FINAL
ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: TREATABILITY STUDY WORK PLAN FOR ION EXCHANGE AND ADSORPTION PROCESSES



Reviewer Name(s): Department of Energy-Headquarters (February, 1993)

Date: May 18, 1993

| REVIEWER'S COMMENTS | | | RESPONSE |
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| 1 | 1 | CRITICAL ISSUES<br>The rationale for choosing the bench scale testing rather than the pilot scale testing is unclear. While it is understood that bench scale testing is useful for a developing technology, the ion exchange technology is a well proven technology for the contaminants of concern (COCs), except possibly the radionuclides. It seems that pilot-scale testing would have been more appropriate because it can more accurately simulate the performance of the full-scale process. Perhaps information from the Operable Unit (OU) 1 French Drain ion-exchange technology will give performance and optimization data necessary to this Treatability Study Plan (TSP). | The rationale for choosing bench-scale testing rather than pilot-scale testing comes directly from the August 26, 1991 FINAL TREATABILITY STUDIES PLAN: "The technologies which were retained after screening according to the first two criteria were included in the treatability program if they could be tested at the bench or laboratory scale. Those technologies which cannot be tested at bench or laboratory scale but can be pilot tested were screened according to an assessment of community and /or state anticipated acceptance of pilot testing and those technologies which were considered favorable according to this criterion were included in a list for consideration for future pilot testing "(§5.1.3)<br>The initial step in the screening process for the site wide treatability studies was to determine if a technology was applicable to contamination found in either surface or groundwater at two or more operable units. OU 1 feed water does not contain any plutonium - one of the COCs. |

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| 2 | 1 | The document does not reference a community relations plan (CRP) as recommended under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). An assessment of issues and concerns the community may have about planned treatability testing should be conducted. If a CRP has been developed, then it should be referenced and briefly discussed in this document. | The treatability studies work plan (TSWP) does not reference a CRP. This document was generated in direct response to the January 22, 1991 Inter-Agency Agreement (IAG) and not specifically to all CERCLA requirements. However, the IAG, the document that is the origin of the Final Treatability Studies Work Plan did, in fact, go out for a 60 day public review and comment period (IAG, PART 53, PUBLIC COMMENT/EFFECTIVE DATE, para. 53) and does contain a section on community relations (IAG, Attachment 2, Table 6). The FINAL TREATABILITY STUDIES PLAN was also subjected to a 60 day public comment and review process. |
| 1 | 1 | **GENERAL COMMENTS**<br>If a bench scale is to be done, a projected budget should be developed an included in this treatability study. According to *The Guidance for Conducting Remedial Investigation/Feasibility Study ((RI/FS)* under CERCLA, Bench Scale TS are performed to determine the sizing requirements for pilot scale studies and implementing the technology. The cost associated with a treatability study should have been discussed. | Chapter 5, *Treatability Investigations*, of the quoted document: *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, contains §5.1.1 **Objectives of Treatability Investigations** which states: "Treatability studies are conducted primarily to achieve the following: Provide sufficient data to allow treatment objectives to be fully developed and evaluated during the detailed analysis and to support the remedial design of a selected alternative (and) reduce cost and performance uncertainties for treatment |

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| 1 | 1 | | alternatives to acceptance level so that a remedy can be selected.<br>There is a possibility that this treatability study may be bid on by outside contractors. A cost estimate would not be allowed under the competitive bidding process. |
| 2 | 1 | Laboratory scale testing is commonly referred to as Bench Scale Treatability Studies. It should be made clear in the title and the early part of the document that this is a Bench Scale Treatability Study Work Plan. In the first part of the document, laboratory scale testing rather than bench scale testing was the terminology used. Consistency in terminology should be used throughout the document. Please correct accordingly. | The document will be revised to maintain consistency with regard to use of the phrase: Bench Scale Treatability Studies rather that laboratory scale testing. |
| 1 | 1 | **SPECIFIC COMMENTS**<br>Section 1.1, p.2: This section states that "media that show sufficient capabilities will be further tested". However, the term "sufficient capabilities" is not defined. Please define this term. (See also Sect. 14.1) | Sufficient capacities are defined as meeting the potential Applicable or Relevant and Appropriate Requirements (ARARs) and to-be-considered standards (TBCs). Quantitatively this is an efficiency determination: ([Input COC concentration - Output COC concentration]/Input COC concentration) X 100%. |

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| 2 | 1 | Section 2.2, p.5: Please define TWSP. When first using an(d) acronym, it should be defined then followed by the acronym within parenthesis. | §2.2 **TSWP (not TWSP)** - Treatability Studies Work Plan is used for the first time and defined in the first sentence of the **EXECUTIVE SUMMARY** (prior to §2.2). |
| 3 | 2 | Section 2.3, p.11, Table 2.2: The footnotes to the table provide a definition for BACK; however, BACK is not used in the table (See also Sect. 15.3, Table 15-2) | The footnote BACK will be deleted from Tables 2-2 and 15-2. |
| 4 | 2 | Table 2-2, p.8, please define superscript "a" above the table number. | Table 2-1, the superscript *a* is incorrect and will be replaced with a *1*. Table 2.2, page 8 have no superscripts. |
| 5 | 2 | Table 2-2, p.8: Please define the "a" found in the body of the table. (see also Table 15-1, Sect. 15.2, p.8) | The **a** denotes the first of several documents by the same author and the same year found in the **REFERENCES** section of the document. |
| 6 | 2 | Please define the terms precision and accuracy. These terms should be defined for clarification in the discussion of precision, accuracy, representativeness, completeness, and comparability (PARCC). (See also Sect. 17.2.5.) | Per PARCC as found in Guide for Conducting Treatability Studies under CERCLA, (EPA/540/R-071a, October 1992, §3, Table 5); precision is defined as: a quantitative measure of variability of a group of measurements, normally stated in terms of standard deviation, range, or relative percent difference. Precision is determined from analytical laboratory replicates (split samples) and test replicates (collocated samples). |

