

Department of Energy Responses to Missouri Department of Natural Resource (MDNR) Comments on the Five-Year Review

MDNR Comment 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.

.....

DOE Response 1: LM will initiate a working group in collaboration with the DOE National Lab Network to evaluate the need and location(s) for additional monitoring wells to further delineate the uranium plume in the unweathered unit. The recommendations identified in the July 2020 EPA Office of Research and Development Memorandum will be evaluated during this working group. This will be addressed in Section 6.0 Issues/Recommendations.

MDNR Comment 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.

.....

DOE Response: The change of objectives is discussed in the revised section "Uranium Concentrations in the Unweathered Bedrock" several pages after Table 10.

MDNR Comment 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.

.....

DOE Response 3: MDNR concern is noted and the issue will be addressed in Section 6.0 Issues/Recommendations of the Five-Year Review.

Comment 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.

.....

DOE Response 4: This issue will be addressed in Section 6.0 Issues/Recommendations of the Five-Year Review.

MDNR Comment 5a: 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 (2?) 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.

.....

DOE Response 5a: Assume this comment is referencing the impacted area which would also include MW-3006 (unweathered) and MW-30003 (screened across the transition from weathered unit to unweathered unit) north of the raffinate pits. There are 5 other unweathered unit downgradient wells that monitor for downward migration in the unweathered unit (MW-4007, MW-2021, MW-2022, MW-2023, and MW-2056). This includes not only lateral migration in the unweathered unit (objective 3) but vertical migration from the overlying weathered unit (objective 4).

MDNR Comment 5b: 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.

.....

DOE Response 5b: Unweathered unit wells MW-4011, MW-2021, MW-2022, and MW-2023 form a west to east line approximately 2,000 ft downgradient to the north of MW-3040 and MW-3024. These wells were added to the unweathered unit monitoring network in 2014 (Table 17)

as Objective 3 wells to monitor for uranium migration. These wells (except Army property well MW-4011) are located within the site boundary. MW-2021, MW-2022, and MW-2023 also monitor for downward migration (Objective 4) of nitrate (MW-2021) and nitroaromatics (MW-2022 and MW-2023) in that area.

MDNR Comment 5c: 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.

.....

DOE Response 5c: It is accepted that there is likely contamination directly beneath the former raffinate pits. A well to confirm would only provide a pathway for downward migration and not add meaningful information.

MDNR Comment 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.

.....

DOE Response 6: The slough was evaluated during the Comprehensive Environmental Response, Compensation, and Liability Act process within the Quarry Residuals Operable Unit. Also, EPA issued a letter, with a report dated March 2019, regarding potential additional work at the slough and stated, “In summary, this re-evaluation, conducted according to current risk methodology, found no unacceptable risks of cancer or non-cancer health effects to adult or adolescent recreational visitors at the slough. In addition, the EPA found no evidence of a change in site conditions based on surface water exchange between the Missouri River and Slough. For these reasons, the EPA is not requiring additional work to be performed by the DOE at the Slough. The EPA considers this issue resolved.”

Specific Comments

MDNR Comment 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”.

.....

DOE Response 7: Will revise answer to 5.2.1 Question A to: “No, the remedy is not functioning as intended by the decision document. The remedy is short-term protective, however there are early indicators of potential issues.”

MDNR Comment 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.

.....
DOE Response 8:

Will revise to add:

“...and the continuation of low contaminant levels at Objective 3 and 4 locations. This progress is reviewed on a regular basis and documented every 5 years in conjunction with the CERCLA FYR. This review includes trending analysis for the past 5 years of data at performance monitoring locations.”

Comment 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.

.....
DOE Response 9: Low uranium concentrations at downgradient unweathered unit wells (MW-2021, MW-2022, and MW-2023) in the northern part of the site indicate that uranium has not migrated to this extent. Low uranium concentrations at well MW-4042, adjacent to highest uranium concentration well MW-4040 but screened deeper, indicate that uranium has not impacted the deeper part of the unweathered unit in this area.

MDNR Comment 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.

.....

DOE Response 10: Contamination in the weathered portion has been of greater concern due to higher permeability and potential for migration. Contamination in weathered unit has decreased since it is more permeable and more easily flushed. The remnant uranium contamination in the unweathered unit in the impacted area is believed to be less significant from a total mass perspective, with more uranium mass in the weathered unit.

Will revise to: “Contamination in groundwater is primarily limited to the weathered portion of the Burlington-Keokuk Limestone. However, persistent elevated uranium concentrations in the upper portion of the unweathered bedrock in the former Raffinate Pits area has increased concern about the effectiveness of the MNA remedy in that area. This section has limited groundwater flow and less flushing relative to the more permeable overlying weathered section”.

