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**RESPONSE TO COMMENTS ENGINEERED
WASTE MANAGEMENT FACILITY SAMPLING
AND ANALYSIS PLAN AUGUST 1991
NOVEMBER 1991**

08/01/91

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REPORT

2469

RESPONSE TO COMMENTS
ENGINEERED WASTE MANAGEMENT FACILITY
SAMPLING AND ANALYSIS PLAN

AUGUST 1991

NOVEMBER 1991

SUMMARY OF COMMENTS/RESPONSES

Engineered Waste Management Facility
Sampling and Analysis Plan
T. Tank

Date Document Issued August 29, 1991
 Date Comments Due October 7, 1991 /Received EPA - October 23; OEPA - October 18
 Date Responses Due November 21, 1991
 Date Report Due November 21, 1991

General Comments -OEPA

Commenting Organization:OEPA	Commentor:		
Pg. #	Section #	Paragraph #	Sent./Line #
Original Comment #1			

Comment: Ohio EPA review and comment of this sampling plan does not indicate Ohio's acceptance of the siting of a waste disposal site on the FEMP. However, Ohio EPA acknowledges that DOE may need a facility to provide short term storage of waste materials from operable unit remediation and that this facility needs to be properly sited. The issue of siting an onsite disposal facility at FEMP will need to be addressed at a later date.

Response: No comment response required.

Action: No action.

Commenting Organization:OEPA	Commentor:		
Pg. #	Section #	Paragraph #	Sent./Line #
Original Comment #2			

Comment: Has DOE considered characterizing offsite areas to the north as part of this effort. It would appear that, with a small additional effort, DOE could acquire valuable information that would answer future questions about this bedrock area. This would provide a complete technical data base to address on-site and near site disposal options.

Response: The scope of work for the EWMF SAP is limited to on-property waste management. However, DOE would be extremely interested in scheduling expanded discussions on in-state off-property disposal options with the State of Ohio. Please advise.

Action: No action.

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Commenting Organization:OEPA Commentor:
Pg. # Section # Paragraph # Sent./Line #
Original Comment #3

Comment: **This plan is intended " . . . to support the evaluation of an engineered waste management facility (EWMF) for disposal/storage of waste generated through remediation activities" (page 1, line 7). Since this facility must be assessed as a portion of a given alternative during the Detailed Analysis of Alternatives (DAA), DOE must consider the facility's ability to comply with ARARs. Compliance with ARARs is one of the two threshold criteria for the DAA. USEPA's "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (1988) states, ". . The detailed analysis should summarize which requirements are applicable or relevant and appropriate to an alternative and describe how the alternative meets these requirements." DOE must include in this plan any sampling and analysis activities and any reviews of existing site and regional data sources that would provide data for evaluating compliance with applicable or relevant and appropriate requirements (ARARs). The sampling and analysis plan should state ARARs and detail what data is needed to determine the proposed facility's ability comply with specific ARARs. The following possible state ARARs and TBC's should be considered:**

- a. **Ohio Revised Code (ORC) 3734.05(D) - Hazardous waste facility standards**
- b. **Ohio Administrative Code (OAC) 3745-27-07 - Solid waste disposal facility permit to install application.**
- c. **Section 3.0, Table 1, should consider the solid waste siting criteria OAC 3745-27-07(B) in development of the data quality objectives.**

Several siting criteria issues which may pertain to the waste management facility are highlighted below, however, OAC 3745-27-07(B) should be reviewed for a complete listing.

The sanitary landfill facility is not located within the surface and subsurface areas surrounding a public water supply well through which contaminants may move toward and may reach the public water supply well within a period of five years; and

The sanitary landfill facility is not located above an aquifer declared by the federal government under the "SAFE DRINKING WATER ACT" to be a sole source aquifer prior to the date of receipt of the permit to install application by the Ohio EPA; and

The sanitary landfill facility is not located above an unconsolidated aquifer capable of sustaining a yield of one hundred gallons per minute for a twenty-four hour period to a water supply well located within one thousand feet of the limits of solid waste placement, unless deemed acceptable by the Director; and

The limits of solid waste placement are not located within two hundred feet of a stream, lake, or natural wetland, unless deemed acceptable to the Director; and

The isolation distance between the uppermost aquifer system and the bottom of the recompacted soil liner of a sanitary landfill facility is not less than fifteen feet of insitu or added geologic material unless deemed acceptable by the Director.

- d. OAC 3745-50-44 - Contents of "Part B" of the permit application (Hazardous waste)
- e. OAC 3745-54, 55, and 57 - New facility standards (Hazardous waste)
- f. Ohio EPA Division of Groundwater, Final Guidance, GD0202.101 - Guidance on solid waste siting criteria: sole source aquifer
- g. Ohio EPA Division of Groundwater, Final Guidance, GD 0202.105 - Guidance on solid waste siting criteria: minimum distance from a public water supply well
- h. Ohio EPA Division of Groundwater, Final Guidance, GD0303.110 - Significant zone of saturation

Response: DOE has reviewed and understands the ARARs and TBCs that may potentially impact the on-property placement of waste. However, no ARAR or TBC could be presently identified that would prohibit the placement of the EWMF on-property. The purpose of the EWMF SAP is to collect field data for a pathway risk assessment and engineering analysis in support of a CERCLA-based detailed analysis of the waste storage/disposal alternative, specifically construction, operation, closure, and potential post-closure activities. The study area, in conjunction with the FS facility design, will be screened against all ARARs and TBCs during the preparation of each OUs FS.

Action: DOE will submit a complete list of potential ARARs/TBCs to U.S. EPA and OEPA by December 1, 1991.

4. Commenting Organization:OEPA Commentor:
Pg. # Section # Paragraph # Sent./Line #
Original Comment #4

Comment: To determine the adequacy of this sampling and analysis plan the EWMF must be described in more detail. The following information at a minimum must be included:

1. Size and possible design of the facility
2. What depth will the facility need? Will the infiltration (vertically or horizontally) of water pose any design problems?
3. Approximate surface area and volume that the facility will incorporate
4. Waste forms (treated/untreated)
5. Waste types (hazardous, solid wastes, mixed)
6. Sources of waste

Response: The EWMF is in a very preliminary design stage and is intended to supply the on-site disposal capacity that will be required should the alternative of on-site disposal be selected.

