TECHNICAL REVIEW COMMENTS ON
"DRAFT FINAL WASTE PITS REMEDIAL ACTION PROJECT (WPRAP)
REMEDIAL ACTION PACKAGE"

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

GENERAL COMMENT

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Not Applicable (NA) Page #: NA Line: NA
Original General Comment #: 1

Comment: In the "Sampling and Analysis Plan" (SAP) and other documents within the remedial action (RA) package, greater document conciseness and consistency could be achieved by citing the "Sitewide Comprehensive Environmental Response, Compensation, and Liability Act Quality Assurance Project Plan" (SCQ) instead of presenting tables and text. Similar Fernald Environmental Management Project (FEMP) documents, such as those for the Soil Characterization and Excavation Project, have benefitted from such citation of the SCQ. The RA package should be revised to incorporate appropriate citation of the SCQ and to include project-specific information only when the SCQ does not contain the necessary procedures, standards, or other material. In addition, the SCQ citation on Page 4 of the "Overview of Remedial Action Package" should be revised to reflect the current edition of the SCQ (Revision 1, September 1998) rather than the original edition (Revision 0, May 1994).

Response: DOE agrees that the concept of the SCQ is to provide consistency between the sampling and analysis efforts at the FEMP, through identifying specific standards, requirements, etc., which can then be referenced in the project-specific sampling plan (PSP), rather than repeating such information in each PSP. In this regard, the SCQ is a baseline document for use in generating the PSPs, and facilitating the discussions presented therein. The SCQ also provides the flexibility, however, to allow for a project to deviate from the SCQ through the development and approval of the PSP.

For WPRAP, it is DOE's opinion that the need to include the tables and the text, instead of making multiple references to the SCQ, is justified. Specifically, as a distinct operational unit, IT benefits more from having all of the information in a single operational document, rather than referencing the user of the document to the SCQ. In the end, nothing is lost through this presentation, and it is DOE's opinion that benefit is gained.

Another reason for including some of the tables in the PSP is that the detection limits specified in the SCQ are lower than are required for the needs of this project, as defined in the SAP and other RA documents. Therefore, as the SCQ allows, higher detection limits have been used where appropriate, and documented in the text and tables.

Action: The following sentence has been added to the Analytical Requirements sections of the SAPs (e.g., Section 2.6 of the SAP for Waste Pit Materials): "Deviations from the Sitewide CERCLA Quality Assurance Project Plan (SCQ) are incorporated, as appropriate, in the aforementioned tables." As stated in the response to USEPA Specific Comment #1 on the Overview of Remedial Action Package, the Reference Section has been deleted. It should be noted, however, that the SAPs do reflect the latest revision of the SCQ.

TECHNICAL REVIEW COMMENT ON "OVERVIEW OF REMEDIAL ACTION PACKAGE"

SPECIFIC COMMENT

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.0 Page #: 4 Line: NA
Original Specific Comment #: 1

Comment: The list of references includes a number of ambiguous entries. For instance, Lines 15 and 22 both use "DOE (1994)," while Line 19 uses "DOE (1994b)." Similarly, Lines 25 and 28 both use "DOE (1995)." This listing should be revised to provide proper, unambiguous entries for all references, and the corrected entries should be properly cited in the various documents of the RA package.

Response: Agreed. There do appear to be a number of ambiguous entries. In addition, upon further review of the RA Package, there appears to be instances where this reference list is not used and/or not needed, where the reference in the text does not match the list, where the list does not accurately reflect documents referred to in the text, etc. DOE has determined, therefore, that the easiest way to address this issue is to delete this Reference Section.

Action: Section 5 of the Overview of the Remedial Action Package has been deleted.

TECHNICAL REVIEW COMMENT ON "SAMPLING AND ANALYSIS PLAN"

GENERAL COMMENT

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line: NA
Original General Comment #: 1

Comment: The selection of radionuclides of concern and methods to be used to analyze for these isotopes presents concerns that should be addressed. The waste pit material SAP states that the material removed may be indicative of enriched uranium. If this is the case, higher activity contributions from uranium 234 and uranium 235 would be evident that would not occur with depleted or natural uranium. Therefore, it is not clear why total uranium analysis was selected for environmental media samples. Although this analytical method may provide accurate uranium concentrations on a weight basis, it will not allow evaluation of the higher specific activity uranium isotopes. If isotopic uranium analysis is specified for the waste pit materials, the same method should be specified for environmental media.

