GWOU ADMINISTRATIVE RECORD
SECTION TITLE:
GW-500-501-1.20

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Mel Carnahan, Governor • Stephen M. Mahfood, Director

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

April 21, 1999

CERTIFIED MAIL #P179 979 875
RETURN RECEIPT REQUESTED

Mr. Steve McCracken, Project Manager
United States Department of Energy
Weldon Spring Remedial Action Project
7295 Highway 94 South
Weldon Spring, MO 63304

RE: DRAFT SUPPLEMENTAL FEASIBILITY STUDY FOR REMEDIAL ACTION FOR THE GROUNDWATER OPERABLE UNIT AT THE CHEMICAL PLANT AREA OF THE WELDON SPRING SITE, WELDON SPRING, MISSOURI (MARCH 1999)

Dear Mr. McCracken:

The Department of Natural Resources has reviewed the above referenced document. The Supplemental Feasibility Study (FS) was prepared to incorporate new data gained from a recent pump test. Major Comments for this draft document are listed below and additional comments are included as an attachment.

Costs associated with Alternatives 4 and 7 include the construction of a water treatment plant. Preliminary requirements indicate that the treatment process would be "similar to that currently applied by the Site Water Treatment Plant" (SWTP). The design capacity of the treatment plant used for these alternatives was approximately 83 gpm. The SWTP located at the chemical plant site seems to meet the capacity requirements and the treatment processes applied are comparable to the plant that would be constructed in Alternatives 4 and 7. The total cost for pump and treat remediation could be reduced if the SWTP, currently located on-site was used as the treatment plant to treat contaminated groundwater as described in Alternatives 4 and 7. This would increase the feasibility of applying an active remedial effort to the Groundwater Operable Unit.

- While recognizing that modifications may be needed, it is unreasonable to include the cost of a new treatment plant when there is already a plant available. Revise costs based on use of the existing SWTP.

The remediation times for Alternatives 4 and 7 hinge on the rate of groundwater extraction, the number of extraction wells, and the number of pore volumes that need to be removed to meet Preliminary Remediation Goals (PRGs). The number of extraction wells was calculated as the minimal number of wells need to capture the plume of contamination, not the optimal number of wells needed to efficiently remediate the groundwater. Calculating the minimal number of

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extraction wells can not be used to compare the cost of Alternatives 4 and 7 to other alternatives.

- The optimal number of extraction wells should be used to develop the cost of a pump and treat alternative so that it can be comparable to other alternatives. Optimizing the number of wells appears to show that active remediation can be accomplished within a reasonable time, is cost effective, and supports the goal of being protective to human health and the environment.

The minimal number of extraction wells used for Zone 1 is speculative. Figure 5-5, page 35 of the "Completion Report For The Pilot Pumping Test For The Groundwater Operable Unit At The Weldon Spring Site" (October 1998) indicates that one pumping well captured over one-half of Zone 1. The Supplemental FS indicates that a minimal number of five wells would be required to capture contaminants down-gradient of Zone 1, as calculated by the Javandel and Tsang method.

- Actual field data would be a more reliable means of determining how a pump and treat system should be designed.

The ARAR of 30 pCi/L Uranium in groundwater was not referenced in this Supplement to the Feasibility Study. The proposed Maximum Contaminant Level (MCL) of 20 µg/l was used as a reference point. The groundwater in the vicinity of the chemical plant has historically been used for drinking water and has the potential to be used as groundwater in the future. While we support the use of the proposed MCL as a reference point and goal for remediation of Uranium in groundwater, the 30 pCi/L UMTRA standard is considered Applicable or Relevant and Appropriate Requirements (ARAR).

- The 30 pCi/l UMTRA standard should be considered an Applicable or Relevant and Appropriate Requirement.

Monitored Natural Attenuation (MNA) relies on natural processes to attenuate contaminant concentrations to PRG levels. It has been concluded that dilution and dispersion would be the major processes associated with the attenuation of contaminants at the site. This attenuation does not occur without decreasing value to nearby property. The DOE must identify costs due to land, mineral, and water-use restrictions. For any reference to institutional controls for any component of a remedy or decision, DOE must fully address who, what, where, when, enforceability, and cost.

- The cost of these use restrictions or damages to resources should be incorporated in the cost of alternatives that include institutional controls.
- More detail should be included in the text about the amount of land and groundwater that would be restricted with institutional controls. This information is critical in determining the feasibility of alternatives that include such controls.
- At present, this alternative alone does not provide a solution within a reasonable time, nor does it describe how permanence would be maintained.