The current EWMF concept consists of 45 slab-on-grade concrete vaults with a total capacity of 2,400,000 cubic yards. This volume is based on preliminary estimates of all Operable Unit waste volumes excluding the rescoped OU3 quantities. The vaults are designed to accept waste either in the form of a grout slurry that will be pumped in to solidify (wet vaults) or in discrete waste containers (dry vaults). The actual waste form will be determined in the future based on the results of raw waste leachate and treatability studies, as well as waste retrievability considerations. Some wastes, such as contaminated OU5 soils, may potentially be placed in the vault untreated.

The exterior dimensions of each vault are approximately 644 feet long by 145 feet wide by 26 feet high. Both the wet and the dry vaults will have a double liner and leachate collection and leak detection systems. If the EWMF is used for permanent disposal, a final 16-foot cover consisting of compacted backfill, a low permeability clay layer, a drainage layer, an intruder barrier, and a topsoil layer would be constructed over the vaults.

However, it is important to note that the study area physical characteristics, final waste volume determination, and associated leaching potential of the raw and/or treated wastes will affect the final EWMF design configuration and size. Therefore, all 330-340 acres specified in the SAP will be investigated for potential EWMF use.

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Specific Comments

Commenting Organization:OEPA Commentor:
Pg. #1 Section #1.0 Paragraph # Sent./Line #7
Original Comment #1

Comment: This sentence appears to indicate that the evaluation of the EWMF will be included in a feasibility study. Section 2.4, page 4, line 2, states that any baseline risk assessment for the EWMF study area will be performed under Operable Unit 5. This sentence appears to indicate that the EWMF would be evaluated in the feasibility study for Operable Unit 5. Clarify this issue.

Response: Evaluation of the EWMF concept will be performed as part of each OU Feasibility Study effort which employs this technology in the alternative undergoing a detailed analysis, specifically on-property waste management (storage/disposal). The detailed analysis will evaluate the EWMF against all screening criteria including short- and long-term design, ARARs, NEPA, risk, and cost issues. Because of the time constraints imposed by the various operable unit primary document delivery dates and the defined environmental media/source term or waste of each operable unit, the SAP sample collection and analytical activities will be used to address generic OU risk and engineering storage/disposal issues as stated in Section 3.0, page 1 of 22, lines 1 through 10. The EWMF study area falls within the OU5 media definition. As such, data collected during the EWMF site characterization will support secondary data needs within the RI OU5. Data collected during the effort will be used to support the baseline RA phase of Operable Unit 5.

Action: No action.

Commenting Organization:OEPA Commentor:
Pg. #1 Section #1.0 Paragraph # Sent./Line #14-15
Original Comment #2

Comment: Define "evaluating the viability of siting the EWMF at the FMPC." This should mean evaluation through the DAA but the document suggests otherwise since it fails to address the issue of compliance with ARARs.

Response: See the response to Comment 5. This SAP data collection effort was developed to fill gaps in the existing defined study area database to the extent required to support the OU FS detailed analysis of the EWMF concept during construction, operation, closure, and potential post-closure life cycles for risk and engineering purposes only. A preliminary screening of ARARs related to an on-property hazardous/mixed waste management facility by DOE (including submissions in previous OU deliverables to the U.S. EPA and OEPA) has not been able to identify any prohibitive ARARs.

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Commenting Organization:OEPA Commentor:
Pg. #1 Section #2.0 Paragraph # Sent./Line #22
Original Comment #3

Comment: **The SAP does not recommend sampling of additional wells as stated in this sentence. The SAP should propose the sampling of wells to determine current groundwater concentrations of potential contaminants of concern in the EWMF study area.**

Response: Groundwater sampling of the wells installed under this SAP would be performed as part of OUS's site characterization program.

Action: Line 23 will be clarified to read, in part; "Although no groundwater samples will be taken, the program..."

Commenting Organization:OEPA Commentor:
Pg. #2 Section #2.3 Paragraph # Sent./Line #19-21
Original Comment #4

Comment: **The background soil samples and reports available are not sufficient for conducting the risk assessments (see OEPA letter to Jack Craig, 8/20/91). DOE needs to submit a sampling and analysis plan to collect data for defining background soil concentrations of naturally occurring elements.**

Response: DOE is considering the development of a separate sampling and analysis plan to supplement existing background soil concentrations for all operable units. Text will be revised.

Action: Section 2.0, page 2 of 5, lines 20-22 will be revised to read; "However, these reports are not sufficient for providing background elemental levels in soils for risk assessment and will not provide site-specific data for the EWMF acreage."

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Commenting Organization:OEPA Commentor:
Pg. #2 Section #2.3 Paragraph # Sent./Line #
Original Comment #5

Comment: 2nd bullet: There should be other chemical interaction testing of the waste leachate with other waste to be placed into the facility. There should also be compatibility testing done between the waste and the proposed facility.

Response: See the response to Comment 47.

Action: No action.

Commenting Organization:OEPA Commentor:
Pg. #2 Section # Paragraph # Sent./Line #36
Original Comment #6

Comment: How will the flow path be evaluated.

Response: Groundwater flow paths will be evaluated using a variety of techniques. Monthly water level measurements from wells will provide the water table gradient which indicates flow direction and how it varies over time. Water chemistry data will determine if there are any contaminants being brought into the area and determine the quality of the water as it leaves the proposed site of the EWMF. The SWIFT III flow and transport model will be calibrated with this information and used to predict future impacts on groundwater flow and solute transport. The geochemical model will be used to determine what chemicals will be added to the groundwater flow system if the storage facility leaks into the glacial overburden. This geochemical model, in conjunction with the ODAST vadose zone vertical transport model, will predict the composition of a leachate that could reach the aquifer if vertical migration from the EWMF occurs. The rate and direction of the leachate migration will be determined with the SWIFT III model.

Action: No action.

Commenting Organization:OEPA Commentor:
Pg. #3 Section # Paragraph # Sent./Line #3-5
Original Comment #7

Comment: Will there be more testing for cation exchange capacity and TOC data for the glacial overburden in the proposed area for the EWMF?

Response: Comment noted.

Action: Text will be revised. The following will be added to end of the second sentence: "...as part of the FMPC RI/FS, but additional samples will be collected from the EWMF acreage for further characterization of these parameters (see Section 3.3)."

