U-006-306.12

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RESPONSE TO COMMENTS RECEIVED ON THE OPERABLE UNIT 4 DRAFT TREATABILITY STUDY WORK PLAN DOCUMENT DATE - OCTOBER 1991 JANUARY 1992

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REPORT

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RESPONSE TO COMMENTS

RECEIVED ON THE OPERABLE UNIT 4

DRAFT TREATABILITY STUDY WORK PLAN

DOCUMENT DATE - OCTOBER 1991

OHIO EPA COMMENTS - NOVEMBER 1991

U.S. EPA COMMENTS - DECEMBER 1991

JANUARY 1992

OU-4 U.S. EPA Comments

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

Comment: **General comment: The revised work plan still has not addressed the performance of toxicity characteristic leaching procedure (TCLP) on untreated waste samples. The revised work plan does not incorporate these analyses as requested by EPA, and the response to comments document does not provide any reasoning or explanation of this omission. The revised work plan must include the TCLP extraction and analysis of untreated waste samples.**

Response: TCLP data on the raw material is being collected during the sampling and analysis effort (see Chapter 6.0 of the Treatability Work Plan). TCLP and/or MTCLP data on the treated material is being generated during this treatability study. The comparison of this data between the untreated and treated waste will be made during the detail analysis phase of the Feasibility Study.

It is assumed the raw waste samples are similar in composition to the samples used for the treatability study. This is a logical assumption because the raw material samples are strata samples (from Zones A, B, and C) from each of the three manways. The treatability samples are strata samples (from Zones A, B, and C) and are composites of the three manways (i.e., each silo has one composite sample from each zone).

Action: Section 1.5.2 of the text has been revised to reflect the above response.

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

Comment: **General comment no. 1d: TCLP is proposed to be performed on the treated waste mixtures only and is not proposed for the untreated samples. The efficiency and quantifiable effectiveness a mixture to fix heavy metal constituents**

cannot be exactly determined without measuring TCLP before and after treatment. It should be noted that after treatment, TCLP measurements must be corrected for the dilution of additives.

Sections 4.0 and 8.0 of the work plan should be revised to include TCLP analysis of untreated waste samples. The text should specify the number of TCLP analysis to be performed. The text should also address the comparability of untreated waste samples taken and the samples proposed for the treatability tests.

Response: See comment 1 response.

Action: See comment 1 action.

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

Comment: **General comment no. 3: The test plan does not clearly identify the constituents of concern that will be used to measure the success of the testing at each phase of the treatability testing. For example, if during preliminary screening of stabilization formulations, a particular test mixture shows the best fixation for lead but the worst for thorium, what criteria will be used to screen the formulations for the next phase?**

The text in section 4.0 should be revised to reflect the explanation provided in the response document. At present, the work plan establishes a minimum unconfined compressive strength (UCS) of 300 pounds per square inch (psi) as the preliminary Phase-Stage 1 screening criteria. The text in sections 3.0 and 4.0 should clearly explain that "the professional judgement of the investigator" will ultimately determine which formulations best meet stabilization performance criteria.

Response: Sections 4.1.1.1 and 4.1.2 have been revised to include the criteria used to screen formulations for the next phase. The revisions reflect the explanation provided in the October 1991 response document (USEPA comment #3).

Action: Sections 4.1.1.1 and 4.1.2 have been revised.

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

Comment: **General comment no. 4: A description of the waste characteristics from all three silos should be presented in section 1.0 of the work plan. This description should be a short summary of the chemical and physical properties of the wastes in each silo.**

The response of no action is unacceptable. The introductory sections of the work plan should summarize the relevant chemical and physical characteristics of wastes from each silo, preferably in tabular form, in section 1.0. Chemicals of concern for both the remedial action and the treatability testing should be provided. The historical description of OU4, including the summaries of radionuclide concentrations, is inadequate to support the test design. A discussion of the affects of particle size distribution, heterogeneity, or results of chemical, physical, or radiological analysis may have on the treatability study should be included.

