

March 25, 2014

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

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION STAFF REVIEW OF U.S. DEPARTMENT OF ENERGY REPORT ENTITLED "GROUNDWATER EVALUATION AND RECOMMENDED MONITORING FOR THE SHIRLEY BASIN SOUTH, WYOMING, UMTRCA TITLE II DISPOSAL SITE," (Docket Number 040-06659)

Dear Mr. Surovchak:

I am writing in response to your letter, dated September 11, 2013, to the U.S. Nuclear Regulatory Commission (NRC) in which you provided a U.S. Department of Energy (DOE) report on ground water monitoring at the Shirley Basin South Title II Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA) site in Wyoming (Agencywide Documents Access and Management System (ADAMS) Accession Number ML13263A244).

After discussions between NRC and DOE staff in 2012 regarding ground water concentrations of Radium-226 (Ra-226) and Radium-228 (Ra-228) that exceeded the approved Alternate Concentration Limits (ACLs) for the site, DOE proposed to evaluate the ground water at the site and provided the evaluation plan to NRC (ML12193A334). The purpose of the evaluation was to develop an assessment of the attenuation of the constituents of concern (COCs) at the site, evaluate the conceptual model for the site, assess the potential risk from the COCs, and reevaluate the ACLs based on this assessment and recommend a revision to the monitoring program, if appropriate. NRC accepted the evaluation plan in August 2012 (ML12226A304).

DOE's September 11, 2013, ground water evaluation report (report) summarizes the results of the evaluation and proposes several changes to the ground water monitoring program at the site. In the report, DOE stated that the prior site conceptual model, specifically the assumptions for the aquifer modeling, remain valid and the site aquifers are behaving better than the modeling predicted. DOE also stated that there is no evidence that a plume is leaving the site. DOE further stated that site-related contamination from tailings seepage would not present an unacceptable risk at the site boundary. Based upon its evaluation, DOE proposes to modify the site Long-Term Surveillance Plan (LTSP) as follows:

- Continue monitoring all site wells annually;
- Continue monitoring uranium and thorium-230 according to the approved ACLs;
- Continue monitoring radium-226 and radium-228, but without application of ACLs or other standards;
- Continue monitoring cell performance and plume migration indicator constituents and parameters (chloride, nitrate, sulfate, pH, and total dissolved solids);

- Discontinue monitoring several COCs (cadmium, chromium, lead, nickel, and selenium); and,
- Evaluate monitoring program after 5 years and revise as warranted.

NRC staff has reviewed DOE's report, and other information about the Shirley Basin South site as discussed below, as well as, DOE's proposed changes to the LTSP. Based on our review of this available information, the NRC staff has concluded that the current ground water monitoring data do not conclusively demonstrate whether or not the tailings impoundment is leaking. Therefore, consistent with the following observations, the NRC staff has concluded that DOE's proposed revisions to the ground water monitoring program are not acceptable:

1. Concentrations of Ra-228 began to increase in 2005 in well 54-SC from approximately 40 picocuries per liter (pCi/l) to approximately 120 pCi/l in 2008, and started to decrease thereafter. During the same time period, concentrations of Chloride (Cl) also increased, but these increases were still within the range historically observed at the site (less than approximately 400 milligrams per liter (mg/l)). This may indicate some degree of leakage from the tailings because the Cl is an indicator constituent and both the Cl and the Ra-228 increased at the same time.
2. Conversely, the pH in wells 54-SC and 5-DC were all below 4. Release of Ra-228 from the surfaces of the aquifer formation may occur at these low pH levels and may be the reason for the increase of Ra-228.
3. The highest Ra-226 concentration of approximately 170 pCi/l was observed at Point of Exposure (POE) well 110-DC, which is above 91.3 pCi/l, the established site ACL for Ra-226. This Ra-226 concentration is also significantly above the site background level of less than 0.5 pCi/l (2012 sampling report).
4. Former site wells had concentrations of Ra-226 and Ra-228 of up to 200-800 pCi/l outside of the restricted area boundary at the site. Regionally, natural radium concentrations as high as 1,700 pCi/l have been observed in the Wind River aquifer. Thus, the background used at the site and for the ACLs may not be representative of the actual background. Therefore, conclusions about the Ra-226 and Ra-228 at the site are difficult to accurately rationalize.

Therefore, in light of the foregoing, the NRC staff has concluded that the DOE should continue to monitor the ground water in accordance with the current ground water monitoring program.

DOE has also proposed modifications to its process for evaluating ACL exceedances at the site, including discontinuing the application of ACLs or other ground water protection limits for certain constituents. NRC staff disagrees with DOE's proposal to permanently discontinue the application of ACLs or other ground water protection limits that are currently required under DOE's LTSP. Notwithstanding the foregoing, the NRC has concluded that, for the present time, and until notified otherwise, DOE's ACL evaluation program should be suspended such that DOE does not need to conduct additional evaluations concerning ACL exceedances at the site. Instead, DOE should continue with the monitoring program as currently provided for in the LTSP. NRC staff bases this conclusion on the uncertainty regarding the source of the radium in the ground water at the site (i.e., whether the radium is naturally-occurring or originating from the tailings impoundment), that the ground water is not a current or potential near-term source

of drinking water, and that the source of livestock water at the site is from an aquifer that is not impacted by former milling operations. Because the ground water is not a current or potential future source of drinking water, we do not believe that there is an imminent threat to the public health and safety or the environment.

NRC staff has discussed DOE's proposal to revise the ground water monitoring at the site with staff of the Wyoming Department of Environmental Quality (WDEQ). WDEQ staff stated that they agree with the NRC staff's conclusions regarding the ground water monitoring at the Shirley Basin South site and believe that the current ground water monitoring program should continue.

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 the 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 staff comments, please contact me at 301-415-6749 or by email at Dominick.Orlando@nrc.gov.

Sincerely,

/RA/

Dominick A. Orlando, Senior Project Manager
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Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 040-06659

cc: Shirley Basin South Distribution List

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