



Missouri Department of dnr.mo.gov
NATURAL RESOURCES
Michael L. Parson, Governor Carol S. Comer, Director

May 27, 2021

Rebecca Roberts
U.S. Department of Energy
Office of Legacy Management
7295 Highway 94 South
St. Charles, MO 63304

RE: Comments on the *Weldon Spring Site Draft Sixth Five-Year Review dated March 2021*

Dear Rebecca Roberts:

The Missouri Department of Natural Resources has completed its review of the above referenced document. Our comments, as well as those from the Missouri Geological Survey and the Missouri Department of Health and Senior Services, are included as an attachment to this letter.

Thank you for giving us the opportunity to review and comment on this document. If you have any questions or need further clarification, please call me at 573-751-3087. Address any written correspondence to my attention at Missouri Department of Natural Resources, Environmental Remediation Program, P.O. Box 176, Jefferson City, MO 65102.

Sincerely,

ENVIRONMENTAL REMEDIATION PROGRAM

Taylor Grabner

Taylor Grabner
Federal Facilities Section
Remediation and Radiological Assessment Unit

TG:rl

Attachment

c: Daniel O'Connor, U.S. EPA Region VII (email only)
Branden Doster, Missouri Department of Natural Resources (email only)
Tiffany Drake, Missouri Department of Natural Resources (email only)
Sherri Stoner, Missouri Department of Natural Resources (email only)
Brenna McDonald, Missouri Department of Natural Resources (email only)
Terry Hawkins, Missouri Department of Natural Resources (email only)
Dennis Wambuguh, Missouri Department of Health and Senior Services (email only)
Andrew McKinney, Missouri Department of Health and Senior Services (email only)



General Comments

- 1.) As previously stated by the Department the nature and extent of contamination in the unweathered portion of the Burlington-Keokuk Limestone bedrock has not been fully characterized. These concerns have been raised since the report for the study on the unweathered Burlington-Keokuk Limestone bedrock was released a number of years ago. EPA's Office of Research and Development (ORD) provided an independent technical review of the Monitored Natural Attenuation (MNA) remedy and also recommended additional sampling locations are needed to more fully account for vertical and lateral contaminant distribution to improve the delineation of plume boundaries and extent of contamination. The Department looks forward to discussing this independent technical review recommendations with DOE and EPA, and working towards a resolution. Please note in the document that further delineation of plume boundaries and extent of contamination is needed.
- 2.) Throughout the report **MW-3040** is referenced as an objective 2 well. **MW-4040** is referenced in Table 10 as an objective 3 well, however, it is referenced on page 34 as an objective 2 well. According to the *Record of Decision for the Final Remedial Action for the Groundwater Operable Unit at the Chemical Plant Area of the Weldon Spring Site*, these wells were established as objective 4 wells. Please clarify which objective these wells are evaluated as and why.
- 3.) There is continued concern that the unweathered zone for uranium may not be sufficiently defined northwest of MW-4043. While monitoring well MWS-2 monitors the unweathered zone, it may not be down gradient of the contamination identified in MW-4043. There is likely a northwest-oriented preferential pathway present at the site between monitoring wells MW-4040 and MW-4043. Whether or not these wells intercept the most permeable zones of this preferential pathway is not known. An unweathered Burlington-Keokuk monitoring well should be placed to the northwest of MW-4043 to determine the northwesterly extent of contamination in the unweathered zone. A geophysical survey, using electrical resistivity tomography (ERT) and multichannel analysis of surface waves (MASW) may prove useful in defining this monitoring location. These methods have been successful in delineating groundwater pathways in Missouri.
- 4.) In general, the unweathered bedrock has not been sufficiently characterized in order to adequately support MNA. Additional monitoring locations are needed to support the MNA and may further refine the site conceptual model.
- 5.) As commented previously, the Department has noted that the monitoring well network in the area of the Chemical Plant does not adequately address the objectives of the GWOU Monitored Natural Attenuation (MNA) Program for the unweathered zone. We recommend that the following wells in the next three bullets be added to meet the objectives of the GWOU MNA Program.