Commenting Organization:OEPA **Commentor:**
Pg. #3 Section #2.3 Paragraph # Sent./Line #11-13
Original Comment #8

Comment: Section 2.3, page 3, lines 11-13: Is this sentence suggesting only treated waste will be deposited in the EWMF? Does DOE intend to place any untreated, contaminated soil in the EWMF? See General Comment #4.

Response: While most waste can be treated by various technologies including chemical processing, mixing with cement/fly ash, or vitrification, some wastes, such as OUS contaminated soils, may potentially be placed untreated into the EWMF. Therefore, data from raw waste leachate, TCLP, and treatability studies will be utilized to support pathway analysis for the EWMF.

Action: No comment.

Commenting Organization:OEPA **Commentor:**
Pg. #3 Section #2.3 Paragraph # Sent./Line #13-16
Original Comment #9

Comment: See Ohio EPA comments (8/23/91) on the use of the modified ANSI/ANS leach test for the Operable Unit 1 Treatability Study Work Plan.

Response: After review of the referenced Ohio EPA comments (8/23/91), it is believed the commentor is referring to the following item.

"**Commenting Organization:** OEPA **Commentor:**
Pg. # 10 Section # 3.2.3 Paragraph # Sent./Line #
Original Comment # 22

Comment: An adequate rationale must be provided for the use of the 5-Day Static Leach Test. This should include an explanation of how the data generated will support the remedy selection process. The work plan does not identify what data will be generated by the proposed procedure. The American Nuclear Society Leach Test (ANSI-16.11986) from which the procedure is derived is intended to provide values for an effective diffusion coefficient and a leachability index. The static leach test cannot provide those values.

DOE feels that OEPAs comments are adequately addressed in the SAP, Appendix A. Specifically, Section A.2.0 explains the following:

- Why the data is required
- How the data is generated
- What data is to be generated
- The purpose of modified ANSI/ANS - 16.1 (evaluation of contaminant solubility limits, rather than diffusion coefficients)

Action: No action.

Commenting Organization:OEPA Commentor:
Pg. #4 Section #2.5 Paragraph # Sent./Line #8-9
Original Comment #10

Comment: Due to the significant implications of NEPA in the siting of the EWMF, it would seem that DOE will need more than a limited ecological survey. A delineation of wetlands and investigation of endangered species and their habitat would seem to be the minimal requirements of NEPA. DOE should be working to answer as many of these types of data needs as possible to determine as soon as possible if the EWMF is feasible on the FEMP.

Response: Detailed ecological surveys, including threatened and endangered species surveys and wetlands delineation, have been completed for the FEMP property. Habitats adjacent to the FEMP are expected to be similar to those on property. A limited survey will be sufficient to validate this hypothesis. An off-property wetlands delineation can be conducted if wetlands indicators are identified during the ecological survey.

Action: No action.

Commenting Organization:OEPA Commentor:
Pg. #1 Section #3.0 Paragraph # Sent./Line #2
Original Comment #11

Comment: The evaluation of criteria list omits the threshold criteria of compliance with applicable or relevant and appropriate requirements. Revise the list to include this criteria. (See general comment #3)

Response: Comment noted.

Action: The referenced list will be revised starting at line 11, as follows:

- Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered (TBCs).

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The EWMF evaluation will be performed as part of each OUs Feasibility Study effort and will evaluate the EWMF against all screening criteria including short- and long-term design, ARARs/TBCs, NEPA, risk and cost issues. To facilitate this screening process, a complete list of potential ARARs/TBCs will be submitted to the Ohio and U.S. EPAs for action independent of this SAP.

Commenting Organization:OEPA Commentor:
Pg. # Section # Paragraph # Sent./Line #
Original Comment #12

Comment: **Table 3: A description of the tests not referenced is needed in this SAP.**

Response: Comment noted.

Action: TOC and CEC will be added to a revised Table 3.

Commenting Organization:OEPA Commentor:
Pg. # Section # Paragraph # Sent./Line #
Original Comment #13

Comment: **Table 3: How will the Modified ANSI - 16.1 Leach Test be modified? Explain.**

Response: Appendix A of the SAP describes the modification to ANSI/ANS 16.1 Method.

Action: The title to Section A.2.0 will be revised to read "modified ANSI/ANS 16.1 Method."

Commenting Organization:OEPA Commentor:
Pg. # Section # Paragraph # Sent./Line #
Original Comment #14

Comment: **Table 3, Critical Samples: Where will the critical samples be taken from?**

Response: The modified ANSI/ANS 16.1 critical samples have been obtained from the OU1 waste pits. The batch sorption, XRD, and PLM critical samples will be obtained from the geotechnical borings.

Action: Table 3 will be revised to clarify from where the critical samples are taken.

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19. Commenting Organization:OEPA Commentor:
Pg. #10 Section #3.4 Paragraph # Sent./Line #
Original Comment #15

Comment: The risk assessment portion fails to address how the risk from possible radon emissions from the disposal facility will be modelled or calculated. Possible radon emissions from the EWMF should be discussed in the text.

Response: The EWMF sampling and analysis plan is not intended to be a risk assessment, nor is it intended to present the methodology for one. The evaluation of risks associated with an on-site storage/disposal alternative will employ the methodologies detailed in the RI/FS "Risk Assessment Work Plan Addendum." Radon emissions from the emplaced materials will be modeled using source emanation information gathered in each operable unit's treatability study. Risk assessment of the on-site storage/disposal alternative will be evaluated for specific source materials, as part of each source operable unit FS.

Action: No further action proposed at this time.

20. Commenting Organization:OEPA Commentor:
Pg. #10 Section #3.4 Paragraph # Sent./Line #10
Original Comment #16

Comment: If this facility is to be a waste management facility and not a disposal facility, activities would include operation and maintenance instead of closure and post closure activities.

Response: For a description of the EWMF, see the response to Comment 4. The EWMF will be evaluated as both a storage and a permanent disposal technology. While not specifically stated, maintenance activities are required to be evaluated as part of the CERCLA detailed analysis of alternatives process.

Action: The text will be revised by adding "maintenance" to Section 3.4, page 10 of 22, line 12.

