UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD.
ARLINGTON, TX 76011-4511

June 11, 2015

MEMORANDUM TO: Docket File WM-00054

THROUGH: Ray L. Kellar, P.E., Chief **/RA/**
Repository and Spent Fuel Safety Branch
Division of Nuclear Materials Safety
Region IV

FROM: Robert J. Evans, Ph.D., C.H.P., P.E., Senior Health Physicist **/RA/**
Repository and Spent Fuel Safety Branch
Division of Nuclear Materials Safety
Region IV

SUBJECT: OBSERVATIONAL SITE VISIT AT SHERWOOD DISPOSAL SITE

On May 19-20, 2015, a U.S. Nuclear Regulatory Commission (NRC) Region IV inspector conducted an observational site visit at the U.S. Department of Energy's (DOE) Sherwood Project Reclamation Cell in Stevens County, Washington. This site visit was conducted in accordance with guidance provided in the NRC Memorandum dated April 17, 2012 (ML120930240). The purpose of the site visit was to observe DOE's routine, annual inspection of the Sherwood disposal site. Enclosed to this memorandum is the NRC's trip report for this site visit.

In summary, DOE representatives conducted the annual inspection in accordance with the requirements specified in the NRC-accepted Long-Term Surveillance Plan dated February 2001 (ML072040133). The disposal cell and surrounding features appeared to be in good condition. No significant regulatory issues or safety concerns were identified during the site visit.

Docket: WM-00054

Enclosure:
NRC Trip Report

cc: T. Petrosky, Site Manager
DOE Office of Legacy Management
2597 Legacy Way
Grand Junction, CO 81503

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	WM-00054
Report:	WM-00054/15-001
Licensee:	U.S. Department of Energy
Facility:	Sherwood Project Reclamation Cell
Location:	Wellpinit, Stevens County, Washington
Dates:	May 19-20, 2015
Inspector:	Robert J. Evans, Ph.D., C.H.P., P.E., Senior Health Physicist Repository and Spent Fuel Safety Branch
Approved by:	Ray L. Kellar, P.E., Chief Repository and Spent Fuel Safety Branch
Attachment:	Photographs Taken at the Sherwood Disposal Site

Enclosure

NRC Trip Report

1 Background

Western Nuclear Inc. operated the Sherwood mill from 1978-1984. The mill processed ore from an open pit mine located near the mill site. The mill processed the ore using an acid-leach process. Approximately 2.4 million cubic yards of tailings were created during operation of the mill. The tailings material contain an estimated 470 curies of radium-226. The tailings were neutralized with lime and placed in a synthetically lined disposal cell.

The U.S. Department of Energy (DOE) decommissioned the site from 1992-1995. In addition to the tailings material, approximately 350,000 cubic yards of contaminated soils, building equipment, and debris were disposed in the northern portion of the tailings impoundment.

The Sherwood disposal site is located about 7.5 miles southwest of the town of Wellpinit in Stevens County, Washington. The property is located within the Spokane Indian Reservation. The disposal cell occupies approximately 94 acres of the 382-acre property. The cell was designed to be partially below grade and is located within an ephemeral drainage basin. As noted earlier, the base of the disposal cell includes a synthetic (hypalon) liner. The cover consists of a 12 to 20-feet thick radon barrier and 6-inch thick topsoil layer. Vegetation was planted on the cover, and the vegetation included native grasses, forbs, shrubs, and trees.

A containment dam was constructed at the down-gradient end of the impoundment. The downslope of the containment dam was stabilized with a 6-inch thick layer of rock riprap. A drainage channel was constructed along the perimeter of the cell to intercept surface water flows and to divert the water around and away from the cell. The perimeter drainage channel was lined with riprap for erosion control.

The Sherwood disposal site is classified as a Title II site under the Uranium Mill Tailings Radiation Control Act of 1978. The DOE maintains long-term custody of the site under the U.S. Nuclear Regulatory Commission's (NRC's) general license requirements of 10 CFR 40.28. The Long-Term Surveillance Plan (LTSP) explains how DOE will fulfill the general license requirements specified in 10 CFR 40.28.

