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TRANSMITTAL OF RESPONSES TO COMMENTS AND RESULTING CHANGE PAGES FOR THE OPERABLE UNIT 5 FEASIBILITY STUDY REPORT

05/19/95

DOE-0993-95
DOE-FN EPAS
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RESPONSES

Department of Energy
Fernald Environmental Management Project
P. O. Box 538705
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MAY 19 1995

DOE-0993-95

Mr. James A. Saric, Remedial Project Manager
U. S. Environmental Protection Agency
Region V-5HRE-8J
77 W. Jackson Blvd
Chicago, IL 60604-3590

Mr. Tom Schneider, Project Manager
Southwest District Office
Ohio Environmental Protection Agency
401 East Fifth Street
Dayton, OH 45402-2086

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF RESPONSES TO COMMENTS AND RESULTING CHANGE PAGES FOR THE OPERABLE UNIT 5 FEASIBILITY STUDY REPORT

References: 1) Letter, T. A. Schneider to J. R. Craig, "Responses to DOE Comment Responses, Operable Unit 5 Feasibility Study/Proposed Plan," dated April 17, 1995

2) Letter, J. A. Saric to J. R. Craig, "Conditional Approval of Draft Final Operable Unit 5 Feasibility Study/Proposed Plan Reports," dated April 20, 1995

On April 21, 1995, the Department of Energy, Fernald Area Office (DOE-FN) received U.S. Environmental Protection Agency's (U.S. EPA) conditional approval of the Operable Unit 5 (OU5) Feasibility Study (FS) Report and Proposed Plan pending responses to 13 additional comments on the FS. The Ohio Environmental Protection Agency (OEPA) also submitted comments; four on the FS and 19 on the Proposed Plan. This letter transmits DOE-FN's responses to the referenced comments and the corresponding change pages for insertion into the document. Comment numbers and revised text are shown in ***bold italics***. As you know, the Proposed Plan was revised and issued on May 1, 1995, and copies were sent to the U.S. EPA and OEPA at that time.

Recycled and Recyclable

When U.S. EPA indicates agreement with the enclosed responses, DOE-FN will prepare FINAL covers, spines and title pages and provide them, along with the appropriate change pages, to all holders of the March 1995 OU5 FS Report. Additionally, DOE-FN plans to initiate a few refinements to the FS that have been identified since the March submittal. For example, one of the colored overlays in Figure 2-15 is incorrect and a new figure will be provided. In addition, the Executive Summary tables that summarize the alternatives will be upgraded for consistency to coincide with revisions to the Proposed Plan.

Following concurrence from the U.S. EPA, a limited distribution of a "cleaned-up version" (i.e., the bold italics and redlining, line numbering and comment numbers removed) of Volume 1 of the FS will be made to the Administrative Record, the U.S. EPA, and the OEPA. This equals the procedure followed for the OU5 Remedial Investigation Report when it received final approval.

If you have questions about this deliverable, please contact Robert Janke at (513) 648-3124 or Kathi Nickel at (513) 648-3166.

Sincerely,

Johnny Reising

for Jack R. Craig
Fernald Remedial Action
Project Manager

FN:Janke

Enclosure: As Stated

cc w/enc:

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PROPOSED RESPONSES TO U.S. EPA COMMENTS ON THE MARCH 1995 OPERABLE UNIT 5 FS REPORT

RESPONSES TO U.S. EPA COMMENTS ON THE MARCH 1995 OU5 FS REPORT

34. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.4 Page #: 6-11 Line #: NA
Original Specific Comment #: 17
Comment: The original specific comment requests that an error in Table 6-2 regarding receptors be corrected. The response to this comment states that the discrepancies in the table would be corrected; however, the table does not appear to have been modified. The table should be corrected.
Response: Agree, the corrected table was inadvertently left out of the revised FS.
Action: The revised Table 6-2 is provided with the change pages for the Final FS report.

49. Commenting Organization: U.S. EPA Commentor: Saric
Section #: C.3.1 Page #: C-3-1 Line #: 9 to 11
Original Specific Comment #: 29
Comment: The original specific comment requests that the location of exposure parameters used to calculate unit risks be specified. The response states that "All exposure parameters are listed in Tables H.III-8A and H.III-8B." Tables H.III-8A and H.III-8B do not exist. Instead, the exposure parameters are listed in Tables H.III-8 and H.III-9. The text should be revised to refer to the correct tables.
Response: Agree.
Action: The text will be revised to state "All exposure parameters are listed in Tables H.III-8 and H.III-9.

54. Commenting Organization: U.S. EPA Commentor: Saric
Section #: C.3.1.2 Page #: C-3-5 Line #: 4, 26, and 34
Original Specific Comment #: 34
Comment: The original comment notes inconsistent presentation of the concentration of uranium-238 (U238) in vegetables. A different value is presented in three places on this page. The response states that the correct value, 0.490, would be inserted at each of the three places; however, only on Line 26 is the value of 0.490 used. Lines 4 and 34 list a value of 0.497. The text should be revised to consistently use the correct value for the concentration of U238 in vegetables.
Response: Agree, the value 0.490 was inadvertently left out of lines 4 and 34.
Action: The value 0.490 will replace 0.497 in lines 4 and 34.

104. Commenting Organization: U.S. EPA Commentor: Saric
Section #: F.7.2 Page #: NA Line #: NA
Original General Comment #: 22
Comment: The original comment requests information concerning source contaminant loadings to the Great Miami Aquifer (GMA). DOE added Table F.7-5, which includes estimates of source contaminant loadings to the GMA. The sources in the table include Paddys Run, the storm sewer outfall ditch (SSOD), and operable units (OU) 1, 2, and 3; however, according to Figure F.7-2, OU5 is also a source of contamination to the GMA. Table F.7-5 should be revised to include an estimate of source contaminant loading to the GMA from OU5.
In addition, technetium-99 (Tc-99) is the only contaminant loaded from OU3 (Production Area) to the GMA. Large amounts of uranium contamination have been detected beneath the production area and near the GMA. The text should be revised to explain whether or not uranium is loaded to the GMA from the production area. If uranium is loaded, then Table F.7-5 should be revised to include uranium.
Response: The new Table F.7-5 lists all the significant modeled source loadings (other than uranium which is shown in Table F.7-1) that may impact the aquifer during the remediation period;

loadings from Paddys Run and the storm sewer outfall ditch represent Operable Unit 5 sources and are due to uncontrolled surface runoff and perched groundwater seepage to the pilot plant drainage ditch.

An additional Operable Unit 5 source is contamination (including uranium) in the glacial overburden under the production area (Operable Unit 3). However, contaminant loading from surface soil through the overburden is insignificant during the remediation period, which is expected to be less than 30 years. These sources will be removed within 30 years. Therefore, technetium-99 is the only mobile contaminant that may have a significant amount of loading and was included in the model simulation and listed in Table F.7-5. Contaminants in perched groundwater below the production area, as defined in Appendix F.6, were included in the model simulation; this loading is also insignificant during the remediation period.

Action: Table F.7-5 will be clarified. The title will be "Modeled Contaminant Mass Loadings to the Great Miami Aquifer for Other Constituents." The footnote will be rewritten to include the phrase "Paddys Run and the storm sewer outfall ditch represent Operable Unit 5 sources."

112. Commenting Organization: U.S. EPA Commentor: Saric
Section #: F.7.3.2 Page #: F-7-11 Line #: NA
Original Specific Comment #: 81

Comment: The original comment states that remediation scenario effects on other COCs should be included in the text. In response to this comment, DOE added Table F.7-7 which includes requested information; however, the table does not show when the concentrations of the other COCs are below screening levels. This information should be provided in the table to help determine if COC concentrations will be below screening levels before 400 years, which is the proposed time to discontinue the groundwater extraction system (see Section 7, Page F-7-3, first bullet).

Response: Table F.7-7 summarizes the maximum concentrations of COCs other than uranium under the no-additional-action scenario (i.e., only the South Plume recovery well system is in operation for 400 years). The information listed in the table is actually from the 1000-year simulation conducted for the OU5 RI in which the South Plume recovery well system was in operation for only 70 years.

As stated in the original response to comment, no simulations were performed for the other COCs under the no-additional-action scenario because useful information would not be obtained from them. Therefore, the times when concentrations of these COCs are below screening levels under this scenario were not determined directly for this scenario. However, the possible ranges of these times can be estimated using the simulation results conducted for the CRARE and presented in Figures H.I-1 to H.I-13. It is clear that among the six COCs listed in Table F.7-7 only the concentrations of arsenic and manganese will not reach the screening levels within 400 years.

Action: A new column will be added in Table F.7-7 to indicate whether the concentration will reach the screening level in 400 years for each COC that has a maximum concentration exceeding the screening level.

Constituent	Estimated Time to Reach the Screening Level (yr)
Neptunium-237	NA
Radium-226	NA
Technetium-99	< 400
Antimony	< 400
Arsenic	> 400
Manganese	> 400

116. Commenting Organization: U.S. EPA Commentor: Saric
Section #: F.7.4.6 Page #: F-7-19 Line #: 36 to 38
Original Specific Comment #: 85

Comment: The original comment requests information concerning the time required to reduce trichloroethene (TCE) concentrations to 5 micrograms per liter (μg/L). In response to this comment, DOE references Table F.7-11, which the response states shows that "the maximum total volatile organic compound (VOC) concentration at 30 years for the Restore to 20 parts per billion (ppb) Design is 0.26 ppb." Table F.7-11, however, actually shows concentrations for uranium, not VOCs. Table F.7-11 should either be revised or a reference to the correct table or text should be made.

In addition, the text also references Table F.8-9 for information showing the time it takes to reduce TCE levels to below 5 ppb. This table shows that the mass of TCE that is treated is less than the mass of TCE that is discharged. It is not apparent how the mass of TCE discharged could be greater than the mass of TCE treated. The table should be revised to address this discrepancy.

Finally, reduction of TCE concentrations are used as the indicator to determine when total VOCs would be reduced to levels of less than 5 ppb because TCE is the dominant VOC detected; however, some VOCs such as vinyl chloride have maximum contaminant levels (MCL) below 5 ppb. For example, the MCL for vinyl chloride is 2 ppb. DOE should determine when VOC concentrations are below MCLs for contaminants with MCLs below 5 ppb.

Response: The correct reference should be Table F.7-12.

The need for treatment of the extracted groundwater is based on uranium concentrations. The extracted groundwater from wells in the South Field, SSOD and South Plume areas, which has higher uranium concentrations, has higher priority for treatment. The extracted groundwater from other areas (e.g., waste pit area) that have TCE concentrations higher than those in the South Field, SSOD and South Plume areas may not be treated because of lower uranium concentrations. Therefore, the TCE mass discharged to the river is higher than the mass removed by the treatment as shown in Table F.8-9.

Based on Figures F.7-63A and F.7-63B, the total VOC concentration will be below 2 ppb in about 20 years.

Action: The following sentence will be added to the text on page F-7-20 at the end of line 6: "Based on Figures F.7-63A and F.7-63B, the total VOC concentration will be below 2 ppb in about 20 years."

128a Commenting Organization: U.S. EPA Commentor: Saric
Section #: F.8.0 Page #: NA Line #: NA
Original General Comment #: 1a

Comment: Of the 11 groundwater extraction and treatment strategies evaluated in Section F.8, the text recommends the soundest engineering strategy that collects the least amount of groundwater and remediates the aquifer in a reasonable period of time, and treats as little groundwater as possible to meet the regulatory requirement for treatment system effluent concentrations of 20 micrograms per liter (μg/L) or less and a total mass loading of 702 pounds (lbs) per year or less. The text, however, needs to provide additional information to determine if the 11 proposed strategies present the best strategies available for evaluation. The text should be revised to respond to the following Original General Comments 2a through 4a.

Response: DOE believes that the 11 strategies described in Appendix F.8 represent the most reasonable approaches using the traditional pump-and-treat technology based on all the analyses conducted in this FS. They provide the bases for the FS cost estimation and defining the achievable ranges of performance measures which can satisfy all the regulatory requirements regarding the aquifer restoration. However, the predesign optimization does not intend to identify the "best"

strategy, which may never be defined. The strategy selected from this FS will still be improved or modified during the engineering design process as well as during its operation.

