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DOE-FN RESPONSES TO COMMENTS ON THE OU3 RI/FS/PP DOCUMENT

02/15/96

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RESPONSES

OHIO EPA COMMENTS AND RESPONSES

Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Page #: Line #:
Original Comment #: 2
Comment: Ohio EPA is still concerned with the lack of commitment to recycling within the RI/FS and PP. Ohio EPA requests that DOE commit to reevaluating the issue of recycling materials within each implementation plan. Additionally, Ohio EPA requests the opportunity to comment on Fernald's recycling policy prior to it being finalized. The development of such a policy should be closely coordinated with the FCTF Waste Management Committee.

Ohio EPA believes the Fernald recycling policy, in keeping with the balanced approach, should take a pro-active position on recycling the maximum amount of materials. Such a position within the policy would show a good faith effort on the part of DOE to limit wastes going into the OSDF. The policy must include maximizing the reuse of materials on-site rather than disposing them as wastes. Additionally, DOE should develop a waste minimization portion of the policy to limit the generation of new wastes. It is also appropriate for DOE to include financial incentives to sub-contractors to motivate them to limit waste production and increase the amount of recyclable material.

Response: DOE acknowledges OEPA's concerns regarding the recycling and reuse of remediation materials. In the response to OEPA Original Comment #2, DOE has committed to the evaluation of recycling and reuse options associated with each D&D complex in the respective implementation plan. DOE's intent is to evaluate recycling and reuse options and summarize the resulting decisions within each project-specific implementation plan. The implementation plan will establish the disposition approach for the materials to which recycling or reuse may apply. DOE will utilize the Fernald Recycle Policy as a guideline when evaluating recycle options for the various D&D complexes.

The minimization of materials generated by the interim remedial action will also be addressed in the project-specific implementation plans. Specifically, guidance for the minimization of materials will be provided in Section 01120, Part 1.6.B, of the D&D subcontractor performance specifications. The performance specification draws upon guidance provided in the FEMP Waste Minimization and Pollution Prevention Awareness Plan and input from the Fernald waste minimization/recycle organization.

Action: The following text has been added to Section 4.3.2: "DOE will continue over the life of the D&D of the Former Production Area to aggressively evaluate existing and emerging recycling technologies and markets to identify opportunities for cost-competitive application at the FEMP. The DOE strives to maintain recycling and reuse as disposition options to be considered for each material at the time of its intended generation, and will continue to evaluate recycling and reuse on a case-by-case basis within each D&D complex implementation plan." Related text throughout the FS portion of the document has been revised to reflect this position. DOE will submit the recycle policy to OEPA for review.

Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Page #: Line #:
Original Comment #: 3
Comment: Ohio EPA is not aware of any language within the OU5 ROD or FCTF Recommendations that require "clean" materials to be in potential direct contact with members of the public. In fact, these documents set a level of allowable contamination to be left on and off-property and which may be contacted by members of the public. DOE should delete reference to these documents and commit within the response to evaluating material reuse on site.

With regard to DOE's suggestions of uncertainty concerning the risks of reuse of materials, Ohio EPA believes the assessment of the risks associated with such alternatives is the function of a FS. DOE should commit within the response to beginning the evaluation of risks associated with on-site reuse of materials in bike paths, rip rap, concrete structures, etc. Ohio EPA expects that DOE will provide a commitment to deliverable(s) for developing reuse alternatives and risk evaluations for such reuse within the RI/FS/PP and response to comments.

Response: Agreed. As stated in the response to Original Comment # 2 above, the reuse of materials will be evaluated in the project-specific implementation plans. The evaluation will utilize existing data to determine material compatibility with uses, cost-effectiveness, and potential long-term risks. The evaluation will consider both short-term and long-term reuse opportunities.

Action: The references to the FCTF recommendation and "clean" materials have been deleted from Section 4.3.2. Please refer to the response and action for Original Comment #2 for discussion regarding the potential reuse of OU3 materials.

Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Page #: Line #:
Original Comment #: 4
Comment: Ohio EPA reiterates its belief that off-site disposal of debris/wastes at a commercial solid waste disposal facility in Ohio will not be the most effective or implementable when a complete cost-benefit analysis is conducted. This cost-benefit analysis should include the analytical expenses required to demonstrate below-baseline concentrations of radionuclides. DOE must take into consideration Ohio Revised Code 3701.914(B) which states in part, "No person shall...dispose of any low-level radioactive waste except at a facility that is licensed for disposal under the 'Atomic Energy Act of 1954'...as amended...regardless of whether the waste has been reclassified as 'below regulatory concern'...." Any material that DOE could validate as being "clean" for disposal in a commercial solid waste facility in Ohio would be useable for on-site activities.

Response: DOE agrees that all materials generated under the OU3 ROD that are scheduled for off-site disposition at a commercial sanitary landfill are subject to an unrestricted release certification program since the FEMP is a CERCLA action. This certification program and its activities will be subject to US EPA and OEPA approval. The materials

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to be dispositioned under the OU3 Final Record of Decision can be broadly defined in 4 categories: 1) production area porous, 2) production area non-porous, 3) administrative area porous, and 4) administrative area non-porous. The materials from the production area are expected to be contaminated due to the past processes that occurred. In contrast, the administrative area materials are relatively uncontaminated and have not been in contact with past processes. For all non-porous material at the FEMP, unrestricted release can occur under DOE Order 5400.5. If non-porous materials have no recycle or reuse opportunities, then to the maximum extent possible and as cost effective, the non-porous materials could be unrestricted released to a solid waste disposal facility. The release of these materials off-site would be subject to a certification program approved by the US EPA and OEPA.

For porous materials, DOE acknowledges that a cost benefit analysis must be performed to evaluate the effectiveness and implementability of releasing porous materials off-site to a solid waste disposal facility. If DOE determines that this approach is effective and implementable, a certification program to deem materials acceptable for unrestricted release will be proposed in the OU3 Remedial Design Work Plan. Such a program would require approval by US EPA and OEPA.

DOE agrees with OEPA that this approach requires public input to finalize the selected remedy. DOE is confident that this is the most effective approach for these materials because 1) it minimizes commingling of LLW with non-radioactive wastes, 2) reduces the quantity of material to be disposed of in the on-property disposal facility, and 3) minimizes the amount of material requiring long-term on-site monitoring.

For planning purposes within the FS, only non-porous materials from the administrative area are considered for unrestricted release in the evaluation and cost estimate. The cost analysis conducted in Appendix E, Section E.4, of the RI/FS Report demonstrates the cost effectiveness of potential disposition at a solid waste disposal facility. Based on the classification of volumes by material descriptions, the non-porous materials considered in this evaluation are structural steel, non-process trailers, and windows. However, any non-porous materials from the administrative area are assumed to be included in these categories. The basis for this cost analysis of non-porous materials is a radiological survey in accordance with DOE Order 5400.5 (NRC Nureg 1.86). Upon confirmation of levels below limits as defined in Table 2-2 of DOE Order 5400.5, the material is not considered low level waste.