21. Commenting Organization:OEPA Commentor:
Pg. #10 Section #3.4 Paragraph # Sent./Line #24-27
Original Comment #17

Comment: Section 3.4, pg. 10, lines 24-27: Since this data will not be acquired until the OU 5 sampling is complete, how will risk from the EWMF be integrated into the FS risk assessments for OUs 1, 2, & 4?

Response: Although this information will be collected concurrently with the installation of wells, the OU5 site characterization data is not critical for the other operable units. The issue is on-property versus off-property disposal for each operable unit. Therefore, the risk

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analysis would cover the construction, operation, maintenance, and closure/post-closure activities of an EWMF. In general, the risks from the EWMF activities would be apportioned among the various OUs dependent on each OUs waste characterization and volume. The comprehensive response action risk evaluation to be included in each OU FS report will examine the risk from the preferred OU alternatives from a site-wide prospective.

Action: No action.

Commenting Organization:OEPA Commentor:
Pg. #10 Section # Paragraph # Sent./Line #31-33
Original Comment #18

Comment: Are long-term effectiveness and permanence grouped together? They do not have the same meaning: long-term effectiveness has a limited time, where permanence means to last indefinitely. Discuss.

Response: The CERCLA guidance document, OSWER Directive 9355.3-01, Chapter 6, groups long-term effectiveness and permanence together as a single criterion. The evaluation of an alternative under this criterion addresses the results of a remedial action in terms of the risk remaining at the site after response objectives have been met. The following components of this criterion will be addressed during the EWMF evaluation:

- Magnitude of residual risk - this factor assesses the residual risk remaining from untreated and treated waste or residuals at the conclusion of an OU remedial activity (e.g., placement into waste management facility).
- Adequacy and reliability of controls - this factor assesses the controls, if any, that are used to manage treatment residuals or wastes that remain at the site (e.g., reliability of containment systems and institutional control).

Action: No action.

Commenting Organization:OEPA Commentor:
Pg. #11 Section #3.0 Paragraph # Sent./Line #
Original Comment #19

Comment: Table 4: Subsurface samples should be taken to obtain background data on the constituents of the subsurface soils. This data is needed to determine the long-term effectiveness of the facility.

Response: The characterization of the subsurface soils in the EWMF study area will be addressed during the sampling effort under OU5. Such characterization will be conducted as part of the Regional Soils Naturally Occurring Constituents Sampling Plan. This program

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will collect information based upon soil type, making the information usable for soils of similar classification elsewhere on site.

Action: No action.

Commenting Organization:OEPA	Commentor:	
Pg. #11 Section #3.4	Paragraph #	Sent./Line #
Original Comment #20		

Comment: Table 4: Under critical samples the table states that "No subsurface soil samples will be taken for chemical analysis." Section 4.4.1, pg. 12, line 8, states that "Unless HNu field screening indicates otherwise, no subsurface soil samples for chemical analysis will be collected." Clarify this discrepancy.

Additionally, if surface soil sampling indicates above background levels of contaminants subsurface soil samples will be needed to determine extent of contamination. DOE should consider subsurface analysis to prevent the need for additional samples.

Response: As stated in the response to Comment 23, if required, the subsurface soil will be collected during the sampling effort for OU5.

The screening of the soils with the HNu will serve as an additional check for volatile constituents and the selection of soil samples for chemical analysis based upon positive results.

Action: The text will be revised to clarify these points.

Commenting Organization:OEPA	Commentor:	
Pg. #12 Section #3.4	Paragraph #	Sent./Line #
Original Comment #21		

Comment: Attachment 1: DOE should justify the limited list of constituents of concern for surface soil. Additional metals on the list should include arsenic, selenium, zinc, chromium, mercury, etc.

Response: The potential constituents of concern which are listed in the SAP's DQOs is consistent with the potential constituents of concern for the OU5 baseline risk assessment. Therefore, this list represents constituents that have been identified in soil samples from OU5 and OU3 thus far. (The OU3 samples are included because the soils in OU3 have been transferred to OU5). The source of this information is the RI/FS database.

As stated in the SAP, a full HSL analysis will be used to document the presence of those potential constituents of concern. Since a full HSL analysis includes the other

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metals listed in the comment (e.g., arsenic, chromium, mercury, selenium, zinc, etc.), additional metals will be added to the list of potential constituents of concern only if detected. These additions would be further addressed under OU5.

Action: No action.

Commenting Organization:OEPA	Commentor:	
Pg. #18	Section #	Paragraph #
Original Comment #22		Sent./Line #

Comment: Attachment 2: Many of the detection limits in this table are above the 10^{-6} risk level. Discuss.

Response: It is DOE's position that remediation goals must be measurable, achievable concentrations. The reviewer has pointed out the discrepancy between the sample detection limits used during the FEMP RI/FS and the site's preliminary remediation goals (PRGs). The risk-based concentration limits in Attachment 2 were calculated using EPA risk assessment methodology (RAGS, HEAST, SEAM, etc...) and represent the site's PRGs. The detection limits cited in this section are the limits presented in the RI/FS QAPP and agreed to by DOE and EPA. These detection limits were selected for two reasons. First, they allow detection of concentrations of constituents which are present above the 95% confidence interval for site background concentrations. Second, DOE believes that these limits represent the practical quantitation levels (PQLs) for the constituents of concern at Fernald. These PQLs are based on a number of considerations, including sample quantity, analytical method, sample counting time, both anticipated and allowable holding times, and the number of samples planned. This is similar to the rationale used by EPA to set the 300 pCi/L PQL for radon in drinking water (56FR33097). Please note that 300 pCi/L corresponds to a lifetime risk of cancer incidence from one constituent and one pathway of 2×10^{-4} .

Action: Include current estimates of background concentrations in Attachment 2 to allow comparisons between background levels and QAPP detection limits. Revise all Attachment 2 detection limits to QAPP specified levels. Clearly reference data sources used to compile background levels and acknowledge current effort to collect additional site-specific background data in text.

Commenting Organization:OEPA	Commentor:	
Pg. #19	Section #	Paragraph #
Original Comment #23		Sent./Line #1

Comment: What are all the exposure scenarios?

Response: The commentor is directed to the draft "Risk Assessment Work Plan Addendum" (October 1991) for a more complete description of exposure scenarios.

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Action: No action.