Action: No action.

128b Commenting Organization: U.S. EPA Commentor: Saric
Section #: F.8.2.2 Page #: F-8-5 Line #: 29
Original General Comment #: 2a

Comment: This section of the FS report discusses the results of the cost sensitivity analysis and presents the results in Table F.8-1. The table shows that the capital cost of treating 1,500 gallons per minute (gpm) is $5.00 million and the capital cost of treating 2,000 gpm is $28.82 million. This increase of $23.82 for the addition of 500 gpm of treatment capacity appears disproportional. The text should provide all assumptions and cost information used to support all the cost estimates in Table F.8-1.

Response: Agree that the variance in costs should be explained.

Action: The following sentences will be added to Section F.8.2.2 on page F-8-5 following the end of the first sentence in line 32:
"Current wastewater treatment capacity can handle up to 800 gpm of extracted groundwater without additional capital cost and can accommodate an expanded capacity of 700 gpm. Therefore, the capital cost of treating 1500 gpm is $5 million for equipment required for the additional 700 gpm capacity. The capital costs of treatment capacity higher than 1500 gpm need to include the cost for a new treatment plant, which is estimated to be more than $20 million."

128c Commenting Organization: U.S. EPA Commentor: Saric
Section #: F.8.3.1 Page #: F-8-6 Line #: 15
Original General Comment #: 3a

Comment: This section of the FS report presents information regarding the results of groundwater extraction optimization modeling. Section F.8.3.1.1 presents the revised baseline extraction system capacity as 6,300 gpm. The optimization scenarios in Section F.8.3.1.2 maintain a constant pumping rate of 6,300 gpm, and the optimization scenarios in Section F.8.3.1.3 maintain a constant pumping rate of 4,000 gpm; however, it does not appear that a true groundwater extraction optimization study has been conducted in either Section F.7 or F.8. The groundwater extraction options in Section F.7 consider only three well configurations. The optimization modeling in both Sections F.8.1.2 and F.8.1.3 are constrained with a fixed extraction rate of either 6,300 or 4,000 gpm. DOE should conduct a groundwater optimization study that evaluates each of the four contaminant plumes independently to determine the optimum number of wells pumping the least amount of groundwater to (1) capture the contaminant plume, (2) remove the greatest mass of contaminants from the aquifer, and (3) occur in the least amount of time. This type of optimization study should be conducted for each of the four groundwater contamination areas. The results of this optimization study should then be combined and used as input into potential treatment options and then undergo the same performance evaluation as presented in Section F.8.4 and the cost compared to the selected alternative.

Response: DOE believes that the extraction strategies described in Appendix F.8 represent the most reasonable approaches using the traditional pump-and-treat technology based on all the analyses conducted in this FS. The 4000-gpm extraction rate was selected as the most cost-effective extraction rate as shown by its total extraction cost in Table F.8-1. Under this optimal extraction rate, time varying and sequential pumping strategies were developed and evaluated by model simulations. Overall six extraction strategies were simulated and one was selected as the most efficient.
Results of these simulations provide the bases for the FS cost estimations and defining the achievable ranges of performance measures which can satisfy all the regulatory requirements

regarding the aquifer restoration. However, the predesign optimization does not intend to identify the "best" strategy, which may never be defined. The strategy selected from this FS will still be improved or modified during the engineering design process as well as during its operation and may incorporate other supporting technologies such as groundwater reinjection.

Action: No action.

128d Commenting Organization: U.S. EPA Commentor: Saric
Section #: F.8.4.5 Page #: F-8-15 Line #: 1
Original General Comment #: 4a

Comment: This section of the FS report presents the cost analysis for the screened groundwater extraction and treatment systems. Only a very cursory and qualitative evaluation is presented, preventing decisionmaking based on a quantitative assessment. The text should provide actual cost estimates for the five groundwater extraction and treatment strategies referenced in this section. In addition, the text should also present cost information for the resultant groundwater extraction and treatment scenario (if warranted) derived from the optimization study suggested in comment 3a.

Response: The objective of Section F.8.4.5 was to select the most relatively cost-effective extraction/treatment strategy from among the 11 strategies evaluated. It was not intended to provide all the details of the cost estimation process. Information presented in Section F.8 is sufficient for selecting the S2-V case as the optimal strategy among these 11 strategies. A detailed cost estimation of this strategy is included in Appendix L of the FS.

Action: No action.

133. Commenting Organization: U.S. EPA Commentor: Saric
Section #: G.3.2.1 Page #: G-3-9 Line #: NA
Original Specific Comment #: 99

Comment: The original comment notes that some of the values in Table G.3-1, which presents exposure point concentrations in soil, are presented as "0.00." Insufficient data was collected to definitively determine if any of the contaminants are not present at the FEMP site. The original comment states that the use of "0.00" should be eliminated and replaced with appropriate terms indicating whether the contaminant was not analyzed for in a particular area or if the concentrations was less than detection limits. The response states that all "0.00" values would be removed and replaced either with "n.d." or with "<d.l." Table G.3-1, however, continues to present the exposure point concentration of some contaminants as "0.00." Table G.3-1 should be revised as suggested in the response to the original comment.

Response: An earlier version of Table G.3-1 was inadvertently used in the draft final FS Report.

Action: The correct table that incorporates the original comment is provided with the change pages.

139. Commenting Organization: U.S. EPA Commentor: Saric
Section #: H Page #: NA Line #: NA
Original General Comment #: 26

Comment: The original comment states that the text should provide a reference for the source of the background levels of chemicals of potential concern (COC). The response states that the text would be revised to provide references for background levels. In most cases, the background sources are correctly referenced; however, in Table H.II-5 on Page H-II-15, the sources of the background COC concentrations in surface soil are incorrectly cited as "DOE 1993j and 1994k." No such references are listed in the reference section. Also, the text should be revised to incorporate the following three revisions: (1) Table H.II-5 should be revised to correctly cite sources of background level information, (2) Section H.II.12 should be revised to add the correct sources of background levels to the reference list, and (3) the entire text of Appendix H should be reviewed to ensure that the sources of the background levels are correctly referenced throughout.

Response: 1) Agree, Table H.II-5 will be revised to correctly cite the sources of background level information. 2) Agree, but the source is already in the reference list (DOE 1994a). 3) Agree, Appendix H has been reviewed and all sources of background levels are now correctly referenced.

Action: Table H.II-5 has changed the reference source from DOE 1993j and 1994k to DOE 1994a.

168. Commenting Organization: U.S. EPA Commentor: Saric
Section #: L.2 Page #: L-2-5 Line #: NA
Original Specific Comment #: 122

Comment: The original comment states that Figure L.2-2 presents data that do not show a variable mass flow rate for Streams 3 and 4. The response states that the text would be modified to indicate that mass flow would vary; however, no modification to the text was made. The text should be corrected.

Response: The response actually states that Figure L.2-2 would be revised to show mass flow rates for Streams 3 and 4 as "Varies." There was/is no modification to text.

Action: No change required. However, the comment caused a closer look at this part of Section L.2 and we noted that the page preceding Figure L.2-2, pg. L-2-4, was inadvertently left out when copies were being made. This page provides an introduction to Figure L.2-2 and is included with the change pages for this final version of the FS Report.

CHANGE PAGES IN RESPONSE TO U.S. EPA COMMENTS ON THE MARCH 1995 OPERABLE UNIT 5 FS REPORT

TABLE 6-2
OPERABLE UNIT 5
COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES

Alternative	Overall Protection of Human Health and Environment	Compliance with ARARs[a]	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or Volume Through Treatment	Short-Term Effectiveness	Implementability	Present Worth Cost vs. Risk Case (Millions of Dollars)
1. Excavate and dispose of soil off property; extract, treat and discharge groundwater	Protective of hypothetical on-property farmer for entire site	Complies with all ARARs	Totally effective and permanent; 100% of contaminated soil leaves the site	No treatment of soil/sediment	High impacts primarily associated with material handling and transportation	Technically implementable; uncertainties for disposal capacity; administratively difficult	$4330/Case 1 1240/Case 2
2A. Excavate and dispose of soil in on-property facility; off-property disposal of soil not meeting facility waste acceptance criteria; extract, treat, and discharge groundwater	Protective of hypothetical on-property farmer for portions of the FEMP and of the trespasser for disposal area	Complies with all ARARs (with waiver)	Effective and permanent; requires continued minimal maintenance; 0.5% of Case 1 and 0.9% of Case 2 contaminated soil leaves the site	No treatment of soil/sediment	Moderate impacts	Technically implementable; moderate project complexity; low administrative difficulty	$2290/Case 1 720/Case 2
2C. Excavate and dispose of heavily contaminated soil off property; consolidate slightly contaminated soil; extract, treat, and discharge groundwater	Protective of hypothetical on-property farmer for portions of the FEMP and of the trespasser for consolidation area	Complies with all ARARs (with waiver)	Highly effective and permanent; approximately 100% of Case 1 and 42% of Case 2 contaminated soil leaves the site	No treatment of soil/sediment	High impacts primarily associated with material handling and transportation	Technically implementable; uncertainties for disposal capacity; administrative difficulty	$4330/Case 1 910/Case 2
3A. Excavate and dispose of soil in on-property facility; off-property disposal of soil not meeting facility waste acceptance criteria; extract, treat, and discharge groundwater	Protective of hypothetical on-property industrial worker and recreational user for portions of the FEMP and of the trespasser for disposal area	Complies with all ARARs (with waiver)	Effective and permanent; requires minimal continued maintenance; approximately 1% of Case 3, 1.13% of Case 4, 1.14% of Case 5, 1.4% of Case 6, and 1.39% of Case 7 contaminated soil leaves the site	No treatment of soil/sediment	Moderate impacts	Technically implementable; moderate complexity; low administrative difficulty	$630/Case 3 630/Case 4 610/Case 5 580/Case 6 580/Case 7

TABLE 6-2 (Continued)

Alternative	Overall Protection of Human Health and Environment	Compliance with ARARs[a]	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or Volume Through Treatment	Short-Term Effectiveness	Implementability	Present Worth Cost vs. Risk Case (Millions of Dollars)
3C. Excavate and dispose of heavily contaminated soil off property; consolidate slightly contaminated soil; extract, treat, and discharge groundwater	Protective of hypothetical on-property industrial worker and recreational user for portions of the FEMP and of the trespasser for disposal area	Complies with all ARARs (with waiver)	Highly effective and permanent; approximately 48% of Case 3, 51% of Case 4, 51% of Case 5, 62.6% of Case 6, and 62.2% of Case 7 contaminated soil leaves the site	No treatment of soil/sediment	High impacts primarily associated with material handling and transportation	Technically implementable; uncertainties for disposal capacity; administrative difficulty	$820/Case 3 800/Case 4 770/Case 5 830/Case 6 770/Case 7
4A. Excavate and dispose of soil in on-property facility; extract, treat, and discharge groundwater	Protective; requires access controls; all areas of FEMP protective of trespasser	Complies with all ARARs (with waiver)	Effective and permanent; requires minimal continued maintenance; approximately 1.14% of Case 8 and 1.4% of Case 9 contaminated soil leaves the site	No treatment of soil/sediment	Moderate impacts	Technically implementable; moderate technical complexity; moderate administrative difficulty	$610/Case 8 580/Case 9
4C. Excavate and dispose of soil off property; extract, treat, and discharge groundwater	Protective; requires access controls to portions of FEMP; all areas protective of trespasser	Complies with all ARARs (with waiver)	Highly effective and permanent; approximately 51% of Case 8 and 62% of Case 9 contaminated soil leaves the site	No treatment of soil/sediment	High impacts	Technically implementable; uncertainties for future disposal capacity; administrative difficulty	$800/Case 8 780/Case 9
No action	Not protective	Does not meet ARARs	Not effective over the long-term	No treatment	No impacts; access controls continue	Not administratively feasible	0

[a]Applicable and appropriate requirement or relevant

C.3.0 CALCULATION OF UNIT RISKS

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49 This section presents the methods for calculating unit risk (UR) and unit toxicity for exposure pathways for determination of risk-based PRGs. The constituent selected for the continued example calculation is U-238. This radionuclide is chosen for illustration because it is present in all media, and uranium contributes to both risk and toxic effects calculated for the operable unit. All parameters and equations are drawn from the FEMP Risk Assessment Work Plan Addendum (DOE 1992) and the Supplemental Guidance to the FEMP Risk Assessment Work Plan Addendum (DOE 1994a) unless noted otherwise. All receptor exposure parameters are listed in Tables *H.III-8 and H.III-9.*

50 For convenience, the equations used to quantify risk are grouped together according to exposure media. The exposure media considered are air (Section C.3.1), soil (Section C.3.2), groundwater (Section C.3.3), surface water (Section C.3.4), and sediment (Section C.3.5). Section C.3.6 presents the PRG calculations for the multiple age group receptors. The calculation of unit risk factors is identical to calculating an ILCR or an HI; however, a unit value of 1.0 is used in place of an exposure point concentration.