The MNA Alternative does not include action levels or compliance points. It is understood that an approach should be developed that would function as a contingency in the event that MNA fails to perform as anticipated. Trigger values would be established at compliance points to signal this unacceptable performance.

- The State feels that a contingency plan should be developed for alternatives that involve implementability concerns. Contingency plans are also required under MNA, as stated in

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the EPA directive. If these alternatives fail to remediate the contaminants as stated, then a backup plan should be included as part of the alternative.

"Use Of Monitored Natural Attenuation At Superfund, RCRA Corrective Action, And Underground Storage Tank Sites," U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response, Directive 9200.4-17, November, 1997, which states:

"The effectiveness of monitored natural attenuation in both near-term and long-term time frames should be demonstrated to EPA (or other regulatory authority) through:
1) sound technical analysis which provides confidence in natural attenuation's ability to achieve remediation objectives
2) performance monitoring
3) backup or contingency remedies where appropriate"

We have the following concerns regarding how the above directive will be met if MNA is applied:

- Directive 9200.4-17 states that "sound technical analysis which provides confidence..." should be demonstrated. This analysis should include a detailed conceptual site model as a starting point.
- Since there are many uncertainties in the effectiveness of MNA to meet the remedial objectives, a MNA alternative should start with source control (hot-spot, active remediation) and include performance monitoring. The MNA alternative presented in the Supplemental FS does not include source control as a fundamental component.
- Source control (plume hot-spot) actions are high priority and should be implemented using MNA as a supplemental to the remediation as applicable.
- "EPA prefers those processes (Natural Attenuation) that degrade contaminants and expects that MNA will be most appropriate where plumes are stable." Are the plumes defined as stable, and will the contaminants degrade?
- A MNA alternative should also include a backup or contingency plan in case the contaminants do not attenuate as expected or the contaminants migrate.
- One type of site-specific information that may be required is that: "Historical groundwater data demonstrates trend of declining contaminant concentration." From data available, the contaminants migrating off-site (onto Missouri Department of Conservation property) are increasing in concentration.
- Use of MNA alone presents an unacceptable time frame for meeting ARARs. Given this information, a Technical Impracticability (T.I.) consistent with guidance may be appropriate.
- The directive also mentions that MNA should only be used as an alternative after an active remedial effort has been made or in union with an active remedial effort.

The Directive notes that natural attenuation should be considered when the cleanup time is reasonable to that offered by the other, more active, methods. Tables 10 and 12 (pages 33& 43 Sup. FS) show estimated cleanup times for the two alternatives, MNA and Pump and Treat respectively. These tables generally show that the pump and treat cleanup times are usually a little less than half of that for MNA. But it should be noted that the times for pump and treat do not include the natural processes of dilution and dispersion or the possibility of installing additional wells within the zones of contamination, reducing cleanup times.

- With these considerations, a pump and treat alternative would generate cleanup times that are reasonable and are much quicker than MNA alone.

- The EPA directive also mentions the difficulty of using MNA in karst geology (pages 11 & 12). Although technically feasible, MNA may prove more costly than active remedial alternatives, especially when comparing the future cost of MNA versus alternatives that remediate in a shorter time.

None of the alternatives included action levels or compliance points. Will these be noted in the Supplemental FS or in the Proposed Plan?

- Action levels and compliance points must be included.

After our review of this document, it is clear that an active remedial effort is appropriate. Monitored Natural Attenuation should only be used as a follow-up to an active remedial alternative or in conjunction with one. MDNR looks forward to resolving these issues. Because of the critical nature of this document, we request a meeting to discuss your response to comments before the document is revised. If you have questions pertaining to these comments, please contact Mr. Branden B. Doster (573-526-2739), of my staff.

Sincerely,

HAZARDOUS WASTE PROGRAM

Larry V. Erickson

Larry V. Erickson, PE, DOE Unit Chief
Federal Facilities Section

LVE:lbe

Attachment

cc: Dan Wall, EPA
Weldon Spring Citizens Commission
Daryl Roberts, MDOH
James Fry, DOC
Myrna Rueff, MDNR/DGLS
Bruce Stuart, MDNR/DEQ/HWP/Permits

Additional Comments
Draft Supplemental Feasibility Study
April 21, 1999

Section 1.1, page 1
"The U.S. Environmental Protection Agency's (EPA's) proposed maximum contaminant level (MCL), which is considered a to-be-considered requirement (TBC), was used as a reference point in the evaluation presented in this supplement."

