



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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ARLINGTON, TX 76011-4511

April 26, 2018

MEMORANDUM TO: Docket File WM-00063

THROUGH: Ray L. Kellar, PE, Chief /RA/
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

FROM: Robert Evans, PhD, PE, CHP, Senior Health Physicist/RA/
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

SUBJECT: NRC OBSERVATIONAL SITE VISIT AT THE MEXICAN HAT, UTAH
DISPOSAL SITE 2018-001

On April 11, 2018, the U.S. Nuclear Regulatory Commission (NRC), Region IV Office, conducted an observational site visit at the U.S. Department of Energy's (DOE) Mexican Hat Disposal Site in Mexican Hat, Utah. This observational site visit was conducted in accordance with the NRC's guidance dated September 7, 2012 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML12213A418). The purpose of the site visit was to observe the DOE's representatives conducting the annual inspection of the Mexican Hat site in accordance with the instructions provided in the NRC-accepted Long-Term Surveillance Plan (LTSP) dated October 2007 (ADAMS Accession No. ML073050056). Enclosed to this memorandum is the NRC's trip report for this observational site visit.

In summary, the DOE representatives conducted the annual inspection in accordance with the guidance provided in the LTSP. No significant regulatory issues or safety concerns were identified during the site visit. The DOE's staff continues to monitor depressions that have formed on the northeastern side slope of the disposal cell. The DOE plans to keep the NRC informed about its investigation of the depressions.

Docket: WM-00063

Enclosure:
NRC Trip Report WM-00063/2018-001

cc:
A. Denny, Site Manager, DOE

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817-200-1234

**U.S. NUCLEAR REGULATORY COMMISSION
REGION IV**

Docket: WM-00063

Report: WM-00063/2018-001

Licensee: U.S. Department of Energy

Facility: Mexican Hat Disposal Site

Location: Mexican Hat, Utah

Date: April 11, 2018

Inspectors: Robert Evans, PhD, PE, CHP, Senior Health Physicist
Fuel Cycle and Decommissioning Branch
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Martha Poston, Health Physicist
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Approved by: Ray L. Kellar, PE, Chief
Fuel Cycle and Decommissioning Branch
Division of Nuclear Materials Safety

Attachment: Photographs taken at the Mexican Hat Disposal Site

Enclosure

NRC Trip Report

1 Background

The Texas-Zinc Minerals Corporation constructed and operated a uranium mill at the Mexican Hat site from 1957-1963. The mill was sold to Atlas Corporation in 1963, and the mill continued to operate until 1965. During its operation, the mill processed 2.2 million tons of ore for its copper and uranium content. In addition to uranium and copper processing, a sulfuric acid manufacturing plant operated at the site from 1957-1970.

The U.S. Department of Energy (DOE) conducted site remediation. The tailings material, contaminated structures, and windblown material was placed into an engineered disposal cell on site property. In addition, tailings, wastes, and vicinity property material from the nearby Monument Valley site was also placed into the Mexican Hat disposal cell. The DOE completed reclamation activities in 1995. The disposal cell contains approximately 4.4 million tons (3.6 million cubic yards) of residual radioactive wastes including mill tailings. The disposal cell covers approximately 68 acres of the 119-acre site.

The Mexican Hat disposal site is located on the Navajo Nation reservation near Mexican Hat, Utah. Pursuant to the Uranium Mill Tailings Radiation Control Act (UMTRCA), the DOE maintains control of the site under a trust agreement. The NRC accepted the disposal cell as a Title I, generally licensed site under the provisions of 10 CFR 40.27 in 1997.

Regulation 10 CFR 40.27(c) states that the DOE shall implement the long-term surveillance plan (LTSP), and care for the disposal site in accordance with the provisions of the LTSP. The most recent LTSP for the Mexican Hat site was submitted to the NRC by the DOE letter dated October 22, 2007 (ADAMS Accession No. ML073050056). This LTSP included changes to the seep sampling program that were previously approved by the NRC by letter dated February 20, 2007. (A seep is a place where groundwater slowly oozes out of the ground.) The DOE used this version of the LTSP during its 2018 annual inspection.