Response: Analytical results from previous sampling efforts have been listed in Appendix D. However, these results do not fully characterize the contents of Silos 1 and 2. The variability and inconsistency of results and the lack of material from the lower areas of the silos precludes the use of these data for fully characterizing the silos' contents. Therefore, a resampling program was conducted (and completed in August 1991), but analytical results are not available for inclusion into this document. The results will be documented in the Operable Unit 4 Remedial Investigation (RI) Report.

It is agreed that the particle size distribution and sample heterogeneity will affect the results of the treatability study. If the cement technology is carried forward, more tests should be conducted during the Remedy Design Phase to better define the effects of these parameters. During the treatability study, the effect of particle size distribution is being controlled by grinding and sieving the waste and reagents, if necessary, to pass through a 0.11- or 0.187-inch sieve before mixing. In addition, the waste and dry reagents are mixed thoroughly before the water (and if appropriate sodium silicate) is added. The wet mixture is further mixed to ensure good mixing. The effects of sample heterogeneity are being monitored during the treatability study Advanced Phase where waste from different locations (Zones A, B, C) will be treated.

During the treatability study, it will be noted if material is hard to mix due to viscosity of sample or high liquid content.

Action: Section 1.1.2 and Appendix D have been revised to include analytical results from previous sampling efforts. Particle size distribution and sample heterogeneity are also discussed in Section 1.1.2.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg #6 **Section #1.3.1** **Paragraph #** **Sent/Line #14-18**
Original Comment #5

Comment: **Specific comment 2: This paragraph appears to conflict with the statement made in Section 2.1, page 1, lines 28 and 29. The paragraph cited or other appropriate text should clearly state that while in situ vitrification is not considered feasible, vitrification treatability studies are proposed to address the ex situ alternatives.**

The text was not revised as specified in the responsive action.

Response: Section 1.3, second paragraph has been revised to state that ex-situ vitrification tests on material from each silo are being conducted under the Treatability Work Plan for Vitrification of Residues from Silos 1, 2, and 3 (November 1991). The description of Alternative 2A in Section 2.1 states that in situ stabilization has been screened out as a process option.

Action: Section 1.3, third paragraph has been revised to include the word "ex situ".

Commenting Organization: **U.S. EPA** **Commentor:**
Pg #11 **Section #1.3.4** **Paragraph #** **Sent/Line #23 and 24**
Original Comment #6

Comment: **Specific comment 3: Provide a brief justification for selection of the additives proposed in the stabilization. For example, Type II portland cement is designed to be used in the presence of moderate sulfate levels. The test plan should describe how the selection of additives relates to the expected characteristics of the wastes and constituents of concern.**

The response to this comment is generally acceptable, but the response action is not. The text in section 1.0 should be revised to justify the selection of additives as provided in the response.

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The response states that "moderate" levels of sulfate may be present. Without a summary of waste characteristics, as requested in general comment 4, the term "moderate" is meaningless. The text should provide a definition of moderate or reference an expected sulfate concentration range. The response should also discuss Type V cement (sulfate resisting) as well as why it has not been selected as a potential reagent.

Response: Per discussions with U.S. EPA, the Type II cement is acceptable for this test. The response to specific comment #3 in the October 1991 Response to Comment document will be added to Section 1.5.3.

Action: Text has been revised.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg #1 and 2 **Section #2.1** **Paragraph #** **Sent/Line #**
Original Comment #7

Comment: **Specific comment 7: Alternatives 3 through 5 are not described. If these alternatives have been previously eliminated, provide a brief explanation of the rationale for their elimination.**

The response is acceptable; however, the response action is not. The comment was made to improve the work plan, not because EPA does not know the answer. The response should be incorporated into section 2.0

Response: All alternatives, even those screened out in the initial screening of alternatives, are briefly described in Sections 2.1 and 2.2. Those alternatives screened out also have a brief explanation for their elimination. However, the numbering system for each set of alternatives can be confusing. Therefore, the response to specific comment #7 in the October 1991 response to comment document has been added to Section 2.0.

Action: Section 2.0 has been revised.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg #7 **Section #3.3** **Paragraph #** **Sent/Line #24 and 25**
Original Comment #8

Comment: **Specific comment 18: The response refers to a table in section 3.0 but does not give the table number. It is assumed that the table is Table 1 on pages 2 and 3 of section 3.0 It is unclear why the limits (per DOE Order 5400.5) for Th-230 and Th-233 (5 picocuries/gram) do not appear in this table as implied in the response.**

Response: The combined Th-230 and Th-232 limit was omitted.

