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STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
P.O. Box 176 Jefferson City, MO 65102-0176

May 28, 1997

Department of Energy
Ms. Karen Reed
Environmental Scientist
Weldon Spring Site Remedial Action Project
7295 South Highway 94
St. Charles, Missouri 63304

Certified Mail/Return Receipt
Receipt No. P 162 259 086

Dear Ms. Reed:

Enclosed please find our comments on the Draft Final *Remedial Investigation for the Quarry Residuals Operable Unit of the Weldon Spring Site, Weldon Spring, Missouri* and the Draft Final *Baseline Risk Assessment for the Quarry Residuals Operable Unit of the Weldon Spring Site, Weldon Spring, Missouri*, Revision 0, both dated April, 1997.

The MDNR staff have reviewed these documents and have determined that the following are major areas which will need to be resolved prior to our concurrence on these documents. The attached are also offered as part of our detailed final comments on the Draft Final. MDNR requests that the Draft Final be edited to incorporate these changes.

- The identification of the recreational visitor as the Reasonable Maximally Exposed (RME) individual is unacceptable. The resident ingesting groundwater through the St. Charles County public wells should be included as a reasonable exposure scenario and the risk evaluated. Groundwater drawn from the floodplain is currently being used as a residential source of drinking water. Sampling data from monitoring well RMW2 demonstrates that uranium from the quarry has already contaminated the groundwater within the floodplain. The *Remedial Investigation* states that migration of uranium across the Femme Osage Slough is "supported hydrologically" and "plausible." The characterization of the extent of uranium contamination into the floodplain is incomplete and further migration of uranium southward across the slough is not ruled out. The location of the purported redox zone is unknown. The long-term behavior of the redox zone and other physical and chemical processes claimed to prevent further migration of uranium has not been evaluated.

- The Baseline Risk Assessment states that groundwater ingestion and dermal contact (considered to be unlikely) upper bound estimates are $2x10^{-5}$ and $5x10^{-7}$, respectively and that these estimates are within EPA acceptable limits. MDNR does not concur that the

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groundwater ingestion estimate of $2x10^{-5}$ is within acceptable limits for the citizens of St. Charles.

- The *Baseline Risk Assessment* may not take credit for dilution of uranium within and as a result of the operation of the St. Charles County drinking water distribution system.

- While radiological contamination entering the public water supply would be diluted within the water distribution system and result in a reduced radiation dose to an individual, the total radiation dose (i.e., the collective dose) to the residents of St. Charles County who consume the water from the county wells will not decrease. The contamination and the resulting radiation exposure is merely spread out among more people. U.S. Department of Energy Order 5400.5, *Radiation Protection of the Public and the Environment*, adopts the principle of reducing radiation exposures to levels As-Low-As-Reasonably-Achievable (ALARA) and states that ALARA shall consider "the collective dose to the population." Calculate the collective dose and resulting risk to St. Charles County residents resulting from consumption of uranium-contaminated groundwater through the public water supply.

- Sampling plans for the "triangle" area and north and east soil faces of quarry have yet to be provided for review.

We expect and will work diligently with you to resolve these issues. However, in the event that we are unable to resolve these issues, this letter constitutes our Statement of Dispute pursuant of the WSSRAP Federal Facility Agreement.

We request a meeting in the near future to discuss these comments. Should you have any questions, please feel free to contact me at 314-441-8030.

Sincerely,

HAZARDOUS WASTE PROGRAM

Martha Windsor
Environmental Specialist

cc: Weldon Springs Citizens Commission
Dan Wall, USEPA, Region VII
Missouri Department of Conservation

MISSOURI DEPARTMENT OF NATURAL RESOURCES - Comments on the Final Drafts of the *Remedial Investigation* (RI) and *Baseline Risk Assessment* (BRA) for the Quarry Residuals Operable Unit of the Weldon Spring Site, Weldon Spring, Missouri documents.

The RI comments follow:

40. The comment regarding the Weldon Spring Quarry which includes the support facilities and the uncontaminated areas within the DOE fence line is not totally accurate. It is MDNR's understanding that the support facilities and common areas will be scanned prior to final release. Please comment.

58. Page 37, last bullet: Regarding DOE's response "At present it is not known what the final remedial decision will be for the quarry residuals operable unit..." This statement is not totally accurate. DOE intends to backfill the quarry, plus the fact that the baseline risk assessment has been evaluated based on this scenario.