C.3.1 AIR EXPOSURES

Risk-based PRGs are not calculated directly for air but they must be considered in the calculation of PRGs for soil. Risk-based PRGs for soil are calculated for four receptor types based on four land use scenarios including the on-property RME farmer (agricultural), groundskeeper (commercial or industrial), and recreational receptors, and the expanded trespasser (no land use). The on-property RME farmer is used for this example to illustrate the calculation of UR for U-238 from air pathways. The pathways of concern for U-238 in air for this receptor include inhalation, deposition onto plants and ingestion of fruits and vegetables, and biouptake from plants into livestock and ingestion of meat and milk products. The inhalation portion of this example applies to receptors associated with alternative land uses. However, appropriate exposure parameters for these target individuals would be substituted where applicable.

C.3.1.1 Inhalation

Equations 7-5 and 7-6 from the FEMP Risk Assessment Work Plan Addendum (DOE 1992) are used to quantify intake from the inhalation pathway:

$$\textit{(radionuclides)}\ I_{ai} = (C_{ai})(IR)(ET)(EF)(ED) \qquad \text{(C.3-1)}$$

$$\textit{(chemicals)}\ I_{ai} = (C_{ai})(IR)(ET)(EF)(ED)/(BW)(AT) \qquad \text{(C.3-2)}$$

$$C_{avi} = (6.48 pCi/m^2/h)\left[\frac{(0.25)(1-e^{-(0.0021\,h^{-1})(1440\,h)})}{(1500\,g/m^2)(0.0021\,h^{-1})} + \frac{(1)(0.004)(0.483)(1-e^{-((6.49\,x\,10^{-6}h^{-1})(8760000\,h))})}{(225000\,g/m^2)(6.49\,x\,10^{-6}h^{-1})}\right] \quad \text{(C.3.-10)}$$

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54 then

$$C_{av\ U238} = 0.490\ pCi/g$$

47 Once the constituent's concentration in the vegetables and fruit is estimated, the resulting unit intake
54 by humans can be estimated using Equations 7-15 and 7-16 of the FEMP Risk Assessment Work Plan
336 Addendum (DOE 1992):

$$(radionuclides)\ I_{avi} = (C_{avi})(IR)(FI)(EF)(ED) \quad \text{(C.3-11)}$$
$$(chemicals)\ I_{avi} = (C_{avi})(IR)(FI)(EF)(ED)/(BW)(AT) \quad \text{(C.3.12)}$$

where

I_{avi}	=	intake from vegetation (pCi, radionuclides) (mg/kg-d, chemicals)
C_{avi}	=	total concentration of contaminants in vegetable (pCi/g, radionuclides) (mg/kg, chemicals)
IR	=	ingestion rate (g/d) (kg/d)
FI	=	fraction ingested from contaminated source (unitless)
EF	=	exposure frequency (d/y)
ED	=	exposure duration (y)
BW	=	body weight (kg)
AT	=	averaging time (d); for noncarcinogens, AT equals ED (365 d/y); for chemical carcinogens, AT equals 70 y/ILCR (365 d/y)

48 Continuing the example begun in Equation C.3-10, ingestion of vegetables and fruit containing a
54 U-238 concentration of C_{avi} of 0.490 pCi/g for a 70-year lifetime has been selected to illustrate the
55 method used to calculate human intake of constituents from plants. The exposure frequency is
305 350 days per year (EF = 350 d/y). The combined consumption rate of fruit and vegetables grown in
337 the study area is 122 grams per day. The fraction of time that crops are consumed from the contaminated source is assumed to be 0.5. The exposure duration (ED) is 70 y/ILCR. The lifetime intake of U-238 from this food supply is given by Equation C.3-11. Using the presented parameter values, this becomes:

$$I_{av\ U238} = (0.490\ pCi/g)(122\ g/d)(0.5)(350 d/y)(70\ y/lifetime)$$
$$I_{av\ U238} = 7.31\ x\ 10^{-5}\ pCi/lifetime \quad \text{(C.3-13)}$$

55 Because the exposure models used in this scenario respond linearly to changes in concentration, they
56 estimate that each additional pCi/m³ of U-238 in air will produce an incremental lifetime intake of
335 about 7.31×10^{-5} pCi U-238 via this pathway.

TABLE F.7-5

MODELED CONTAMINANT MASS LOADINGS TO THE GREAT MIAMI AQUIFER FOR OTHER CONSTITUENTS

Constituent	Distribution Coefficient K_d (mL/g)	Retardation Factor R	Loading from Paddys Run Section C-D[a] (kg/yr)	Loading from Paddys Run Section D-E[a] (kg/yr)	Loading from Paddys Run Section E-F[a] (kg/yr)	Loading from Storm Sewer Outfall Ditch (kg/yr)	OU1 Area (kg/yr)	OU2 Area (kg/yr)	OU3 Area (kg/yr)
Neptunium-237	15	93.5	9.96×10^{-5}	3.75×10^{-5}	4.00×10^{-6}	0	0	0	0
Radium-226	470	2899	2.91×10^{-7}	1.09×10^{-7}	1.15×10^{-8}	4.20×10^{-8}	0	0	0
Technetium-99	0.2	2.23	5.42×10^{-3}	1.1×10^{-2}	1.26×10^{-3}	9.10×10^{-3}	2.77×10^{-6}	0	9.45×10^{-7}
Antimony	1.4	9.63	2.21×10^{-1}	9.2×10^{-2}	1.76×10^{-2}	2.56×10^{-1}	0	0	0
Arsenic	16	99.7	5.23×10^{-1}	2.67×10^{-1}	5.12×10^{-2}	7.45×10^{-1}	0	0	0
Manganese	30	186	3.16×10^{1}	2.41×10^{1}	6.33×10^{0}	1.51×10^{2}	0	0	0
Total volatile organic compounds	1	7.16	0	0	0	0	0	0	0

[a] See Operable Unit 5 RI Report (DOE 1995) for definition of Paddys Run reaches; Paddys Run and the storm sewer outfall ditch represent Operable Unit 5 sources.

TABLE F.7-7

112 SUMMARY OF GROUNDWATER NO-ADDITIONAL-ACTION SCENARIO - 6900
116 RESULTS FOR OTHER CONSTITUENTS OF CONCERN

Constituent	Maximum Concentration (ppb)	Location	Time (yr)	MCL[a] Screening Level (ppb)	Estimated Time to Reach the Screening Level (yr)	Maximum Concentration Below Screening Level
Neptunium-237	8.66×10^{-4}	On site	910	1.42×10^{-3}	NA[b]	Yes
Radium-226	1.62×10^{-5}	On site	1000	2.02×10^{-5}	NA	Yes
Technetium-99	4.01×10^{-1}	On site	90	5.53×10^{-2}	< 400	No
Antimony	4.65×10^{1}	On site	10	6.0×10^{0}	< 400	No
Arsenic	1.36×10^{2}	On site	10	5.0×10^{1}	> 400	No
Manganese	2.38×10^{3}	On site	10	9.04×10^{2}	> 400	No

[a] Where maximum contaminant level was not available, an incremental lifetime cancer risk of 10^{-5} or a hazard quotient of 0.2 was used.
[b] NA - not applicable

clearly marked. In general, modeling results for technetium-99 match the measured concentration patterns with larger simulated plumes of concentrations below the detection limit. Technetium-99 is considerably more mobile than uranium with K_d of 0.2 L/kg and a retardation of 2.23. Figures F.7-55A and F.7-55B show the maximum concentrations for all layers of the 5 model zones over time. The maximum concentration reduces below the screening level in less than 25 years.

System averages for technetium-99 are reported over the 40-year pumping period in Figure F.7-56. Extraction System 2 initially has a concentration greater than 1.0×10^{-2} μg/L at Year 5, which reduces over time. Other extraction systems follow similar patterns over time although with lower concentrations.

113 • Antimony: Elevated concentrations of antimony have been identified in the waste pit area, in the South Field area, in the pa K_d of 1.4 L/kg and production area, and an isolated concentration was detected in the South Plume area (see Figure F.7-12). Antimony has similar mobility as uranium with a K_d of 1.4 L/kg and a retardation of 9.6. Figures F.7-57A and F.7-57B show the maximum concentrations for all layers of the 5 model zones over time. The maximum concentration reduces below the screening level in less than 10 years.

System averages for antimony are reported over the 40-year pumping period in Figure F.7-58. System 1 initially has a concentration of approximately 5.0×10^{-1} μg/L at Year 5, which reduces rapidly over time. Other extraction systems follow similar patterns over time although with lower concentrations.

113 • Arsenic: Elevated concentrations of arsenic have been identified in the South Plume area (as part of the Paddys Run Road Site plume) and at the northern property line (see Figure H.7-13). Arsenic is less mobile than uranium, with a K_d of 16 L/kg and a retardation of 99.7. Figures F.7-59A and F.7-59B show the maximum concentrations for all layers of the 5 model zones over time. The maximum concentration remains above the screening level over the entire 40-year period by one order of magnitude.

System averages for arsenic are reported over the 40-year pumping period in Figure F.7-60. System 4 (the South Plume extraction system) extracts the majority of the arsenic mass.

113 • Manganese: Elevated concentrations of manganese are scattered throughout the Great Miami Aquifer underlying the FEMP area (see Figure H.7-14). Manganese has a low mobility with a K_d of 30 L/kg and a retardation of 186. Figures F.7-61A and F.7-61B show the maximum concentrations for all layers of the 5 model zones over time. The maximum concentration remains above the screening level over the entire 40-year period by at least a factor of 2 or 3.

System averages for manganese are reported over the 40-year pumping period in Figure F.7-62. Average concentrations are typically less than 3.0×10^{2} μg/L.

116 • Total VOCs: Elevated concentrations of total VOCs are scattered throughout the Great Miami Aquifer generally underlying the FEMP (see Table F.7-5). The most significant VOC is trichloroethene (TCE), which decomposes to other VOCs. Modeling was

conducted as if all VOCs were TCE using the risk-based screening levels for TCE. Figures F.7-63A and F.7-63B show the maximum concentrations for all layers of the 5 model zones over time. Being relatively mobile with a K_d of about 1 L/kg, maximum TCE concentrations are reduced from in excess of 1000 μg/L to below the MCL level of 5 μg/L within a period of 16 years. Because mobilities are similar, transformation products such as vinyl chloride are also expected to be removed by the system. ***Based on Figures F.7-63A and F.7-63B, the total VOC concentration will be below 2 ppb in about 20 years.***

System averages for VOCs are reported over the 40-year pumping period in Figure F.7-64. Average concentrations are typically less than 3.0×10^{-1} μg/L.