- There are only two Objective 4 monitoring wells (MW-4042 and MWD-2) in the existing monitoring network that monitor the deep unweathered Burlington-Keokuk Limestone. Monitoring well MW-4042 is located near MW-4040 and is used as supporting evidence that deeper unweathered Burlington-Keokuk Limestone is not impacted by uranium at this area. MWD-1 is located about 1500 feet north-north west of MW-4040. A deep unweathered Burlington-Keokuk monitoring well is needed near MW-3040 and MW-3024 to monitor the vertical extent of uranium concentration. This information will aid in determining extent of contamination and may serve as an Objective 4 well.
 - There are no Objective 3 wells near MW-3040 and MW-3024. An unweathered Burlington-Keokuk monitoring well would be beneficial for monitoring and/or defining extent of contamination to the north of MW-3040 and MW-3024. This well may either serve as an Objective 3 well or Objective 2 well, depending upon uranium concentrations.
 - There are no unweathered monitoring wells between well MW-4040 and monitoring wells MW-3040 and MW-3024. An additional unweathered monitoring well is needed to define extent of contamination. This well may either serve as an Objective 3 (near) well or an Objective 2 well depending upon uranium concentrations. This Sixth five-year review identifies the area near MW-4040 and MW-4043 and the area near MW-3040 and MW-3024 as the only locations impacted by uranium in the unweathered zone. The extent of uranium contamination in the unweathered zone is not known.
- 6.) Although EPA has provided an updated review of the uranium content in the Femme Osage Slough, the sediment data used was from the original Baseline Risk Assessment, which was collected in 1997. Uranium values in the surface water of the slough have not decreased as anticipated in the decision documents. A new round of sediment sampling would verify that uranium content in the sediment remains at levels that do not pose unacceptable risk to human health.

Specific Comments

- 7.) **Section 2.3.2.2 GWOU Remedy Implementation** (page 34), states “Until the stable trend begins to decrease, it is not possible to project a cleanup time for this area.” The remedy is not projected to meet the RAO of restoring groundwater to its beneficial use within a reasonable timeframe and as such would result in the answer to Question A being “No.” As mentioned numerous times by EPA this would result in the remedy being classified as “short-term protective”.

8.) **Section 2.3.2.2 GWOU Remedy Implementation** (page 34) states “Performance of the MNA remedy will be gauged against long-term trends in Objective 2 wells.” The GWOU ROD specifies the objectives for the MNA monitoring network are as follows “Objective 2 is to verify that contaminant concentrations are declining with time at a rate and in a manner that cleanup standards will be met in approximately 100 years as established by the predictive modeling. Objective 3 is to ensure that lateral migration remains confined to the current area of impact. Contaminant impacts in these locations are expected to remain minimal or nonexistent. Objective 4 is to monitor locations underlying the impacted groundwater system to confirm that there is no significant vertical migration of contaminants. No significant impacts at these locations should be observed.” Therefore performance of the MNA remedy should also be gauged with Objective 3 and 4 wells as defined in the GWOU ROD to ensure the plume is fully characterized in both the lateral and vertical directions.

9.) **Section 4.2.1 Groundwater Operable Unit**, states “Some contamination exists in the deeper unweathered portion of the bedrock, primarily beneath the Raffinate Pits.”

The GSP does not necessarily agree with the statement, as the extent of uranium contamination on the Raffinate Pit Area has not been defined.

10.) **Section 4.2.1.4 Contaminants of Interest**. The Department disagrees that contamination is generally limited to the shallow, weathered portion of the Burlington-Keokuk Limestone as the most significant uranium concentrations are in unweathered monitoring wells. Additional sampling locations are needed to more fully account for vertical and lateral contaminant distribution to improve the delineation of plume boundaries and extent of contamination.

11.) **Section 4.2.1.5 Chemical Plant (GWOU) Monitoring Program** (page 63), states “Appropriate responses to concentrations in excess of the fixed triggers ...or revise the trigger as warranted.”

The trigger levels exist to assess the performance of the monitoring location. If trigger levels were indeed established prematurely, then the DOE must present the argument to the regulators as to why the trigger levels should change, propose new trigger levels, and identify the method of changing the CERCLA documents (ROD amendment, ESD). The argument to change the trigger levels must include evidence that the geologic units of the subsurface have been sufficiently characterized. The new trigger levels must have a justification as to their basis and why these new values will be valid. There must be a change in the CERCLA documentation, after the regulators agree that a change is needed or is valid, to make the new proposed trigger values final.