1) Please clearly indicate which contaminant is considered a TBC requirement (Uranium).

Section 1.1, page 1
"When plotted on a map of the chemical plant area, seven zones of contamination are indicated (Figure 2)."

2) It should be noted that the zones of contamination do not represent the extent of the contamination. Nitrate contamination is distributed over an area larger than represented by the zones. Nitrates are distributed over more than 145 acres at the chemical plant site. The boundaries of zones are speculative. Values used for cleanup times include the maximum concentration of a contaminate within a zone. It should be noted that the maximum concentration observed might not be representative of the zone due to some zones only having a few wells with its boundaries. This would add to the uncertainty of projected cleanup times.

3) Zone 1 does not seem to be located to encompass the TCE contamination. One-third of the zone is located over an area that is south of the groundwater divide, which DOE has identified to be below ARAR for TCE. A more appropriate location of Zone 1 would be to encompass more of the TCE contamination to the north.

4) Table 1 does not include all monitoring wells that show concentrations above PRG's. All monitoring wells above PRG's should be shown so that the true extent of the contamination can be seen.

Section 1.2 Chemical Plant Area Hydrogeology, page 7

5) It is asserted that since fracturing is predominantly horizontal then flow must be also. Known karst development in this area demonstrates that preferred pathways are developed by dissolution. Karst features will not be only horizontal. Flow is determined by head differences, not the number or density of fractures. If there is discharge from a lower permeable unit then there will be a vertical flow potential down. The only way to demonstrate vertical flow potential is with clustered wells in multiple horizons.

Section 2.1, Identification of Natural Attenuation Process For the Chemical Plant GWOU, page 11
It is stated in this paragraph that contaminant transport will occur either slowly or rapidly, depending on the subsurface geologic conditions. The definition of Monitored Natural Attenuation presented in Section 2.0 states that "site cleanup will be carefully controlled."

6) Please discuss how contaminant transports, especially off-site, will be controlled.

Section 2.3.2 Compliance with Potential ARARs, page 35
The reference to nitroaromatic compounds includes 1,3-TNB,

7) This typographical error should read 1,3-DNB.

Section 2.1.4.2 Sorption, page 24

8) Include a discussion of where, on-or off-site, dilution and dispersion of uranium is expected to occur.

Section 2.1.4.3, Chemical Stabilization of Uranium, page 24

9) The text mentions that some compounds of uranium form insoluble minerals that would quickly dilute out of the groundwater. Then the Supplemental FS mentions (Section 2.2, page 31) that the accumulation of uranium in Burgermeister Spring could be from overland flow. The Supplemental FS later states that "(u)ranium concentrations (in the spring) have been reported at slightly higher levels than the current maximum concentrations reported for the monitoring wells because of residuals in fractured zones." The Supplemental FS should clarify whether these higher readings are from groundwater or overland flow. The supplemental FS should also address the possibility of accumulation of insoluble uranium in lake bottoms and stream beds.

Section 2.2, Time Requirements to Attain PRGs For Monitored Natural Attenuation, page 28

10) We disagrees with the statement that historical measured contaminants at Burgermeister Spring have been low, because of dilution. According to the Groundwater Operable Unit RI, the maximum concentration of nitrate detected at Burgermeister Spring was 10,000 mg/l, with an average of 210 mg/l (1995 concentrations of 5.1 and 17 mg/l), the maximum lithium concentration was 52 ug/l (1995 concentrations of 5.3 and 18ug/l) and uranium concentrations in 1995 were 48 and 69 pCi/l. These historical concentrations are relatively high. In fact, Burgermeister Spring was one of four springs containing the highest levels of nitroaromatics. The more recent downward trend in concentrations may be attributed to site cleanup and dilution.

11) DOE is taking credit for the natural physical process of dilution of site-related contaminants, which occurs primarily off-site in the Busch and Weldon Spring Wildlife Areas. This places the burden of use restrictions on nearby landowners. This is unacceptable.

12) The Supplemental FS states that the equations used to determine cleanup times for natural attenuation assume that contaminants that leave a specified contaminated zone are removed from the system. In other words, it does not take into account plume migration. The text argues that paleochannels located under the chemical plant will help dilute the contaminants and reduce plume migration. However, modeling for this type of scenario should be conservative and a correction factor should be added for plume migration.