Action: As stated in the action for Original Comment #2, the reuse of these materials will be evaluated in the appropriate implementation plan. Text in the FS regarding the unrestricted release of OU3 materials was revised to state the "potential unrestricted release" to support the assertion that all materials would be required to comply with release certification requirements. The text has been modified in Section 4.3.2 to reflect the potential release of non-porous materials. The following text has also been added to Section 4.3.2 to clarify the issue associated with the potential for release of porous materials:

"For porous materials, DOE acknowledges that the effectiveness and implementability of releasing porous materials off-site to a solid waste disposal facility is dependent

upon requirements of a certification program. If DOE determines that this approach is effective and implementable, then a certification program designed to verify the acceptability of materials for unrestricted release will be proposed in the OU3 Remedial Design Work Plan. Such a program would require approval by US EPA and OEPA."

Further, the cost evaluation contained in Appendix E (Tables E-1, E-2 and E-3) has been revised to address only non-porous materials from the Administration Area. This volume is approximately 364,000 ft^3.

Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Page #: Line #:
Original Comment #: 6

Comment: Ohio EPA is satisfied with the commitment to refrain from using off-site borrow to pack around debris in the OSDF in the event that inadequate soils are available from OU5. It is necessary, however, to take issue with DOE's reticence to crush concrete. Ohio EPA has not had the opportunity to review OU2's Waste Management Plan. We anticipate potential problems with achieving proper compaction around large blocks of concrete. For this reason, Ohio EPA would prefer not to close the door on potential use of a concrete crusher until the waste management plan has been finalized.

Response: At this time, the disposal facility design firm does not foresee potential problems with achieving proper compaction around large blocks of concrete. However, DOE does recognize OEPA's position as a contingency measure. Therefore, crushing concrete will remain an option to support concrete disposal. As detailed in Section 4 and Appendix D, crushing has been retained as a supporting technology. The use of a crusher will be determined in the waste placement plan for the disposal facility.

Action: No action.

Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Page #: Line #:
Original Comment #: 26

Comment: DOE's response has failed to provide sufficient clarity concerning the procedure used to make the waste categorization determinations in the field. Specifically, the determination of process related metals and equipment is not sufficiently detailed. DOE's response and an Appendix to the RI/FS should detail the methods used to make such a determination as well as provide general types of piping that are expected to fall into each category (e.g., potable water and fire lines are inaccessible metals, while sanitary lines and piping used to convey product or waste materials are process related). Such clarity is necessary both for assessing the appropriateness of the RI/FS calculations as well as for Ohio EPA's ability to measure compliance in the field.

Response: Waste categorization determinations occur in two phases during the project. The first phase occurs during the Safe Shutdown program and results in the identification of a majority of the process related materials. During Safe Shutdown,

identified piping and equipment are cleaned of process residues. The equipment and piping to be addressed by Safe Shutdown is identified by process knowledge and the use of in-situ gamma detection equipment (NaI scanning). When holdup material is detected within process equipment, the equipment is dismantled and the holdup removed. When piping is identified, the pipe is removed in its entirety. These materials are then transported to NTS for off-site disposal.

The second phase of the project occurs during the component D&D activities. Prior to turnover to the D&D Subcontractor, Safe Shutdown and FERMCO Construction personnel walk down the facility identifying all process piping and equipment. These materials are identified by marking the equipment or pipe with spray paint. This approach allows the clear recognition of processing materials by the D&D Subcontractor personnel. Because some processing equipment and piping will remain in the facility after Safe Shutdown, all equipment and piping is visually verified. The visual verification is the step that segregates the materials into either Inaccessible Metals or Process Related Metals. The basis for the segregation is whether visible process material is located on or in the equipment or piping.

The definition of visible process material is:

> **Visible Process Material** - *Visible process residues (such as green salt, yellow cake, orange oxide) on the interior or exterior surfaces of materials that is obvious to the eye and that if rubbed, would be easily removed. Stains, rust, corrosion, and flaking paint do NOT qualify as visible process material.*

All non-process piping will be cut by the subcontractor and stacked at the point of generation. Once removed, a FERMCO CRU3 representative will perform a verification inspection for visible process material to confirm that the piping is non-process. After verification, as a best management practice, all ends of the piping will be sealed in accordance with the performance specification to minimize the spread of contamination throughout the facility. If visible process material is contained on or in the piping, it is segregated into Material Category C (Process Related Metals). Piping that passes the verification will be designated as Material Category B (Inaccessible Metals) and will have exterior surfaces cleaned prior to being containerized by the subcontractor for interim storage and eventual placement within the on-site disposal facility.

For the Category B and C materials that are not piping (e.g., equipment), after cutting and removal, all accessible surfaces will be cleaned by the subcontractor. As possible, inaccessible areas would be cleaned with a H2O wand. After washing, accessible areas would be inspected to verify the removal of visible process material. If visible process material is discovered, the equipment will be re-cleaned and re-inspected. If it fails the second verification, the equipment will be segregated and containerized as Category C for off-site disposal. The materials passing the verification would be containerized for interim storage by the subcontractor as Category B.

This approach is detailed in Figure 1, which illustrates the coordination of Safe Shutdown activities and the complex D&D activities. Note that *all* materials failing the visual verification are containerized for disposal at the NTS.

Based on the approach outlined above, each type of piping may typically be segregated into one category over another, however, actual segregation is based on visual verification. The visual verification approach will be used to segregate all piping in the field. However, based on typical uses of the piping, it is expected that potable water, storm water, sewage, natural gas, electrical conduit, cooling water, steam and fire lines will be inaccessible metals. Similarly, processing lines (waste water and process residue lines) will typically be categorized as process related metals. The segregation of all lines would be based on the visual verification process.

Action: Figure 1 has been added to Section 3.5.5. as Figure 3-35 and Section B-7 as Figure B-7. The title of Section 3.5.5. Material Quantities by Segregation Category, has been changed to Segregation by Material Category. The following text has been added to Section 3.5.5. to provide more detailed definitions of the material categories and to explain the procedure that will be used to make waste categorization determinations in the field:

"OU3 RI/FS material categories were developed as a management strategy to handle the diverse materials generated in OU3 as a result of ongoing and proposed decontamination and dismantlement activities. The categorization of OU3 construction materials into ten material categories and 67 construction material types was based on potential treatment and disposition options, possible dismantling techniques, and existing material management strategies, as well as the regulatory drivers for segregation and disposition of materials. The estimated weights and volumes of materials, and process knowledge, were also considered in the definition and categorization of materials. The material categories provide a cross-walk to link weight and volume estimates in the SWIFTS database, RI/FS characterization data, and potential process options. The material categories and material descriptions developed for OU3 materials are defined below and were summarized in Table 3-1.

A-Accessible Metals: Structural steel and steel decking have large accessible surface areas and thicknesses which are greater than 1/4 inch. The surface of accessible metals are accessible for application of physical surface decontamination techniques, as well as, subsequent radiological surveys prior to disposition.

B-Inaccessible Metals: Non-process piping, equipment in non-process areas, decontaminated process equipment, conduit/wire, electrical fixtures, miscellaneous electrical items, doors, and other miscellaneous metals are included in this category. These materials have surfaces which cannot be easily decontaminated or surveyed, and thus are considered inaccessible.

C-Process-Related Metals: Process equipment, electrical equipment not included in Category B, and process piping which are assumed to be highly contaminated and to contain holdup material.

D-Painted Light-Gauge Metals: Ductwork, louvers, metal wall and roof panels, and sheet lead are painted metals less than 1/8 inch thick. Metals in this category are assumed to be painted with lead-based paint or, in the case of lead sheeting, to be made of lead themselves.

E-Concrete: Concrete, masonry, asphalt, and clay piping are porous construction materials.