Action: The combined Th-230 and Th-232 limit for surface soils has been included as a footnote to Table 3-1.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg #3 **Section #4.2** **Paragraph #** **Sent/Line #6-9**
Original Comment #9

Comment: **Specific comment 26: Additional physical characterization, such as viscosity measurements, should be considered.**

TCLP analysis on the raw waste composites should be added to the chemical characterization. The text should provide a justification for the selection of the chemical parameters in Table 4-2.

Specific analytical procedures should also be referenced in Table 4-2.

Sample analysis of the stabilization additives, especially Portland cement and fly ash, should be performed as part of the treatability studies. Both additives contain some quantity of heavy metal constituents. Alternatively a reagent mix blank samples can be prepared by using pure quartz sand in place of the waste materials. The sand should also be tested to confirm that it is free of any contamination.

a) **Waste viscosity can be a significant factor when determining the feasibility of stabilization as a treatment method. Apparently, some consideration has already been given to the physical nature of the silo wastes with regard to the feasibility**

of mixing reagents with the waste; otherwise treatability testing of stabilization processes would not be considered.

b) **Response to the second paragraph of specific comment 26 is inadequate. The work plan must include a methodology for comparing TCLP results against untreated sample results.**

c) **The work plan should further specify how to conduct TCLP analysis on a blank reagent mixture. The text should be revised to include a blank TCLP analysis of reagents from both Group I and Group II experiments to cover variation in fly ash origin.**

Response: a) Disagree. The determination of waste viscosity is best conducted in the Remedy Design Phase. In the treatability study, the viscosity of the sample is modified by mixing dry reagents to the waste before adding liquid. Enough water is added to the mixture to form a mixable matrix.

b) See U.S. EPA Attachment A, comment 2 for a discussion concerning analysis of TCLP results against untreated sample results.

c) Agree. The text (Section 4.1.1.1) will be revised to discuss reagent blanks.

Action: Text has been revised to discuss reagent blanks.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg #10 **Section #4.3.2** **Paragraph #** **Sent/Line #27-31**
Original Comment #10

Comment: **Specific comment 28: The text should justify the selection of the bentonite-silo material mixture ratio.**

The response provided is acceptable, but the response action is not. An explanation of bentonite-silo material mixture ratios should be added to the text of Section 4.1.2 to justify the testing methods chosen.

Response: The response given in the Response to Comment document will be added to Section 4.1.2.

Action: Text has been revised.

Comments on the
OU-4 Treatability Study Work Plan Addendum

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

Comment: **General comment: The addendum to the treatability study work plan should provide additional information concerning the objectives of the radon leach test and the use of the resulting data.**

Response: The objective of the radon leach test is to measure the rate radon will leach out of the treated material as required by U.S. EPA. The results will be presented in tabular form with the rest of the treatability data for each formulation.

Action: Section 1.0 of the test procedure in Appendix C (page 31 of 48) has been revised to include the objective and how the results will be presented.

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

Comment: **Proposed item no. 4: The proposed revision states that the radon leach test will be performed if the combined Ra-226 and Ra-228 levels in treated residue samples are below 15 picocuries per gram (pCi/g). The limit of 5 pCi/g specified for the first 15 centimeters of soil after remediation action should also be addressed [40 CFR 192.12(a) (1).]**

Response: "Below" is a typo. This should read "the radon leach test will be performed if the combined Ra-226 and Ra-228 levels in treated waste are above 15 pCi/g." The 15 pCi/g limit was selected because the waste will ultimately be buried. The 5 pCi/g radium limit mentioned in the response is for surface soil.

Action: Section 4.2.1.3 has been revised to add the above rationale.

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

Comment: **Proposed item no. 4: The addendum should specify what action will be taken if the combined Ra-226 and Ra-228 levels in the insoluble residue are above the 15 pCi/g limit.**

Response: Please see response to comment 2.

Action: See proposed action for comment 2.