117 In summary, the proposed extraction system, based on this modeling, will be effective for reducing maximum aquifer concentrations of neptunium-237, technetium-99, antimony, and total VOCs below MCL or 10^{-5} ILCR screening levels. Capture of the remaining constituents will be less effective, primarily due to the lower mobility of these compounds and, to a lesser degree, locations of the recovery wells (based on uranium concentrations). Certain relatively less mobile contaminants also have large initial groundwater plumes which were conservatively assigned using the maximum detected value in each monitoring well for groundwater modeling purposes. Some portions of these plumes are located far away or upgradient from known contaminant source areas such as the former production area, waste management areas, Paddys Run, and the SSOD and may not be due to FEMP releases considering the reasonable transport speeds of these contaminants in the aquifer. Examples of such situations include portions of the arsenic, manganese, and radium-226 plumes used in the modeling. Measured 1993 groundwater data presented in the Plates in the Operable Unit 5 RI Report (DOE 1995) show much smaller groundwater plumes of these contaminants.

453 F.7.4.7 Modeling of the Higher Desorption K_d Case

Following the approach outlined in Section F.7.2.8, simulations were also run for the upper limit uranium K_d (desorption) of 12 L/kg so that a range of cleanup times could be calculated. These simulations were run until clean up to the 20 μg/L concentration was achieved. Scenario 3B was used in this analysis.

The results of these simulations with higher desorption K_d of 12 L/kg are discussed below.

- Rate of Removal: Figure F.7-63 presents the system performance for this case. After 40 years of pumping, this case has removed approximately 52 percent of the total uranium from the Great Miami Aquifer. The rate of uranium removal is relatively slow from 0 to 5 years when only the original five South Plume extraction wells are pumping, increases dramatically from Years 5 to 10 after the installation of the new wells, and gradually decreases over the next 30 years until Year 40. Overall, as expected, the rate of removal is significantly slower for this higher K_d case than the baseline K_d case (compare Figures F.7-42 and F.7-65).

Based on inspection of the treatment demand versus time curves, typically there is a steep drop off in needed capacity after the first few years followed by a more gradual decrease. Satisfying this peak in demand is not cost-effective because treatment capacity is used for only a few years (i.e., less than its design life). However, if some portion of this peak treatment demand is not treated, then there will be greater mass discharged to the river. To determine potential cost savings of not treating this peak in demand, two cases of fixed treatment capacity were also costed.

Hypothetical cases were created by first estimating cleanup time for different extraction rates. In Appendix F.7, three extraction rates were simulated and remediation times were determined:

- No additional action at 1500 gpm (System 4) - remediation in 90 years
- Containment at 2600 gpm - remediation in 60 years
- Revised baseline at 6300 gpm - remediation in 30 years.

With these three cases, an estimated curve of extraction rate versus cleanup time was created and values of cleanup time for any hypothetical extraction rate could be estimated (see Figure HYP-1 in Attachment F.8.II). These cleanup times were only estimates, because the lower pumping rates are only extracting groundwater at limited locations. Total mass to be extracted and treated was the second parameter used to constrain the solution; this was estimated from a simulation of the revised baseline extraction of 6300 gpm with groundwater containing greater than 20 ppb of uranium sent to treatment. The hypothetical cases cover a wide range of extraction rates (as low as 2000 gpm) and cleanup times (as high as 65 years) (see Figure HYP-2 in Attachment F.8.II).

With treatment time and total treatment mass, treatment capacity over time could be estimated as a first order decay curve. These curves were used to estimate costs based on different extraction and treatment rates. As discussed above, two other cases were created which pumped 4500 gpm and treated groundwater above 20 ppb of uranium up to a maximum of 1500 gpm and 800 gpm.

F.8.2.2 Sensitivity Analysis Results

128b Table F.8-1 summarizes the costs (in 1994 dollars) of these hypothetical scenarios and Figure F.8-3 breaks the extraction and treatment costs into capital and operation and maintenance (O&M) components. ***Current wastewater treatment capacity can handle up to 800 gpm of extracted groundwater without additional capital cost and can accommodate an expanded capacity of 700 gpm. Therefore, the capital cost of treating 1500 gpm is $5 million for equipment required for the additional 700 gpm capacity. The capital costs of treatment capacity higher than 1500 gpm need to include the cost for a new treatment plant, which is estimated to be more than $20 million.***

From simply an extraction perspective, Case H4 with an extraction rate of 4500 gpm and a remediation period of 30 years is slightly lower in cost than the other options. For all of the cases (except H9), total extraction costs are approximately 25 to 30 percent of the total while treatment

133

TABLE G.3-1

EXPOSURE POINT CONCENTRATIONS IN SOIL

Contaminants of Concern	Area (as shown in Figure G.2-2)									
	1sp	560a	560b	560c	560d	570a	570au	570b	570d	570e
Radionuclides (pCi/g)										
Cesium-137	2.00×10^{-1}	3.60×10^{-1}	3.60×10^{-1}	3.10×10^{-1}	4.80×10^{-1}	2.90×10^{-1}	2.90×10^{-1}	2.50×10^{-1}	2.50×10^{-1}	3.80×10^{-1}
Neptunium-237	2.00×10^{-1}	5.30×10^{-1}	5.00×10^{-1}	6.00×10^{-1}	2.10×10^{0}	4.40×10^{-1}	4.40×10^{-1}	1.60×10^{-1}	4.00×10^{-1}	6.00×10^{-1}
Plutonium-238	4.30×10^{-1}	3.50×10^{-1}	3.40×10^{-1}	6.00×10^{-1}	3.30×10^{0}	4.00×10^{-1}	4.00×10^{-1}	3.70×10^{-1}	3.50×10^{-1}	6.00×10^{-1}
Plutonium-239/240	2.00×10^{-1}	3.50×10^{-1}	3.30×10^{-1}	6.00×10^{-1}	4.50×10^{0}	3.50×10^{-1}	3.50×10^{-1}	6.10×10^{-1}	3.50×10^{-1}	6.00×10^{-1}
Radium-226	6.76×10^{0}	9.52×10^{-1}	2.99×10^{1}	9.00×10^{-1}	2.21×10^{3}	1.54×10^{0}	2.01×10^{0}	3.79×10^{0}	9.17×10^{-1}	9.00×10^{-1}
Radium-228	1.04×10^{0}	9.20×10^{-1}	8.50×10^{-1}	4.96×10^{0}	1.27×10^{1}	7.00×10^{-1}	7.00×10^{-1}	8.80×10^{-1}	6.50×10^{-1}	8.50×10^{-1}
Strontium-90	2.50×10^{-1}	7.11×10^{-1}	1.36×10^{0}	5.90×10^{-1}	1.61×10^{0}	3.25×10^{-1}	2.50×10^{-1}	2.50×10^{-1}	3.97×10^{-1}	2.50×10^{-1}
Technetium-99	1.13×10^{0}	1.13×10^{0}	1.86×10^{0}	9.85×10^{0}	1.11×10^{0}	6.80×10^{0}	1.13×10^{0}	1.01×10^{2}	1.60×10^{1}	1.13×10^{0}
Thorium-228	9.80×10^{-1}	1.41×10^{0}	1.05×10^{0}	5.23×10^{0}	1.84×10^{1}	9.00×10^{-1}	9.00×10^{-1}	3.37×10^{0}	1.53×10^{0}	1.15×10^{0}
Thorium-230	4.81×10^{0}	1.87×10^{0}	6.39×10^{0}	8.43×10^{0}	2.76×10^{1}	1.37×10^{1}	6.53×10^{1}	1.02×10^{2}	1.63×10^{1}	4.11×10^{0}
Thorium-232	2.76×10^{0}	1.01×10^{0}	1.93×10^{0}	7.03×10^{0}	5.31×10^{0}	1.02×10^{0}	1.36×10^{0}	1.89×10^{0}	1.03×10^{0}	1.87×10^{0}
Uranium-234	7.45×10^{-4}	2.98×10^{-4}	1.56×10^{-3}	1.07×10^{-2}	2.46×10^{-3}	1.61×10^{-3}	1.30×10^{-3}	5.44×10^{-4}	3.38×10^{-3}	4.27×10^{-4}
Uranium-235/236	9.75×10^{-2}	3.90×10^{-2}	2.05×10^{-1}	1.40×10^{0}	3.21×10^{-1}	2.10×10^{-1}	1.70×10^{-1}	7.13×10^{-2}	4.42×10^{-1}	5.59×10^{-2}
Uranium-238	1.35×10^{1}	5.42×10^{0}	2.84×10^{1}	1.94×10^{2}	4.46×10^{1}	2.92×10^{1}	2.36×10^{1}	9.90×10^{0}	6.14×10^{1}	7.76×10^{0}
Metals/Chemicals (mg/kg)										
1,1-Dichloroethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.[a]	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
1,1-Dichloroethene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
1,2,4,5-Tetrachlorobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
1,2,4-Trichlorobenzene	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
1,2-Dichlorobenzene	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
1,2-Dichloroethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
1,2-Dichloroethene (Total)	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
1,3,5-Trinitrobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
1,3-Dichlorobenzene	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
1,3-Dinitrobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

Contaminants of Concern	Area (as shown in Figure G.2-2)									
	1sp	560a	560b	560c	560d	570a	570au	570b	570d	570e
Metals/Chemicals (mg/kg) (Continued)										
1,4-Dichlorobenzene	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
2,3,7,8-Tetrachlorodibenzo-p-dioxin	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
2-Benzyl Alcohol-4-chlorophenol	4.00×10^{-1}	n.d.	n.d.	n.d.	n.d.	4.00×10^{-1}	4.00×10^{-1}	4.00×10^{-1}	n.d.	n.d.
3,3'-Dichlorobenzidine	4.10×10^{-1}	6.20×10^{-1}	4.10×10^{-1}	2.03×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	6.00×10^{-1}	5.80×10^{-1}	n.d.
3,3'-Dimethylbenzidine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
4-Methylphenol	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	2.00×10^{-1}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
4-Nitroaniline	9.80×10^{-1}	1.50×10^{0}	1.02×10^{0}	4.97×10^{0}	n.d.	9.40×10^{-1}	9.40×10^{-1}	1.43×10^{0}	1.42×10^{0}	n.d.
7,12-Dimethylbenz(a)anthracene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Antimony	1.20×10^{0}	7.70×10^{0}	3.48×10^{0}	1.83×10^{0}	1.20×10^{0}	1.18×10^{1}	1.53×10^{1}	2.13×10^{1}	2.89×10^{1}	1.72×10^{1}
Alpha-chlordane	n.d.	n.d.	n.d.	2.20×10^{-1}	n.d.	n.d.	n.d.	5.00×10^{-2}	1.40×10^{-1}	n.d.
Aroclor 1254	2.80×10^{-2}	8.58×10^{-2}	5.68×10^{-1}	1.20×10^{0}	6.11×10^{-1}	2.44×10^{-1}	4.56×10^{-2}	6.03×10^{-2}	5.90×10^{-1}	4.71×10^{-2}
Arsenic	6.40×10^{0}	4.22×10^{0}	5.69×10^{0}	6.05×10^{0}	6.80×10^{0}	7.84×10^{0}	6.30×10^{0}	6.26×10^{0}	6.40×10^{0}	6.20×10^{0}
Benzene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
Benzidine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzo(a)anthracene	6.10×10^{-1}	2.13×10^{-1}	8.05×10^{-1}	4.14×10^{0}	2.42×10^{0}	7.17×10^{-1}	3.38×10^{-1}	3.03×10^{-1}	3.85×10^{-1}	2.15×10^{-1}
Benzo(a)pyrene	3.70×10^{-1}	2.16×10^{-1}	1.01×10^{0}	5.25×10^{0}	3.18×10^{0}	6.76×10^{-1}	2.63×10^{-1}	2.49×10^{-1}	3.45×10^{-1}	2.15×10^{-1}
Benzo(b)fluoranthene	5.00×10^{-1}	2.03×10^{-1}	8.88×10^{-1}	5.25×10^{0}	2.79×10^{0}	3.11×10^{-1}	3.01×10^{-1}	2.74×10^{-1}	3.37×10^{-1}	2.10×10^{-1}
Benzo(g,h,i)perylene	4.10×10^{-1}	4.10×10^{-1}	2.50×10^{-1}	2.60×10^{-1}	n.d.	5.00×10^{-1}	5.00×10^{-1}	2.90×10^{-1}	3.80×10^{-1}	n.d.
Benzo(k)fluoranthene	4.50×10^{-1}	2.15×10^{-1}	1.00×10^{0}	5.34×10^{0}	3.16×10^{0}	5.09×10^{-1}	2.88×10^{-1}	2.67×10^{-1}	3.76×10^{-1}	2.15×10^{-1}
Benzoic acid	1.95×10^{0}	5.00×10^{-1}	1.50×10^{0}	7.50×10^{-1}	n.d.	9.60×10^{-1}	9.60×10^{-1}	4.80×10^{-1}	1.66×10^{0}	n.d.
Benzyl alcohol	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	3.80×10^{-1}	3.80×10^{-1}	n.d.
Beryllium	1.39×10^{0}	5.46×10^{-1}	5.21×10^{-1}	4.98×10^{-1}	4.98×10^{-1}	6.28×10^{-1}	9.66×10^{-1}	8.34×10^{-1}	8.36×10^{-1}	4.89×10^{-1}
Bis(2-chloroethoxy)methane	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
Bis(2-chloroethyl)ether	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
Bis(2-chloroisopropyl)ether	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	2.10×10^{-1}	2.10×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
Bis(2-ethylhexyl)phthalate	9.60×10^{-2}	5.18×10^{-1}	4.28×10^{-1}	8.80×10^{-1}	1.87×10^{0}	3.32×10^{-1}	1.60×10^{-1}	3.25×10^{-1}	3.17×10^{-1}	2.04×10^{-1}
Bis(chloromethyl)ether	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Bromodichloromethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
Bromomethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
Cadmium	1.16×10^{0}	8.60×10^{-1}	3.05×10^{0}	2.94×10^{0}	n.d.	8.10×10^{-1}	8.10×10^{-1}	2.64×10^{0}	3.90×10^{0}	n.d.