The State of Washington terminated the site license on March 9, 2001. The property was transferred to DOE, as trustee for the Spokane Tribe of Indians. The LTSP was submitted by DOE to the NRC by letter dated February 15, 2001 (ML010640264). The NRC accepted the LTSP by letter dated March 9, 2001 (ML072040133).

2 Site Status

The DOE conducts limited groundwater monitoring as a best management practice. The DOE collects annual samples from three wells: background well MW-2B; bedrock point-of-compliance well MW-4; and alluvial point-of-compliance well MW-10. The primary indicators of cell performance are sulfate and chloride. If any sample result exceeds the State of Washington's water quality criteria, then DOE would conduct confirmatory sampling. The sample results are included in an annual report.

The NRC inspector reviewed the most recent groundwater sampling results for the Sherwood disposal site. The DOE collected the samples in May 2014 and reported the results in a data validation package that was posted on the DOE's web site (http://www.lm.doe.gov/sherwood/Documents.aspx). In summary, the chloride and sulfate sample results for all three wells were less than or equal to 12-percent of the water quality criteria established by the State of Washington. Records indicate that no contamination has been detected in groundwater down-gradient of the disposal cell. The results of the annual sampling are reported by DOE in its annual site reports.

The DOE routinely monitors four piezometers installed in the disposal cell near the containment dam. The piezometers provide DOE with a direct means of determining dam moisture conditions. (During reclamation, the tailings material was not dewatered to avoid lowering the tailings fluid pH which would have increased the hazardous constituent concentrations.) Three out of four piezometers continued to remain dry, and the fourth indicated a water level consistent with previous annual results. Based on these field observations, the DOE inspectors concluded that the tailings dam was unsaturated. The results of the piezometer inspections are included in the annual site reports.

The DOE re-vegetated the disposal cell in 1996, after site reclamation. The vegetative cover is used to promote moisture removal, and thus, provides drainage for the cover. The LTSP specifies that the annual inspections will include a visual review of the vegetation on the cell. The LTSP provides instructions for DOE to re-seed the area as necessary.

The 2001 LTSP requires DOE to inspect the Sherwood site once every calendar year. In addition to observing the condition of the disposal cell cover, containment dam, and diversion channels, DOE staff must review the site features. For the Sherwood site, the site features include six boundary monuments, one site marker, six perimeter signs, one entrance sign, and a site access gate.

The DOE inspectors conducted the last site inspection on July 16, 2014. At that time, the disposal cell cover, containment dam, and diversion channels were noted to be in good condition. Several minor runoff channels and gullies were identified, but none were directly impacting the disposal cell. The impoundment continued to exhibit settlement in the center of the cell. Ponding of water would occur in some of these settlements. In the last annual report, DOE stated that it would continue to monitor the settlements for impact on cover integrity and performance. Areas of sediment were observed in the diversion channels, but the sediment did not appear to have an impact on the channel's design function. The rock cover on the tailings dam was observed to be in excellent condition. Vegetation was noted on the tailings cover, diversion channels, and dam surfaces. The vegetation on the cell cover appeared to be heavily grazed and drought-stressed. The DOE stated it would continue to monitor the vegetation during future annual inspections.

3 Site Observations and Findings

The purposes of the annual inspection were to confirm the integrity of the visible features of the site, to identify changes in conditions that may affect site integrity, and to determine the need for maintenance or additional inspection and monitoring. The detailed instructions for the annual inspection are provided in Section 3 of the LTSP.

To conduct the annual inspection, the DOE and its contractors created an inspection checklist. The checklist included requirements to inspect the impoundment cover, diversion channel, and impoundment dam as well as site features such as boundary monuments, site marker, perimeter signs, entrance sign, and entrance gate. During the site visit, the NRC inspector observed the DOE site inspectors implementing the site-specific checklist.