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

Comment: **Proposed items nos. 5 and 6: The addendum should specify what actions, if any, will be taken based on the results of the radon leach tests.**

Response: The results of the radon leach tests will be documented and tabulated in the feasibility study.

Action: See response to U.S. EPA addendum comment #1.

Comments on Proposed Measurement of Radon Leaching in Water

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.1.1** **Paragraph #** **Sent/Line #**
Original Comment #5

Comment: **The addendum should specify how the amount of radon in the leachate will be "back-calculated" to the amount of radon leached from the stabilized mass during the leaching period. The text should include the complete set of equations to be used and the assumptions to be made.**

Response: Equilibrium will be assumed. The analytical solution to a simple differential equation with one source (the waste) and one sink term (radioactive decay) will be used to calculate the total activity leached.

Action: A calculation section will be appended to the end of the proposed radon leachate procedure. Included in this section will be the equation $R = C_{(t)} * \lambda * V / (1 - e^{-\lambda t})$, where R is the measured leach rate (pCi/day), $C_{(t)}$ is the activity concentration at time t (pCi/L), λ is the decay constant for Rn - 222 ($days^{-1}$), V is the volume of the extracted leachate (L), and t is the time (days). A sample calculation will be provided.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.5.6** **Paragraph #** **Sent/Line #**
Original Comment #6

Comment: **The addendum should specify the precautions that will be taken to ensure that the radon in the leachate will not escape the container during the 30-day period. In addition, the addendum should specify the type of container and seal that will be used.**

Response: The leachate will be contained in a sealed container during the 30-day period. Subsection 2.4.1 of the test procedure in Appendix C (page 31 of 48) specifies a sealable Teflon or glass container for this part of the test. The specific container has not been selected yet, but a prime consideration is use of material that is impermeable to radon.

Action: None required.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.5.9** **Paragraph #** **Sent/Line #**
Original Comment #7

Comment: **The addendum does not provide sufficient detail concerning the sample collection protocol. The addendum should provide information more specific than "rapidly remove enough leachate to conduct the liquid scintillation test." The addendum should specify how the sample will be removed, what precautions will be taken to ensure that radon does not escape during sample collection, and the amount of sample to be collected.**

Response: Details on the liquid scintillation has not progressed enough to respond to some of the issues raised in this comment. The procedure will be revised to permit the measurement of radon by either liquid scintillation or by radon emanation. If liquid scintillation is used, procedures given in EPA draft Method 913.0 will be used.

Action: Section 2.1.1 of the test procedure in Appendix C (page 31 of 48) has been revised to reflect the above response.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.5.10** **Paragraph #** **Sent/Line #**
Original Comment #8

Comment: **The addendum does not provide sufficient information on how the liquid scintillation test will be performed. The following matters should be addressed in the addendum:**

- **Scintillation (or collection) vial and cap type**
- **Cocktail type**
- **Preparation of the sample**
- **Temperature control**
- **Instrument parameters**

The addendum should also address the following considerations:

- **Adsorption of radon into plastic vials**
- **Adsorption of radon into septa**
- **Effect of headspace**

- **Effect of air bubbles in the sample**

Response: Details on the liquid scintillation has not progressed enough to respond to some of the issues raised in this comment. If scintillation is used, procedures given in EPA Draft Method 913 will be used.

Action: The test procedure in Appendix C (page 31 of 48) has been revised.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.5.11** **Paragraph #** **Sent/Line #**
Original Comment #9

Comment: **The addendum should provide additional information concerning equations to be used and assumptions to be made in calculating the amount of radon in the liquid scintillation sample.**

Response: See Response No. 8.

Action: See Action No. 8.

Specific Comments

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #4.2.1.3** **Paragraph #** **Sent/Line #**
Original Comment #1

Comment: **This states that radon emission and radon leach tests will be performed if the combined Ra-226 and Ra-228 levels are below the limit of 15 pCi/g. The leach tests should be performed when the levels are above the 15 pCi/g limit. The addendum needs to explain why tests are required when below the limit of 15 pCi?**

Response: Typo noted.

Action: In Section 4.2.1.3, "below" has been changed to "above".

