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

January 30, 2017

Mr. Mark Kautsky, Site Manager
U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: THE U.S. NUCLEAR REGULATORY COMMISSION STAFF REVIEW OF THE U.S. DEPARTMENT OF ENERGY REPORT ENTITLED "ANNUAL PERFORMANCE REPORT APRIL 2015 THROUGH MARCH 2016 FOR THE SHIPROCK, NEW MEXICO, SITE" DATED OCTOBER 2016 (DOCKET WM-00058)

Dear Mr. Kautsky:

I am writing in response to the U.S. Department of Energy (DOE) report entitled "Annual Performance Report April 2015 Through March 2016 for the Shiprock, New Mexico, Site" dated October 2016 (Agencywide Document Access and Management System (ADAMS) Accession Number ML16334A026). U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the report and has the following comments:

1. On October 29, 2014, the NRC staff provided comments on the report entitled "Annual Performance Report April 2012 Through March 2013 for the Shiprock, New Mexico, Site" dated November 2013 (ML14297A140). Based on the current information available to the NRC staff, observation 4 from our comments on the April 2012 through March 2013 report are still relevant:

   > Previous Observation 4. The conceptual model for the terrace groundwater system appears to include vertical movement of contaminated groundwater from the terrace alluvium through the weathered Mancos Shale into fractures and bedding surfaces of the unweathered Mancos Shale before discharging into the floodplain. However, little information has been gathered on the vertical gradient within the terrace system. No downward vertical gradient in the terrace groundwater system has been collected, for example, with data from a piezometer nest composed of two or more piezometers installed side by side at the same location. It would be helpful if approximation of the downward rate of flow or specific discharge of contaminated water was determined. A better understanding of the downward flow from the terrace may provide a better understanding for the concentration measurements in those floodplain wells showing little improvement. A better basis for the terrace groundwater flow and transport conceptual model would provide a better basis for makings decisions.

2. On March 4, 2015, the NRC staff provided comments on the "Annual Performance Report April 2013 Through March 2014 for the Shiprock, New Mexico, Site" dated October 2014 (ML15043A741). Based on the current information available to the NRC

staff, comments 4.a and 4.b from our comments on the April 2013 through March 2014 report are still relevant:

> Previous Comment 4.a. With the drop in the terrace water table elevation, a greater percentage of the contaminated water will be found in the weathered Mancos Shale. Greater emphasis on this unit would be beneficial. West of U.S. Highway 491, only three wells exist sufficiently deep to monitor the upper weathered Mancos Shale. Contaminated water would occur at least as far down as the lower boundary of the weathered Mancos Shale. One of the purposes of the active remediation is to hydraulically cut off the recharge from the east terrace to the west terrace. However, most monitoring wells in the terrace are above the Mancos Shale and, therefore, cannot provide data about where the interface between the weathered and unweathered Mancos Shale is located and whether the hydraulic connection between the east terrace and the west terrace within the weathered Mancos Shale has been cut. Based on current information, it would appear that the hydraulic connection between the east terrace and the west terrace has not been cut. The steeper drop in the west terrace water table elevation (as shown in Fig. 10 from the Performance Report of April 2013 Through March 2014) compared to the east terrace water table elevation would suggest an increase in the specific discharge from east to west and claims that the hydraulic connection between the east terrace and the west terrace has been severed should be further validated.
>
> Previous Comment 4.b. NRC staff had commented in the past (ML14288A599) that the results of the temporal redundancy analysis appear to indicate that semiannual sampling at most of the locations is warranted. To date, DOE has not addressed these comments and, as such, it would appear from the DOE report that semiannual sampling is still an optimal approach.

