



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 11, 2019

Mr. Jason Nguyen
U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: LAKEVIEW ROCK DEGRADATION MONITORING PROGRAM

Dear Mr. Nguyen:

By letter dated March 2, 2015, the U.S. Department of Energy (DOE) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) staff to discontinue rock degradation monitoring at the Lakeview, Oregon Uranium Mill Tailings Radiation Control Act (UMTRCA), Title I, Disposal Site (Agencywide Document Access and Management System [ADAMS] Accession No. ML15068A252). DOE's 2015 letter also provided responses to a series of comments from the NRC staff dated November 12, 2014 (ADAMS Accession No. ML14303A623).

As discussed in more detail below, the NRC staff has no additional comments or concerns about DOE's decision to cease rock degradation monitoring and modify its long-term surveillance plan (LTSP) to perform more focused visual inspections on the west side slope. This letter also reviews past efforts related to understanding the rock degradation issue at the Lakeview site; further details the NRC staff's position on DOE's request to discontinue rock degradation monitoring; and provides suggestions for DOE to consider moving forward with regard to this issue.

History of Rock Degradation at Lakeview

During construction of the west side slope of the disposal cell in 1988, it was acknowledged that weathering of rock on the side slope of the disposal cell (also referred to as Type B riprap) would likely occur and accelerate degradation of the cover system. This weathering results from the presence of clay mineralogy within the basalt rock chosen for use in the cover system. Therefore, the LTSP for the Lakeview disposal cell included monitoring the particle size of the riprap (referred to as D_{50} monitoring in the remainder of this letter) to generally quantify the rate of rock degradation over time and to compare the measured D_{50} value to the design specification, which is a D_{50} of 2.7 inches to 3.9 inches. D_{50} monitoring is performed during the annual site inspection and the test results are included in DOE's annual inspection report.

In 2009, DOE initiated a rock durability monitoring procedure as part of the rock degradation monitoring program. DOE and NRC collaboratively developed the rock durability monitoring procedure. The purpose of durability monitoring was to identify the durability class of the rock present on the side slope. The durability classes range from durable, susceptible to near-term degradation, to nondurable (i.e. rocks that have already crumbled). This rock durability monitoring has been implemented at the D_{50} monitoring locations that are randomly selected

prior to each monitoring event. This durability information along with the D_{50} data facilitated the documentation of the condition of the existing rock cover.

The results of the D_{50} monitoring in 2018 showed an average D_{50} of 2.53 inches, which was within the range of D_{50} values (2.26 to 2.88 inches) measured over the last 22 years. However, the average D_{50} of 2.53 inches is lower than the design specification D_{50} of 2.7 to 3.9 inches. In the 2018 annual monitoring report, DOE also performed a statistical analysis of the D_{50} values measured over the last 22 years. While DOE's analysis did not identify a statistically significant trend, the measured D_{50} values typically fall at or below the minimum D_{50} design specification of 2.7 inches. At the NRC staff's suggestion, DOE collected 10 samples of the riprap during the 2010 annual site inspection (ADAMS Accession No. ML110180360). DOE had an off-site laboratory perform a particle size analysis in accordance with ASTM method D5519. The purpose of this effort was to obtain the field D_{50} based on weight and not the number of rocks retained. The results indicated that the mean D_{50} was 2.24 inches. The D_{50} value obtained using ASTM D5519 is based on weight, which is how the D_{50} value is typically specified in an engineering design.

DOE Request to Discontinue Rock D_{50} and Durability Monitoring

In its 2015 letter, DOE summarized its rock degradation monitoring experience and the current condition of the disposal cell at Lakeview. In its correspondence, DOE:

- Recognized the limitations of the rock D_{50} monitoring.
- Discussed the conservatism associated with the design D_{50} range of 2.7 to 3.9 inches.
- Acknowledged that the rock on the west side slope is degrading.
- Stated that the Lakeview disposal cell continues to meet the requirements of 40 CFR Part 192. DOE's statement was based on observations that the erosion protection was intact and functioning properly during the 2014 annual inspection and the lack of water infiltration identified during the 2010 geoprobe field investigation.

For these reasons, DOE proposed replacing rock degradation monitoring with more focused visual inspections along the west side slope of the disposal cell. Specifically, DOE proposes to revise the inspection checklist in the LTSP to include visual documentation of any erosion rills that form along the west side slope. This would include taking photographs of the rills, mapping their location, inspecting the condition of the erosion protection downslope of a rill, and making repairs as warranted. Because this augmented inspection approach more directly focuses on the potential development of vulnerabilities on the side slope (including those associated with rock degradation), DOE proposes to discontinue the annual rock D_{50} and durability monitoring.