2 Site Status

The site consists of a disposal cell located within a fenced boundary. The disposal cell was constructed with a rip-rap layer, bedding layer, and radon barrier over the contaminated materials. The DOE installed 43 warning signs and 12 boundary markers around the disposal cell. The DOE also installed two site markers on the site property. One marker was installed on top of the cell, and the second marker was installed adjacent to the main gate.

The cell cover was constructed with a 2-percent grade slope that flows to the north and east. Runoff water flows down the 20-percent grade side slopes into a rock apron that surrounds the cell. The runoff exits the cell through three toe drains that discharge into existing arroyos that are located to the north and east of the cell. (An arroyo is a steep-sided gully cut by running water in an arid or semiarid region.)

In 2016, the DOE staff first observed subtle depressions in the rock cover along the lower portion of the northeast side slope leading to the northeast toe drain. The DOE notified the NRC of its findings by letter dated May 5, 2016 (ADAMS Accession No. ML16131A719).

In response to its discovery of the depressions, the DOE staff took several corrective actions including implementation of supplemental examination and evaluation activities. The DOE installed a meteorological monitoring station to monitor weather conditions over time including precipitation. The DOE conducted topographical surveys. The survey data will be used help identify new depressions. The DOE also conducted radiological surveys, in part, to ensure that the radon barrier continued to cover the radioactive wastes. The survey results were at background levels, indicating that radioactive materials were not exposed to the environment.

In December 2017 and January 2018, the DOE staff conducted additional investigations, as allowed by Section 3.6, "Routine Site Maintenance and Emergency Measures," of the LTSP. These investigations included visual inspection of the side slopes and hand-excavation of several test pits, to observe the erosion, bedding, and radon barrier layers at various locations. By email dated January 22, 2018 (ADAMS Accession No. ML18022A697), the NRC informed the DOE that its proposed work plan was in compliance with LTSP requirements. The NRC also requested that the DOE keep the NRC informed of the results of its investigations.

The DOE informed the NRC of its investigations by teleconference dated February 12, 2018 (ADAMS Accession No. ML18053A752). The DOE informed the NRC that approximately 20 depressions were visually observed, and that eight were hand-excavated for closer examination. The larger depressions were roughly 4-5 feet in diameter. The causes of the depressions appear to be related to erosion, but the DOE's investigations are currently incomplete.

During the April 2018 annual inspection, the DOE staff indicated that additional investigations were necessary to observe the status of the bedding layer at different locations on the slope, to determine how much radon barrier material is present at the different locations, to sample the soil at certain locations, and to ensure there were no radiological issues at any location. The DOE staff believed that core samples may be needed, to determine the type and density of buried material underneath the northeast side slope. The target date for these additional investigations was scheduled for early to mid-May 2018, after the work plan had been developed and submitted to the NRC for consideration.

Groundwater in the uppermost aquifer was not contaminated by previous uranium milling operations. However, the groundwater in the soils located between the uppermost aquifer and the surface was impacted by previous operations. As a result, the DOE continues to monitor selected seeps on an annual basis. These seeps are located primarily in two nearby ephemeral streams, the South Arroyo and Gypsum Creek. These streams eventually discharge into the San Juan River.

Seep monitoring and sampling has been in place since 1997 as a best management practice. Water quality monitoring of the seeps was discontinued in 2006. In 2007, the DOE concluded that seep monitoring was not warranted, but the DOE decided that seven of 11 seep locations would be visually monitored during annual inspections for a

minimum of 10 years. At the request of the Navajo Nation, following increased precipitation, water quality samples were collected from certain seeps in 2015-2016. The analyses of the seep samples were inconclusive, but the results could suggest that the samples may have contained a combination of naturally occurring and mill-related uranium. The results were above the maximum contaminant levels for drinking water but below the local surface water standard for secondary human contact (for example, consumption of fish caught in local streams). The DOE determined that the seeps were not a risk to human health or the environment for several reasons, including remoteness of the seeps and little to no flow originating from the seeps. In addition, the local groundwater is not a source of drinking water.