MDNR Comment 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.

.....

DOE Response 11: The fixed trigger level for uranium in impacted areas (100 pCi/L) was set based on data from two wells and prior to the initial sample results from two newly installed wells. Fixed trigger levels are indicators of when concentrations are increasing slowly and are of little use when set at a level that is exceeded from the outset. The fixed trigger level for uranium in the impacted area could be revised to a level that provides some utility for MNA monitoring. The level could be calculated using data collected since 2004 and from any additional wells installed in the unweathered unit where there are at least three years of data.

Follow-up actions will be addressed in Section 6.0 Issues/Recommendations.

MDNR Comment 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.

.....

DOE Response 12: That uranium is decreasing at MW-4043 does support that the extent is shrinking in that downgradient area in the unweathered unit. This does not infer that it is shrinking in other unweathered unit areas. Uranium in the unweathered unit is low north of the raffinate pits (MW-3003 and MW-3006), stable (neither increasing or decreasing) in the impacted area: at MW-4040 (west of the raffinate pits) and at MW-3040/3024 (east of the raffinate pits).

For MW-4043 and MW-3024, it is more appropriate to consider elevations, rather than depths, since MW-3024 is at a higher topographic elevation. The 20 ft screened elevation range of MW-3024 (569 – 549 ft amsl) spans the 5 ft screened interval of MW-4043 (566 – 561 ft amsl). The screened intervals overlap even when correcting for MW-4043 being about 8 ft downdip along the top of the unweathered unit.

MDNR Comment 13: Section 4.2.2 Chemical Plant Surface Water, references Figure 16 for information on surface water locations. Please verify this is correct.

.....

DOE Response 13: Will revise to reference Figure 13

MDNR Comment 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.

.....

DOE Response 14: Will revise to: “Busch Lake 34, the relatively highest uranium concentration pond, is immediately downgradient of Burgermeister Spring where much of the groundwater from the Chemical Plant flows. Busch Lake 36 and Busch Lake 35 are nearer the site but have lower uranium levels. Dye tracer injected in wells in the northern part of the site were detected at Burgermeister Spring, possibly under-flowing the Busch Lake 36 and Busch Lake 35 drainage.”

MDNR Comment 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.

.....

DOE Response 15: Will revise to: “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. Analysis of the last 5 years of data indicates that

only MW-1002 has a statistically downward trend based on Mann-Kendall analysis, though MW-1002 is already at low levels. The previous long-term downward trends in uranium at MW-1004 and MW-1005 have significantly slowed over the last 5 to 10 years.”

MDNR Comment 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.

.....

DOE Response 16: Will revise to add the following language: “The results for well MW-1027, at the center of the western exit of the Quarry (Figure 75), vary about an order of magnitude but have been steadily decreasing and are still plotted with the higher Line 1 uranium concentration wells (Figure 76). This conclusion is from observation of the overall dataset, since the Mann-Kendall analysis does not indicate a “statistically significant” downward trend for the last 5 years of data which is highly variable.”

MDNR Comment 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.

.....

DOE Response 17: Will revise to: “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. Analysis of the last 5 years of data indicates that only MW-1002 has a statistically downward trend based on Mann-Kendall analysis, though MW-1002 is already at low levels. The previous long-term downward trends in uranium at MW-1004 and MW-1005 have significantly slowed over the last 5 to 10 years.”

MDNR Comment 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.

.....

DOE Response 18: Will revise to add:

“No recommendations or findings were noted during the inspection.

Observations included:

- Half of a number was missing from the label on MW-4037. This item has been corrected.

- Historical Marker No. 8 was broken and on the ground. This item has been corrected.
- The “No Trespassing” signs on the LCRS were faded. This item has been corrected.
- The vault at the Quarry located on MDC property was open. This item has been corrected”

MDNR Comment 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.

.....

DOE Response 19: The addendum has been finalized and signed by both parties. It was recorded on June 30, 2021. The report will be revised to state “An addendum to the easement that removed the allowance of nonpotable groundwater uses on MDC property and updated the special area references to the new citation was signed by both the DOE and MDC and recorded with St. Charles County on June 30, 2021.”

MDNR Comment 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.

.....

DOE Response 20: Tables 9-3 and 9-4 of the ROD will be included as Tables 42 and 43 in the FYR report. These tables will be adapted to include current EPA criteria—PRGs and Regional Screening Levels (RSLs)—for CPOU radionuclides and chemical COCs, respectively. For comparative purposes, post-cleanup residual soil concentration data will also be provided. The statistical bases for the soil background levels listed in the ROD will also be provided (e.g., for metals, background concentrations were the mean plus two standard deviations measured at a nearby offsite area).

