



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV  
URANIUM RECOVERY FIELD OFFICE  
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OCT 31 1989

URFO: PJG  
Docket No. 40-8907  
04008907320E

MEMORANDUM FOR: Docket No. 40-8907  
FROM: Pete J. Garcia, Project Manager  
SUBJECT: CLEANUP OF TAILINGS AT THE NORTHEAST CHURCH ROCK MINE

Introduction

By letter dated April 27, 1989, United Nuclear Corporation (UNC) submitted a report documenting the cleanup of tailings at the Northeast Church Rock Mine. The report included a discussion of the cleanup methodology used as well as the results of soil sampling conducted to verify the adequacy of cleanup. The cleanup and submittal were in accordance with Condition No. 33 of Source Material License SUA-1475 for UNC's Church Rock mill.

Background

On January 29, 1979, the New Mexico Environmental Improvement Division authorized UNC to utilize coarse sand tailings for backfilling excavated mine stopes at the Northeast Church Rock (NECR) Mine. Tailings sands from the Church Rock tailings pond were stockpiled at three locations near the mine. Rainfall runoff from the stockpile areas was routed to four mine dewatering ponds, where it was treated in an ion exchange circuit prior to discharge under an NPDES permit. Pond sediments were periodically dredged and stored on a muck pad, and eventually transported to the UNC mill for processing.

The three stockpile areas, the four ponds, and the muck pad are the areas which required cleanup due to contamination by tailings. These areas are shown on Figure 1 of the report submitted by UNC. The licensee had initiated cleanup of the area by returning remaining stockpiles of tailings to the tailings impoundment in 1986.

The entire area in the vicinity of the NECR Mine has been heavily impacted by mining operations. Low-grade ore stockpiles and mine waste are located throughout the area. This situation complicates the determination of the extent of cleanup required. Criterion 6 of Appendix A to 10 CFR 40 requires the long-term stabilization of areas containing byproduct material contamination in excess of 5 pCi/g Ra-226 in soil above background. Seven

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background samples taken in the vicinity of the mine were analyzed for Ra-226, with the results shown in Table II of the UNC submittal. The results indicate an average background Ra-226 concentration of about 2 pCi/g, which would require cleanup of areas exceeding 7 pCi/g due to contamination by tailings.

### Cleanup Program

Cleanup activities at the minesite were performed in two phases. The first phase consisted of excavation of material based on data obtained from boreholes drilled using truck-mounted and hand-held augers. The boreholes were drilled in all areas requiring cleanup, and gamma probes used to estimate the Ra-226 concentrations at various depths. Although this method could not distinguish between Ra-226 from tailings or non-byproduct wastes, it was used to determine overall initial excavation depths based on elevated Ra-226 concentrations.

The initial excavation resulted in the removal of approximately 1.5 feet of material from the stockpile areas and 1.25 to 7.0 feet from the ponds and muck pad. The areal extent of cleanup was approximately 4 acres for Area 1, 3 acres for Area 2, 1 acre for Area 3, 2.5 acres for the muck pad, and 3 acres for the ponds.

UNC then took soil samples for analysis to determine which areas would require additional excavation. Due to the presence of elevated concentrations of Ra-226 in the low grade ore and mine waste, additional data regarding U-nat concentrations in the tailings and non-byproduct materials was necessary to allow differentiation of the materials. Analysis of samples from six non-byproduct areas at the minesite indicate U-nat/Ra-226 ratios of 1.26 to 1.69, with an average of 1.44. Two tailings samples were also analyzed, resulting in an average U-nat/Ra-226 ratio of 0.035. The ratios for the natural materials and the tailings clearly showed the expected difference in equilibrium due to the removal of uranium during the milling process.

To identify areas requiring additional excavation, the licensee used an action level for the U-nat/Ra-226 ratio of 0.75. This value is the average of the values for tailings and non-byproduct materials. Sampling following the initial excavation was conducted using a grid spacing of 50 to 100 feet. Resampling was performed in those areas requiring additional excavation. The equilibrium ratio used by UNC to verify final cleanup was the average tailings value of 0.035. The data from the sampling program following both initial and final excavation is shown on Tables III-XVIII of the report. The sampling locations are shown in the figures accompanying the report. Photographs of the areas showing pre and post cleanup conditions are included with the figures.

### Staff Review

The staff review of the data provided by UNC indicates that all U-nat/Ra-226 ratios following final excavation exceeded the verification ratio of 0.035, and the large majority exceeded the action level of 0.75. Further, many of the Ra-226 values were below the value of 7 pCi/g required by Criterion 6.


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Based on the equilibrium ratio data, UNC concluded that remaining Ra-226 levels in excess of the Criterion 6 limit result from low grade ore or mine waste. In addition, staff review of the data for areas exceeding 7 pCi/g indicates the U-nat values are significantly higher than the low values which would be expected from tailings. Based on the equilibrium ratio and U-nat data provided by the licensee, the staff concludes that UNC has adequately removed remaining byproduct material from the mine site. No further action is therefore necessary.



Pete J. Garcia  
Project Manager

Approved by:



Ramon E. Hall  
Director

Case Closed: 04008907320E

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