F-Brick: Acid brick was used extensively to line floors, drain areas, and trenches in process areas utilizing corrosive chemicals, and thus is expected to be highly contaminated.

G-Non-Regulated Asbestos Containing Materials (ACM): Transite walls and roofs, refractory (fire brick and insulating brick) materials, ceiling demolition, floor tile, and feeder cable are nonfriable materials.

H-Regulated ACM: Piping insulation, ductwork insulation, and personal protective equipment (PPE) which are classified as regulated ACM because either the material matrix is potentially friable ACM (e.g., insulation), or, in the case of PPE, contaminated with asbestos fibers during asbestos abatement activities. The copper scrap metal pile is included in this category because most of the material is copper conduit covered with a coating that contains ACM.

I-Miscellaneous Materials: Other miscellaneous items present in the structures and buildings in OU3 including windows, wood, built-up roofing, building insulation (non-ACM), drywall, process and non-process trailers, polyvinyl chloride (PVC) pipe, fabric roofs and walls, PPE, and other miscellaneous debris. Neither the characteristics nor the volume of material indicate a need to categorize these materials separately.

J-Product, Residues and Special Materials: The coal pile, sand piles, soil piles, rock salt pile, the outside equipment storage area, and scrap metal pile are large quantities of material. This category also includes the containerized hazardous/mixed waste, nuclear product, and the thorium inventory which is considered part of OU3.

The purpose of this section is to further define how OU3 materials are segregated into material categories. Materials defined by material category are organized such that, in Section 5 of this RI/FS report possible disposition options, treatments, and cost estimates may be made. Detailed discussion of material categories and associated material descriptions, along with determination of weights and volumes for additional materials (paint, holdup, CRUD, and dust), are provided in Appendix B. These materials are affected by decontamination activities prepared under the interim remedial action scope, such as vacuuming and washdown.

Layers of paint, dust, CRUD, or holdup may be categorized within several material categories based on the associated equipment or piping. Material such as holdup is assumed to be radiologically contaminated and all will be placed into Material Category J. Other materials, such as paint, dust, and CRUD, are placed into Material Categories B, C, and J based on decontamination and cleanup assumptions.

The segregation of Category B and C materials occurs in two phases during the project. The first phase occurs during the Safe Shutdown program and results in the identification of a majority of the process related materials. When holdup material is detected within process equipment, the equipment is dismantled and the holdup removed. When piping is identified, the pipe is removed in its entirety. These materials are segregated into Material Category C.

The second phase of the project occurs during the component D&D activities and is illustrated by the flow diagram in Figure 3-35. Because some processing equipment and piping will remain in the facility after Safe Shutdown, all equipment and piping is visually verified to segregate the materials into either Category B or C. The basis for the segregation is whether visible process material is located on or in the equipment or piping. Visible process material is defined as the visable process residues (such as green salt, yellow cake, orange oxide) on the interior or exterior surfaces of materials that is obvious to the eye and that if rubbed, would be easily removed. Stains, rust, corrosion, and flaking paint are not considered to be visible process material.

All non-process piping will be cut by the subcontractor and stacked at the point of generation. Once removed, a FERMCO CRU3 representative will perform a verification inspection for visible process material to confirm that the piping is non-process. After verification, as a best management practice, all ends of the piping will be sealed in accordance with the performance specification to minimize the spread of contamination throughout the facility. If visible process material is contained on or in the piping, it is segregated into Material Category C (Process Related Metals). Piping that passes the verification will be designated as Material Category B (Inaccessible Metals) and will have exterior surfaces cleaned prior to being containerized by the subcontractor for interim storage and eventual placement within the on-property disposal facility.

For the Category B and C materials that are not piping (e.g., equipment), after cutting and removal, all accessible surfaces will be cleaned by the subcontractor. As possible, inaccessible areas would be cleaned with a H2O wand. After washing, accessible areas would be inspected to verify the removal of visible process material. If visible process material is discovered, the equipment will be re-cleaned and re-inspected. If it fails the second verification, the equipment will be segregated and containerized as Category C for off-site disposal. The materials passing the verification would be containerized for interim storage by the subcontractor as Category B."

Sections 3.5.5.1, 3.5.5.2 and 3.5.5.3 have been renumbered for organization to Sections 3.5.6, 3.5.7 and 3.5.8 respectively. The text in these three sections have not been modified.

The following text replaces the third bullet in Appendix B, Section B.7:

"Figures B-4, B-5, B-6 and B-7 provide logic diagrams of the categorization of piping, equipment, and ductwork, and the associated layers or coatings. It is assumed that for approximately 87 percent of the piping and process equipment, 100 percent of the interior holdup contamination, 50 percent of the interior CRUD layer, and 80 percent (4 mils) of the exterior dust layer will be removed. For the remaining (13 percent)

process area piping and process equipment, the associated coatings and layers remain with the piping material. These materials are placed in Category C. Non-process area piping and process equipment are placed in Category B because they are assumed to be free of radiological contamination and thus require minimal decontamination effort. The segregation of Category B and C materials occurs in two phases during the project. The first phase occurs during the Safe Shutdown program and results in the identification of a majority of the process related materials. When holdup material is detected within process equipment, the equipment is dismantled and the holdup removed. When piping is identified, the pipe is removed in its entirety. These materials are segregated into Material Category C."

Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Page #: Line #:
Original Comment #: 28

Comment: The Ohio EPA still has major concerns with the mass based WAC for Tc-99. These concerns stem from the limitations of data used to derive the WAC and the inherent difficulty of verifying compliance with the mass based WAC. Roughly half of the Tc-99 data have been qualified as estimated. No data were collected from inaccessible metals, which make up the second largest waste stream. Residual holdup is assumed to contain only uranium contamination, leaving out any possibility of holdup Tc-99. Contributions from OU1 debris or soils were not included in the WAC calculation. Other assumptions within the development of the WAC lead Ohio EPA to believe the mass based WAC is less than conservative.

Ohio EPA is unaware of any method available to verify achievement of the mass based WAC during remediation. Verification of concentration based WAC is relatively simple and consistent with normal disposal facility operation. Ohio EPA is not confident that the current approach of mass-based WAC and limited scabbling will be protective of the GMA.

Response: For clarification, it appears that the issues raised in this comment reflect concerns regarding the development of the OU3 technetium-99 source term and its application during WAC implementation. As the result of FERMCO, DOE, US EPA, and OEPA discussions at the meeting held in Chicago on July 31, 1995, the group came to a consensus that a mass-based WAC needs to be employed for Tc-99 in OU3 materials considered for on-property disposal based on data collected from the leachability studies. A wide range of initial Tc-99 concentrations were detected in leachability study samples. However, the data showed that a high percentage of Tc-99 leached from the concrete samples during the experiments, regardless of initial concentration. This verified the high mobility of Tc-99 and suggested that Tc-99 leachability from concrete is controlled by diffusion rather than adsorption/desorption processes. Since a constant ratio of solid phase to liquid phase concentrations was not observed, a KL (and therefore a concentration-based WAC) could not be determined. Conclusions were made from these observations that Tc-99 leachate concentrations from debris in the on-property disposal facility would be controlled by the initial *mass* of Tc-99 associated with the debris rather than the initial *concentration*. Therefore, a mass-based WAC would need to be applied for Tc-99 in debris. The 70-year rule was therefore used to calculate the allowable mass of Tc-99 for debris, assuming that all

of the Tc-99 associated with debris would leach within a 70-year period, which makes this approach inherently conservative.