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.1.1** **Paragraph #** **Sent/Line #**
Original Comment #2

Comment: **Due to the short half-life of radon, it is recommended that a seven-day leachate measurement be taken in addition to the 30 days leaching measurement. If maximum leaching occurs early in the 30 day procedure, most of the radon will have decayed off.**

Response: The reviewer's suggestion implies that the rate at which radon is leached from the treated material may decrease over time. If this is true, a longer test would provide a more accurate indication of the long-term effectiveness of this waste.

This comment reaffirms DOE's position that, due to its short half-life, radon separated from its parent radium will decay away before it can migrate far enough to pose a threat to human health and the environment. Therefore, it should not be necessary to determine the rate at which radon is leached from the treated material. However, it is recognized that US EPA now requires DOE to perform radon leachability tests on the treated material's final form. In response to EPA's request, DOE will measure radon in the leachate at 7 and 30 days.

Action: Text has been revised to include measuring radon in the leachate at 7 and 30 days.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.2** **Paragraph #** **Sent/Line #**
Original Comment #3

Comment: **It is stated here no known interferences, but what if the leachate contains radium? A measurement for radium should be included.**

Response: No interference from radium or any other radionuclides is expected because any radon present in the leachate partitions with the organic cocktail phase in the liquid scintillation counting vial during analysis while other radionuclides including the parent radium and radon progeny remain in the aqueous phase in the vial. The partioning is based on the fact that radon is nonpolar and hydrophobic, but the radium and radon progeny are charged and hydrophilic.

In a recent paper that examines the standard liquid scintillation counting method for measuring radon in water, Vitz (1991) quantified the interference from aqueous-layer radionuclides. The experiment involved off-gassing radon from a standard aqueous radium solution by boiling, adding the radium solution and cocktail to a counting vial, and counting immediately to determine the initial activity. The initial activity represents the potential interference from radionuclides other than radon. The vials were then allowed 30 days for equilibration of radon and reanalyzed to determine ultimate activity. The data show that the initial activity contributes only 1.1 to 2.2 percent of the ultimate activity (Vitz 1991) a negligible contribution.

In order to confirm whether the leachate samples contain substantial radium activity, the leachate sample vials could be analyzed initially to measure radon, the radon could be driven from the samples, and the samples reanalyzed 30 days later. If a substantial quantity of radium is present then an equal quantity of radon would have ingrown and would be measured in the reanalysis. If radium is not present then no radon would ingrow and the reanalysis would indicate this.

In addition, the work plan states that radium concentrations in the TCLP leachate will be measured. These can be used to provide an upper bound on the portion of the Rn in the leachate, which is attributable to radium in solution.

Action: A measurement for radium is not necessary because interference from radionuclides other than radon is not expected; therefore, no change in the text is necessary.

References: Vitz, E., 1991, "Toward A Standard Method for Determining Waterborne Radon," Health Physics, Vol. 60, No. 60, No. 6, pp. 817-829.

Asikainen, M., 1981, "State of Disequilibrium between U-238, U-234, Ra-226, and Rn-222 in Groundwater From Bedrock," Geochim. Cosmochim. Acta 45, 201-210.

Commenting Organization: **U.S. EPA** **Commentor:**
Pg # **Section #2.5.5** **Paragraph #** **Sent/Line #**
Original Comment #4

Comment: **Enough water should be added to eliminate the vapor space, rather than minimize the vapor space. The vapor space will allow for partitioning of dissolved radon and result in losses.**

Response: The vapor space will be eliminated to the extent possible.

Action: Text has been revised.

Ohio EPA Comments on
Draft Treatability Study Work Plan For Operable Unit 4
October 1991

General Comment

Commenting Organization:		**OEPA**	**Commentor:**
Pg #	**Section #**	**Paragraph #**	**Sent/Line #**

Original Comment #1

Comment: **DOE should consider incorporating some mechanism for quantifying the radon emission which occurs during the treatment options. This information would be directly related to the evaluation of short-term effectiveness for the remedial alternatives. See Ohio EPA General Comment #4 (8/22/91).**

Response: This type of test is best conducted during the Remedy Design Phase. A worst case study was implied in the radon emission procedure. Possible radon emission for each treatment alternative will be addressed in the Feasibility Study.