Commenting Organization: OEPA Commentor:
Pg. #19 Section #3.4 Paragraph # Sent./Line #4
Original Comment #24

Comment: Direct gamma radiation should be considered an additional potential significant route of exposure during construction.

Response: Gamma exposures to workers will be considered (see Table 5). However, experience has shown that the bulk of the risk incurred during handling of dispersible low-level radioactive materials is associated with the inhalation pathway; thus the term "significant exposure." Other pathways, including direct gamma and dermal adsorption of organics, will also be assessed to insure that all reasonable exposure scenarios are evaluated.

Action: The text will be modified to reflect the expectation that the most significant route of exposure during construction will be from the inhalation pathway, but that it is not the only pathway under consideration.

Commenting Organization: OEPA Commentor:
Pg. # 19 Section # 3.4 Paragraph # Sent./Line # 28-30
Original Comment # 25

Comment: Runoff from the EWMF and its construction will most likely enter Paddys Run. DOE should address the potential impacts of this runoff and sedimentation on Paddys Run.

Response: Potential impacts of EWMF construction on Paddys Run will be addressed in the EWMF siting report.

Action: No action.

Commenting Organization: OEPA Commentor:
Pg. # 19 Section # 3.4 Paragraph # Sent./Line # 30
Original Comment # 26

Comment: Identification of wetlands cannot be accomplished solely by the use of aerial photographs. A walk-over survey must be performed to evaluate if wetlands occur in the study area.

Response: The wetlands delineation conducted for the FEMP did not rely solely on aerial photographs and did include an on-property walkover.

Action: No action.

31. Commenting Organization: OEPA Commentor:
Pg. # 19 Section # 3.4 Paragraph # Sent./Line # 30
Original Comment # 27
- Comment:** Define the significance of whether the area "constitutes an area of permanent surface water."
- Response:** The possible existence of permanent surface water in this area has no bearing on its status as a jurisdictional wetland. The point is that collection of surface water and sediment data in this area is impracticable, since surface flooding is very rare.
- Action:** For clarification, the entire last paragraph of Section 3.4 will be revised; see the response to Comment 33.
32. Commenting Organization: OEPA Commentor:
Pg. # 19 Section # Paragraph #Last Sent./Line # Last Paragraph
Original Comment # 28
- Comment:** Could the wetlands pose a possible pathway for airborne contaminants to enter the soil, subsoil and groundwater at a quicker rate? Or the wetlands could cause other pathways of contamination through the plants and animals associated with the area.
- Response:** Wetlands pathways for contaminant transport would not be qualitatively different from those identified for aquatic and terrestrial habitats.
- Action:** No action.
33. Commenting Organization: OEPA Commentor:
Pg. # 20 Section # 3.4 Paragraph # Sent./Line # 1-3
Original Comment # 29
- Comment:** This paragraph and the portion on the preceding page are confusing and need to be reworded.
- Response:** The paragraph will be clarified.
- Action:** Replace Section 3, Pages 19-20, Lines 28-31 and 1-3, with the following: "Pathways involving surface waters and sediments per se do not exist in the study area. (The jurisdictional wetland located in the northern part of the study area does not ordinarily contain standing water.) For these reasons, it is impracticable to obtain data on surface water and sediment contamination in the study area. However, potential impacts of EWMF construction and operation on surface water, including wetlands, will be evaluated in the siting report."

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Commenting Organization: OEPA Commentor:
Pg. # 20 Section # 3.5 Paragraph # Sent./Line # 27-28
Original Comment # 30

Comment: **Constituents need not be toxic to threaten ecological receptors. Concentrations affecting reproduction, embryonic development, etc. are sufficient to justify additional sampling.**

Response: The word toxic as used here includes potential sublethal effects such as reproduction and development.

Action: For clarity, the phrase "acute and chronic toxic effects" will be substituted for the word "toxic."

Commenting Organization: OEPA Commentor:
Pg. # 21 Section # 3.5 Paragraph # Sent./Line # Table 6
Original Comment # 31

Comment: **Constituents of Concern: Justification should be provided for the use of uranium as the only contaminant to be analyzed. Is uranium the most easily absorbed or bioaccumulated contaminant of concern? Is it only because it is the most abundant contaminant? Appropriate references should be cited in the justification.**

Response: Uranium will be analyzed because it is the most abundant and widely distributed contaminant at the FEMP. As stated in the text and table, other constituents will be analyzed in the design stage if they are found in soils at sufficient levels to be of concern for ecological risk.

Action: No action.

Commenting Organization: OEPA Commentor:
Pg. # 21 Section # 3.5 Paragraph # Sent./Line # Table 6
Original Comment # 32

Comment: **Critical Samples: Replace "field geologist" with field botanist/biologist. Wetlands should not only be noted but should be delineated to determine compliance with ARARs and NEPA. Since Facimire et. al., 1990 noted that the endangered Indiana Bat was present in the areas surrounding the FEMP, efforts should be made to determine the presence or absence of these bats in the off property study area and any impact the EWMF and its construction might have on the bats habitat.**

Response: As stated in the response to Comment 14, formal wetlands delineation can be conducted if wetlands indicators are identified in the ecological survey. The endangered species

survey conducted for the RI/FS included evaluation of potential off-property habitat for the Indiana bat. Indiana bats were not found adjacent to or on FEMP property.

Action: "Field geologists" will be changed to "field biologists."

37. Commenting Organization: OEPA Commentor:
Pg. # 22 Section # 3.5 Paragraph # Sent./Line # 5
Original Comment # 33

Comment: An additional pathway which must be considered for ecological receptors is inhalation and the ingestion of soils by receptors (i.e., moles and mice) living in or on contaminated soils.

Response: Soil ingestion will be considered as a possible pathway for contaminant uptake by ecological receptors.

Action: The word "grazing" will be deleted from Section 3.5, page 22 of 22, line 14.

38. Commenting Organization: OEPA Commentor:
Pg. # 1 Section # 4.0 Paragraph # Sent./Line #
Original Comment # 34

Comment: The activities should be conducted under the RI/FS QAPP as stated, so long as recent comments submitted by Ohio EPA and USEPA on the QAPP are implemented.

Response: The EWMF SAP field activities will be conducted under the latest revision to the RI/FS QAPP in force at the time the activities take place.

Action: No action.