62. Page 41, first sentence and question 163, Appendix F, Table F-3, page F-6: the question asked about the presence and concentrations of protactinium, polonium and actinium. Further, the comment refers to "only trace amounts of U-235 daughters present." Please clarify this statement and provide an estimate for the trace amounts of U-235. Please elaborate on your response to the comment by providing estimates for the radionuclide contaminants listed here. The question was not answered and still stands. Please comment.

63. Page 41, Section 6.2.3.1: Referring to the original comment..."Will the contamination in the northeast corner be addressed prior to the feasibility study being finalized?", DOE responded by stating that the contamination will be addressed during quarry restoration. How does restoration relate to the feasibility study? Please comment. Remediation plans for the northeast corner of the quarry is needed prior to quarry restoration for MDNR's review. With regard to results of the sampling of the northeast corner, what will "an appropriate document" be? When will this document be issued for MDNR review? Are there contingency plans made for unexpected discovery of additional contamination? Has it been determined that there is contamination adjacent and underneath Highway 94? If there is contamination, are there any action plans in place?

64. Page 41, Section 6.2.3: Regarding residual contamination left in cracks and fractures, DOE responded by stating that efforts are being made to remove contamination. MDNR acknowledges these efforts. These efforts appear to be based on visual observations-based on the previous CERCLA document Quarry Bulk Waste ROD. This document has been closed out and can no longer be used as a standard for Quarry Residuals Operable

Unit. The comment that remains is, MDNR and DOE need to come to an agreement on the final land use, and reasonable maximum exposure. From this, standards will need to be set for remediation expectations. Finally, as long as DOE/PMC is having to go back and remove contamination, a state operating wastewater permit will be needed.

8. Page 43, Figure 6-2A: DOE's response state that the results of the risk assessment show that the risks are within EPA's acceptable limits. The question here is, what are the risk numbers and what scenario was used?

72. Page 45, last paragraph: Please comment/ identify the exception, its location and if available provide the contaminant(s) and concentration(s).

74. Page 53, first paragraph: the response indicates that the correct figure number will be 6-8A. There is no figure 6-8A. Please clarify this discrepancy.

84. Page 65, last paragraph: with regard to the thallium concentrations, additional thallium samples should be taken for analysis with an appropriate analytical method, whose detection limit is well below the analytical method. The Groundwater Operable Unit Remedial Investigation had a similar problem. Actions being taken for this problem are to continue water sampling and analysis, until it is determined that thallium is not a contaminant.

85. Page 66, Figure 7.3A: DOE indicated that there was no appropriate background available for the aquatic portion of the Femme Osage Slough, the BRA did not perform a risk assessment on the aquatic community. This is unacceptable. An assessment of the risk needs to be performed- the public is fishing out of the Slough.

89. Page 72, fourth paragraph: regarding the Missouri River sediment samples, the response by DOE is poorly developed. Please expound.

91. Pages 73-76: and question #94, Page 75: DOE indicated that nothing was done that would impact uranium levels in the quarry pond. MDNR is concerned as to what control DOE has over the uranium levels of the pond, based on the previous sentence. How can DOE be so sure that uranium levels won't increase at some time in the future?

117. Page 123, Section 9.2, paragraph 2 and 3: tetra- and tri-chloroethylene need to be sampled for this operable unit, in light of the fact that TCE was used at the Chemical Plant and groundwater underlying the plant is contaminated with TCE.

120. Page 128, fourth paragraph: it would be more appropriate for Kd values to be placed in this document. What work needs to be done to enable accurate Kd values placement in

the RI?

126. Page 141, second paragraph: the response did not fully explain why the nitroaromatic plume is confined by different processes. Please develop this further.

129. Page 144, Figures 9-8A 9-8B. 9-8C: Please discuss the western nitroaromatic plume and any plans to possibly remediate this area as it is the location of maximum nitroaromatic concentrations.

135. Page 153, last paragraph and section 10: MDNR acknowledges positive points about the presence of uranium south of the Slough. However MDNR believes that it is more important to be conservative, especially in light of the well field's position to the contamination. Further discussion is needed regarding the prevention of uranium migration to the well field.

150. Page 170, third paragraph and question 161, page 181, Section 9.6, paragraphs 2 and 3: MDNR has not concurred with any quarry restoration designs, yet the preliminary CERCLA draft Feasibility Study has proceeded ahead, incorporating the quarry restoration designs. MDNR acknowledges that, though it is imperative to plan ahead, it is also very important to get concurrence with all the stakeholders prior to issuance of any documents. MDNR believes issuance of the preliminary draft Feasibility study is inappropriate and requests that the document review be withheld until further discussions with the stakeholders results in concurrence of the designs.