TABLE G.3-1
(Continued)

Contaminants of Concern	Area (as shown in Figure G.2-2)									
	1sp	560a	560b	560c	560d	570a	570au	570b	570d	570e
Metals/Chemicals (mg/kg) (Continued)										
Chlordane	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Chlorobenzene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
Chlorobenzilate	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Chloroform	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
Chrysene	6.60×10^{-1}	2.03×10^{-1}	8.94×10^{-1}	5.00×10^{0}	2.79×10^{0}	8.42×10^{-1}	3.51×10^{-1}	3.10×10^{-1}	4.33×10^{-1}	2.10×10^{-1}
Dibenzo(a,h)anthracene	3.00×10^{-1}	7.35×10^{-2}	2.99×10^{-1}	1.72×10^{0}	9.22×10^{-1}	1.06×10^{-1}	1.45×10^{-1}	1.24×10^{-1}	1.15×10^{-1}	7.40×10^{-2}
Dibenzofuran	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	2.10×10^{-1}	2.10×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
Dibromomethane	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Dieldrin	n.d.	1.00×10^{-2}	n.d.	5.00×10^{-2}	n.d.	n.d.	n.d.	1.00×10^{-2}	3.00×10^{-2}	n.d.
Ethylbenzene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.
Gamma-chlordane	n.d.	n.d.	n.d.	2.20×10^{-1}	n.d.	n.d.	n.d.	5.00×10^{-2}	1.40×10^{-1}	n.d.
Hexachlorobenzene	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
Indeno(1,2,3-cd)pyrene	3.70×10^{-1}	2.18×10^{-1}	7.74×10^{-1}	3.95×10^{0}	2.31×10^{0}	5.00×10^{-1}	2.67×10^{-1}	2.53×10^{-1}	2.86×10^{-1}	2.20×10^{-1}
Manganese	5.46×10^{2}	8.84×10^{2}	9.75×10^{2}	5.10×10^{2}	6.56×10^{2}	6.32×10^{2}	7.74×10^{2}	5.53×10^{2}	6.06×10^{2}	6.94×10^{2}
Mercury	5.50×10^{-2}	5.50×10^{-2}	5.64×10^{-2}	5.50×10^{-2}	5.50×10^{-2}	6.77×10^{-2}	5.50×10^{-2}	5.50×10^{-2}	7.11×10^{-2}	5.50×10^{-2}
Methylene chloride	1.00×10^{-3}	4.07×10^{-3}	2.12×10^{-2}	1.29×10^{-1}	1.00×10^{-3}	6.97×10^{-3}	1.62×10^{-2}	4.86×10^{-3}	7.00×10^{-3}	1.00×10^{-3}
N-Nitroso-di-n-propylamine	4.10×10^{-1}	2.00×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
Nitrobenzene	4.10×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	1.02×10^{0}	n.d.	3.70×10^{-1}	3.70×10^{-1}	4.00×10^{-1}	3.80×10^{-1}	n.d.
O-Dichlorobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
P-Dimethylaminoazobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Phenanthrene	3.70×10^{-1}	2.12×10^{-1}	5.30×10^{-1}	2.30×10^{0}	1.34×10^{0}	3.31×10^{-1}	2.63×10^{-1}	2.49×10^{-1}	5.09×10^{-1}	2.15×10^{-1}
Silver	2.55×10^{-1}	2.07×10^{0}	2.85×10^{0}	3.77×10^{0}	3.60×10^{0}	1.63×10^{0}	1.37×10^{0}	5.22×10^{0}	4.56×10^{0}	2.05×10^{0}
Trans-1,2-dichloroethene(total)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Trichloroethene	3.40×10^{-2}	2.00×10^{-3}	2.00×10^{-3}	2.00×10^{-3}	2.00×10^{-3}	4.30×10^{-3}	6.00×10^{-3}	9.11×10^{-3}	2.00×10^{-3}	3.73×10^{-3}
Uranium - total	4.06×10^{1}	1.63×10^{1}	8.52×10^{1}	5.82×10^{2}	1.34×10^{2}	8.76×10^{1}	7.07×10^{1}	2.97×10^{1}	1.84×10^{2}	2.33×10^{1}
Zinc	5.42×10^{1}	6.40×10^{1}	5.33×10^{1}	1.93×10^{2}	n.d.	6.07×10^{1}	6.07×10^{1}	5.73×10^{1}	4.75×10^{1}	n.d.

TABLE G.3-1
(Continued)

Contaminants of Concern	Area									
	575a	575b	580a	581a	581b	581c	581d	582a	582b	afp
Radionuclides (pCi/g)										
Cesium-137	5.00×10^{-1}	1.05×10^{0}	3.50×10^{-1}	5.50×10^{-1}	3.90×10^{-1}	4.90×10^{-1}	2.50×10^{-1}	2.50×10^{-1}	3.90×10^{-1}	2.00×10^{-1}
Neptunium-237	4.00×10^{-1}	6.00×10^{-1}	6.00×10^{-1}	6.00×10^{-1}	6.00×10^{-1}	6.00×10^{-1}	5.50×10^{-1}	6.00×10^{-1}	6.00×10^{-1}	1.78×10^{0}
Plutonium-238	4.00×10^{-1}	3.50×10^{-1}	4.00×10^{-1}	3.50×10^{-1}	3.50×10^{-1}	6.00×10^{-1}	7.50×10^{-1}	4.50×10^{-1}	6.00×10^{-1}	3.00×10^{-1}
Plutonium-239/240	4.00×10^{-1}	3.50×10^{-1}	4.00×10^{-1}	5.00×10^{-1}	4.00×10^{-1}	6.00×10^{-1}	7.50×10^{-1}	3.20×10^{-1}	6.00×10^{-1}	2.00×10^{-1}
Radium-226	7.93×10^{0}	1.82×10^{0}	1.86×10^{1}	1.07×10^{0}	2.01×10^{0}	9.00×10^{-1}	7.61×10^{0}	2.68×10^{0}	3.74×10^{0}	3.74×10^{0}
Radium-228	5.80×10^{-1}	7.80×10^{-1}	5.00×10^{-1}	7.20×10^{-1}	9.50×10^{-1}	9.00×10^{-1}	1.05×10^{0}	6.00×10^{-1}	7.90×10^{-1}	2.55×10^{0}
Strontium-90	2.50×10^{-1}	2.50×10^{-1}	3.11×10^{-1}	1.10×10^{0}	6.57×10^{-1}	6.20×10^{-1}	1.72×10^{0}	6.79×10^{-1}	1.45×10^{0}	1.60×10^{0}
Technecium-99	4.96×10^{0}	1.13×10^{0}	1.13×10^{0}	1.13×10^{0}	1.41×10^{0}	1.10×10^{0}	1.88×10^{1}	1.13×10^{0}	1.13×10^{0}	1.13×10^{0}
Thorium-228	4.50×10^{-1}	9.00×10^{-1}	8.50×10^{-1}	9.90×10^{-1}	1.58×10^{0}	1.02×10^{0}	1.61×10^{0}	8.20×10^{-1}	1.20×10^{0}	2.42×10^{0}
Thorium-230	7.17×10^{0}	1.77×10^{0}	1.40×10^{1}	3.46×10^{0}	2.46×10^{2}	2.27×10^{0}	2.32×10^{1}	1.41×10^{1}	3.03×10^{1}	2.84×10^{0}
Thorium-232	1.47×10^{0}	8.00×10^{-1}	8.73×10^{-1}	9.55×10^{-1}	1.26×10^{0}	1.14×10^{0}	1.64×10^{0}	1.54×10^{0}	2.81×10^{0}	2.81×10^{0}
Thorium-234	n.d.	n.d.	n.d.	2.05×10^{0}	1.58×10^{1}	n.d.	2.91×10^{2}	n.d.	n.d.	n.d.
Uranium-234	3.90×10^{-4}	4.37×10^{-4}	2.39×10^{-4}	5.40×10^{-4}	1.51×10^{-3}	1.11×10^{-3}	2.51×10^{-3}	8.33×10^{-4}	4.70×10^{-4}	1.32×10^{-4}
Uranium-235/236	5.11×10^{-2}	5.72×10^{-2}	3.13×10^{-2}	7.06×10^{-2}	1.97×10^{-1}	1.45×10^{-1}	3.28×10^{-1}	1.09×10^{-1}	6.15×10^{-2}	1.73×10^{-2}
Uranium-236	n.d.	n.d.	n.d.	6.00×10^{-2}	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Uranium-238	7.10×10^{0}	7.95×10^{0}	4.34×10^{0}	9.81×10^{0}	2.74×10^{1}	2.02×10^{1}	4.56×10^{1}	1.51×10^{1}	8.54×10^{0}	2.40×10^{0}
Metals/Chemicals (mg/kg)										
1,1-Dichloroethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
1,1-Dichloroethene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
1,2,4,5-Tetrachlorobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
1,2,4-Trichlorobenzene	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
1,2-Dichlorobenzene	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
1,2-Dichloroethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
1,2-Dichloroethene (Total)	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
1,3,5-Trinitrobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
1,3-Dichlorobenzene	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
1,3-Dinitrobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
1,4-Dichlorobenzene	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
2,3,7,8-Tetrachlorodibenzo-p-dioxin	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

TABLE G.3-1
(Continued)