The total allowable mass of Tc-99 that could leach from all materials in the on-property disposal facility within a 70-year period and still meet protectiveness criteria for the Great Miami Aquifer was calculated. Then, the Tc-99 contribution estimated to leach in a 70-year period from all other materials in the disposal facility, including OU2 materials, OU5 soil, and residual soil from OU1, OU2, and OU4, was subtracted out from this total allowable mass. This remaining allowable mass is the allowable Tc-99 mass for all debris in the disposal facility combined (calculated to be 105 grams of Tc-99). This allowable mass is independent of source term estimates for debris.

To address the specific concerns raised in the OEPA comment, the bulleted listing below discusses the Tc-99 data set, inaccessible metals, holdup calculations and OU1 and OU4 contributions.

- OEPA expressed concern with the fact that nearly 50% of the Tc-99 data were qualified by data validation as estimated. This fact had previously been identified as a data uncertainty in Section 3.6 of the RI/FS document. The usability of these data is not in question; however, a specific concern regarding the ramifications of using estimated Tc-99 data has been raised. As a result, a detailed analysis of the Tc-99 estimated data was performed to determine if, based on the specific validation comment codes applied, estimated values were biased either high or low.

  662 solid media samples were analyzed for Tc-99. 506 samples exhibited detectable levels. 258 (51% of the Tc-99 results database) data points exhibiting detectable Tc-99 levels were qualified as estimated. 11 comment codes were invoked to qualify the data as estimated. Table 1 describes these comment codes and ranks them by relative frequency, impact, and bias. It is important to note that the most serious comment codes in terms of data quantification confidence (i.e. ranked in the Comment Code Impact column) are not included in the four most frequently encountered comment codes.

  Figure 2 presents the relative percentages of the all the Tc-99 estimated data compared to all Tc-99 solid media samples. While 258 of the detected results are estimated, 127 of these results do not reflect bias in one particular direction. Where direction of bias can be defined, the low biased samples do exceed the high biased samples by a 5% total sample count margin.

  The directionally biased samples were examined by media type. It was determined that the high biased samples are predominately steel coatings, while the low biased samples are predominately concrete. This determination further emphasizes the degree of conservatism of the Tc-99 source term calculated from steel coatings data. However, it also requires further evaluation of the low biased concrete samples.

Figure 3 examines all solid media Tc-99 sample results for concrete. These results are divided into two groups: results greater than 20 pCi/g and results less than 20 pCi/g. Of the fifty-two concrete samples that were biased low, only 14 had Tc-99 results greater than 20 pCi/g. These 14 low biased samples, when applied to OU3 materials to calculate the source term, produced approximately 22 grams of Tc-99. In order to bound the worst case low bias scenario, these samples were examined further to determine their individual total propagated uncertainty (TPU) and the effect of low bias on the Tc-99 source term. Table 2 delineates the results used for these samples and adjusts the source term calculation by adding the maximum uncertainty to the estimated result. When the reported results are increased by the maximum uncertainty, and applied to OU3 materials, the source term for Tc-99 in concrete will increase by 6 grams. When the total Tc-99 source term is concrete of 97 grams is considered, the uncertainty of the estimated data producing a low biased source term value is approximately 6 percent.

Given the extreme conservatism of the approach implemented by the RI/FS sampling program and the application of hot spot activities applied to OU3 materials, the potential increase in the Tc-99 source term for concrete due to low biased data is insignificant.

- OEPA reiterated their concern from Original Comment #14 that no data were collected from inaccessible metals. The original response indicated that, as per the Work Plan Addendum, no intrusive samples were planned for any metals other than structural steel because of the limited options for treatment or recycling. Given the conservative nature of the sample location determinations, it is felt that contaminants in coatings from structural steel I-beams and the application of conservative assumptions validated by field experience adequately represent contamination for all inaccessible metals.

- Interior contamination for inaccessible metals in process and process-related components is partially accounted for through application of the UNH holdup assumption. This assumption is used to estimate the source term for total uranium. In the response to US EPA's Original Specific Comment #11, DOE compared the assumptions to data collected from recent Plant 4 Safe Shutdown activities. This comparison concluded that the applied holdup assumptions overestimated actual holdup quantities by a factor of 10. Tc-99 residual contamination on interior surfaces is also accounted for through application of a CRUD layer (see Figure 1). Since holdup material is being segregated into Material Category C for off-site disposal, as detailed in OEPA Comment #5, these materials will not be placed in the on-site disposal facility.

- Although the potential Tc-99 contributions from OU1 and OU4 were not considered to determine an allowable OU3 mass, the Tc-99 source terms combined from OU1, OU3, and OU4 debris would be required to meet the allowable mass of 105 grams for disposal in the on-property disposal facility. In the response to comments for the OU1 Preliminary Remedial Design Packages I and II (submitted January 19, 1996), DOE committed to disposing

all debris from the OU1 waste pits off-site.

If the OU1 equipment (non-porous materials) were to be disposed of within the on-site disposal facility, a technetium-99 contribution from the approximate 540,000 ft^3 has been calculated. Applying CRUD, paint and dust layer assumptions from the OU3 source term calculations for equipment, using the maximum Tc-99 concentration detected in the OU1 waste pits (3,000 pCi/g), the total debris contribution from OU1 would be 1.9 grams of Tc-99. Tc-99 is not expected in the contents of the silos in OU4 and therefore would not be expected in OU4 debris. However, additional samples may be required from OU4 materials to estimate Tc-99 source terms. Based on this, the OU1 source contribution would be minor and the OU4 contribution would be estimated prior to any material placement in the on-site disposal facility.

The only step in the WAC development process that used characterization data or source term estimates was the identification of post-remediation COCs, which included Tc-99. Once the allowable Tc-99 mass was determined using the 70-year rule, the characterization data and source term estimates were used to identify which materials would need to be excluded from on-property disposal to meet the mass-based WAC. Based on the sampling strategy used in the OU3 RI field program, the OU3 RI/FS Report has provided a conservative and highly biased characterization of OU3 materials. Significantly contaminated areas were identified on the basis of many years of survey data, process knowledge, and location. Samples were collected for identified "hot spots" in major construction materials, and the data set has been validated. Any additional sampling to refine current source term estimates would be less meaningful in terms of making disposition decisions. In reality, an additional sampling program to refine the Tc-99 source term estimates, conducted prior to D&D, should result in a reduced overall Tc-99 source term. Since the WPA sampling program identified and sampled maximum concentrations, lower Tc-99 concentrations would be expected from a new sampling program. The net result would be a lowering of the calculated source term, which would allow a greater volume of materials to be placed in the on-site disposal facility.

Similarly, after demolition, inherent problems exist for implementing a verification sampling program. Survey knowledge is lost, as is process knowledge and spatial information relative to the material. Material becomes more heterogeneous, and no good basis exists for choosing sampling locations. Existing data provide a better understanding/characterization of materials than would any practical post-demolition sampling/survey program. The WAC implementation section in Section 5 of the OU3 RI/FS Report is based on the assumption that source term estimates are sufficiently conservative and bound the Tc-99 mass associated with OU3 materials.