39. Commenting Organization: OEPA Commentor:
Pg. # Section # 4.0 Paragraph # Sent./Line #
Original Comment # 35

Comment: The screened interval for all 1000 series wells should be sampled to ensure the proper formation is monitored.

Response: All well installation and soil sampling specified in the SAP is per the RI/FS QAPP. Generally, locations where multiple wells are clustered in close proximity, only the deepest well will have soil samples collected. This avoids the time and expense of collecting redundant samples and aids in identifying the correct screen placement depth for the shallower well(s) in the cluster. During the installation of the shallower well in

the cluster, a site-experienced field geologist will exam the soil cutting to verify proper screen placement depth based on the boring profile from the adjacent deeper well.

Action: No action.

40. Commenting Organization: OEPA Commentor:
Pg. # 1 Section # 4.1 Paragraph # Sent./Line # 33
Original Comment # 36

Comment: Define hydraulic communication.

Response: Comment noted.

Action: The term "hydraulic communication" will be deleted and the text will be revised to read as follows: "...each well will be developed to ensure it is clear of fines and sediment and the readings for pH, specific conductance, and temperature are stable per the RI/FS QAPP requirements."

41. Commenting Organization: OEPA Commentor:
Pg. # 2 Section # 4.1 Paragraph # Sent./Line # 1
Original Comment # 37

Comment: By what method will the hydraulic conductivity be tested?

Response: The specified slug test will be performed per the RI/FS Work Plan, Volume 5, Section 5.6 (e.g., the introduction of an appropriate decontaminated stainless steel solid cylinder of known volume into the well casing and noting the lessening of water level versus time).

Action: No action.

42. Commenting Organization: OEPA Commentor:
Pg. # Section # 4.1.2 Paragraph # Sent./Line #
Original Comment # 38

Comment: The proposed monitor wells and geotechnical borings should be located in such a manner to provide adequate coverage of the area and to ensure that representative samples are collected for the study area. A grid pattern may provide better coverage of the study area for the geotechnical borings compared to the linear alignment of the proposed boring locations shown on Figure 4. All decontamination water and development water should be containerized and tested to ensure proper disposal while any water added into a well during drilling must be tested, and 3 to 5 times the amount of water added during drilling should be removed during development to ensure that representative samples are collected.

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Response: The geotechnical boring configuration was chosen to gather additional engineering information (soils data) in the site interior between the new and existing well locations located along the study area perimeter. In addition, the borings were slightly off set from dead center, east to west, to obtain chemical and radiological data in historically suspect areas (e.g., north of the treatment plant). This placement allows a crude grid pattern to be established that minimizes project costs while, in conjunction with new and existing well boring data, meeting the objectives of the FS program's geotechnical needs. If required, all additional engineering/geotechnical data will be collected as part of the remedial design phase.

Action: No action.

Commenting Organization: OEPA	Commentor:
Pg. # 5 Section # 4.2.1	Paragraph # Sent./Line # 21
Original Comment # 39	

Comment: Explain how the drillers will know that the borehole is "sufficiently above the overburden/aquifer interface as to avoid leakage from any perched zones into the aquifer."

Response: Comment noted.

Action: Text will be revised for clarity to incorporate OEPA concerns. If perched water is encountered in the geotechnical borings, drilling will cease and the boring abandoned per the RI/FS Work Plan, Volume 5, Section 5.2 (e.g., bentonite grout). The boring will be relocated and reinitiated at a new location based on the discretion of the field geologist/geotechnical engineer and the EWMF RI/FS program manager.

Commenting Organization: OEPA	Commentor:
Pg. # Section # 4.2	Paragraph # Sent./Line #
Original Comment # 40	

Comment: All geotechnical borings need to be properly abandoned upon completion.

Response: Comment noted.

Action: Text will be revised by citing appropriate RI/FS protocol for boring abandonment.

Commenting Organization: OEPA	Commentor:
Pg. # 7 Section # 4.2.2	Paragraph # Sent./Line # 15
Original Comment # 41	

Comment: Define what DOE considers background radiation levels for soil.

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Response: Samples will be shipped to nonlicensed facilities only if radionuclide concentrations are less than generally licensable quantities, such as defined in 10CFR30.18, or less than permissible levels of radiation in unrestricted areas, as defined in 10CFR20.105 or appropriate AGREEMENT STATE Regulations.

Action: No action.

Commenting Organization: OEPA Commentor:
Pg. # 7 Section # 4.2.2 Paragraph # Sent./Line # 20
Original Comment # 42

Comment: Explain the meaning of "meeting the intent" of ASTM Method D3740-80.

Response: Comment noted.

Action: Text will be revised to delete the words "the intent of."

Commenting Organization: OEPA Commentor:
Pg. # 7 Section # 4.3 Paragraph # Sent./Line # 24-25
Original Comment # 43

Comment: Waste interaction between other waste and the facility should be tested also.

Response: The waste interaction between other waste and the facility will not be addressed in this SAP. There are other RI/FS programs, such as treatability, where it can be more appropriately addressed. The interaction between a vitrified or cement-treated waste and surrounding structural concrete would be, in all likelihood, marginal. If vitrified, the waste would offer little or no potential leachate generation or interaction with infiltrated rainwater. If treated with cement/flyash etc., the waste would have, to a great degree, already reacted to the surrounding matrix pazzolonic (cementitious) material in the waste mix.

Action: No action.

Commenting Organization: OEPA Commentor:
Pg. # 11 Section # 4.3.2 Paragraph # Sent./Line # 7 and 20
Original Comment # 44

Comment: Brass liners are not appropriate for sample collection and storage of samples that will be analyzed for metal content and/or adsorption ratios. Stainless steel liners should be used.

Response: Comment noted.

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Action: Text will be revised to replace the word "brass" with "stainless steel."

Commenting Organization: OEPA Commentor:
Pg. # 12 Section # 4.4.1 Paragraph # Sent./Line # 8
Original Comment # 45

Comment: The HNu can be used as a field screening tool; however, it will not detect all possible chemical constituents of concern.

Response: As stated in the response to Comment 24, the use of the HNu will be used as an additional check for volatile constituents during sampling operations. The HNu will be used to screen the samples as well as monitor the work zone of the sampling crew. It is acknowledged that the HNu cannot detect all potential chemicals of concern. If required, additional sampling and analysis will be conducted for OU5 to characterize the subsurface soils.