Contaminants of Concern	Area									
	575a	575b	580a	581a	581b	581c	581d	582a	582b	afp
Metals/Chemicals (mg/kg) (Continued)										
2-Benzyl Alcohol-4-chlorophenol	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4.30×10^{-1}
3,3'-Dichlorobenzidine	5.90×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	8.20×10^{-1}	4.10×10^{-1}	8.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.60×10^{-1}
3,3'-Dimethylbenzidine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
4-Methylphenol	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	1.70×10^{0}	4.40×10^{-1}	4.40×10^{-1}
4-Nitroaniline	1.45×10^{0}	9.80×10^{-1}	1.00×10^{0}	2.00×10^{0}	1.00×10^{0}	2.00×10^{0}	9.50×10^{-1}	1.00×10^{0}	1.10×10^{0}	1.10×10^{0}
7,12-Dimethylbenz(a)anthracene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Antimony	7.02×10^{0}	1.20×10^{0}	1.20×10^{0}	2.51×10^{0}	1.71×10^{0}	3.70×10^{0}	2.90×10^{0}	1.79×10^{0}	1.20×10^{0}	1.20×10^{0}
Alpha-chlordane	5.00×10^{-2}	n.d.	n.d.	n.d.	n.d.	1.00×10^{-1}	5.00×10^{-2}	n.d.	n.d.	n.d.
Aroclor 1254	3.31×10^{-2}	7.64×10^{-2}	5.22×10^{-2}	2.00×10^{-1}	3.04×10^{-1}	1.53×10^{-1}	7.64×10^{-2}	2.20×10^{-2}	2.20×10^{-2}	2.20×10^{-2}
Arsenic	6.27×10^{0}	6.20×10^{0}	8.20×10^{0}	8.29×10^{0}	6.18×10^{0}	5.52×10^{0}	5.84×10^{0}	9.43×10^{0}	4.94×10^{1}	8.01×10^{1}
Benzene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
Benzidine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Benzo(a)anthracene	1.66×10^{0}	2.15×10^{-1}	1.13×10^{0}	2.16×10^{-1}	2.21×10^{-1}	2.15×10^{-1}	3.40×10^{-1}	2.17×10^{-1}	2.15×10^{-1}	2.15×10^{-1}
Benzo(a)pyrene	1.61×10^{0}	2.15×10^{-1}	1.08×10^{0}	2.16×10^{-1}	2.26×10^{-1}	2.15×10^{-1}	4.57×10^{-1}	2.16×10^{-1}	2.15×10^{-1}	2.15×10^{-1}
Benzo(b)fluoranthene	3.77×10^{-1}	2.10×10^{-1}	2.84×10^{-1}	2.11×10^{-1}	2.34×10^{-1}	2.10×10^{-1}	7.40×10^{-1}	2.11×10^{-1}	2.10×10^{-1}	2.10×10^{-1}
Benzo(g,h,i)perylene	2.20×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	6.40×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
Benzo(k)fluoranthene	1.04×10^{0}	2.15×10^{-1}	7.34×10^{-1}	2.16×10^{-1}	2.31×10^{-1}	2.15×10^{-1}	5.77×10^{-1}	2.16×10^{-1}	2.15×10^{-1}	2.15×10^{-1}
Benzoic acid	9.80×10^{-1}	9.80×10^{-1}	1.00×10^{0}	6.00×10^{-2}	7.00×10^{-2}	6.00×10^{-2}	2.90×10^{-1}	6.80×10^{-1}	1.20×10^{-1}	1.20×10^{0}
Benzyl alcohol	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.20×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.50×10^{-1}
Beryllium	1.06×10^{0}	6.33×10^{-1}	1.03×10^{0}	6.53×10^{-1}	9.26×10^{-1}	4.10×10^{-1}	8.87×10^{-1}	1.27×10^{0}	3.64×10^{0}	3.91×10^{0}
Bis(2-chloroethoxy)methane	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
Bis(2-chloroethyl)ether	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
Bis(2-chloroisopropyl)ether	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
Bis(2-ethylhexyl)phthalate	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}
Bis(chloromethyl)ether	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Bromodichloromethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
Bromomethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
Cadmium	3.35×10^{0}	1.20×10^{0}	1.30×10^{0}	4.90×10^{-1}	1.60×10^{0}	4.80×10^{-1}	1.43×10^{0}	7.50×10^{-1}	7.40×10^{-1}	5.80×10^{-1}
Chlordane	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Chlorobenzene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}

TABLE G.3-1
(Continued)

Contaminants of Concern	Area									
	575a	575b	580a	581a	581b	581c	581d	582a	582b	afp
Metals/Chemicals (mg/kg) (Continued)										
Chlorobenzilate	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Chloroform	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
Chrysene	2.00×10^{0}	2.10×10^{-1}	1.35×10^{0}	2.11×10^{-1}	2.16×10^{-1}	2.10×10^{-1}	3.37×10^{-1}	2.12×10^{-1}	2.10×10^{-1}	2.10×10^{-1}
Dibenzo(a,h)anthracene	1.36×10^{-1}	7.40×10^{-2}	1.05×10^{-1}	7.42×10^{-2}	7.89×10^{-2}	7.40×10^{-2}	1.83×10^{-1}	7.49×10^{-2}	7.40×10^{-2}	7.40×10^{-2}
Dibenzofuran	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
Dibromomethane	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Dieldrin	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	n.d.	2.00×10^{-2}	1.00×10^{-2}	n.d.	n.d.	n.d.
Ethylbenzene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}
Gamma-chlordane	5.00×10^{-2}	n.d.	n.d.	n.d.	n.d.	1.00×10^{-1}	5.00×10^{-2}	n.d.	n.d.	n.d.
Hexachlorobenzene	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
Indeno(1,2,3-cd)pyrene	1.06×10^{0}	2.20×10^{-1}	7.42×10^{-1}	2.20×10^{-1}	2.39×10^{-1}	2.20×10^{-1}	6.47×10^{-1}	2.21×10^{-1}	2.20×10^{-1}	2.20×10^{-1}
Manganese	9.57×10^{2}	1.15×10^{3}	5.88×10^{2}	8.23×10^{2}	1.06×10^{3}	7.15×10^{2}	1.15×10^{3}	4.52×10^{2}	4.18×10^{2}	4.18×10^{2}
Mercury	5.50×10^{-2}	5.50×10^{-2}	5.50×10^{-2}	1.28×10^{-1}	9.29×10^{-2}	5.50×10^{-2}	5.50×10^{-2}	5.79×10^{-2}	7.44×10^{-2}	2.30×10^{-1}
Methylene chloride	1.00×10^{-3}	1.00×10^{-3}	1.00×10^{-3}	1.37×10^{-3}	5.62×10^{-3}	8.57×10^{-3}	6.33×10^{-3}	1.71×10^{-3}	1.67×10^{-2}	1.10×10^{-1}
N-Nitroso-di-n-propylamine	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
Nitrobenzene	4.00×10^{-1}	3.90×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.10×10^{-1}	4.40×10^{-1}	4.40×10^{-1}
O-Dichlorobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
P-Dimethylaminoazobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Phenanthrene	4.03×10^{-1}	2.15×10^{-1}	3.25×10^{-1}	2.17×10^{-1}	2.13×10^{-1}	2.15×10^{-1}	1.62×10^{-1}	2.16×10^{-1}	2.15×10^{-1}	2.15×10^{-1}
Silver	6.30×10^{-1}	4.70×10^{-1}	4.72×10^{-1}	8.24×10^{-1}	1.02×10^{0}	1.41×10^{0}	4.80×10^{-1}	6.13×10^{-1}	4.74×10^{-1}	4.70×10^{-1}
Trans-1,2-dichloroethene(total)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Trichloroethene	2.05×10^{-3}	2.19×10^{-3}	2.35×10^{-3}	2.04×10^{-3}	2.14×10^{-3}	2.00×10^{-3}	2.00×10^{-3}	2.00×10^{-3}	2.00×10^{-3}	2.00×10^{-3}
Uranium - total	2.13×10^{1}	2.38×10^{1}	1.30×10^{1}	2.94×10^{1}	8.22×10^{1}	6.05×10^{1}	1.37×10^{2}	4.54×10^{1}	2.56×10^{1}	7.20×10^{0}
Zinc	3.50×10^{1}	5.58×10^{1}	6.63×10^{1}	5.72×10^{1}	4.88×10^{1}	2.56×10^{1}	1.07×10^{2}	4.90×10^{1}	4.96×10^{1}	6.78×10^{1}

TABLE G.3-1
(Continued)

Contaminants of Concern	Area										
	Pa1	Pa2	Pa3	Pa4	Pa5	Pa6	sf	sw1	wp1	wp2	wpaa
Radionuclides (pCi/g)											
Cesium-137	2.40×10^{-1}	2.80×10^{-1}	2.10×10^{-1}	3.50×10^{-1}	2.20×10^{-1}	7.00×10^{-1}	2.40×10^{-1}	3.30×10^{-1}	5.43×10^{0}	5.30×10^{-1}	2.00×10^{-1}
Neptunium-237	5.40×10^{-1}	5.00×10^{-1}	1.03×10^{0}	6.00×10^{-1}	5.40×10^{-1}	6.00×10^{-1}	2.20×10^{-1}	1.80×10^{-1}	3.68×10^{0}	3.80×10^{-1}	4.90×10^{-1}
Plutonium-238	6.00×10^{-1}	6.00×10^{-1}	6.00×10^{-1}	6.00×10^{-1}	3.30×10^{-1}	6.00×10^{-1}	2.20×10^{-1}	2.90×10^{-1}	1.22×10^{0}	4.60×10^{-1}	1.50×10^{-1}
Plutonium-239/240	6.00×10^{-1}	6.00×10^{-1}	7.30×10^{-1}	6.00×10^{-1}	4.10×10^{-1}	6.00×10^{-1}	4.00×10^{-1}	3.00×10^{-1}	3.67×10^{0}	4.80×10^{-1}	1.60×10^{-1}
Radium-226	7.72×10^{1}	2.38×10^{2}	9.00×10^{-1}	1.89×10^{0}	9.00×10^{-1}	1.10×10^{0}	1.29×10^{1}	n.d.	9.67×10^{-1}	n.d.	2.26×10^{0}
Radium-228	2.57×10^{0}	9.70×10^{-1}	6.60×10^{-1}	6.80×10^{-1}	6.60×10^{-1}	7.30×10^{-1}	1.26×10^{0}	1.17×10^{0}	1.47×10^{0}	8.20×10^{-1}	5.50×10^{-1}
Strontium-90	9.16×10^{-1}	5.47×10^{-1}	5.74×10^{-1}	3.51×10^{0}	2.50×10^{-1}	5.01×10^{-1}	2.50×10^{-1}	n.d.	3.60×10^{-1}	n.d.	4.44×10^{-1}
Technetium-99	1.10×10^{0}	3.38×10^{0}	7.50×10^{0}	2.33×10^{0}	1.13×10^{0}	1.13×10^{0}	1.19×10^{0}	n.d.	1.64×10^{1}	n.d.	1.14×10^{0}
Thorium-228	3.40×10^{0}	8.30×10^{-1}	1.05×10^{0}	9.20×10^{-1}	7.10×10^{-1}	8.80×10^{-1}	1.15×10^{0}	1.17×10^{0}	1.68×10^{1}	2.77×10^{1}	1.37×10^{0}
Thorium-230	1.45×10^{2}	5.95×10^{2}	1.06×10^{3}	4.71×10^{1}	1.77×10^{0}	2.16×10^{0}	1.81×10^{1}	n.d.	3.68×10^{1}	n.d.	1.54×10^{1}
Thorium-232	5.66×10^{0}	1.20×10^{1}	5.96×10^{0}	2.44×10^{1}	8.88×10^{-1}	8.88×10^{-1}	8.96×10^{-1}	n.d.	5.42×10^{0}	n.d.	9.10×10^{-1}
Thorium-234	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Uranium-234	3.08×10^{-3}	2.72×10^{-3}	1.48×10^{-2}	2.85×10^{-2}	1.18×10^{-3}	8.52×10^{-4}	6.07×10^{-4}	n.d.	7.84×10^{-3}	n.d.	9.20×10^{-4}
Uranium-235/236	4.04×10^{-1}	3.56×10^{-1}	1.94×10^{0}	3.73×10^{0}	1.54×10^{-1}	1.12×10^{-1}	7.95×10^{-2}	n.d.	1.03×10^{0}	n.d.	1.20×10^{-1}
Uranium-236	2.62×10^{1}	2.60×10^{-1}	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
Uranium-238	5.61×10^{1}	4.94×10^{1}	2.69×10^{2}	5.18×10^{2}	2.14×10^{1}	1.55×10^{1}	1.10×10^{1}	n.d.	1.43×10^{2}	n.d.	1.67×10^{1}
Metals/Chemicals (mg/kg)											
1,1-Dichloroethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	2.00×10^{-2}	3.30×10^{-1}	9.00×10^{-2}	n.d.
1,1-Dichloroethene	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	3.30×10^{-1}	9.00×10^{-2}	1.00×10^{-2}
1,2,4,5-Tetrachlorobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	6.30×10^{-1}	n.d.	n.d.	n.d.
1,2,4-Trichlorobenzene	3.70×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
1,2-Dichlorobenzene	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
1,2-Dichloroethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.50×10^{-1}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	3.30×10^{-1}	9.00×10^{-2}	1.00×10^{-2}
1,2-Dichloroethene (Total)	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	3.30×10^{-1}	1.00×10^{-1}	1.00×10^{-2}
1,3,5-Trinitrobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	6.30×10^{-1}	n.d.	n.d.	n.d.
1,3-Dichlorobenzene	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
1,3-Dinitrobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	6.30×10^{-1}	n.d.	n.d.	n.d.
1,4-Dichlorobenzene	3.70×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
2,3,7,8-Tetrachlorodibenzo-p-dioxin	4.00×10^{-2}	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