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| 6 | 2 | | Accuracy is defined as a quantitative measure of the bias in a measurement system, normally stated in terms of percent recovery. Accuracy is determined by QC samples and matrix spikes with known concentrations. |
| 7 | 2 | Please add the acronyms ERM OPS to the list of acronyms. | Environmental Remediation Management/Operations (ERM/OPS) will be added to the list of acronyms. |
| 8 | 2 | Section 6.4.2, p. 29: The definition of breakthrough as defined in Sect. 6.4.2 states that a breakthrough is a point during the test when the first column becomes exhausted and the concentration of the critical component...begins to rapidly increase and the first column effluent of a cations present in the raw Rocky Flats water. Breakthrough curves are established from the breakpoint, where the concentration of solute in the effluent has suddenly risen to an appreciable value for the first time, to a solute concentration in the effluent, over time that is substantially close to the initial value. | Ion Exchange Training Manual, by George P. Simon (Van Nostrand Reinhold, 1991) defines breakthrough as: "that volume of effluent where the concentration of the exchanging ion in the effluent reaches a predetermined limit. This point is usually the practical end of the exhaustion cycle and the beginning of the regeneration cycle". |

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| 9 | 2 | Section 4.3, p.9: The sentence "Analytical methods are indicated in subsection 6.4.3, Table 6-6." should read"...Section. 6.4.2, Table 6-6." | "Analytical methods are indicated in subsection 6.4.3, Table 6-6" will be corrected to read subsection 6.4.2. |
| 10 | 2 | Section 6.2.1, p.3: In the selection of resins, were the resistance to the particle fracturing and the resistance of the resin to oxidation considered? This information on the resin may be important in the determining the total cost of this technology. | Of the two types of resin commercially available, gel and marcoreticular, macroreticular was chosen because of its resistance to particle fracturing and oxidation. |
| 11 | 2 | Section 6.3, p.25: This sections states that hydrochloric acid produces higher operating capacities than sulfuric acid. How much higher and how will this affect the conclusions and/or further testing? | HCl has approximately 20 to 25% higher operating capacity compared to $H_2SO_4$. However, HCl is more difficult to handle and store requiring stainless steel vessels, valves, and other similar high cost operating equipment. |
| 12 | 2 | Section 6.4.1, p. 26: The treatment targets for COCs are unclear. Please elaborate. | The treatment targets for the COCs are found in §2, Table 2-1, **ANALYTE CONCENTRATIONS AND ARARS**. Performance will be based upon an individual resin's ability to remove COCs down to the ARARS and the resin's efficiency of removal of an individual COC: ([Input COC concentration - Output COC concentration] / Input COC concentration). |

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| 13 | 2 | Section 6.4.2, Step 4 Individually Rinse Columns, p. 33: This section should state that valves V5 and V6 are in Column 1 and not in Column 2 as stated. | The information for valves V5 and V6 will be changed to note that they are in Column 1 and not Column 2. |
| 14 | 2 | Section 6.4.2, Step 7S Test Column for Resin Capacity (Single-Column Operation), p.35: Please define the acronym ERM and add to the list of acronyms. | Environmental Restoration Management (ERM) will be added to the list of acronyms. |
| 15 | 2 | Section 9.0, p.1: This section should explain how the samples and residues will be handled upon being returned to Rocky Flats Plan (RFP). Section 13 states that the samples will be placed in permitted storage. This section should further explain the storage of samples and residues. Also, the limited number of shippers with radioactive and hazardous materials license will require additional time and additional cost. | All sludge and residual waste shipments will comply with the provisions of the Federal Treatability Study Exemption Rule (see §3.9 Guide for Conducting Treatability Studies Under CERCLA). Further, disposal of materials at the source site will be in accordance with the requirements of CERCLA, RCRA, Federal, State, and RFP waste management practices. Should an outside contractor laboratory be used for this program, all unused treatability samples and residues will be returned to RFP under the Treatability Study Exemption Rule. As regards §13, samples will be placed in RCRA permitted storage areas in accordance with RFP policies per the direction of Waste Guidance (WP). |

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| 16 | 3 | Figure 6-2 and Fig. 19-2: Please explain the legend what the shaded areas and cross-hatched areas represent in the two columns. | The shaded areas in the figures indicate influent and the cross-hatched areas indicate resin. Additional information in the notes of these figures will be provided for clarification. |
| 17 | 3 | Appendix A: According to the Guidance for Conducting RI/FS, one of the elements of a field sampling plan is the sampling objectives. Sampling objectives are specific objectives of a sampling effort that describe the intended uses of data should be clearly and succinctly stated. The sampling objective is not stated in this appendix and should be included in the final version of this document. | This TSWP is not being performed under the requirements of a RI/FS. However, the objective of the sampling plan is to generate a composite water sample from two or more samples of ground water and/or surface water to result in that composite sample having levels of COCs above the ARARs. |
| 18 | 3 | There was no comment corresponding to number 18. | |

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| 19 | 3 | Appendix A-1: Please define the boundaries of this diagram. | The bolded boundaries provided in Figure A-1 are the Rocky Flats Plant buffer zone and do not correspond to topographical features. |
| 20 | 3 | Please add the CRP as an appendix to this document. | A CRP has not been developed as this TSWP is not related to a specific OU RI/FS. These studies are being conducted prior to the OU RI/FSs in order to provide information to the RI/FS process and the OU managers. Should one of the treatment options be chosen as the final treatment alternative it will be subjected to the normal CRP as required under EPA CERCLA guidance. |