Action: No action.

Commenting Organization: OEPA Commentor:
Pg. # 12 Section # 4.4.3 Paragraph # Sent./Line # 27
Original Comment # 46

Comment: This section describes radiation field measurements for beta and gamma emitters. Section 3, pg. 17, Table 5, describes a surface gamma survey. Clarify this discrepancy.

Response: Comment noted.

Action: Delete reference to beta radiation from text.

Commenting Organization: OEPA Commentor:
Pg. # 15 Section # 4.4.3 Paragraph # Sent./Line # 1
Original Comment # 47

Comment: Explain how the results of the walkover survey may influence the location of surface soil sampling.

Response: It is possible that the proposed gamma survey will discover a previously undetected area containing elevated (i.e., above background) levels of contamination. If this is the case, the sampling plan may be altered or supplemented to further characterize this area.

Action: Text will be clarified.

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Commenting Organization: OEPA Commentor:
Pg. # 15 Section # 4.5 Paragraph # Sent./Line # 21-29
Original Comment # 48

Comment: See Specific Comment #32.

Response: See response to Comment 36 (Specific Comment 32).

Action:

Commenting Organization: OEPA Commentor:
Pg. # 17 Section # 4.5.2 Paragraph # Sent./Line # 8-9
Original Comment # 49

Comment: **Justification should be provided for collecting twig and leaf tissue for uranium analysis. Are these the most likely portions of the tree to accumulate uranium? Wouldn't core samples provide a better estimate of uranium concentration in the tree since much higher levels of uranium air releases occurred in the past. Appropriate references should be cited in the justification.**

Response: It is important for comparative purposes that the data collected for this study use established methods. A preliminary survey of the literature on radionuclide uptake by trees indicates that leaf and twig tissue is more commonly sampled than are wood cores. This is true for both uranium and other radionuclides. Example references are listed below and will be added to the text of the sampling plan. Further, one study (Landeem and Mitchell 1986) which compared leaf and twig tissue samples with cores found similar levels of plutonium, cesium, and strontium in the two sample types.

Garten, C.T., 1980, "Comparative Uptake of ²³⁴U, ²³⁸U, ²³⁹U, ²⁴¹Am and ²⁴⁴Cm by Boxelder Trees (*Acer negundo*) Inhabiting a Contaminated Tennessee Floodplain," Health Physics, Vol. 339, pp. 332-334.

Landeem, D.S. and R.M. Mitchell, 1986, "Radionuclide Uptake by Trees at a Radwaste Pond in Washington State," Health Physics, Vol. 50, pp. 769-774.

Pinder, J.E., K.W. McLeod, J.J. Alberts and D.C. Adriano, 1984, "Uptake of ²⁴⁴Cm, ²³⁸Pu and Other Radionuclides by Trees Inhabiting a Contaminated Flood Plain," Health Physics Vol. 47, pp. 375-384.

Sheard, J.W., 1986, "Distribution of Uranium Series Radionuclides in Upland Vegetation of Northern Saskatchewan, I. Plant and Soil Concentrations," Canadian J. Botany, Vol. 64, pp. 2446-2452.

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Action: Add the following after the second sentence of Section 4.5.2 (Section 4, Page 17 of 17, Lines 8-10):

"Sampling of twig and leaf tissue, which is more commonly sampled than other plant tissue (Garten 1980; Landeen and Mitchell 1986) will allow comparison of FEMP concentrations with those in trees from other contaminated and noncontaminated sites." Add the references of Garten (1980) and Landeen and Mitchell (1986) to the SAP reference section.

General Comments - U.S. EPA

Commenting Organization:U.S. EPA	Commentor:
Pg. # Section #	Paragraph # Sent./Line #
Original Comment #1	

Comment: The SAP describes various programmatic needs and data analysis required, but no specific remedial actions. The SAP should include the remedial actions contemplated, which may help identify additional, action-specific data needs.

Response: The commentor is directed to review the various operable unit initial screening of alternatives tasking documents. In those documents, numerous remedial action alternatives and supporting technologies were compared amongst each other and to the CERCLA screening criteria. The EWMF is one of those supporting technologies, specifically an on-property waste storage/disposal technology, not a remedial action.

Action: No action.

Commenting Organization:U.S. EPA	Commentor:
Pg. # Section #	Paragraph # Sent./Line #
Original Comment #2	

Comment: An overall sampling matrix should be included to identify the number of sampling locations, samples, and analyses. Presently, these items are covered separately under each programmatic group, causing confusion.

Response: Numerous attempts at creating an overall sampling matrix were attempted during the SAP development. However, each format was confusing and seemed potentially contradictory to the descriptive text unless a large series of supporting notes were appended.

Unlike radiological and chemical sample collection, the selection of geotechnical, geologic, and/or geochemical samples requires active intervention by a trained specialist to determine the appropriate depth, location and number of sample collection points. Therefore, it is recommended that the present table formats be maintained and the SAP

text be clarified in Section 4.0 to assist the reader in interpreting the sampling frequency.

Action: Minor text revisions to Section 4.0.

Commenting Organization:U.S. EPA	Commentor:
Pg. # Section # Paragraph # Sent./Line #	
Original Comment #3	

Comment: Tables 1 through 6 contain duplicate and overlapping information. For example, the Data Quality Objectives (DQO) for Geologic and Hydrogeologic Table 1 includes radiological, chemical, geochemical, and geotechnical analyses. Similarly, the DQO for Geotechnical Table 2 includes radiological, chemical, geochemical, geologic and hydrogeologic analyses. Additionally, radiological, chemical and geochemical analyses are included in Tables 3, 4 and 5 respectively. This duplication creates considerable confusion.

Response: Comment noted.

Action: Tables 1 through 6 will be revised to incorporate comment.

Commenting Organization:U.S. EPA	Commentor:
Pg. # Section # Paragraph # Sent./Line #	
Original Comment #4	

Comment: The heading "Critical Samples" in Tables 1 through 6 should be changed to "Number of Samples" because none of the samples is identified as being critical; only the total number of samples is identified.

Response: Comment noted.

Action: Tables 1 through 6 will be revised to incorporate comment.