In addition, contingency analyses for the presence of unspecified isotopes should be incorporated into the SAPs. The waste pits served as disposal cells for waste generated throughout the FEMP site. Therefore, any radioisotopes handled on the site during the years of waste pit operations could have made their way into the waste pits. Although site production facilities primarily handled uranium, thorium, and their daughter isotopes, site laboratories and research facilities may have handled a larger array of radionuclides. For this reason, the SAPs should specify a gross analytical method, such as gamma spectrometry, for both waste pit materials and environmental media.

Response: Total uranium analysis is used only for wastewater and stormwater analyses, not for the analysis of air samples. For wastewater and stormwater analyses, the selection was based on consistency with the management of these waters in general at the FEMP for discharge in accordance with the NPDES permit. Specifically, discharge is based on total uranium, and is not isotope specific. In the case of the waste pit material, there is a specific basis for the isotopic uranium analysis specified in the SAP for Waste Pit Materials, as identified therein.

Enrichment is a criticality safety and Envirocare WAC Compliance issue. In water samples, the concentration of Uranium are expected to be very low. Because the concentrations are so low, there is no criticality issue associated with water samples. Total Uranium analysis provides adequate information for personnel and environmental protection. The SAP for Waste Pit Materials addresses the WAC Compliance issue with respect to enrichment.

Action: No further action required with respect to the RA Package.

TECHNICAL REVIEW COMMENTS ON "SAMPLING AND ANALYSIS PLAN FOR ENVIRONMENTAL MEDIA"

SPECIFIC COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3 Page #: 7 Line: NA
Original General Comment #: 1
Comment: Although radium 226 must be monitored and reported under WPRAP, no acceptance criterion is specified for this isotope. This omission should be justified. Furthermore, technetium 99 may be present in reprocessed uranium. Because the distribution coefficient for technetium 99 is quite low, it tends to partition to aqueous media. For this reason, the text should be revised to include monitoring and reporting of technetium 99.

Response: As discussed in the response to USEPA Comment #1 on the SAP, the selection of analytes for wastewater/stormwater sampling was based, generally, on providing the levels and type of data needed to ensure compliance with the NPDES permit. It is for this reason, that it is not necessary to analyze for Technetium 99. Additionally, certain analytes such as Thorium were added to ensure that operations of the AWWT were not otherwise adversely affected by discharges from the WPRAP operations.

Action: No further action required with respect to the RA Package.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.6 Page #: 11 Line: NA
Original Specific Comment #: 2
Comment: This section and the cited tables discuss analytical methods and associated quality control (QC) requirements. Table 2.1 notes that process control testing for nickel, chromium, and copper will be performed using "Hach kits" or the equivalent rather than Method 6010B. Similarly Table 2.3 notes that total uranium will be analyzed for using pulsed laser phosphorimetry rather than Method 6010B. First, the Hach Company and its competitors

market several testing kits for each of the listed metals. Most of these kits use colorimetry, but some use titrimetry, and others use paper strips. The SAP should be revised to specify the kits or methods to be used and to include appropriate QC requirements. The minimum QC requirements would be blanks, duplicates, laboratory control samples, and matrix spikes. In addition, the SAP should specify QC criteria for the total uranium analyses similar to those in Table 3.2.

Response: As discussed in Sections 2.4 and 2.5 of this SAP, the samples which are being analyzed with the use of "Hach kits" are process samples (i.e., samples being taken to facilitate the operation of the treatment facilities). DOE has provided information in this SAP to aid in describing how it will support the entire process. In that this sampling and analysis is for internal control purposes only, and will not be used to demonstrate compliance with remedial action objectives associated with meeting environmental discharge requirements, the SCQ does not require that the associated methods and QC requirements be included in this SAP. As an aside, it should be noted that the SAP is being revised to replace the use of Hach kits with X-Ray Fluorescence (XRF) for this screening of metals in waters. When using the XRF, a pre-concentration step will be used to collect the metals in a thin layer geometry for analysis. The instrument will be calibrated per the manufacturers requirements.

Action: The SAP has been revised to reflect the change from "Hach type kits" to the "XRF".

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.5 Page #: 18 Line: NA
Original Specific Comment #: 3
Comment: This table lists an acceptance limit for duplicate pH measurements of 20 percent relative percent difference (RPD). This acceptance limit is not appropriate for logarithmic units such as pH units. The table should instead list the $\pm$0.2 pH unit criterion given in Table G-2 of the SCQ.

Response: Agreed. The limits will be changed to reflect the criterion in Table G-2, which, according to the currently approved SCQ, is $\pm$ 0.1 pH, not $\pm$ 0.2 pH.