Action: None required in the Treatability Work Plan.

Commenting Organization:		**OEPA**	**Commentor:**
Pg #	**Section #**	**Paragraph #**	**Sent/Line #**

Original Comment #2

Comment: **Durability tests should be run during the advanced phase testing for the stabilization of untreated material. The following is the justification for these tests:**

a. **Through failure mechanisms such as: desiccation cracks, slope instability, settlement, piping, penetration, erosion, cold climate, earthquakes, and construction errors, water can permeate through the facility. Therefore the waste can become saturated, causing the stabilized waste to erode and possibly contaminate the surrounding area. Therefore to determine what waste matrix is the most durable (erosion resistant), a wetting and drying test is needed.**

b. **This radioactive waste has a life expectancy over 1,000 years. There is no data available on the structural longevity of the low level radioactive waste facility.**

Since this remediation is to be a permanent solution, a durability test would provide data to help choose the most durable solidified waste matrix.

c. **Radioactive waste will emit heat radiation as it decays. Proper venting of the stabilized waste will allow the waste to be cooled off, therefore a change in temperature will occur. With this change in temperature, an additional source for degradation is encountered. A freezing and thawing test would provide data on the most durable form.**

d. **From the technical document: Stabilization/Solidification of CERCLA and RCRA Wastes; Physical Tests, Chemical Testing Procedures, Technology Screening, and Field Activities (EPA/625/6-89/02). In Section 4, Physical Tests to Characterize Waste Before and After Stabilization/Solidification, recommends the use of five physical tests: index property, density, permeability, strength, and durability tests. Durability tests are the following 1) Freezing and Thawing Test of Solid Waste (ASTM D4842); 2) Wetting and Drying Tests of Solid Wastes (ASTM D4843).**

Response: We submit that there may be technical value in performing durability tests on the cement stabilized waste.

Action: Durability testing (ASTM D4842 and ASTM D4843) will be performed on the cement-stabilized waste during the optional phases of the Treatability Program. The data will be presented in the FS.

Specific Comments

Commenting Organization: **OEPA** **Commentor:**
Pg #4 **Section #1** **Paragraph #** **Sent/Line #19**
Original Comment #1

Comment: **This sentence contains a typographical error. Change "conjuncture" to conjecture.**

Response: Agreed.

Action: Text has been revised.

Commenting Organization: **OEPA** **Commentor:**
Pg #5 **Section #1.2** **Paragraph #** **Sent/Line #Figure 1-1, 1-2**
Original Comment #2

Comment: **In addition to MCLs as Remedial Action Objectives, non-zero MCLGs should be included. The NCP's support of MCLGs has been previously emphasized by Ohio EPA in our comments on a number of documents.**

Response: Although we have made the change as requested by Ohio EPA, only noncarcinogens have non-zero MCLGs. Furthermore, with the exception of three compounds (all in the Aldicarb family), the value of the MCLG is equal to the MCL for all noncarcinogens. Therefore, inclusion of "non-zero MCLGs" does not change the Remedial Action Objectives for OU4.

Action: Figure 1-1 has been revised.

Commenting Organization: **OEPA** **Commentor:**
Pg #6 **Section #1.2** **Paragraph #** **Sent/Line #Figure 1-1,6**
Original Comment #3

Comment: **Incorporate non-zero MCLGs as ARARS. See previous comment.**

Response: See response to specific comment 2.

Action: See action to specific comment 2.

Commenting Organization: **OEPA** **Commentor:**
Pg #4 **Section #3** **Paragraph #** **Sent/Line #Table 3-2**
Original Comment #4

Comment: **The table's title indicates that the table lists ARARs and TBCs. These items were omitted from the table. Additionally, a definition of footnote "e" was left off the table. Please correct the table.**

Response: There are no ARARs/TBCs for inorganics in soil.

Action: This information has been incorporated in a revised copy of the table.

Commenting Organization: **OEPA** **Commentor:**
Pg #6 **Section #3** **Paragraph #** **Sent/Line #Table 3-3**
Original Comment #5

Comment: **Footnote "a" lists a document that is not in the reference list. Add the 7/18/91 memo, "Drinking Water MCLs and HAs" from J. Dee to the reference list. The footnote also discusses PCBs, but PCBs are not included in the table.**

Response: Agreed.