152. Page 170, fifth paragraph: the question still remains, How long will these reducing conditions remain? Please comment.

154. Page 171, third paragraph: MDNR has determined that the current and future use of the groundwater is residentia (the groundwater is currently being used as a public drinking water supply.).

155. Page 173, second bullet: DOE's response was that the bullet would be modified. MDNR believes that the screening criteria (target risk levels) used in the work plan were too high and should not be used. Please comment.

164. Appendix F-5: TCE should have been sampled in the surface water. USGS is finding TCE in the standing water at Burgermeister Spring, there is a chance that it would be present at the Slough.

168. Appendix H, Table H-8: Table H-8 did not show analytical results from vinyl chloride, but did show trichloroethene. Please comment on this discrepancy.

Additional questions on *Remedial Investigation:*

A. Page 6-4. Clarify "relatively inaccessible."

B. Page 6-4, Section 6.2.1, paragraph 3 and page 6-7, paragraph 1, Fractures, and page 7-13, section 7.4.1. quarry pond, paragraph 4: The halides of radium are soluble in water, i.e., radium chloride and radium nitrate. Their solubilities are 24.5 g/100 gr of water and 13.9 g/100 gr of water, respectively at 20-25 deg C. If present, these compounds could leach/solubilize from the soils at the quarry and migrate downgradient. Based upon the solubilities, why were these radionuclide not sampled? Are these compounds present? The statement that radium compounds are insoluble is not totally true. Please comment.

C. Page 6-13, Section 6.3.3.1, Potential Contaminants, Paragraph 2: With the high chloride levels, this would enhance the mobilities of uranium dichloride and radium chloride because these compounds are water soluble. Please comment on whether or not these compounds are present and if so, do they cause any contamination problems?

D. Page 6-13, paragraph 3, Appendix E, Table E-9 and Page E-12: no data is shown for trichloroethylene and tetrachloroethylene. Why were no soil samples taken for these contaminants?

E. Page 6-17. Revise first bullet to state that characterization of triangle area is incomplete and further characterization will be performed.

F. Page 7-7, Table 7.3B: What are the concentrations of these nitroaromatics. Please expand the graph scale to enable a determination of the concentration levels.

G. Page 7-8, Figure 7-4: What were the uranium concentrations at sampling locations FS02, 1019, 1003, FS03, 1004, 1005, 1007, FS06, 1022, 1023 and 1024?

H. Page 9-6, Section 9.3.3, paragraph 2: How were the Eh values determined. Please describe.

I. Page 9-33, paragraph 2: Metal ions in the groundwater can be transported by colloidal particles. The statement of colloidal transport of arsenic may not be totally true. Please comment.

J. Page 10-5, Section 10.5.1, Redox reactions: Please provide calculations to show that redox reactions provide sharp decreases in the uranium concentrations.

K. Page 10-11, Section 10.6, paragraph 1: Will a bench scale test be used to determine if

soils amended with organic material will decrease oxidation potentials and provide a reducing environment to precipitate metals including uranium?

L. Section 10.5.1. The report states, "The variability in redox sensitive parameters in some monitoring wells located directly north of the [Little Femme Osage] slough . . . suggests that the [redox zone] probably shifts back and forth in response to seasonal variation in slough and groundwater levels"? What are the "redox sensitive parameters"? Which monitoring wells are included in "some"?

M. Section 10.5.1. Evaluate the stability or persistence of redox zone over long term. The report states that monitoring well RMW2 in the floodplain "has displayed a stable range of uranium concentrations for past 10 years." If we assume that the boundary of the redox zone is moving from the slough toward RMW2 and has not reached RMW2 in ten years, an upper bound on the rate of movement of the redox zone may be calculated.

N. Section 10.5.1. The location of the redox zone should be identifiable by the accumulation in the soils of precipitated uranium at the boundary of the zone. No soil sampling data for insoluble uranium at specific locations in the floodplain south of the slough are provided. Please provide these data.