Acknowledging MDNR’s concerns regarding the protectiveness of the remedy, the answer directly following Question B (page 166 of the March 2021 draft report) will be revised as follows:

“No. Changes in risk assessment methodology, exposure parameters, and toxicity values since the ROD was signed have resulted in some cleanup levels no longer being protective, assuming a residential land use scenario. However, implementation of the CPOU remedy resulted in achieving residual contaminant concentrations far below

cleanup levels. Remaining concentrations are either reflective of background or do not pose unacceptable risk under reasonably anticipated future land use. In addition, ICs are in place to prevent residential land use.”

MDNR Comment 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.

.....

DOE Response 21: As indicated in LM’s response to Comment 20 (above), residual soil COC concentrations will be included in the FYR report as requested (to be listed in new Tables 42 and 43). These values will be based on the average residual soil concentrations listed in Table A-4 of the December 2008 *Long-Term Surveillance and Maintenance Plan*.

LM acknowledges that, for some COCs, the allowable cleanup concentrations approved in the 1993 ROD pose unacceptable risks to a residential receptor using current methodology. In some cases, this finding also applies to background levels. This is acknowledged in the ESD and on page 168 of the March 2021 draft FYR report. ICs prohibiting residential land use are in place as documented in the 2004 Notation on Ownership Record (*Notation on Ownership Record for Notification to Potential Owners of Contamination in Groundwater and Applied Restrictions, Chemical Plant and Quarry Areas*). This observation is also addressed in the revised response to Question B noted above.

MDNR Comment 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.

.....

DOE Response 22: MDNR is correct in stating that the CPOU cleanup criteria were developed for resident, ranger, and recreational visitor receptors. This is reflected in Tables 9-3 and 9-4 of the 1993 ROD, which will be adapted for inclusion in the 2021 FYR as indicated in LM’s response to Comment 20 (as new Tables 42 and 43, respectively). Risks estimated for each hypothetical scenario are also listed in these tables—for the specified cleanup criteria, ALARA goals, and background. The March 2021 draft report acknowledges that risks to hypothetical residential receptors generally exceed EPA’s acceptable risk range (maximum of 1E-04). For Ra-226 and Ra-228, this finding also applies to background levels. LM concurs that estimated risks are not acceptable for residential use; this point will be clarified in the revised FYR report.

However, because residential use is not a viable nor likely scenario (refer to LM's responses above), the remedy is still considered protective.

MDNR Comment 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”.

.....

DOE Response 23: As indicated above, Table 9-3 of the ROD will be adapted for inclusion in the revised FYR report (as new Table 42). This table will include previous risk estimates, residual (post-cleanup) soil concentrations, and (for comparison purposes) current EPA PRG values. As chronic daily intake (CDI) values vary based on specific CPOU location and corresponding soil exposure concentrations, adding location (confirmation unit-specific) CDIs would entail a level of effort that would not necessarily be commensurate with the value added (instead, the reader should refer to the original risk assessment).

MDNR Comment 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.

.....

DOE Response 24: As noted in EPA's most recent (May 2021) RSL tables (<https://semspub.epa.gov/work/HQ/400750.pdf>), the current EPA RSL for lead (400 mg/kg) was developed using the IEUBK model. EPA issues a caution regarding the 400 mg/kg screening level when both soil and water are assessed (<https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide#special>). However, this consideration is not germane to the CPOU because (1) the average residual soil lead concentration (18.2 mg/kg) is below background (34 mg/kg) and about 20 times less than the RSL; and (2) lead results for CPOU groundwater in 2019–2020 have all been nondetects (<0.0005 mg/L). This information will be included in the revised FYR report: in new Table 43 (an adaptation of ROD Table 9-4), revised Table 45 (Table 43 in the March 2021 draft version); and in subsequent accompanying text.

MDNR Comment 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.”

.....

DOE Response 25: Will revise answer to 5.2.1 Question A: “No, the remedy is not functioning as intended by the decision document. The remedy is short-term protective, however there are early indicators of potential issues.”

MDNR Comment 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.

.....

DOE Response 26: Will revise to: “...continue to reduce uranium levels in the weathered unit. In the unweathered unit, uranium levels are not yet trending downward in source area wells and the unweathered unit monitoring network is not as extensive as the weathered unit network. However, uranium levels in near downgradient unweathered unit well MW-4043 are steadily decreasing and are now below the Objective 3 (near) 50 pCi/L trigger level. Uranium levels in farther downgradient unweathered unit wells remain low.”

MDNR Comment 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.

.....