At the time of the April 2018 annual inspection, the DOE was finalizing a technical report involving seep monitoring that will be submitted to the NRC in the near future. Based on information provided in the draft report, the DOE plans to continue with visual seep observations for the foreseeable future. The DOE will reconsider the need to continue with visual observations based future annual monitoring results. Further, the DOE will only collect samples of the seeps if flow increases or at the request of the Navajo Nation.

The last annual DOE inspection was conducted on April 11, 2017 (ADAMS Accession No. ML18067A214, ML18067A216). The purposes of the inspection were to confirm the integrity of visible features at the site, to identify changes in conditions that might affect conformance with the LTSP, and to determine the need for maintenance or additional inspection and monitoring. During that inspection, no significant changes were noted from the previous year's inspection. The report indicates that the DOE continued to observe the depressions along the lower portions of the northeast side slope and toe areas. No problems were identified that required immediate contingency action. At that time, Seep 0248 was the only seep with wet conditions; all other seeps were dry.

3 Site Observations and Findings

To conduct the annual inspection, the DOE created an inspection checklist. The checklist included requirements to inspect the fences, boundary monuments, site markers, perimeter signs, entrance sign, and entrance gate. Also, the DOE inspectors were required to check the condition of the disposal cell top, side slopes, diversion channels, the area between the cell and the site boundary, the outlying areas, and vegetation. The DOE inspectors were required to visually monitor the seven seeps listed in the 2007 LTSP. In addition to the seven seeps, DOE inspectors were tasked to observe a new seep location, Seep 0923 in Gypsum Creek.

During the inspection, the DOE observed that the site fences were intact, all markers and monuments were in place, the entrance gate was intact, but a number of boundary signs had been vandalized by gunfire. The disposal cell appeared to be in excellent condition, with the exception of the side slope area with the depressions. Some vegetation and sediment were identified in the western diversion channel. However, the DOE inspectors reasonably assessed that the vegetation and sediment was not a significant concern because it did not impact the disposal cell itself. Seep 0248 was found to be moist but did not have enough fluid for sampling.

The NRC inspectors noted that the arroyo near the main gate, located on the northwestern side of the disposal cell, was eroding towards the western diversion channel. The NRC staff discussed with the DOE representatives the possible need for

intervention at some point in the future. The DOE representatives acknowledged that repairs may be necessary in the future to slow down the erosion. However, the NRC staff concluded that the erosion did not require immediate action, and the erosion did not appear to have a near-term impact on the disposal cell itself.

The DOE representatives did not identify any significant problems during the annual inspection that required immediate contingency actions; although, the DOE planned to conduct additional investigations of the depression areas. The DOE staff identified several locations where fence repairs were needed. The DOE staff planned to repair the fence deficiencies as necessary.

The NRC inspectors measured the ambient gamma exposure rates using a hand-held survey meter (Ludlum Model 19, NRC No. 016337, calibrated to radium-226, calibration due date of October 26, 2018). With a background of about 10-12 microRoentgens per hour ($\mu\text{R}/\text{hr}$), the highest measurement on the disposal cell was noted to be 14 $\mu\text{R}/\text{hr}$. Offsite, the highest measurement was observed at Seep 0248 at 22-24 $\mu\text{R}/\text{hr}$. This slightly elevated measurement was attributed to naturally occurring radioactive material. Overall, the survey results indicate that the disposal cell property was consistent with background levels.

4 Conclusions

The NRC inspectors concluded that the DOE inspectors conducted the site inspection in accordance with LTSP and 10 CFR 40.27 requirements. The condition of the site was nearly identical to the condition that was reported during the previous year's DOE inspection, as documented in the 2017 annual report. The NRC inspectors discussed the depressions with the DOE staff who indicated that additional investigations were planned for the near future. The erosion of one nearby arroyo was not affecting the disposal cell. However, the DOE may have to address this erosion at some point in the future because it may eventually impact a site diversion channel.