O. *Remedial Investigation*, Section 11, and *Baseline Risk Assessment*, Section 3. Sampling data from monitoring well RMW2 demonstrates that uranium from the quarry has already contaminated the groundwater within the floodplain. The *Remedial Investigation* states that migration of uranium across the Femme Osage Slough is "supported hydrologically" and "plausible." Further migration of uranium southward across the slough has not been ruled out. The location of the purported redox zone is unknown. The long-term behavior of the redox zone and other physical and chemical processes claimed to prevent further migration of uranium has not been evaluated. The resident ingesting groundwater through the St. Charles County wells should be included as a reasonable exposure scenario and the risk evaluated.

P. *Remedial Investigation*, Section 11, and *Baseline Risk Assessment*, Section 3. Dilution of uranium within and as a result of the operation of the St. Charles County drinking water distribution system may not be taken credit for in the risk assessment. Calculate the collective dose and resulting risk to St. Charles County residents resulting from consumption of uranium-contaminated groundwater through the public water supply.

Q. Appendix G, Dilution calculation results for uranium: Will a fate and transport model be used to determine the mass transfer effects in the groundwater for uranium.

R. *Remedial Investigation*. What is the total activity of each radiological contaminant of

concern within the Quarry Residual Operable Unit?

S. *Remedial Investigation*, Appendix G. Explain why Borehole and Well Completion Logs were relogged.

T. *Remedial Investigation*, Figure 6-3. Specify date of survey.

U. *Remedial Investigation*, Figure 6-4. Specify date of measurements.

V. *Remedial Investigation*, Figure 8-16. Specify date of slug testing.

W. *Remedial Investigation*, Table G-7. Table appears to be unreferenced in text. How is "bearing" of a fracture defined? How were data determined for fractures which are "not accessible"?

X. *Remedial Investigation*, Figure 8-19. Soil at surface north of quarry (extreme left of page) incorrectly identified as "Soil/fine-grained alluvium"?

Y. *Remedial Investigation*, Page 8-3, fifth complete paragraph. Change "topography" to "topographic."

Z. *Remedial Investigation* and *Baseline Risk Assessment*, various locations. Change "Missouri State Trail" and "Katy Trail" to "Katy Trail State Park."

Baseline Risk Assessment

1. Please refer to the Remedial Investigation, #85 response. Where have the potential pathways of concern evaluations included fish? Please respond.

8. Page 2-2, Section 2.1.2.2, Surface Water, Paragraph 2: the response indicated that VOCs and SVOCs were not detected in any surface water. In related comments #117 and #164 of the RI, VOCs (tricholoroethylene, tetrachloroethylene, and carbon tetrachloride) were not sampled for in the creek water. Please comment on this discrepancy.

21. Page 3-1, last sentence in the introduction of Section 3.0 and Question #24, Page 3.2, first paragraph: MDNR does not agree with the statement that the wellfield is not a part of the quarry area or the Operable Unit. Groundwater is a dynamic media. Where ever the contamination migrates, this "location" must be considered part of the operable unit.

31. Page 4-2, Section 4.2.1: MDNR disagrees that exposure to groundwater is an incomplete

pathway. Refer to earlier comments.

Additional comments on *Baseline Risk Assessment*:

A. The addition of Figure 1.1 is an improvement over previous drafts.

B. Pages 1-4, 2-18, 3-34 and 4-12 are blank and should be removed.

C. In Section 2, a concentration-toxicity screening is performed to further eliminate the number of COPCs. According to EPA guidance (RAGS, Section 5-9), multiple screenings should be performed in rare instances with RPM approval. An example of such an instance is when the assessment of a large number of chemicals is not feasible, such as when an assessor has inadequate computer ability to compute large amounts of data. With only 12 COPCs in quarry soils having toxicity information prior to the concentration-toxicity screening, there is no need to further reduce the number of COPCs.

D. Page 2-13, Table 2-4, lists nickel as not being retained as a COPC in groundwater after the concentrations-toxicity screening. Nickel was detected at a maximum concentration of 0.78 mg/l which is above it's MCL of 0.1 mg/l. It is inappropriate to exclude COPCs detected above ARARs in the concentration-toxicity screening process.

E. Section 2.1.4. Report states, "The highest concentrations were along the eastern rim of the quarry." Concentrations of what?

F. Section 2.1.4. Report states, "Contamination has been detected primarily north of the Femme Osage Slough." Identify contaminants detected.

G. Section 3.1. The report states that the risk assessment does not include risk due to inhalation because "contaminants present in groundwater . . . do not appreciably volatilize from groundwater." Notwithstanding the volatility of some contaminants, nonvolatile contaminants can contribute to the inhalation risk when contained within inhaled aerosols, e.g., water droplets from showering.