In summary, DOE feels that the Tc-99 mass-based WAC presented in the RI/FS Report is appropriate for construction debris. Because the characterization data set and source term assumptions are highly conservative, the resulting source term estimates are also conservative. Therefore, use of existing characterization data is sufficiently conservative to make disposition decisions during the WAC implementation process.

To address concerns associated with potential contributions from the Pilot Plant due to inherent chemical and radiological contamination, as a best management practice, additional scabbling will be performed in the Pilot Plant Wet Side (13A). Analytical results in this component show high concentrations only in Process Area 1, the Southern Extraction Area. The top ½ inch of concrete registered 588 pCi/g Tc-99 followed by 50 pCi/g Tc-99 in the second ½ inch. Due to the lower concentrations at depth, only scabbling of the first ½ inch would be performed in this area.

Action: The following text has been added to the recommended action/justification column of Table 3-12, Operable Unit 3 Data Limitations:

"12.4 percent of the Tc-99 solid media samples are biased low. Only 14 (2% of all Tc-99 samples) of the low biased samples exceed 20 pCi/g. The effect of applying the maximum uncertainty to these sample results adds 6 percent potential error to the Tc-99 source term for concrete."

The following information has been added to Section 5.5.2.1 to define the additional scabbling performed within the Pilot Plant Wet Side (13A):

"To further reduce the Tc-99 source term, an additional area of concrete, having a concentration at 588 pCi/g of Tc-99, will also be removed. This concrete is located in process area 1 of Building 13A (Pilot Plant Wet Side). This area was selected for removal due to its inherent chemical and radiological contamination and because of its relative contribution to the Tc-99 source term. The removal of the top half-inch of concrete in Building 13A, process area 1 would further reduce the total Tc-99 source term by approximately 0.5 grams and would generate approximately 205 ft^3 of residue.

As a result of the concrete removal, the remaining mass of Tc-99 estimated for disposal within the on-property disposal facility is 59 grams."

This change has also been incorporated into Table 5-5, Figure 5-5, and the Proposed Plan. The cost estimate in Appendix E has also been modified in Table E-10, Figure E-5, and all associated tables.

Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Page #: Line #:
Original Comment #: 57

Comment: Ohio EPA does not concur with DOE's suggestion of the "inherent nonprocess function of below-grade piping." Ohio EPA believes there is no basis for such a statement and that available data suggest below-grade piping will be internally contaminated. Ohio EPA would refer DOE to reviewing the Pilot Plant Sump RA. At this location, significant contamination existed within the below-grade piping leading to the sump. Additionally, it is likely that highly contaminated piping and waste residue within the remaining subgrade facilities such as the floor drains of the Pilot Plant. The failure to include such contamination within the source term calculations is another example of the lack of conservatism built into the WAC development for OU3. DOE

must re-evaluate the source term calculations with revised consideration of the below grade piping.

Response: Agreed. The initial response to Ohio EPA Comment #57 was incorrect. The comment pointed out an inconsistency in Section B.2.3.12, which implied that below-grade piping in the former Production Area was not assumed to be contaminated. During DOE's review of the below-grade piping assumptions, it was verified that below-grade piping was not considered separately from above-grade piping in terms of data application. Therefore, the conservative piping contamination layer assumptions applied to the above-grade piping were also applied to the below-grade piping. The source term for process and process-related below-grade piping is consistent with above-grade piping assumptions and is accurate.

Action: Section B.2.3.12 has been revised to eliminate the inconsistency implying that below-grade piping in the former Production Area was not assumed to be contaminated.

TABLE 1. COMMENT CODES

COMMENT CODE	CODE DESCRIPTION	BIAS DIRECTION	COMMENT CODE FREQUENCY[1]	COMMENT CODE IMPACT[2]
EE	Estimated value where the total error approaches the analytical result.	Not applicable	1	5
D	Estimated value where a duplicate analysis of the sample does not meet the QC specifications for duplicate samples. No data is qualified unusable on the basis of this indicator. This indicator gives information about ability to reproduce analytical results which may be affected by either the analytical method or sample matrix.	Not applicable	2	9
LR	Estimated value because of a low recovery of a matrix spike. No data is qualified unusable on the basis of this indicator.	Low	3	6
QC	Estimated value due to lack of necessary QC information. Primarily used to indicate missing Laboratory Blank QC Trend Chart, which is used to determine if blank used to correct data was typical or atypical.	Not applicable	4	11
HR	Estimated value because of a high recovery of a matrix spike. No data is qualified unusable on the basis of this indicator.	High	5	7
LCS	Estimated value due to Laboratory Control Sample (LCS) result does not meet the QC specifications for the sample. No data is qualified unusable on the basis of this indicator. This indicator gives information about analytical method problems and does not indicate sample specific problems.	Not applicable	6	8
LY	Estimated value because of a low tracer yield. Tracer yield is considered a key indicator to evaluate overall quality of the result generated. A low yield may indicate both method and sample specific problems.	Low	7	1
HY	Estimated value because of a high tracer yield. Tracer yield is considered a key indicator to evaluate overall quality of the result generated. A high yield may indicate both method and sample specific problems.	High	8	2
HT	Estimated value because the sample exceeded the maximum hold time before analysis. The hold time for a solid sample is not a great concern for the analysis of Tc-99, where the half life of the meta stable isotope analyzed is 3.13×10^{5} years. A liquid sample set may have a high bias where evaporation of a sample over a one year period affects the analytical result.	Not applicable for solids, High for liquids	9	10
B(FLD)	Estimated value where contamination was found in the field blank. This contamination indicates that sample analytical results obtained may be biased high if the same level of contamination occurred in the associated samples.	High	10	3
B	Estimated values where the analytical result was corrected for a laboratory or method blank. The blank result may have been significantly higher than typical blank results found on any other given day in that laboratory.	Low	11	4

Notes
(1) Ranking of how frequently a comment code was utilized to qualify a result (1 = most frequent, 11 = least frequent).
(2) Ranking of the relative seriousness of the comment code to data confidence.

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TABLE 2 LOW BIAS SAMPLES' EFFECT ON SOURCE TERM

Sample ID	Result	TPU	Component/ Process Area	Source Term (grams)	Added (grams)
37-028R[a]	21.1	4.40	N/A	0.00000	0.00000
37-033R	22.2	4.60	37 - PA7	0.02650	0.00549
01A-024	29.6	6.10	01A - PA6	0.02075	0.00428
02A-022[a]	32.7	3.9	N/A	0.00000	0.00000
01A-003	40.5	8.30	01A - PA1	0.02330	0.00478
02A-025	50.2	5.8	02A - PA2	0.01079	0.00125
04A-003A	52.8	63.50	04A - PA1 04A - PA2	0.4322 0.0396	0.51940 0.04760
02D-009	53.9	6.40	02D - PA2	0.00150	0.00018
74T-010[a]	62.9	12.80	N/A	0.00000	0.00000
02A-004	66.7	20.00	02A - PA1	0.20100	0.06030
74R-003R	71.6	36.50	74R - PA1	0.03674	0.01870
74T-009	120.0	24.00	74T - PA2 74T - PA3 74T - PA4	1.28380 0.76260 12.3760	0.26090 0.15510 2.51600
02A-003	214.0	66.00	02A - PA1	0.64400	0.19860
71-001	571.0	265.00	71 - PA1 07A - PA1 32B - PA1	4.40600 1.56400 0.17334	2.04500 0.72600 0.08040
TOTALS (grams)				22.02748	6.64375

