These criteria are dam stability analyses for the following conditions:

Loading Condition	Minimum Factor of Safety	Shear Strength
End of construction	1.3	UU and CD
Maximum pool with steady seepage $1/$	1.5	CU or CD
Earthquake, 0.10G Minimum (in combination with the above conditions)	1.0 2/	3/

- 1/ Seepage analyses may be based on a graphical method, model studies, or mathematical solutions using appropriate soil and rock parameters.
- 2/ Factor of safety is for pseudostatic stability analyses. In addition, liquefaction and excessive deformation should be assessed.

3/ Use shear strength for case analyzed without earthquake.

2. Plans and Specifications - Since the proposed tailings containment

plan is a major modification to the approved plans and specifications,

modified plans and specifications including as-built drawings of both the primary and secondary containment areas must be submitted to the State Engineer for approval. The plans and specifications must be prepared by a professional engineer registered in New Mexico and include: 1) the ultimate height of the sand tailings; 2) supporting stability and seepage analyses and 3) additional instrumentation consisting of more piezometers and surface settlement and horizontal movement points to monitor the performance of the structures and their respective foundations.

- 3. Supervision Since the discharge of liquids and tailings is a part of the tailings dam construction, the discharge of liquid and tailings must be under the supervision of a professional engineer registered in New Mexico.
- 4. Stability Analysis The stability analysis for the east slope of borrow pit no. 2 has been reviewed. The Northern Testing Laboratories test result of an effective stress friction angle of 36.5° and 0 cohesion appear too high for the consolidated undrained (CU) shear condition. Review of the Dames and Moore test results on similar material (silty sands, SM) from essentially the same location indicate an average CU effective stress friction angle of 21° and 0 cohesion. In addition, the total stress shear strength for the undisturbed sample at elevation 6940 was not presented. It is recommended that the shear strength values be reviewed.

T. Lopez, P.E.

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Re: UNC letter dated April 22, 1980 and attachments thereto



STATE OF NEW MEXICO NATURAL RESOURCES DEPARTMENT WATER RESOURCES DIVISION

> S.E. Reynolds, State Engineer Bataan Memorial Building Santa Fe, New Mexico 87503 (505) 827-2526



April 30, 1980

Mr. Tom Hill Director of Tailings Management United Nuclear Corporation Post Office Box 3951 Albuquerque, New Mexico 87130

Certified-Return Receipt Requested

Re: File No. 3346

Dear Mr. Hill:

Reference is made to our April 24, 1980 telephone conversation in which I advised you that we had not been receiving the freeboard readings as required by Condition 7 of my February 29, 1980 letter to you. The April 29, 1980 report from Robert D. Booth, P.E., does not contain the freeboard readings. It is requested that by May 5, 1980 the freeboard readings be submitted to this office for the period March 1 through April 26, 1980. Thereafter, freeboard readings must be submitted with the weekly report.

Sincerely,

S. E. Reynolds State Engineer

By

F. R. Allen, Chief Technical Bureau

FRA*pat

cc: Stanley Crout Tom Baca V Robert D. Booth