

NRC Staff Comments
on Draft Cimarron Environmental Response Trust Evaluation
of Potential Alternative Groundwater Remediation Technologies

As the proposed alternative groundwater remediation technologies are conceptual in nature, comments 1-11 are general, and 12-18 are more specific.

- 1) NRC staff agree with the proposal to install additional monitoring wells north of 02W43 in BA #1 Area to further define the extent of uranium in groundwater;
- 2) A potential issue with uranium recovery through groundwater extraction may exist due to the low permeability and surface adsorption in the transition zones and fractured sandstone of the upland areas. Further investigation and assessment of the flow path, capture zone, pore volumes of extraction required, and interaction of uranium between the groundwater and solid phase (e.g., clays and oxides) should be included in the final evaluation of alternative groundwater remediation technologies.

This analysis should account for the spatial variability in the aquifer as well as physical and geochemical properties.

- 3) If discharge of groundwater into the Cimarron River is selected as a component of the alternatives, provide estimates of uranium concentrations in sediments and water in the Cimarron River resulting from the discharge of uranium-containing groundwater under, both, direct discharge and discharge after-treatment scenarios. Demonstrate that these estimates meet the sediment and surface water uranium criteria.
- 4) Irrigation is considered in Alternatives #3, #4, and #6. Provide estimate and analysis to demonstrate that the amount of uranium in the top soil zone under each of the alternatives meets the level required by regulation at the end of irrigation period or for site remediation.
- 5) Provide the basis for the 8 month duration of Alternative #6 and 12 month duration of Alternative #7 for treatment of BA #1 and WA.
- 6) Provide details on the design, operation and efficiency of the proposed uranium treatment system.
- 7) Provide procedures on how the uranium content in the filter/resin in the treatment system will be monitored.
- 8) Document design alternatives and optimization of the proposed groundwater extraction and injection configuration, including well depth, spacing, pumping and injection rates.

- 9) Include design basis and specific details for the proposed groundwater retention impoundment, along with hydraulic properties of the clay material used for the clay liner.
- 10) Include selection criteria and groundwater monitoring network for the post-remediation monitoring.
- 11) Provide evaluation procedure and specific action plan if uranium in the aquifer increases above the release criteria during a post-remediation monitoring.
- 12) Page 1-5, C. Conclusions, lists only 6 areas where chemicals of concern exceed release criteria. However, the previous paragraph notes that Tc-99 in well 1346 exceeds the 900 pCi/l EPA limit. Therefore, shouldn't well 1346 be added as a seventh area?
- 13) Page III-1, notes that eight consecutive quarterly sampling events for COCs will be used to demonstrate that remediation is complete. Because of the overall geochemistry of the site, we would want to see all COCs meet the release limits in each of those 8 quarterly samples.
- 14) Page III-2, A. Alternative, cites drinking water as the only exposure pathway. For this to be true, there will have to be specific restrictions against hunting, grazing, and farming.
- 15) Page III-3, Alternative 2 cites the need for a pollution discharge elimination system permit. Has ODEQ identified a need for any other permits for this or any of the other alternatives?
- 16) Pages III-4, III-5 and elsewhere mention mowing grass and harvesting it as cattle feed. A dose analysis will have to be performed before NRC would consider allowing this. Furthermore, if harvesting for feed were allowed, there are likely to be license requirements for periodic sampling of the grasses to ensure that dose limits are not exceeded.
- 17) Page III-7 and elsewhere discuss using extracted water for irrigation. Dose modeling will be required to demonstrate that release limits are not exceeded in the water or accumulated in the soil over time.
- 18) Please demonstrate that the various impoundments described will be sufficient to contain the volume of water that would go into the impoundments.