3. On October 13, 2015, the NRC staff provided comments on the "Annual Performance Report April 2014 Through March 2015 for the Shiprock, New Mexico, Site" dated August 2015 (ML15281A054). Based on the current information available to the NRC staff, comments 3 and 4 from our comments on the April 2014 through March 2015 report are still relevant:

> Previous Comment 3. The NRC staff notes that the current annual performance report no longer includes the "Recommendations" section. Rather, the report states that recommendations for future actions and a technically sound and protective "path forward" are discussed by a technical working group on a regular basis and implemented as soon as feasible. However, it would be useful for the reader if the DOE included the recommendations agreed upon by the working group in the report as the recommendations and actions of the working group are not currently being made publically available.
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> Previous Comment 4. The executive summary stated that contaminant concentrations, in particular sulfate and uranium, appear to be increasing for some of the floodplain wells. It could be possible that a time-delayed correlation exists between the rainfall events effecting the alluvium-Mancos shale terrace

groundwater system and the increased flow of contaminants in the some of the floodplain wells. It may be useful if the DOE evaluated the possibility of this correlation.

4. Section 3.3.1 discusses the new table (Table 5) on the past and current volumes of solid and liquid in an area of the southern terrace as well as percentages of liquid removed since pumping began. The report states that the volumetric reduction approximated in the table (approximately 21.7 million gallons) was relatively close to the 19 million gallons (cumulative) measured entering the evaporation pond from terrace alluvium pumping. However, the amount approximated in the table is apparently only the shaded areas in the southern part of the terrace as seen in Figure 15 while the 19 million gallons it is compared to represents the cumulative volume of water removed from the entire terrace with the exception of the Bob Lee and Many Devils washes. Unless NRC staff has misunderstood the information being presented, a comparison of the volumetric amount withdrawn from the southern terrace vicinity to the volumetric amount withdrawn from the entire east terrace with the exception of the Bob Lee and Many Devils washes is an inappropriate comparison and should be modified so that the same areas are being compared.

5. Some of the changes in terrace alluvial groundwater thicknesses as represented by the contour maps in Figure 15 do not seem to match the nonparametric, locally-weighted statistical regression line as presented in Appendix B. For example, Figure B-4 shows a water elevation drop for well 814 of about 0.6 feet while Figure 15 shows a difference of about 1 foot. Well 827 in Figure B-6 shows a water elevation decline of around 0.3 feet while Figure 15 shows a difference of about 1.7 feet. If data points were used that were outside the shaded area given by the local regression method, the rationale for their use should be given.

6. Figure B-1 shows wells that have gone dry (e.g., wells 1120 and 1122). Well 1048 in Figure B-5 also went dry but before it went dry the general trend was an increasing water elevation. Suggest that the DOE evaluate whether this is an error in reporting as this seems to be an unlikely occurrence.

In addition, we have the following observations about the report that do not require any consideration or response by the DOE. They are included to document the changes in the current report.

1. Many of the traditional grouped line plots provided in previous annual reports and their appendixes have been replaced with plotted data for each separate well.

2. For each major floodplain contaminant, a new version of baseline vs. current plume map is provided with contaminant concentrations plotted and color-coded based on the range of the data.

3. A new figure has been included comparing baseline (2000–2003) uranium, sulfate, and nitrate concentrations from floodplain monitoring wells to concentrations measured during the current (2015–2016) reporting period.

4. Background threshold values are no longer discussed in the San Juan River monitoring section.

5. The figure with current and previous surface water monitoring locations is new.

6. The area showing the terrace water elevation contours from March 2003 is different from the area representing March 2016 contours.

7. The terrace alluvial groundwater thickness contour maps are new.

8. Past and current volumes of solid and liquid in the southern terrace are given in a new table, as well as the percent reduction (i.e., liquid removed).

9. Plate 1 with the Shiprock geologic cross sections and estimated groundwater surface were included and found useful by the reviewing NRC staff.

In accordance with Title 10 of the *Code of Federal Regulations* Part 2.390 of the NRC's "Agency Rules of Practice" 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 ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions concerning the NRC comments please feel free to contact me at 301-415-6749 or at Dominick.Orlando@nrc.gov.

Sincerely,

/RA/

Dominick Orlando, Senior Project Manager
Materials Decommissioning Branch
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

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