This issue of insufficient characterization of the unweathered unit raises concerns for Question C for the GWOU and further action is needed to determine whether the extent of

contaminants of concern is actually known. The Department recommends adding a follow-up action to this Five-Year Review to characterize the full extent of impacts to the unweathered unit.

- 12.) **Section 4.2.1.6 Performance Monitoring four the GWOU** (page 80) states “the uranium extent is shrinking.” **MW-4043** is screened 47-52 feet below ground surface while **MW-3024** and **MW-3040** are screened much deeper at 77-97 and 95-105 feet below ground surface respectively. As such the current monitoring well network is inadequate to determine plume behavior. Additional monitoring wells are needed to determine the horizontal and vertical extent of migration, determine plume stability and to determine the progression of the MNA remedy.
- 13.) **Section 4.2.2 Chemical Plant Surface Water**, references Figure 16 for information on surface water locations. Please verify this is correct.
- 14.) **Section 4.2.2 Chemical Plant Surface Water**, states “The uranium levels at Busch Lake 34 continue to be higher than the other locations...” Please include a discussion on why the uranium levels are higher in Busch Lake 34 than other locations.
- 15.) **Section 4.2.4.5 Monitoring Results for Groundwater in the Area of Impact at the Quarry**, states “The average uranium levels in MW-1004 and MW-1005 exceeded that target level of 300 pCi/L, though many recent uranium results from MW-1005 were near target level and are trending down.” Figure 76 does not demonstrate a recent historical downward trend for MW-1005 over the past eight years. Please review and revise.
- 16.) **Section 4.2.4.5 Monitoring Results for Groundwater in the Area of Impact at the Quarry**, states results from MW-1027 “have been steadily decreasing.” However, Figure 76 does not demonstrate a recent historical downward trend over the last eight years for MW-1027. Please review and revise.
- 17.) **Section 4.2.4.5 Monitoring Results for Groundwater in the Area of Impact at the Quarry**, states “ The results of trend analysis for the Line 1 wells (Figure 76 and Figure 77) indicate that uranium concentrations have been decreasing in most of the wells in recent years, as indicated by negative slopes.” Please specify whether the reference to negative slopes is to the calculated slope or visual determination. If referring to the calculated slopes, clarify that the negative slopes calculated in Figures 76 and 77 only apply to data since 2016 and not since the completion of the wells.
- 18.) **Section 4.3 Site Inspection**, please discuss findings from the 5YR site inspection such as the need to continue to monitor erosion in the buffer zone surrounding the disposal in the Chemical Plant Area and the damage to historical markers. Also discuss if any other issues were identified.

19.) **Section 5.1.1.5 Implementation of ICs and Other Measures** (page 165), states “DOE is currently working with MDC to finalize an addendum to the easement that will remove the allowance of nonpotable groundwater uses on MCD property and update the special area references to the new citation.” The current ICs in place with MDC are not in compliance with the GWOU ROD. While DOE is working with MDC to finalize an addendum to the easement to ensure the long-term protectiveness of the site, until the addendum is in place, the site is not long-term protective.

20.) **Section 5.1.2.1 Changes in Standards and To Be Considered (TBCs)**, Tables 9-3 and 9-4 of the 1993 ROD are Soil Cleanup Criteria for radiological and chemical contaminants and are ARARs and TBCs. These tables should be included in the 5YR. Tables 9-3 and 9-4 of the 1993 ROD identified the future receptor as a resident. EPA’s Regional Screening Levels determine what the current risk of a contaminant is on a residential receptor. The current residential soil RSLs should be compared to the 1993 chemical cleanup criteria. EPA’s Preliminary Remediation Goals for Radionuclides (PRGs) should be compared to the 1993 radiological cleanup criteria.

The Department also agrees with second paragraph of EPA comment #60 regarding the changes to standards on TBCs that could affect the remedy’s protectiveness.