5 Meeting Summary

The NRC inspectors participated in a safety meeting with the DOE's site manager and contractors prior to the site inspection. During this meeting, the participants discussed topics such as site status, inspection plan, and potential hazards.

6 Persons Contacted

- B. Cary, Radiation Control Technician, Navarro Research and Engineering, Inc.
- A. Denny, Site Manager, DOE Office of Legacy Management
- D. Johnson, Site Lead, Navarro Research and Engineering, Inc.
- P. Lemke, Site Lead, Navarro Research and Engineering, Inc.
- J. Tallbull, Senior Environmental Specialist, Navajo Nation, Division of Natural Resources
- B. Tsosie, Site Manager, DOE Office of Legacy Management
- E. Tyrrell, Site Lead, Navarro Research and Engineering, Inc.

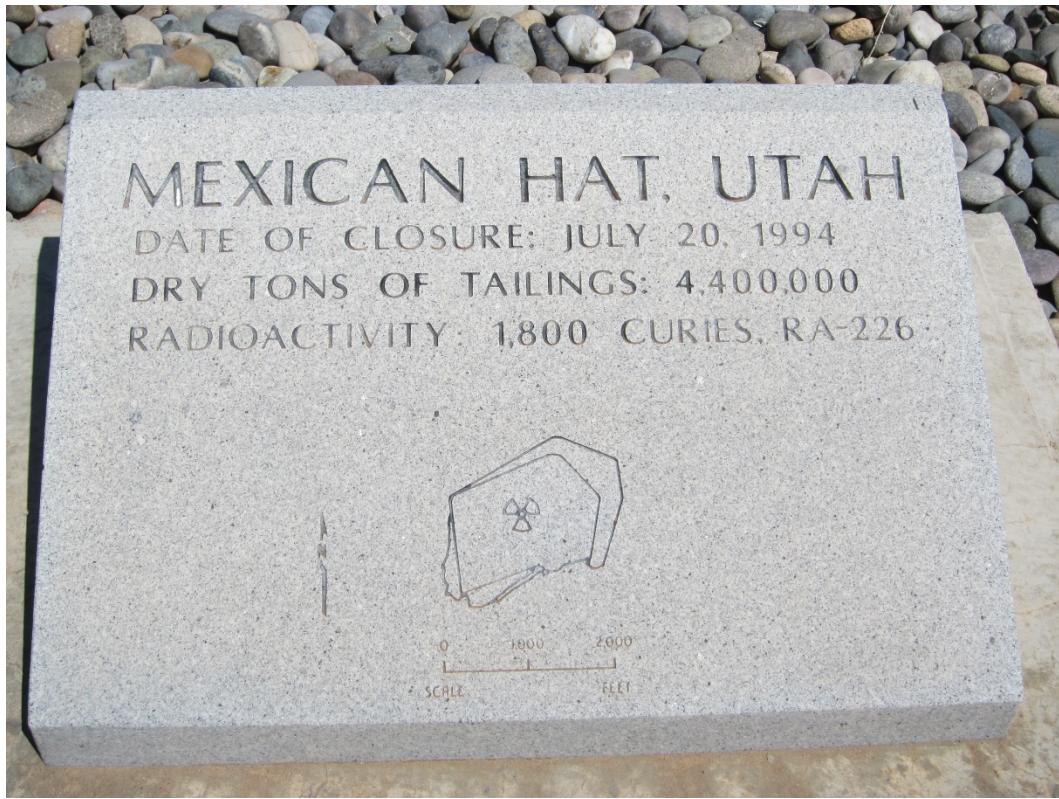


Figure 1: Site marker on top of Mexican Hat disposal cell



Figure 2: Top of disposal cell, looking northeast to southwest

Attachment



Figure 3: Northeast side slope, the area where small depressions were located



Figure 4: Sediment buildup in northeast toe drain



Figure 5: Meteorological monitoring station located northeast of disposal cell



Figure 6: Washout located northwest of cell near west diversion channel

NRC OBSERVATIONAL SITE VISIT AT THE MEXICAN HAT, UTAH DISPOSAL SITE, DATED
APRIL 26, 2018

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