The NRC staff reviewed DOE's letter, the past D_{50} and durability monitoring results, DOE's responses to previous NRC staff comments and the LTSP for the Lakeview disposal cell. For the rock durability monitoring, the NRC staff recognizes that this inspection activity was never incorporated into the LTSP. The NRC staff reviewed the rock durability data and concludes that the results have been helpful in documenting the rock durability class present at the site. Given the sampling methodology, the NRC staff recognizes that collection of additional rock durability data would not significantly enhance the understanding of rock durability at the site. Therefore, the NRC staff has no further comments or concerns with DOE's decision to terminate this activity during the annual site inspection.

For the rock D_{50} monitoring, the NRC staff recognizes the limitations of the current approach. The procedure used to measure the D_{50} is based on a count of the number of rocks retained on each sieve. This is different from the approach used in laboratory testing, such as the ASTM D5519 procedure, where the material retained on each sieve is weighed. The NRC staff performed its own statistical analysis of the data presented in the 2018 monitoring report and agrees that the data do not suggest a statistically significant trend in the D_{50} values. While the lack of a trend does not indicate a stable D_{50} value, it does indicate that the D_{50} values have not decreased by a statistically significant amount in the past two decades. However, the NRC staff notes that the current procedure, measuring the D_{50} value at different locations every year is potentially better suited to documenting the D_{50} values across the side slope than the estimating the rate of degradation.

In its November 12, 2014 letter, the NRC staff suggested that DOE consider mapping the D_{50} results to identify potential areas of the cover that may not be protective. In its March 2, 2015 response, DOE stated that its position that “the original gradation and durability monitoring data were not intended to be used in this way, and such use could result in magnifying the data limitations identified in this letter.” Thus, especially given the lack of agreement on how to use the rock D_{50} data, the NRC staff has no further comments or concerns with DOE’s proposal to terminate the D_{50} measurements, concurrent with its proposed visual inspections, and the observations below.

The NRC staff believes that a focused visual inspection will allow for the identification of problems with the west-side slope cover. Additionally, the NRC staff understands that the LTSP states that DOE will provide an assessment of the development of any erosion rills or gullies on the cover system within 60 days of their identification, in addition to the obligations associated with DOE’s annual inspection program and performing any necessary repairs.

Cover Observation in the Future

While the NRC staff does not have any additional comments on DOE’s decision to discontinue rock D_{50} and durability monitoring at Lakeview, the cessation of these activities does not change or mitigate our concerns regarding the presence of poor-quality rock at Lakeview. The NRC staff recognizes that DOE’s design procedures and decision to double the rock thickness on the side slope likely resulted in a sufficiently robust cover in the near-term. However, the D_{50} monitoring has shown that the in-place D_{50} on the side slope is frequently smaller than the value specified in the design specification. Thus, it is possible that the existing conditions are not as robust as was envisioned at the time of construction of the cover system.

In its March 2, 2015, letter, DOE states that the Lakeview disposal cell continues to meet the criteria in 40 CFR 192. DOE basis its statement on the observations made during the annual inspections that the erosion protection is intact and functioning properly. The NRC staff recognizes that the past annual inspections have verified adequate performance of the cover system to date. However, these inspections and observations do not reflect the impacts of ongoing degradation and potential future events. The NRC staff’s concern going forward remains that the current cover has not been demonstrated to be sufficient over the timeframes identified in 40 CFR Part 192. To provide the NRC staff with continuing assurance that the cover will be effective for the required timeframes, DOE should consider one or more of the following approaches:

- Calculate the minimum D_{50} required on the west side slope to meet the required timeframes in 40 CFR Part 192, based on the current conditions on the top slope of the

disposal cell, while considering newer analytical techniques for calculation of the D_{50} and determination of the appropriate probable maximum precipitation (PMP) event. If DOE decides to perform this calculation, the potential for flow concentrations should be taken into consideration as well. This is discussed further in our December 3, 2009 letter and technical evaluation report (ADAMS Accession Nos. ML093220639 and ML093220669).

- Construct a rock apron at the intersection of the side slope and top slope to reduce flow concentrations.
- Place additional riprap on the side slope of the disposal cell.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions, please contact me at (301) 415-0724, or by e-mail, at douglas.mandeville@nrc.gov.

Sincerely,

//RA//

Douglas T. Mandeville, Project Manager
Uranium Recovery and Materials
Decommissioning Branch
Division of Decommissioning, Uranium Recovery
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

Docket No.: WM-64

SUBJECT: LAKEVIEW ROCK DEGRADATION MONITORING PROGRAM
DATE: October 11, 2019

ADAMS Accession No:ML19199A175

*** via email**

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