H. In Section 3.4, which examines ecological intakes, the mallard duck, great blue heron, bald eagle, muskrat and white tailed deer are examined. The reasons for choosing these particular endpoints should be included.

I. Page 4-3, states that the interim soil clean-up level for lead is 500 to 1000 mg/kg for residential settings. This was a range for industrial settings. EPA uses a clean-up level of 400 mg/kg for lead in residential settings (Region 9 Soil Screening Guidance, Region

7 Screening Table). The Missouri Department of Health's Any-Use Soil Level for lead is 240 mg/kg.

J. Page 4-3, please include a brief statement addressing health effects in children with blood lead levels lower than 40 ug/dL in the discussion of lead. Some experts believe there is no adverse effects threshold for lead in children. Health effects, for example, decreased IQS, have been observed in children with blood lead levels as low as 10 ug/dL.

K. Page 4-7, Table 4.1, presents radionuclide slope factors used in this portion of the assessment. The slope factors for thorium 228+D and uranium 238+D are given as 9.94 x 10 -7 and 5.25 x 10 -8, respectively.

L. Page 5-1 states that EPA considers 1 x 10-6 to 1 x 10-4 an "acceptable risk range". Please state the reference for this statement. RAGS states that above 1 x 10-4 is unacceptable and that amounts below 1 x 10-6 are "acceptable". In Part B, of RAGS, EPA guidance for calculating

M. Section 5.1.2.2. Provide reference for RfDs

N. PRGs, hazard indices greater than 1.0 and cancer risks greater than 1 x 10-6 as the target risk range for calculating PRGs. Previous comments from the state of Missouri have designated 1 x 10-6 as the appropriate target risk. Risk management agencies make policy decisions related to institutional controls, remediation techniques, etc. when risk fall between the 1 x 10-6 to 1 x 10-4 range. Please clarify if it is the position of risk management agencies at this site that an excess cancer risk above that of 1 x 10-6, 1 x 10-5 and/or 1 x 10-4 is acceptable.

O. Page 5-8, Section 5.2.3, first paragraph, please clarify what is meant by "the hazard quotient is less than 1." It is unclear if this means the range for the 1-5 wells or which chemical, pathway or media does the hazard quotient mentioned represent. Please include the total excess lifetime cancer risk (radiological and chemical) and hazard index for a resident from the cumulative risks from exposure to all COPCs through all pathways to represent the total risk to a resident from site groundwater. This is discussed in Section 5.3.4 but no value is given. Also, please discuss the chemical and total cancer risks (not only radiological) to a resident from exposure to groundwater from RMW2.

P. Section 6.5.1.2. Define "depuration."

Q. Section 6, Table 6-14 indicates extreme risk to fish and aquatic invertebrates from uranium and moderate to high risk from manganese, aluminum and barium in the Femme Osage Slough. Page 6-15 states that fish surveys do not indicate any obvious adverse

ecological impacts to be occurring. Please include whether these chemical-specific effects were examined for in ecological surveys. Although, no obvious gross abnormalities were observed in fish, it is not conclusive that no effects are occurring or will occur to fish and aquatic invertebrates.

R. Section 6.5.1.3 states that "These results, together with EEQ risk estimates support a preliminary determination of no potential for future adverse effects..." The EEQs presented in Table 6.3 for fish and aquatic invertebrates does not support that there is no potential for future adverse effects. On the contrary, EEQ risk estimates dispute that assumption. This statement contrasts the one immediately following it in Section 6.5.2 that states, "...a potential for adverse effects to aquatic biota has been identified..." Please clarify.

S. Page 7-2, Section 7.1, states that estimates of risk (2 x 10-5 for ingestion alone) to a hypothetical resident are within EPA's acceptable limits. Please include documentation of EPA's decision that risks above 1 x 10-5 at this site are acceptable.

T. Page 7-2, first paragraph, the last sentence in this paragraph states an assumption that risks to the muskrat are likely the result of conservative modeling. This statement that belongs and is included in the uncertainties section of this document. To repeat this singular uncertainty in the summary is subject. Please remove.

U. Section 7.2: the summary for the ecological assessment contains contradictory statements. The first paragraph states "Current levels...have been identified as posing a moderate to extreme potential risk to aquatic biota..." Yet the third paragraph states, "...current levels...do not pose a future risk to biota..." These are conflicting statements. Please clarify.