Section 2.2, Time Requirements to Attain PRGs For Monitored Natural Attenuation, page 29

13) It should be noted whether the additional dilution occurring in the conduit system happens after migration of the contaminates off-site.

Section 2.2, Time Requirements to Attain PRGs For Monitored Natural Attenuation, Tables 7 and 8, page 30

14) These tables are mislabeled or the text references them incorrectly.

Section 2.2, Time Requirements to Attain PRGs For Monitored Natural Attenuation, page 31

15) Please explain, specifically to what processes uranium would undergo in the springs, as well as in groundwater.

16) Please explain how it was determined that higher concentrations of uranium identified in springs were associated with postulated residual uranium located in bedrock fracture zones.

Section 2.2, Time Requirements to Attain PRGs For Monitored Natural Attenuation, page 31

17) Dardenne Creek is part of the Mississippi River watershed (as identified previously in the subject document and others). The Mississippi River watershed includes an area, which extends from a groundwater divide located across the southern part of the WSSRAP site to the confluence of Dardenne Creek and the Mississippi River. No other groundwater divides are present between the WSSRAP site and the Mississippi River.

The fact that the Missouri Department of Health (DOH) historical private well sampling results show possible site-related radionuclides (alpha and R-226 above MCLs) at DOH well number 27, located north of Dardenne Creek and drilled into the St. Peter formation, supports this position. We do not consider Dardenne Creek to be a hydrogeological boundary; rather, it is one of several surface drainage basins between the WSSRAP site and the river. Dardenne Creek receives surface flow via springs, which act as discharge points for shallow site groundwater.

Section 2.3, Detailed Analysis of Alternative 3: Monitored Natural Attenuation, page 34

18) The Missouri Department of Conservation and/or nearby private residents may not favor implementation of institutional controls for their properties because of the contaminated groundwater originating from the Chemical Plant area. It should be noted that MDOC and nearby private residents will incur cost associated with implementation of institutional controls and land use restrictions. This cost must be factored in when comparing MNA to other alternatives.

Section 2.3.1, Overall Protection of Human Health and the Environment, page 35

19) Please describe how the migration of contaminated groundwater toward the springs will be monitored.

Table 12, Estimated Pore Volumes and Cleanup Times for Pump and Treat Method, page 43

The Pump Rate of 1 gallon per minute for Zone 1 is unexpectedly low. Meetings between MDNR and DOE prior to the Supplemental FS, included an agreement that an extraction rate of 10 gpm would be applied to zones 1 and 5.

20) Please indicate whether this is a typographical error.

21) According to this table, the minimum cleanup time for TCE is 30 years in Zone 1. The Final FS for the GWOU predicted a cleanup time of 16 years for this zone (page 4-15 Final FS). The pumping rate in Zone 1 was increased in this Supplemental FS but the remediation time doubled. Please explain this apparent discrepancy

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Section 3.2, page 46

22) In the 1998 Final Feasibility Study, it was calculated that 258 extraction wells were needed for the chemical plant area. With the new data from the pump test, the calculated number of extraction wells has been reduced to 24. This greatly reduces the cost and the number of expected short-term worker injuries that would be due to

construction of the extraction wells. These changes significantly increase the implementability of the pump and treat alternative.

Section 3.2.6, Implementability, page 53

23) No permits or licenses may be required, but certification and meeting of substantive requirements of new groundwater monitoring wells (extraction wells are classified as monitoring wells) is required by the Missouri Well Driller's Law.

Section 4, Alternative Concentration Limits, page 57

24) We disagree with the statement that "dissolved groundwater contaminants from Zone 7 would generally flow toward the Southeast Drainage," Valley 5300. Dye tracing studies conducted by DGLS (1991) show that Zone 7 is located within the Valley 5200 groundwater recharge boundary. Groundwater within Zone 7 emerges at Spring 5201. Valley 5200 is located next to and east of the Southeast Drainage.

25) The system used to classify the groundwater is vague and should be described in greater detail. The groundwater identified as Class II that which is being used for private drinking water supplies in areas near the Chemical Plant. However, according to the text, the Class II designation is used for groundwater too high in salinity to be used as drinking water supplies. Please explain.

26) The use of ACL would include enforceable measures to restrict human exposure with the groundwater between the facility boundary and the point at which the contaminated groundwater flows into surface water. It should be noted here that the addition of enforceable measures place costs on nearby landowners. This is unacceptable.

END