TABLE G.3-1
(Continued)

Contaminants of Concern	Area										
	Pa1	Pa2	Pa3	Pa4	Pa5	Pa6	sf	sw1	wp1	wp2	wpaa
Metals/Chemicals (mg/kg) (Continued)											
2-Benzyl Alcohol-4-chlorophenol	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	4.30×10^{-1}	4.00×10^{-1}	n.d.	n.d.	3.60×10^{-1}
3,3'-Dichlorobenzidine	6.20×10^{-1}	5.70×10^{-1}	6.00×10^{-1}	4.80×10^{-1}	4.80×10^{-1}	3.80×10^{-1}	5.20×10^{-1}	5.20×10^{-1}	1.11×10^{0}	5.90×10^{-1}	5.90×10^{-1}
3,3'-Dimethylbenzidine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	5.15×10^{0}	n.d.	n.d.	n.d.
4-Methylphenol	3.40×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	3.50×10^{-1}	3.50×10^{-1}	5.30×10^{-1}	4.10×10^{-1}	3.80×10^{-1}
4-Nitroaniline	1.48×10^{0}	1.41×10^{0}	1.44×10^{0}	1.17×10^{0}	1.17×10^{0}	9.50×10^{-1}	1.43×10^{0}	1.25×10^{0}	2.79×10^{0}	2.03×10^{0}	1.00×10^{2}
7,12-Dimethylbenz(a)anthracene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	1.29×10^{0}	n.d.	n.d.	n.d.
Antimony	1.73×10^{0}	1.85×10^{1}	1.20×10^{0}	3.13×10^{0}	1.20×10^{0}	1.20×10^{0}	1.20×10^{0}	n.d.	2.35×10^{1}	n.d.	2.64×10^{1}
Alpha-chlordane	1.20×10^{-1}	5.00×10^{-2}	5.00×10^{-2}	n.d.	2.00×10^{-2}	n.d.	2.00×10^{-2}	2.00×10^{-2}	n.d.	9.00×10^{-2}	1.50×10^{-1}
Aroclor 1254	5.14×10^{0}	2.60×10^{0}	1.84×10^{0}	3.24×10^{0}	9.20×10^{-2}	3.75×10^{-2}	4.43×10^{-2}	n.d.	8.71×10^{-1}	n.d.	1.36×10^{-1}
Arsenic	1.00×10^{1}	7.38×10^{0}	7.44×10^{0}	6.82×10^{0}	7.67×10^{0}	7.38×10^{0}	6.59×10^{0}	n.d.	6.36×10^{0}	n.d.	5.54×10^{0}
Benzene	1.00×10^{-2}	2.00×10^{-2}	1.00×10^{-1}	1.50×10^{-1}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	3.30×10^{-1}	9.00×10^{-2}	1.00×10^{-2}
Benzidine	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	2.00×10^{0}	n.d.	n.d.	n.d.
Benzo(a)anthracene	6.05×10^{0}	1.67×10^{0}	3.75×10^{0}	9.89×10^{-1}	3.60×10^{-1}	2.43×10^{-1}	4.27×10^{0}	n.d.	5.11×10^{-1}	n.d.	2.22×10^{-1}
Benzo(a)pyrene	7.85×10^{0}	2.11×10^{0}	4.66×10^{0}	9.25×10^{-1}	3.42×10^{-1}	2.39×10^{-1}	4.07×10^{0}	n.d.	4.57×10^{-1}	n.d.	2.21×10^{-1}
Benzo(b)fluoranthene	7.22×10^{0}	1.95×10^{0}	7.45×10^{0}	3.98×10^{-1}	4.07×10^{-1}	2.48×10^{-1}	5.37×10^{-1}	n.d.	4.32×10^{-1}	n.d.	2.15×10^{-1}
Benzo(g,h,i)perylene	7.80×10^{-1}	3.20×10^{-1}	5.50×10^{-1}	2.70×10^{-1}	4.50×10^{-1}	8.00×10^{-2}	1.50×10^{-1}	1.90×10^{-1}	4.70×10^{-1}	4.10×10^{-1}	2.68×10^{0}
Benzo(k)fluoranthene	7.86×10^{0}	2.11×10^{0}	7.49×10^{-1}	6.55×10^{-1}	3.78×10^{-1}	2.46×10^{-1}	2.52×10^{0}	n.d.	5.11×10^{-1}	n.d.	2.22×10^{-1}
Benzoic acid	2.78×10^{0}	1.11×10^{0}	8.80×10^{-1}	1.00×10^{0}	1.17×10^{0}	9.50×10^{-1}	3.20×10^{-1}	1.38×10^{0}	2.29×10^{0}	2.04×10^{0}	9.20×10^{-1}
Benzyl alcohol	3.40×10^{-1}	3.80×10^{-1}	3.80×10^{-1}	3.90×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.10×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
Beryllium	1.16×10^{0}	9.56×10^{-1}	1.22×10^{0}	1.19×10^{0}	8.92×10^{-1}	5.54×10^{-1}	8.06×10^{-1}	n.d.	6.41×10^{-1}	n.d.	6.81×10^{-1}
Bis(2-chloroethoxy)methane	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
Bis(2-chloroethyl)ether	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
Bis(2-chloroisopropyl)ether	3.40×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
Bis(2-ethylhexyl)phthalate	1.64×10^{0}	3.89×10^{-1}	2.97×10^{-1}	3.00×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	2.10×10^{-1}	n.d.	6.14×10^{-1}	n.d.	3.01×10^{-1}
Bis(chloromethyl)ether	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	7.20×10^{-1}	n.d.	n.d.
Bromodichloromethane	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.50×10^{-1}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	3.30×10^{-1}	9.00×10^{-2}	1.00×10^{-2}
Bromomethane	1.00×10^{-2}	1.30×10^{-1}	1.00×10^{-2}	3.10×10^{-1}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	6.70×10^{-1}	1.80×10^{-1}	1.00×10^{-2}
Cadmium	1.10×10^{0}	8.54×10^{-1}	1.04×10^{0}	2.18×10^{0}	4.90×10^{-1}	1.54×10^{0}	1.09×10^{0}	2.82×10^{0}	2.02×10^{0}	1.62×10^{0}	8.77×10^{-1}
Chlordane	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	5.10×10^{-1}	5.80×10^{-1}	4.00×10^{-1}	n.d.
Chlorobenzene	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.50×10^{-1}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	3.30×10^{-1}	9.00×10^{-2}	1.00×10^{-2}

TABLE G.3-1
(Continued)

Contaminants of Concern	Area										
	Pa1	Pa2	Pa3	Pa4	Pa5	Pa6	sf	sw1	wp1	wp2	wpaa
Metals/Chemicals (mg/kg) (Continued)											
Chlorobenzilate	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	8.00×10^{-2}	n.d.	n.d.	n.d.
Chloroform	3.00×10^{-2}	1.00×10^{-2}	2.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	2.00×10^{-2}	2.90×10^{-1}	6.00×10^{-2}	1.00×10^{-2}
Chrysene	7.22×10^{0}	1.96×10^{0}	3.59×10^{0}	1.19×10^{0}	3.98×10^{-1}	2.46×10^{-1}	5.27×10^{0}	n.d.	6.06×10^{-1}	n.d.	2.20×10^{-1}
Dibenzo(a,h)anthracene	2.29×10^{0}	6.26×10^{-1}	1.34×10^{0}	1.20×10^{-1}	1.00×10^{-1}	7.90×10^{-2}	2.11×10^{-1}	n.d.	1.30×10^{-1}	n.d.	7.54×10^{-2}
Dibenzofuran	2.20×10^{-1}	3.30×10^{-1}	3.10×10^{-1}	2.70×10^{-1}	3.20×10^{-1}	3.80×10^{-1}	3.20×10^{-1}	6.60×10^{-1}	4.70×10^{-1}	4.30×10^{-1}	1.44×10^{0}
Dibromomethane	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	1.00×10^{-2}	n.d.	n.d.	n.d.
Dieldrin	2.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	n.d.	1.00×10^{-2}	n.d.	1.00×10^{-2}	2.00×10^{-2}	1.20×10^{-1}	6.00×10^{-2}	3.00×10^{-2}
Ethylbenzene	5.00×10^{-2}	1.10×10^{-1}	1.10×10^{-1}	1.50×10^{-1}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	1.00×10^{-2}	2.80×10^{-1}	3.00×10^{-2}	1.00×10^{-2}
Gamma-chlordane	1.20×10^{-1}	5.00×10^{-2}	5.00×10^{-2}	n.d.	2.00×10^{-2}	n.d.	3.00×10^{-2}	2.00×10^{-2}	n.d.	9.00×10^{-2}	1.50×10^{-1}
Hexachlorobenzene	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
Indeno(1,2,3-cd)pyrene	5.69×10^{0}	1.56×10^{0}	2.56×10^{0}	6.57×10^{-1}	2.00×10^{-1}	2.16×10^{-1}	2.54×10^{0}	n.d.	3.36×10^{-1}	n.d.	2.23×10^{-1}
Manganese	5.73×10^{2}	6.18×10^{2}	5.58×10^{2}	5.85×10^{2}	9.15×10^{2}	8.17×10^{2}	7.51×10^{2}	n.d.	5.92×10^{2}	n.d.	6.72×10^{2}
Mercury	1.40×10^{-1}	1.27×10^{-1}	1.14×10^{-1}	1.35×10^{-1}	5.50×10^{-2}	7.95×10^{-2}	5.50×10^{-2}	n.d.	5.50×10^{-2}	n.d.	5.50×10^{-2}
Methylene chloride	5.01×10^{-3}	1.98×10^{-3}	2.24×10^{-3}	1.96×10^{-3}	1.00×10^{-3}	1.86×10^{-3}	1.00×10^{-3}	n.d.	1.60×10^{-2}	n.d.	2.26×10^{-3}
N-Nitroso-di-n-propylamine	3.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.50×10^{-1}	2.07×10^{1}
Nitrobenzene	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	3.80×10^{-1}	4.00×10^{-1}	3.90×10^{-1}	5.60×10^{-1}	4.60×10^{-1}	2.07×10^{1}
O-Dichlorobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
P-Dimethylaminoazobenzene	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	1.90×10^{0}	n.d.	n.d.	n.d.
Phenanthrene	3.31×10^{0}	1.00×10^{0}	4.39×10^{0}	3.66×10^{-1}	5.04×10^{-1}	2.70×10^{-1}	7.05×10^{-1}	n.d.	7.86×10^{-1}	n.d.	2.29×10^{-1}
Silver	4.02×10^{0}	2.99×10^{0}	1.46×10^{0}	3.75×10^{0}	1.10×10^{0}	7.74×10^{-1}	2.28×10^{0}	n.d.	6.23×10^{0}	n.d.	5.10×10^{0}
Trans-1,2-dichloroethene(total)	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	3.20×10^{-1}	2.80×10^{-1}	n.d.	n.d.
Trichloroethene	3.95×10^{-3}	7.96×10^{-3}	7.53×10^{-3}	5.04×10^{-3}	3.00×10^{-3}	2.26×10^{-3}	2.00×10^{-3}	n.d.	2.00×10^{-3}	n.d.	2.00×10^{-3}
Uranium - total	1.68×10^{2}	1.48×10^{2}	8.06×10^{2}	1.55×10^{3}	6.41×10^{1}	4.65×10^{1}	3.31×10^{1}	n.d.	4.28×10^{2}	n.d.	5.02×10^{1}
Zinc	8.08×10^{1}	1.39×10^{2}	5.50×10^{1}	7.63×10^{1}	6.07×10^{1}	7.06×10^{1}	4.44×10^{1}	5.92×10^{1}	7.18×10^{1}	9.44×10^{1}	4.85×10^{1}

* n.d. means no data available.