[a] Duplicate sample - not used in source term calculation

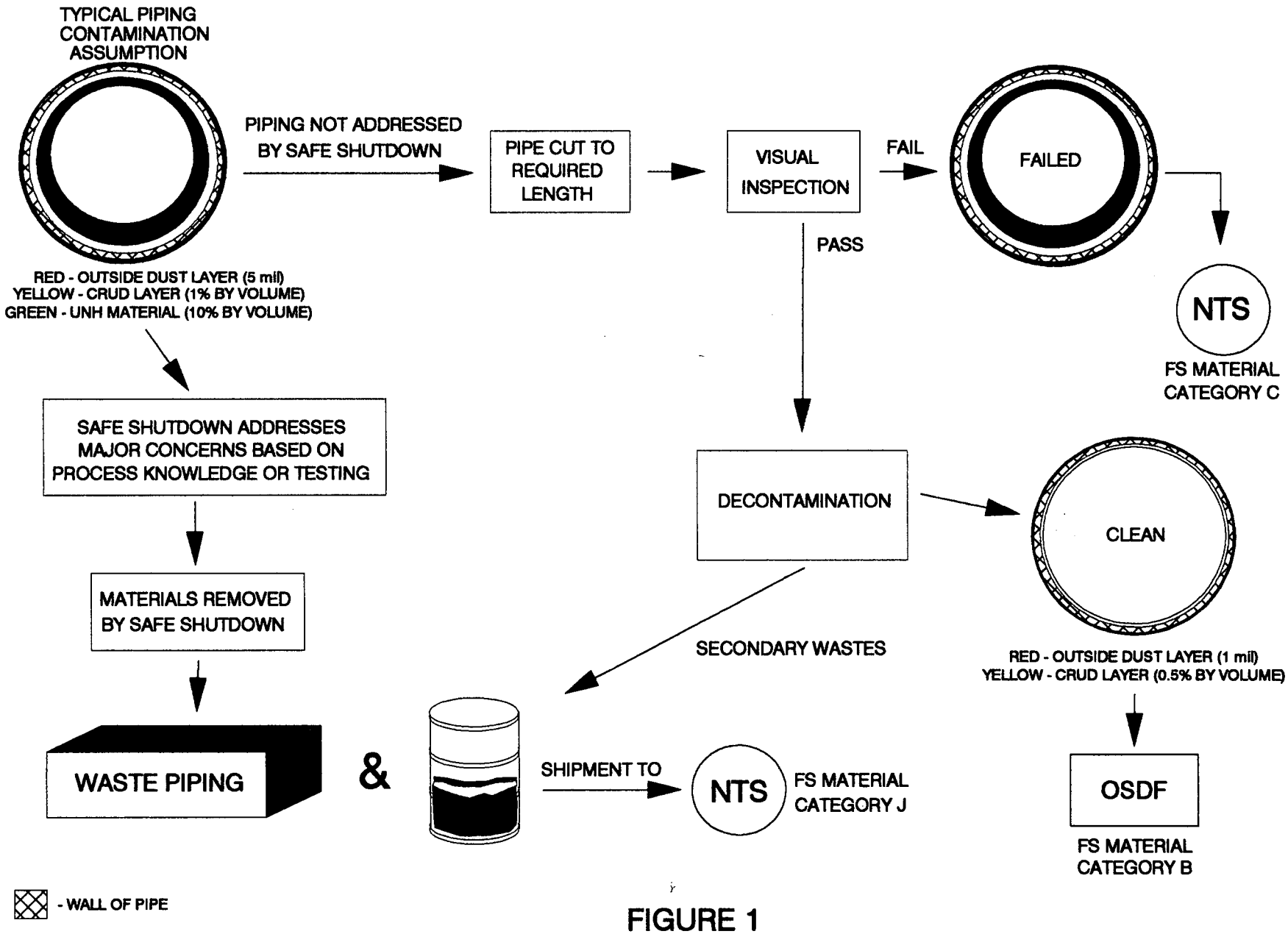

FIGURE 1
MATERIAL SEGREGATION APPROACH for PIPING and RELATED MATERIALS

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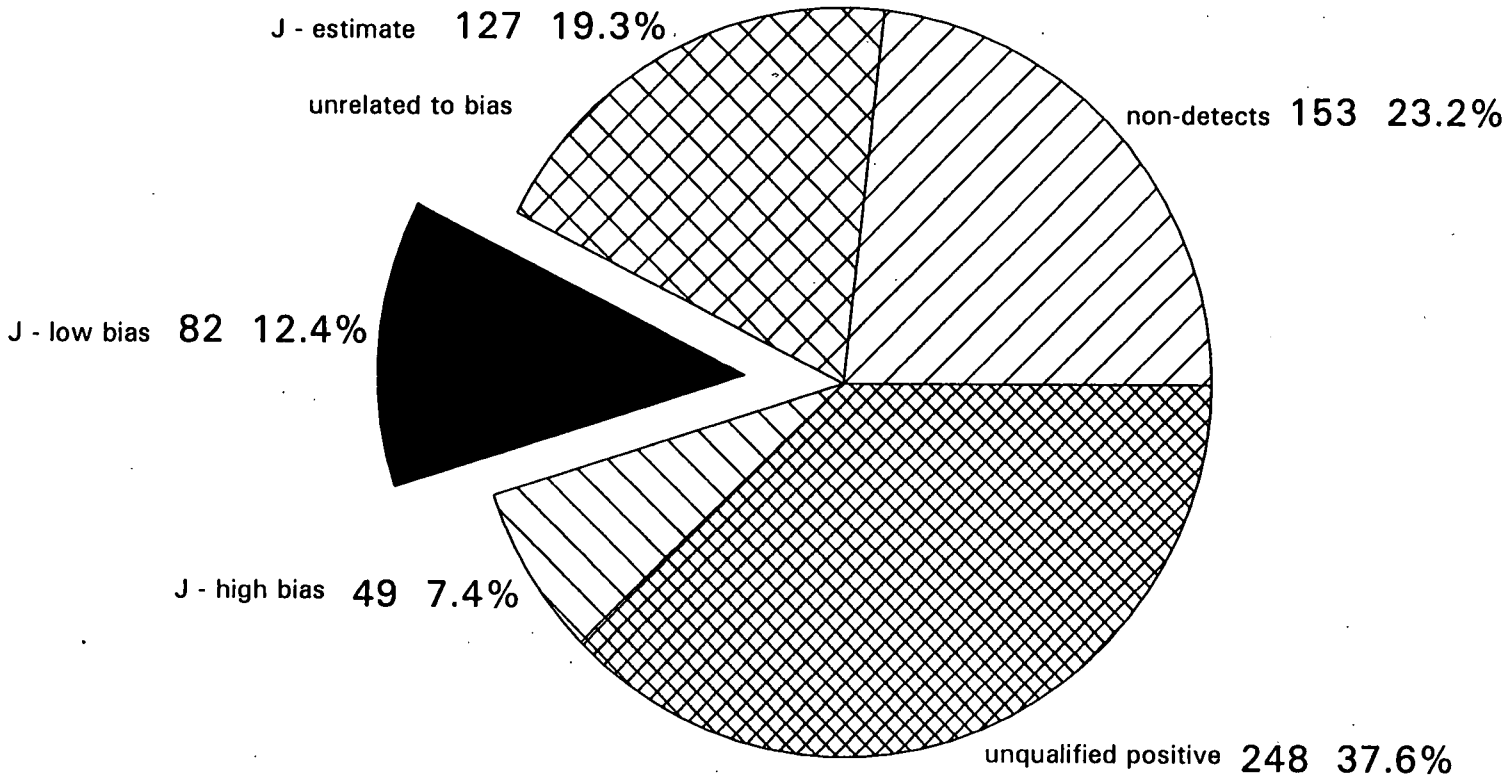

