



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

DEC 27 1979

MEMORANDUM FOR: Ross A. Scarano, Chief
Uranium Recovery Licensing Branch, DWM

THRU: *JK* James P. Knight, Assistant Director
for Engineering, DSS

FROM: Robert E. Jackson, Chief
Geosciences Branch, DSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST - RESPONSE TO CHURCH
ROCK INFORMATION REQUEST BY CONGRESSMAN UDALL (TAC 5294, R53)

PROJECT NAME: Church Rock - United Nuclear Corporation
RESPONSIBLE BRANCH: Uranium Recovery Licensing Branch
REQUESTED COMPLETION DATE: December 19, 1979

In reply to your memorandum of December 15, 1979 to James P. Knight requesting technical assistance, we have enclosed our response to question no. 8 of Congressman Morris K. Udall letter of December 6, 1979 to Chairman Joseph Hendrie. The enclosed input was prepared by J. Kane of the Geosciences Branch.

We direct your attention to enclosure 2 of Frank Schroeder's letter of October 4, 1979 to Robert E. Browning and G. Wayne Kerr concerning draft congressional testimony. Pertinent portions of our response on pages 2 and 3 which discusses the applicable regulations covering tailings dam could also be incorporated into the response to question no. 8.

In view of our Branch's heavy workload that has been impacted by reduced manpower, including a loss of personnel to your Branch, we recommend that future technical assistance for the Church Rock project be obtained from your geotechnical engineering consultants.

Robert E. Jackson
Robert E. Jackson, Chief
Geosciences Branch
Division of Systems Safety

Enclosure:
As stated

cc: w/o enclosure
R. Mattson
F. Schroeder
J. Martin
G. Kerr

cc: w/enclosure
See next page

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R. Scariano

- 2 -

DEC 27 1979

cc: w/enclosure

J. Knight
R. Jackson
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T. Sullivan
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L. Reiter
J. Kendig
J. Linehan
J. Nelson
J. Kane

CHURCH ROCK URANIUM MILL TAILINGS PROJECT
TAC NO. 5294, R53
GEOTECHNICAL ENGINEERING INPUT FOR RESPONSE
TO CONGRESSIONAL INQUIRY
PREPARED BY: JOSEPH D. KANE, P.E.
NRR, DSS, GB, GES

Reference. Congressman Morris K. Udall December 6, 1979 Letter, Item No. 8.

Question United Nuclear Corporation representatives at our hearing stated that the Church Rock tailings impoundment met "all design criteria established by the NRC," including Regulatory Guide 1.101. Did the Church Rock facility meet all NRC's impoundment design criteria?

Response In the opinion of the Geotechnical Engineering Section staff, who was not requested to conduct a review or to provide technical assistance until after the July 1979 dam failure, the design of the Church Rock facility does not meet all of NRC's impoundment criteria. The following areas in the design of the Church Rock facility are considered inadequate in meeting NRC criteria and conservative engineering practice.

1. Stability analysis. The results of stability studies completed by the Applicant prior to the dam failure are not acceptable. The results are unacceptable because the shear strengths adopted for the foundation soils and used in the stability studies did not adequately anticipate the significant loss in shear strength caused by the wetting of foundation soils resulting from the tailings pond impoundment. The factors of safety computed in the submitted stability studies are therefore, based on unconservative soil shear strengths and a direct comparison cannot be validly made with minimum factors of safety that are listed in Regulatory Guide 3.11.

2. Settlement studies. The extent that settlement and potential cracking within the retention embankment was addressed and analyzed in design was not sufficient to properly estimate the magnitude of the settlement problem over the collapsible foundation soils. A more detailed evaluation of settlement would likely have resulted in design measures that provided a satisfactory engineering solution against harmful embankment cracking.

3. Dam safety instrumentation. Basic instrumentation (piezometers and movement devices) to monitor the retention embankment's performance and safety was not installed as suggested in Regulatory Guide 3.11.

In varying degree, design, construction and operation inadequacies continue to exist, even today. Outstanding geotechnical engineering issues as noted in recent safety reviews completed by the NRC staff and its consultant remain unresolved for the Church Rock project.