Action: Table has been corrected.

Commenting Organization: **OEPA** **Commentor:**
Pg #5 **Section #4.1.1.1** **Paragraph #** **Sent/Line #6-9**
Original Comment #6

Comment: **All tests should be referenced either in the Appendix or as a standard method.**

Response: Agreed.

Action: A procedure section will be added which list the contents of Appendices B and C, "SOP" and "Other Operating Procedures", respectively.

Commenting Organization: **OEPA** **Commentor:**
Pg #7 **Section #4.1.3** **Paragraph #** **Sent/Line #13**
Original Comment #7

Comment: **All tests to be performed during the Optional Phase should be submitted to the EPAs for review and approval.**

Response: At the present, the known tests that would be conducted in the optional phase will be the same tests conducted during the advanced phase, the radon release tests, the physical inspection of the 90-day leaching tests, and durability tests. If any other tests are added to the optional phase at a later time, they will be submitted to the EPAs at that time for their information.

The optional phase is off the critical path for this project.

Action: None required at this time.

Commenting Organization: **OEPA** **Commentor:**
Pg #23 **Section #4.2.7** **Paragraph #** **Sent/Line #15**
Original Comment #8

Comment: **TCLP should be conducted on the vitrified precipitate selected as the leading mixture (See Figure 1-4). TCLP analysis of the vitrified material will allow for direct comparison to the other selected waste forms, all of which will be subject to TCLP during the final screening/selection. It will be important during the detailed analysis of alternatives to have directly comparable analyses on all the waste forms in order to implement the 9 selection criteria. See Ohio EPA Specific Comment #28 (8/22/91).**

Response: There will not be an adequate amount of vitrified material to perform a full TCLP. Therefore, a MTCLP will be performed. A sufficient amount of the vitrified material cannot be produced due to the limited amount of raw material.

The vitrified material will be treated in a crucible at 1250°C. Any organic compounds should be destroyed by the treatment conditions. The RCRA metal leachability of the glass will be determined by the MTCLP procedure instead of the full TCLP. If the leaching alternative is carried forward, a full TCLP should be performed during the Remedy Design Phase when the actual precipitating reagents and larger volumes are used.

Action: None required.

Commenting Organization: **OEPA** **Commentor:**
Pg # **Section #4.2.7** **Paragraph #** **Sent/Line #**
Original Comment #9

Comment: **Radiological and HSL analysis of the "liquid" to be discharged to the "wastewater collection system" (See Figure 1-4) should be included in this section. The analysis of this waste stream is information which is needed to understand the complete mechanism of this alternative and to perform a comparison of the various remedial alternatives.**

Response: An analysis of the "liquid discharged to the Wastewater Collection System" should be done under Remedy Design. At this stage of treatability, there will not be enough "liquid" generated to perform a full radiological and HSL analysis of the liquid. Since this is preliminary testing, metals, uranium, and gross alpha and beta analysis will be performed in the same manner as for the modified TCLP extract in the preliminary phase. These data will be evaluated during the FS.

Action: None required in the Treatability Work Plan.

Commenting Organization: **OEPA** **Commentor:**
Pg # **Section #Appendix C** **Paragraph #** **Sent/Line #**
Original Comment #10

Comment: **a. This test does not represent what conditions would be expected for waste placed in a disposal facility. Considering this waste disposal facility is to have an extensive life, the waste could go through many saturated cycles. A representative wetting cycle should be longer than five days.**

b. **The use of this test as a screening test is acceptable, if the Measurement of the Leachability of Solidified Low-Level Radioactive Waste by Short-Term Procedure (ANSI/ANS-16.1-1986) is used in the advanced phases.**

Response: a. The data from 5-Day Static Leach test is to be used for comparative purposes between samples and provide leaching information using a deionized water leachant instead of acetic acid.

Action: None.

Response: b. The ANSI-16.1 test should be performed on samples produced during the Design Phase. If ANSI-16.1 were to be implemented into the Operable Unit 4 Treatability Program at this date, it would have adverse impacts to the budget prescribed for the program.

Action: None.