FIGURE 2 - TECHNETIUM 99 SAMPLES

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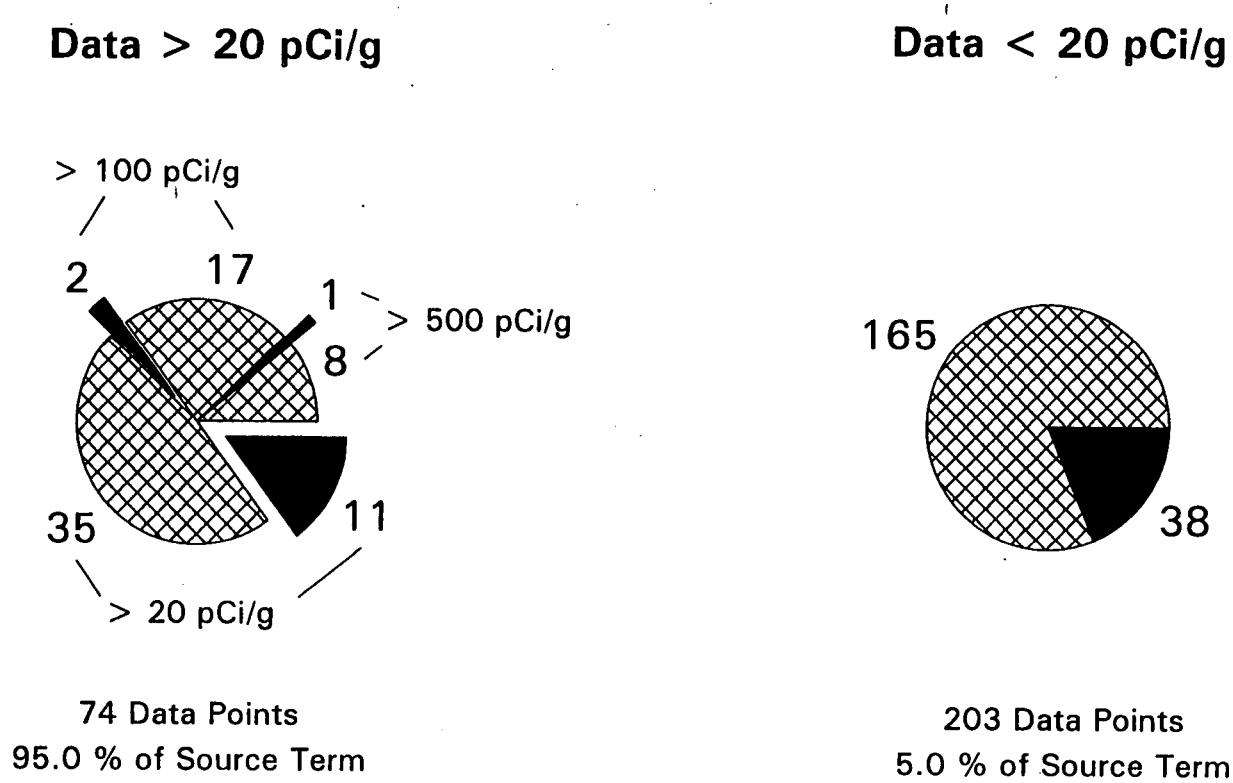

- Unqualified Positives & Estimate Unrelated to Bias Samples

- Low Bias Samples

Non-detects not included

FIGURE 3 - TECHNETIUM-99 IN CONCRETE
Data Grouped by Result

US EPA COMMENTS AND RESPONSES

GENERAL COMMENTS

Commenting Organization: US EPA Commentor: Saric
Section #: Not Applicable (NA) Page #: NA Line #: NA
DOE Response #: NA (Original General Comment #: 5)
Comment: The original comment requests that the U.S. Department of Energy (DOE) provide additional information regarding interim storage of remediation materials. DOE's response indicates that information regarding interim storage should be obtained from the "Operable Unit 3 (OU3) Record of Decision for Interim Remedial Action (IROD)," "the Removal Action No. 17 Work Plan (Revision 3)," and supporting site procedures. DOE modified text regarding interim storage in Section 1.0 of the Remedial Investigation/Feasibility Study (RI/FS) report to include a reference to the IROD. However, additional references to the above-mentioned documents should be incorporated into the text regarding interim storage.

Response: Agree.

Action: An additional bullet has been added to the text in Section 1.2.2.1. The bullet includes references to the Removal Action No. 17 Work Plan, its accompanying procedure, and the OU3 PSR.

Commenting Organization: US EPA Commentor: Saric
Section #: Not Applicable (NA) Page #: NA Line #: NA
DOE Response #: NA (Original General Comment #: 8)
Comment: The original comment requests that DOE incorporate the additional costs that OU3 would contribute to the on-property disposal cell, such as costs for disposal and for operation and maintenance, into the costs for Alternative 2. DOE's response clarified the fact that these additional costs are included in the original cost estimate for Alternative 2; however, the text in Section 6.4.2.5 of the RI/FS report was not revised to clarify this matter. DOE should revise the text in Section 6.4.2.5 accordingly.

Response: Agree.

Action: The text in Section 6.4.2.5 has been revised to provide additional information concerning the costs that OU3 would contribute to the on-property disposal facility.

SPECIFIC COMMENTS

Commenting Organization: US EPA Commentor: Saric
Section #: 5.2.2 Page #: 5-7 Line #: 15
DOE Response #: 3 (Original Specific Comment #: 12)
Comment: The original specific comment requests that DOE provide details on the duration of temporary storage and the types of temporary storage facilities that will be provided. DOE's response indicates that information regarding temporary or interim storage should be obtained from the documents listed in the general comment on the response to Original General Comment 5. DOE should incorporate references to these documents into the discussion of interim storage in Section 5.2.2.

Response: Agreed.

Action: References to the Removal Action No. 17 Work Plan and its accompanying procedure have been added to Section 5.2.2.

Commenting Organization: US EPA Commentor: Saric
Section #: 5.4 Page #: 5-14 Line #: 15
DOE Response #: 3 (Original Specific Comment #: 16)
Comment: The original specific comment requests that DOE provide more detailed information regarding interim storage of OU3 remediation materials. DOE should incorporate references to the documents listed in Original General Comment 5 into the discussion of interim storage in Section 5.4.

Response: The text referenced in Original Comment #16 (pages 5-14, line 15) has been deleted as indicated in the OU3 RI/FS Report Comment Response Document. The text in Section 5.4 does not specifically discuss interim storage of materials. Therefore, references to the Removal Action 17 Work Plan in Section 5.4 are not applicable.

Action: No Action.