The inspector observed that the disposal cell cover, containment dam, and diversion channels appeared to be in good condition. The settlement of the cover was evident in the center of the cell. One pond was observed in the center of the cell. The smaller peripheral ponds were dry at the time of the inspection. No newly formed settlement, erosion, or slumping was observed on or around the cell. Although vegetation was observed on the cell cover, dam, and apron, there were no indications that the vegetation was negatively impacting the integrity of the cell itself. Some minor washouts, erosion, and animal intrusions were observed around the cell, but these features had no impact on the disposal cell itself.

Section 2.4.1 of the 2001 LTSP specifies that the uncompacted reclamation soil cover system is designed to withstand up to 10 feet of settlement with no adverse impact on the performance of the cover relative to erosion stability, radon attenuation, or groundwater protection. The inspector noted that the 2001 LTSP provided settlement measurements that were originally obtained in 1999. The difference between the highest elevation measurement (2076.4 feet) and the lowest elevation measurement (2070.4 feet) was six feet. The NRC inspector was unable to identify any elevation measurements collected by DOE since 1999, although the LTSP does not specifically require routine elevation monitoring. The NRC inspector discussed with DOE staff the possibilities for obtaining routine elevation measurements, at the same locations specified in the LTSP. As long as disposal cell settlement does not exceed 10-feet, the design criteria of the cell will not be exceeded. Additional measurements may be necessary, however, to ensure that the cell is no longer settling.

The NRC inspector conducted radiological surveys using a Ludlum Model 19 microRoentgen survey meter (NRC No. 015546, calibration due date of 07/22/15, calibrated to radium-226). With a background of 18 microRoentgens per hour (µR/hr), measurements on top of the disposal cell ranged from 16-20 µR/hr. The areas around the perimeter of the cell ranged from 18-32 µR/hr, with the highest measurement being identified on the riprap-armored tailings dam. This elevated measurement was attributed to naturally occurring radioactive material in the rock material. In summary, the survey results indicate that the ambient gamma radiation levels on and around the disposal cell were essentially at background levels.

4 Conclusions

The NRC inspector concluded that the DOE inspectors conducted the site inspection in accordance with the checklist, LTSP, and 10 CFR 40.28 requirements. The disposal cell exhibited some settlement in the center of the cell, but the amount of settlement could not be quantified without elevation measurements in the field. Vegetation was observed on and around the disposal cell, but the vegetation did not appear to negatively impact cell integrity. The NRC inspector collected radiological measurements, and the survey

results indicate that the measurements were essentially at background levels on and around the disposal cell.

5 Meeting Summary

The NRC inspector participated in a pre-planning meeting with the DOE site manager and DOE representatives prior to the site inspection. During this meeting, the NRC and DOE representatives discussed topics such as site status, inspection plan, and potential hazards. The NRC inspector discussed the final site observations with DOE staff at the conclusion of the onsite visit.

6 Persons Contacted

R. Barnes, Director, Legacy Site Closure, Newmont Mining/Dawn Mining
R. Connolly, Superfund Coordinator, Spokane Tribe of Indians
E. Kerschuer, Consultant, Spokane Tribe of Indians
W. Lyle, Director, Newmont Mining/Dawn Mining
L. Miller, Consultant, Newmont Mining/Dawn Mining
S. Pachernegg, Geologic Engineer, Washington Department of Health
T. Petrosky, Site Manager, DOE Office of Legacy Management
L. Sheader, Ecologist, Stoller Newport News Nuclear (SN3)
D. Smith, Regional Geologist, Bureau of Indian Affairs, Northwest Region
B. Stasney, Hydrogeologist, Washington Department of Health
D. Traub, Site Lead/Scientist, Stoller Newport News Nuclear (SN3)
D. Wood, Wildlife, Spokane Tribe of Indians

Figure 1: Sherwood disposal site marker


Figure 2: Sherwood Project Reclamation Cell (looking northeast to southwest)

Figure 3: Disposal cell with Pond 1 in background (looking west to east)

Figure 4: Pond 1 in center of cell (looking north)

Figure 5: Base of tailings dam on southern portion of cell (looking northeast)

Figure 6: Rip-rap armored swale in southeastern corner of site