21.) **Section 5.1.2.2 Exposure Pathways, Toxicity and Risk Assessment**, states “following completion of the site cleanup activities, an assessment if the residual risks based on actual site conditions will be performed to determine the need for any future land use restrictions.” As mentioned above, using current exposure parameters, toxicity values, and risk assessment determination, the cleanup criteria approved in the 1993 ROD pose unacceptable risks to a residential receptor. Therefore, ICs are required to restrict residential land use. Compare the post-remediation residual COC concentrations with the 1993 and current cleanup criteria. Please review and revise.

22.) **Section 5.1.2.2 Exposure Pathways, Toxicity and Risk Assessment**, The CPOU cleanup criteria were developed in consideration of a resident, ranger, and recreational visitor, not just a recreator. The 1993 ROD indicates that the Ra-226 cleanup criteria would pose an excess cancer risk of 2E-02, the Ra-228 cleanup criteria would pose an excess cancer risk of 1E-03, and the U-238 cleanup criteria would pose an excess cancer risk of 5E-04 to a residential receptor. Please review and revise to clarify that risk is not acceptable for residential use.

23.) **Section 5.1.2.2 Exposure Pathways, Toxicity and Risk Assessment**, Table 42 does not include values for chronic daily intake or excess lifetime cancer risk. The Department recommends including these values in additional columns on the table to better demonstrate risk. Updating Table 42 would allow DOE to include numerical values in the discussion of

radiological risk (page 172, first paragraph) to support statements relating to risk, rather than using words such as “would probably result”.

- 24.) **Section 5.1.2.2 Exposure Pathways, Toxicity and Risk Assessment**, discusses the use of EPA’s Integrated Exposure Uptake Biokinetic (IEUBK) model. This model was updated in May 2021 and input parameters to the IEUBK model for lead have changed. Use the current model and input parameters to re-evaluate the human health impacts from residual lead concentrations.
- 25.) **Section 5.2.1 Question A: Is the remedy functioning as intended by the decision documents?** The Department disagrees that the remedy is functioning as intended by the decision documents. The current monitoring well network is insufficient to meet MNA remedy objectives and as stated above the remedy is not projected to meet the RAO of restoring groundwater to its beneficial use within a reasonable timeframe. This would result in the answer to Question A being “No.”
- 26.) **Section 5.2.1.1 Remedial Action Performance**, states “...continue to reduce uranium levels in the weathered unit.” As stated previously, the monitoring well network is inadequate to define the vertical and horizontal extent of uranium contamination in Chemical Plant Area. Please refer back to Comment #1, review and revise this section.
- 27.) **Section 5.2.2.2 Exposure Pathways, Toxicity, and Risk Assessment**, states “the vapor intrusion pathway is currently incomplete and the remedy is protective.” While the Department agrees that a vapor intrusion exposure pathway does not currently exist, a future assessment may be appropriate as the result of changes in site conditions (e.g., future construction; development of foundation cracks; inadequate O&M). Please review and revise this section to reflect that changes in future site plans or conditions may require further evaluation.
- 28.) **Table 46: Review of Toxicity Values Used in Risk Assessments for the GWOU and QROU**, only includes oral information for nitrobenzene and trichloroethylene and lacks information regarding the inhalation unit risks (IUR) and reference concentrations (RfC). Please review Table 46 and revise accordingly.
- 29.) **Section 5.2.2.3 Progress Toward RAOs**, states “It has been concluded that the remediation objectives are still valid and that under the current exposure scenario the remedy remains protective..... Final remedy protectiveness cannot be assessed until groundwater remediation is completed.” The remedy is not long-term protective as the MNA monitoring well network is inadequate and as stated on page 34 “it is not possible to project a cleanup time for this area [GWOU].” The purpose of a FYR is to evaluate the implementation and performance of a remedy in order to determine if the remedy is or will be protective of human health and the environment. This is determined through the

evaluation of Questions A, B, and C. Please review and revise, specifically regarding the long term protectiveness statement for this operable unit.

- 30.) **Section 5.2.2.3 Progress Toward RAOs**, states “there is no ongoing contamination of the groundwater.” Prior 5YRs discuss residual contamination that has accumulated in subsurface cracks and fissures acting as residual sources to groundwater and surface water. The EPA July 2020 ORD Memo came to a similar conclusion. Please review and revise.