DOE Response 27: The paragraph on page 5.2.2.2 goes on to state: “ICs for the CPOU prohibit the future construction of residences and allow only buildings that are mission-related. Therefore, while residences are prohibited, it is possible that a mission-related structure could be built over the TCE-contaminated groundwater. Comparison of site data to EPA’s screening levels indicates that such a use might be unacceptable. Therefore, further characterization might be prudent if such use is considered in the future. The inhalation pathway is not considered further in this discussion of groundwater, as it is inconsequential for a recreational visitor. However, this pathway may require further analysis if changes in land or water use are contemplated.”

MDNR Comment 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.

.....

DOE Response 28: Table 46 (Table 48 in the revised report) will be augmented to include the requested IUR and RfC values. This table will also be reformatted to better distinguish between oral and inhalation toxicity values and, for clarity, to eliminate repetition of toxicity value units.

MDNR Comment 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.

.....

DOE Response 29: Will Revise to: “The RAO listed in the GWOU ROD is to restore contaminated groundwater in the shallow aquifer to its beneficial use by attaining the cleanup standards. The remedy is progressing as originally expected in the shallower weathered unit. However, persistent elevated uranium concentrations in the upper part of the unweathered unit near the former raffinate pits has shown limited progress. The initially increasing uranium concentrations have stabilized but have yet to begin decreasing. Until concentrations begin to decline, a cleanup time cannot be estimated.

Unweathered unit wells MW-3040 and MW-4040 were installed in May 2004, MW-3040 adjacent to MW-3024 due to suspect construction after raffinate pit remediation and MW-4040 to vertically delineate uranium impact. These wells were planned as objective 4 wells (monitor for vertical migration). The first sample results from the two new wells were not available until August 2004. The initial sample results from well MW-3040 exceeded the 40 pCi/L objective 4 fixed trigger level and were just below the 100 pCi/L objective 2 trigger level. The fixed trigger levels were established July 2004 in the RD/RA Workplan (DOE 2004d). The initial results from well MW-4040 exceeded the 100 pCi/L fixed trigger level. Subsequent sampling confirmed that uranium concentrations in these unweathered unit wells (MW-3024, MW-3040, and MW-4040) were not only elevated but that there was also an upward trend. Due to the elevated concentrations, the wells were reclassified as objective 2. Uranium exceeded 100 pCi/L in all three unweathered unit wells within a few years (Figure 23).”

MDNR Comment 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.

.....

DOE Response 30: Will revise to: “Therefore, there is no ongoing contamination of the groundwater from significant source areas. Residual contamination that has accumulated in subsurface cracks and fissures acts as a residual contaminant source to groundwater and surface water.”

MDNR Follow Up Comments

The Department looks forward to the initiation of a working group to evaluate the need and location(s) for additional monitoring wells to further delineate the uranium plume in the unweathered unit as stated on numerous comments by DOE. The Department is hopeful this working group will also work toward resolving ongoing issues with Comments 5, 6, 9, 10 and 26.

DOE Response: The National Lab Working Group will focus on the persistence of elevated unweathered unit uranium concentrations in the raffinate pits area.

Comment 19: Revise the report to state the amendment to the easement was signed by both parties and recorded with St. Charles County. The January 2004 *Record of Decision for the Final Remedial Action for the Groundwater Operable Unit at the Chemical Plant Area of the Weldon Spring Site* states “the primary purpose of the institutional controls that will be implemented is to restrict use of contaminated groundwater and springwater...” Please include a discussion on why a restriction on springwater use was not needed.

DOE Response: The report will be revised to state: “An addendum to the easement that removed the allowance of nonpotable groundwater uses on MDC property and updated the special area references to the new citation was signed by both the DOE and MDC and recorded with St. Charles County on June 30, 2021.”

As discussed and confirmed by MDNR on March 29, 2021, the intent of the Amendment to the Easement and Covenant to Restrict Use was to revise Article 1.5 and Article 2.3 to update the Special Area Number and to remove language related to potable water from these sections rather than to add another restriction to springwater.

Springwater is specifically restricted in other areas of the easement.

Comment 20: Please add a footnote to the proposed new Tables 41 and 42 identifying how background levels for COCs were determined (i.e. upper limits, etc.)

DOE Response: The first footnote of the new tables, now Tables 42 and 43 in the red-line (July) report version, has been augmented to clarify the statistical basis for the soil background levels listed in the ROD.

Comment 24: Please include this information in the revised 5YR.

DOE Response: Information regarding EPA’s updated IEUBK model for lead will be included in the revised FYR report: in new Table 43 (adapted from ROD Table 9-4), revised Table 45 (Table 43 in the March 2021 draft version), and in accompanying text.