Action: Table 2.5 of the SAP for Environmental Media has been revised to show a $\pm$ 0.1 pH acceptance level.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.6 Page #: 18 Line: NA
Original Specific Comment #: 4
Comment: This table gives QC criteria for total suspended solids analysis. However, the corrective action for method blanks differs from that in Table 3.3. This discrepancy should be reconciled.

Response: Agreed. Table 3.3 will be revised to match Table 2.6.

Action: Table 3.3 of the SAP for Environmental Media has been revised to match Table 2.6.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.0 Page #: 31 Line: NA
Original Specific Comment #: 5

Comment: Section 4.0 discusses monitoring for radionuclide emissions other than radon as required by Title 40 of the *Code of Federal Regulations* Part 61, Subpart H. However, FEMP is also subject to the radon emission regulations of Subpart Q of Part 61. In fact, FEMP is explicitly mentioned (under its former name, "Feed Materials Production Center") in the "Designation of Facilities" section of Subpart Q. The SAP should be revised to discuss how compliance with the 20 picocuries per square meter per second standard for radon listed in Subpart Q will be verified.

Response: The standard of 20 pCi/m2/sec applies only to the waste pits prior to excavation and after the pits have been remediated. The waste pits, as is, do meet the standard. After the pits are remediated, radon emissions will be measured to verify that the standard has been met. During excavation and working of the pit materials, BAT shall be applied to minimize radon emissions.

Action: No further action required with respect to the RA Package.

TECHNICAL REVIEW COMMENTS ON "SAMPLING AND ANALYSIS PLAN FOR WASTE PIT MATERIALS"

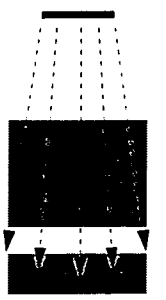
SPECIFIC COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3.2 Page #: 9 Line: 29
Original Specific Comment #: 1

Comment: The text discusses use of a gamma scanner to provide a 100 percent evaluation of individual bin composites. In addition to evaluating gamma-emitting target radionuclides, this scanner is intended to provide information regarding the enrichment status of uranium. However, the text provides little information on how this scanner is to be used. The text should be revised to provide additional information on the specific technical capabilities and limitations, including detection limits, of this scanner.

Response: IT and Oxford Instruments (now Canberra -- purchased in February, 1999), developed a gamma approach specifically designed to monitor actinides and the levels expected in the wastes. The process is based on using short co-axial HPGe detectors in conjunction with an external source to correct for self-absorption of weak gamma rays. The short co-axial detector was selected to obtain high resolution of low energy gamma rays while minimizing Compton background. Schematically the new system looks like:

- **Co57 Source Used to Correct for density and effective Z**
- **Flat Sample Geometry (can be "thick" or "thin") used for simplicity and consistency**
- **Short Coax HPGe Used for low Compton Background in 40-200 kev Range (for Actinides)**



Data Available for All Nuclides of Interest in Approximately 30 Minutes

Gamma analysis was selected for the following reasons:

1. Very rapid – Possible to screen Pit materials in a few minutes, and analyze Blended Wastes in a few hours,
2. Very robust and less likely to become contaminated (specially with recoil species as in Alpha Spectroscopy)
3. Produces no waste – Unlike Alpha Spectroscopy and Alpha/Beta Methods
4. Can be applied to all isotopes of interest for the Blended Wastes (Uranium, Thorium, and Radium)
5. Not subject to chemical interferences likely to be encountered with Alpha Spectroscopy

Action: The SAP has been revised to reflect the change in instruments from Oxford to Canberra.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3.3 Page #: 11 Line: 45
Original Specific Comment #: 2
Comment: The text states that IT Corporation (IT) will conduct all radiological analyses, physical tests, and pH measurements of waste pit materials at its on-site laboratory. However, the SAP for environmental media states that both IT and an off-site, independent laboratory will be used for analysis of environmental media. It is therefore not clear why only IT is specified for laboratory analysis of waste pit materials. The rationale for this approach should be discussed in the text.

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Response: The on-site lab performs radiological screening on all samples and radiological analysis on waste samples, water samples, and air samples. The on-site lab also provides screening analysis for certain chemical constituents in water samples. The off-site lab provides analytical results for hazardous chemicals for waste and water samples. A second off-site lab has been selected to provide backup capability to both the on-site lab and the primary off-site lab.