Commenting Organization: US EPA Commentor: Saric
Section #: B.3.6 Page #: B-16 Line #: 23
DOE Response #: 4 (Original Specific Comment #: 34)
Comment: The original specific comment requests that DOE sample and analyze the transite materials to reliably estimate the mass of metals in the transite. This comment refers to DOE's methodology for estimating the mass of metals in the transite by multiplying the leachate analytical result by 20 liters per kilogram (L/kg). DOE's response states that the 20 L/kg value in the text of the RI/FS report was incorrect and has been changed to the 60 L/kg value actually used. However, to adequately address the comment, DOE should sample and analyze the transite materials or provide the rationale for using the 60 L/kg value.

Response: A reliable estimate of the RCRA metals for transite can be obtained from current data, eliminating the need to perform an additional sampling effort. During the RI/FS field program 12 samples were collected from transite for analysis using the TCLP protocol (extract results). No samples were collected for a total weight analysis. In order to estimate RCRA metals in transite for the source term calculation, extract results were converted to total results. In order to perform this conversion, a leach rate for transite is needed. In the September version of the RI/FS document, a leach rate was established using concrete data from both extract results and total weight analysis. Based on these data, DOE estimated that the maximum leach rate for the eight RCRA metals was approximately 33%. As US EPA correctly points out, if one applies a 20 L/kg multiplier to the extract result, the calculated solid result would assume all of the metal leached from the original solid and, if this were not the case, the total concentration estimate would be biased low. Increasing the 20 L/kg factor by a factor of three to 60 L/kg corresponds to a 33% leach rate (the maximum determined for the September submittal). While this methodology provides a more conservative value than the 20 L/kg, it is not consistent with the extremely conservative approach carried through the RI/FS document.

The most conservative approach would be to calculate a solid phase total weight analysis based on the lowest leaching percentage. This methodology would produce the maximum solid phase concentration. The lowest leaching rate determined from the RI/FS data for metals in concrete was 0.1%. If this rate was used to back calculate metallic content in the transite the resulting total concentration for the RCRA metals would be unrealistically high. It therefore became apparent that another approach was needed.

Results recently became available from the "Transite Characterization Treatability Study Final Report," performed for FERMCO by the University of Cincinnati (UC) - College of Engineering. The purpose of the treatability study was to develop a methodology to determine the depth of radiological contamination for transite samples from the Fernald site to ascertain the feasibility of decontamination. In addition to the radiological studies, UC was requested to perform an analysis of selected metals contamination in the transite. In particular, the penetration of lead through the thickness of transite.

The metals characterization was performed by digesting and analyzing abraded material from the surface of transite panels removed from the interior of Plant 7. Total extractable lead and barium were analyzed using USEPA SW-846, Method 6010A. Twenty-four (24) samples were analyzed in triplicate and the average of these replications was reported. Below is a summary of these results:

	Maximum result	Minimum result	Average result
Lead, mg/kg	462.0	362.9	427.1
Barium, mg/kg	199.6	143.6	168.5

The twelve transite samples analyzed using the TCLP protocol (extract results) during the OU3 RI/FS study were collected from the following components: the Preparation Plant (1A), Ore Refinery Plant (2A), Hot Raffinate Building (3E), Green Salt Plant (4A), Metals Production Plant (5A), Metals Fabrication Plant (6A), Recovery Plant (8A), Special Products Plant (9A), and the Incinerator Building (39A). Only one of the twelve lead results and five of the twelve barium results were reported above the detection limit. By comparing these detected extract results to the maximum levels of the total lead and barium results discussed above, a percent leached was determined for lead and a range of percent leached was determined for barium.

Lead	mg/kg	462.0	
	mg/L	0.189	
	% leached	*0.82*	
Barium	mg/kg	199.6	199.6
	mg/L	0.312 (minimum result)	0.64 (maximum result)
	% leached	*3.13*	*6.41*

The lead value of 0.82% is the most conservative of the three leach percentages calculated and indicates that approximately one percent (1%) of the total available lead in the transite sample would transfer into the leachate during a TCLP protocol determination. Therefore, to be conservative, a one percent (1%) leach rate was used to recalculate the metallic content in the transite.

Using the 20 times TCLP rule as a basis, if 20 times equates to 100% analyte leaching, then 2000 times the TCLP value (20 x 100) approximates a one percent (1%) leach rate. In order to accurately estimate the source term, DOE proposes to replace the 60 L/kg value previously used in the calculations to estimate metallic content in transite with a 2000 L/kg value.

The transite source term was calculated assuming that contamination is distributed equally throughout all transite materials and applying a one percent leach rate to the extract results for metals. These calculated values were used in determining the source term for transite in sampled components. Where no usable detected result was available, or where no samples were taken, the maximum non-detected value for each inorganic contaminant was used to determine the source term for transite.

The RCRA metals source term contribution calculated for transite ranged from less than one percent of the total source term for chromium up to 98 percent for selenium. Selenium, arsenic, mercury, and silver are present throughout OU3 materials at low levels (with geometric means from 0.1 to 5 mg/kg), thus the overall source term for these analytes, as expected, is relatively low. However, the relatively high transite source term determined for selenium, arsenic, mercury, and silver was calculated by multiplying the extract result by a one percent leach rate as discussed above, resulting in a highly conservative estimate of the source term for transite. Based on the highly conservative methodology used to calculate the total

transite results, the source term associated with transite represents 98, 26, and 16 percent of the total source term for selenium, arsenic, and silver, respectively. The source term associated with transite represents only one percent of the total lead source term and less than one percent of the total chromium source term. Overall, the source term for chromium is associated with the normal constituents of carbon and stainless steel metals and the paint in painted metals, while the majority of the source term for lead is associated with painted materials. A summary of the RCRA metals source term for all materials, transite, and the percent of the total source term contribution from transite, follows.

Parameter	Total Source Term (kg)	Transite Source Term (kg)	Percent of Total Source Term
Arsenic	2780	711	26
Barium	26200	1850	7
Cadmium	823	63	8
Chromium	2470000	1650	0.067
Lead	103000	1150	1
Mercury	32	4	13
Selenium	1000	977	98
Silver	3460	550	16

Transite represents less than one percent of the total weight and volume of OU3 materials; thus, the source terms for RCRA metals associated with transite are insignificant. While application of the methodology above produces a conservative estimate of the RCRA metals source term in transite, it will not drive any disposition decisions because, based on hazardous waste determination analysis, no transite is characteristically hazardous.

Action: Section 3 and Appendix B of the RI/FS Report have been revised to apply a more conservative methodology to estimate the RCRA metal content in transite material. Appendix A discussion on the original extract conversion methodology has been deleted. Section 3.5.4.2, Table 3-9, Figures 3-23 through 3-32, and Section B.5.1.1. of Appendix B have been revised to incorporate the recalculated source term values for RCRA metals. Section B.3.6 of Appendix B has been revised to incorporate the specific methodology used to convert extract results to total weight analysis for RCRA metals in transite, outlined above.

Commenting Organization: US EPA Commentor: Saric
Section #: J.3.2 Page #: J-11 Line #: 23-32
DOE Response #: 5 (Original Specific Comment #: 50)
Comment: The original specific comment states that the discussion of how the on-property disposal cell will impact groundwater is inadequate. DOE's response to this comment consists of new text that improves the discussion of potential impacts of the on-property disposal cell on groundwater. In addition to the new text, however, DOE should incorporate text that states the following: "Mitigative measures to minimize long-term impacts on groundwater will be fully considered when the final land use is established. For example, administrative controls on land use, such as deed restrictions, will be considered."

Response: Acknowledged.

Action: The text has been added to Section J.3.2 as requested.