Specific Comments

Commenting Organization:U.S. EPA	Commentor:
Pg. #1 Section #2.1 Paragraph # Sent./Line #15	
Original Comment #5	

Comment: This sentence should be clarified. It seems to imply that very few monitoring wells exist because of "the need to determine the nature and extent of contamination..."

Response: The sentence is correct as presently written. For this reason, DOE will be placing additional wells under a separate program to aid in FEMP site characterization.

Action: No action.

59. Commenting Organization:U.S. EPA Commentor:
Pg. #3 Section #2.4 Paragraph # Sent./Line #30
Original Comment #6

Comment: The following sentence should be clarified: "The securing of radiological and chemical samples allows maximum use of the time, resources, and logistics involved in the installation of the geotechnical borings and monitoring wells." The samples are to be collected during installation of borings and wells.

Response: Comment noted.

Action: Text will be clarified to read, as follows; "The radiological and chemical samples will be collected during installation of the geotechnical borings and monitoring wells."

60. Commenting Organization:U.S. EPA Commentor:
Pg. # Section #3 Paragraph # Sent./Line #
Original Comment #7

Comment: Tables 1 and 2: The "Critical samples" heading is inaccurate and should be used for water content determination and one-dimensional consolidation tests.

Response: Comment noted.

Action: Tables 1 through 6 will be revised to incorporate comment.

61. Commenting Organization:U.S. EPA Commentor:
Pg. # Section #3 Paragraph # Sent./Line #
Original Comment #8

Comment: Table 2: The latest ASTM test designation numbers should be used for water content determination and one-dimensional consolidation tests.

Response: Comment noted.

Action: Test designations on Tables 2 and 9 will be revised to read, as follows: "ASTM D2216-90" and "ASTM D2435-90"

62. Commenting Organization:U.S. EPA Commentor:
Pg. # Section #3 Paragraph # Sent./Line #
Original Comment #9
- Comment:** Table 2: For permeability testing, the test to be used for a given type of soil should be identified.
- Response:** Comment noted.
- Action:** Table 2 will be revised by adding explanatory notes identifying falling head permeability as used on soils having a permeability of less than 10^{-4} cm/s and constant head permeability as the permeability of granular soil. Both explanatory notes are based on their respective agency's test description.
63. Commenting Organization:U.S. EPA Commentor:
Pg. # Section #3 Paragraph # Sent./Line #
Original Comment #10
- Comment:** Table 2: Standard Proctor or Modified Proctor test should be included to determine the moisture and density relationship for any kind of soil.
- Response:** After review of the detailed analysis of alternatives (DAA) geotechnical engineering data requirements, DOE has determined the inclusion of the Proctor tests would not yield any particularly useful information. At the DAA stage of engineering, available geologic boring profiles and conventional geotechnical judgment/experience can be substituted for determining bearing capacity of potential site fill materials and estimated cost envelopes for structural placement. Typically, foundations are constructed on compacted fills only when the design absolutely warrants it. However, during preliminary remedial design efforts, laboratory Proctor tests on various site soils will be performed as mandated by DOE and standard engineering practices.
- Action:** No action.
64. Commenting Organization:U.S. EPA Commentor:
Pg. #10 Section #3.3 Paragraph # Sent./Line #3
Original Comment #11
- Comment:** A total of 33 samples are needed for soil characterization, but only 29 samples are identified in Table 3. This discrepancy should be resolved.
- Response:** Comment noted.

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Action: Text will be revised to read; "23" samples and Table 3 will have an explanatory note stating "Each of the 20 selected split-spoon samples (see Section 4.3.2) will yield the following samples for analysis: (1) TOC, (1) CEC, (1) XRD, and (1) PLM."

Commenting Organization: U.S. EPA Commentor:
Pg. #20 Section #3.5 Paragraph # Sent./Line #23
Original Comment #12

Comment: This sentence should be clarified. It seems to imply that accumulation of radionuclides by trees is beneficial to animals and plants and that removal of trees could pose a risk to animals and plants.

Response: Removal of trees poses a potential ecological risk because accumulated contaminants could be mobilized, for example, via air dispersion of sawdust or natural decay of wood and needles. The sentence will be clarified.

Action: Insert the following after the first sentence (Lines 22-23) of Section 3, Page 20, Paragraph 4:

"These activities could mobilize radionuclides taken up by trees into the environment."

Insert "therefore" between "could" and "pose" in Line 23 of Page 20, Section 3.

Commenting Organization: U.S. EPA Commentor:
Pg. # Section #4 Paragraph # Sent./Line #
Original Comment #13

Comment: Table 8: It should be explained how the number of tests are arrived at. There are two Shelby tube samples for each of the 18 boreholes, making a total of 36 soil samples; however, number of tests for each specific kind of test varies between 10 and 100.

Response: Shelby tubes will be taken to collect undisturbed geotechnical soil samples when cohesive material is encountered. From these estimated 36 Shelby tubes (2 tubes per boring x 18 borings), a geotechnical engineer or geologist will select 10 representative soil samples for undisturbed laboratory analysis. It was further estimated for SAP program purposes that the following additional split-spoon samples would be selected by the field technician:

- 3 split-spoon samples per geotechnical boring (total = 54 samples)
- 4 split-spoon soil samples per 1000-series geologic boring (total = 20 samples)

for a total of 74 disturbed samples. Additional allowances have been included for more disturbed soil analyses, specifically grain size distribution, to assist in engineering

material properties characterization and unforeseen subsurface conditions encountered during drilling. However, it must be restated that these estimates are assumptions, and the number of samples collected per borehole could change in response to the subsurface soils conditions.

The SAP will collect the optimum amount of geotechnical information needed to perform a DAA engineering evaluation in support of the RI/FS effort. In addition, the 18 geotechnical borings will supplement the study area's geological database.

Action: Section 4.2.2, Page 7 of 17, Line 11 will have text added to explain the assumptions used for the number of tests.

67. Commenting Organization: U.S. EPA Commentor:
Pg. #11 Section #4.3.2 Paragraph # Sent./Line #
Original Comment #14

Comment: This section should identify the leach tests included in Section 3, Table 3, and Appendix A.

Response: Comment noted.

Action: Text will be revised to identify the modified ANSI/ANS 16.1 leach test derived recipe used in the batch sorption tests. In addition, Appendix A, Section A.2.0 heading will be revised to read, "Modified ANSI/ANS 16.1 Method."