Action: No further action required with respect to the RA Package.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.5 Page #: 13 Line: 12 and 13
Original Specific Comment #: 3
Comment: The text lists actinium 228 in parentheses after thorium 228, thorium 232, and radium 228 as well as an independent entry of actinium 228. It is not clear whether these notations mean that the activities of these thorium and radium isotopes will be estimated based on the measured actinium isotope activity under the assumption of secular equilibrium or something else is intended. As radium 228 has a half-life of 5.8 years, an assumption of secular equilibrium might not be valid for the waste pit materials, which were chemically manipulated no more that a few half-lives ago. The text should be revised to provide an explanation of the actinium 228 notations.

Response: Ac-228 is intended to be used as the isotope marker for Th-232, Ra-228, and Th-228. The last thorium processing performed at Fernald was approximately 1975, so the Ac-228 should be no worse than 94% equilibrium.

Action: No further action required with respect to the RA Package.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.5 Page #: 13 Line: NA
Original Specific Comment #: 4
Comment: The text discusses low specific activity (LSA) determinations for certain isotopes. The text should be revised to include LSA determinations for uranium 233, technetium 99, and strontium 90. LSA determination for strontium 90 is recommended because the text specifies analysis for cesium, and these two long-lived fission products are generally found together.

Response: IT has performed an extensive review of DOT LSAI issues. Data from the RI/FS, the CIS, and the ASR were used to evaluate the contribution of minor radionuclides. The radionuclides that were evaluated were:

Tc99
Sr90
Pu238
Pu239/240
Ru106
Np237
Cs137 (please note that the evaluation **did** include this radionuclide)

(Note: U233 was not considered since it has rarely been identified on the site)

It was determined that even in a worst case scenario (and including Cs137 contribution), these minor radionuclides contributed well less than 1% to LSAI criteria. For this reason these radionuclides have (except for Cs137) been excluded from consideration. Cs137 has been retained in the list for two reason:

1. Cs137 is a strong gamma emitter and is easily determined at low detection limits, and
2. Cs137 is a fission product and serves as a good indicator parameter this gives an additional, cost effective means to protect against finding unexpected conditions.

Action: No further action required with respect to the RA Package.

Commenting Organization: U.S. EPA Commentor: Saric
Tables #: 2.2 and 2.5 Page #: 22 and 25 Line: NA
Original Specific Comment #: 5
Comment: These tables list analytical parameters. However, they do not include actinium 228, analysis for which is listed in Section 2 as being necessary to determine whether waste meets the LSA type I definition. The tables should be revised to include actinium 228.

Response: Ac-228 will be analyzed by gamma spectral analysis for each sample. Ac-228 will be used to infer the Th-232, Th-228 and Ra-228 concentrations which will be used in the LSA-I calculation.

Action: No further action required with respect to the RA Package.

Commenting Organization: U.S. EPA Commentor: Saric
Table #: 2.4 Page #: 24 Line: NA
Original Specific Comment #: 6
Comment: This table presumably summarizes analytical methods and related information. However, the table was omitted from the review copy received. Even if some information, such as the laboratories to be used, is not yet available, the table should be submitted for review.

Response: Table 2.4 was inadventently missing from the copy, but will be included in the next revision.

Action: Table 2.4 has been included in the SAP for Waste Pit Materials.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.6 Page #: 26 Line: NA
Original Specific Comment #: 7
Comment: This table lists QC requirements for radiochemical analyses. The table notes state that the final calibration verification (FCV) involves use of the same material as the initial calibration verification (ICV). However, the ICV is specified as including at least four peaks from 40 to 2,600 kiloelectronvolts (keV), while the FCV is specified as including at least four peaks from 42 to 1,596 keV. This discrepancy should be reconciled.

Response: Agreed. The discrepancy will be corrected. The ICV and FCV range will both be from approximately 40 kev to approximately 2620 kev.

Action: Table 2.6 of the SAP for Waste Pit Materials has been revised as discussed above.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.8 Page #: 27 Line: NA
Original Specific Comment #: 8

Comment: This table lists an acceptance limit for duplicate pH measurements of 20 percent RPD. This acceptance limit is not appropriate for logarithmic units such as pH units. The table should instead list the $\pm$0.2 pH unit criterion given in Table G-2 of the SCQ.

Response: Agreed. The limits will be changed to reflect the criterion in Table G-2, which, according to the currently approved SCQ, is ± 0.1 pH, not ± 0.2 pH.

Action: Table 2.8 of the SAP for Waste Pit Materials has been revised to show a ± 0.1 pH acceptance level.