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6900

TABLE H.II-5
BACKGROUND COC CONCENTRATIONS IN SURFACE SOIL

COC	Representative Background Concentration
Radionuclides (pCi/g)	
Cs-137	4.40×10^{-1}
Ra-226	1.22×10^{0}
Sr-90	2.50×10^{-1}
Tc-99	ND
Th-228	1.12×10^{0}
Th-232	1.08×10^{0}
U-234	1.04×10^{0}
U-235/236	9.00×10^{-2}
U-238	1.08×10^{0}
Inorganics (mg/kg)	
Antimony	3.65×10^{0}
Arsenic	5.56×10^{0}
Beryllium	6.00×10^{-1}
Cadmium	5.20×10^{-1}
Copper	8.60×10^{0}
Cyanide	1.50×10^{-1}
Manganese	8.14×10^{2}
Mercury	2.50×10^{-1}
Molybdenum	1.20×10^{0}
Silver	2.20×10^{0}
Uranium - Total	3.27×10^{0}
Zinc	4.46×10^{1}

Sources: DOE 1994a
ND - Not detected

6900

- Reagent receipt and handling
- Waste handling
- Clean soil handling

The following sections provide detailed descriptions of the soil washing unit operations.

L.2.2.1 Incoming Material Handling

Figure L.2-2 provides a process flow diagram and a major equipment list for the incoming material handling operation. An incoming soil storage facility would provide storage for contaminated soil before treatment. The incoming soil storage facility would be divided into active and backup storage. The active storage would provide feed soil for soil washing operations. The backup storage (up to 3500 tons) would store excess soil over and above the daily process requirements and would be used to supply material to the soil washing facility during weekend operations. Excavated soil would be dumped from 40-ton roll-off containers to the backup storage pile. A track loader would move soil from backup to active storage. A hydraulic excavator would transfer soil from the active stockpile to the feeding hopper of a vibrating grizzly. Any contaminated soil size over six inches would be screened off into a container which would be transferred to a storage area for subsequent radiological monitoring and disposition. The undersize (less than six inches) material from the vibrating grizzly would be conveyed to a 50-ton capacity soil silo. A dust collection system would be integral to the soil silo to minimize escape of radioactive airborne particulate matter into the facility. The silo discharge apron feeder would direct the soil onto a 24-inch-wide belt conveyor for transfer to a vibrating grizzly in the soil washing facility. The incoming soil storage facility would be covered and equipped with storm water control at its perimeter. It will also be equipped with a leachate collection system.

L.2.2.2 Washing, Screening, Flocculation, and Thickening

Figure L.2-3 provides a process flow design and a major equipment list for the washing, screening, flocculation and thickening operations.

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DOE Washing and screening is performed on the soil to loosen and remove any surface contamination that may be present. High-pressure water used during this process operation is assumed to be adequate for removing loosely bound contaminants from gravel greater than 4 mesh (0.187 inch). The gravel and soil particles less than 0.187 inch are considered to have contaminants more tightly bound to them, requiring more aggressive soil washing processes. The test data of Appendix D (Tables D.4-6 through D.4-9) do not permit conclusive support of this assumption, which is based primarily on technical expertise and judgment.

PROPOSED RESPONSES TO OEPA COMMENTS ON THE MARCH 1995 OPERABLE UNIT 5 FS REPORT/PROPOSED PLAN

RESPONSES TO OEPA COMMENTS ON THE MARCH 1995 OU5 FS REPORT

240. Commenting Organization: OEPA Commentor: OFFO
Section#: 2-6 Pg.#: Table Line#: Code: C
Original Comment# 31
Comment: Ohio EPA disagrees with the contention that the total trihalomethane standard is not an ARAR. The chemical substance is relevant here, not whether it originates from chlorine disinfection in a water treatment system.
Response: As OEPA is aware, the total trihalomethane standard specifically applies only to community water systems using chlorine disinfection. As discussed in the April 20 conference call, the FEMP has no intention of applying chlorine disinfection to the treatment of wastewater or groundwater before discharge to the Great Miami River. As stated in the conference call, DOE will add the standard to the list of ARARs as requested by OEPA.
Action: Add the referenced standard to the list of ARARs in Appendix B.

256. Commenting Organization: OEPA Commentor: OFFO
Section#: 4.1.6.2.2 Pg.#: 4-39 Line#: Code: C
Original Comment# 67
Comment: It is Ohio EPA's understanding that during the February 23 meeting in Chicago that DOE made the commitment that the WAC for on-site disposal of uranium was to be fixed at 1030 ppm regardless of the chemical or physical form of the uranium. Ohio EPA will concur with this response if the clarification is made that the inorganic constituents referred to on line 17 page 4-39 of the text are "non-radioactive inorganic constituents" or similar language. There should be an opportunity for the reader to infer that, for example, legacy wastes (or hold-up material) can be treated to achieve a WAC and then disposed of on site.
Response: We agree with OEPA's intent. However, we would like to bring to the attention of EPA and OEPA that in the event that future off-site radioactive waste disposal capacity is eliminated and there is no option to ship materials exceeding the on-property uranium WAC, then treatment measures for meeting the on-property WAC would need to be identified. Under these circumstances the application of fixation (i.e., mobility reducing) technologies may need to be considered for those Operable Unit 5 soil volumes that exceed the WAC. Should this condition occur in the future, approval from the regulatory agencies would need to be sought in order to apply uranium fixation technologies as a contingency action for on-property disposal.
Action: Revise sentence on line 17, page 4-39 to read: "For the nonradioactive inorganic constituents..."

277. Commenting Organization: OEPA Commentor: OFFO
Section#: Table 4-2 Pg.#: 4-31 Line#: Code: C
Original Comment# 65
Comment: Based upon the facts that the sump stored hazardous wastes, and was filled to a volume above the floor drain pipe inlet, and the inlet piping was still connected to the sump, and that the video survey of the piping revealed solids remaining therein, Ohio EPA believes that the ancillary piping acted as a storage unit. If DOE maintains the position that the associated piping is not a part of the unit, please provide Ohio EPA with a detailed justification at the earliest convenient date.
Response: The purpose of including a list of hazardous waste management units within the Operable Unit 5 Feasibility Report was to estimate the volume of soil that may contain RCRA hazardous constituents. The regulatory basis for determining if the subgrade piping beneath the pilot plant is part of a unit is an issue that has historically been addressed by Operable Unit 3. Therefore, it is requested that clarification and ultimate resolution of this issue be deferred to Operable Unit 3.
Action: None.

286. Commenting Organization: OEPA Commentor: OFFO
Section#: 6.4.2.2 Pg.#: 6-22 Line#: Code: C
Original Comment# 98

Comment: This response minimally address our concerns that innovative technologies be evaluated during the RD RA process. We also cannot fail to note that "brickmaker" technology is not even mentioned in the FS text.
Ohio EPA also is concerned by the phrase in the "Response" "other than as a support technology for materials that fail to meet the WAC". Please refer to the previous comment about Ohio EPA's understanding of the uranium WAC.

Response: The brickmaker technology is referred to as "soil compaction" in the text revisions to the FS and is mentioned in a number of locations throughout the revised FS and accompanying Appendices. Of note, the brickmaker technology is one of the four initial technologies designated by EPA and OEPA to be evaluated as part of the FEMP's ongoing commitment to evaluating innovative technologies over the active life of the on-property disposal facility, and DOE is planning to conduct engineering evaluations of all four technologies. As requested by EPA and OEPA, Operable Unit 2 will be responsible for conducting engineering evaluations of the brickmaking and geochemical barrier technologies, and Operable Unit 5 will be responsible for evaluating physical separation and phosphate amendment technologies. These commitments will be reflected specifically in the Operable Unit 5 ROD. The engineering evaluations will consider the dual potential benefits cited by OEPA of 1) potential for volume reduction and 2) further reducing contaminant mobility for materials placed in the disposal cell.

Action: The ROD for Operable Unit 5 will specify the commitments on the part of DOE to examine innovative technologies over the life of the FEMP remedy. The commitments will clearly identify the engineering evaluations to be completed by Operable Unit 2 (brickmaker and geochemical barriers) and Operable Unit 5 (phosphate amendments for mobility reduction and physical separation for volume reduction).

RESPONSES TO OEPA COMMENTS ON THE MARCH 1995 OU5 PROPOSED PLAN

1. Commenting Organization: OEPA Commentor: OFFO
   Section#: PP Pg.#: 1 Line#: Code: C
   Comment: The term environmental media is defined in a very limiting way. Perhaps the wording could be changed to: "The term environmental media *includes* groundwater..."
   Response: Agree.
   Action: Text on pg. 1 was changed in accordance with the comment.

2. Commenting Organization: OEPA Commentor: OFFO
   Section#: PP - Intro Pg.#: 2 Line#: 1st sentence Code: C
   Comment: This sentence is ambiguous. A reader may conclude that there is only one Proposed Plan. Suggested rewording: "Proposed Plans are being issued for each of the Operable Units. This Proposed Plan for OU5 is the fourth to be issued."
   Response: Agree.
   Action: Text at top of pg. 2 was revised to read: Proposed Plans are being issued for Operable Units 1 through 5 at the FEMP; this is the fourth.

3. Commenting Organization: OEPA Commentor: OFFO
   Section#: Scope of OU5 etc. Pg.#: 2 Line#: last bullet Code: C
   Comment: The phrase "generated treatment residuals" hasn't been defined.
   Response: The phrase was changed to be more generic.
   Action: "generated treatment residuals" was changed to "...sludge generated through treatment..."

4. Commenting Organization: OEPA Commentor: OFFO
   Section#: PP Pg.#: 2 Line#: definitions Code: C
   Comment: In the definition of **Operable Unit**, omit the words "environmental issues or". This vague term confuses the definition. Similarly, in the next paragraph, omit the words "level description"; they add redundancy to the definition.
   Response: Agree, "environmental issues" is vague.
   Action: Side bar was changed to "...grouping of environmental media or..."; "...level description..." was deleted.

5. Commenting Organization: OEPA Commentor: OFFO
   Section#: PP Pg.#: 2 Line#: Code: C
   Comment: The second paragraph of the **Agency Involvement** section has a semicolon (;) that should be a comma. Please edit to read, "health and the environment, summarizes..."
   Response: Agree.
   Action: Punctuation corrected.

6. Commenting Organization: OEPA Commentor: OFFO
   Section#: Scope of OU5 etc. Pg.#: 3 Line#: last sentence Code: C
   Comment: "Lower cleanup levels typically... resulting in increased costs for a given remedial alternative." This phrase can be interpreted to mean lower in the sense of "lower concentration" and also lower in the sense of "lower level of protection". Ohio EPA suggests using the term "lower concentration cleanup levels".
   Response: Disagree.
   Action: No change. This language is consistent with that presented in the FS Report.

7. Commenting Organization: OEPA Commentor: OFFO
Section#: Side bar Pg.#: 11 Line#: Volatile Organic side bar Code: C
Comment: Methane is probably not the best choice of an example for a VOC. Ohio EPA suggests using 1.2-dichloroethane because it appears in Table 2.
Response: Agree.
Action: Methane was deleted and replaced with dichloroethane.

8. Commenting Organization: OEPA Commentor: OFFO
Section#: Human Health Evaluation Pg.#: 12 Line#: Last line on pg.Code: C
Comment: This sentence is unclear. It can be interpreted to mean one family that lives both on and off the site. Suggest replacing the phrase "members of a farm family" with "the members of farm families".
Response: Agree.
Action: Requested change was made.

9. Commenting Organization: OEPA Commentor: OFFO
Section#: Human Health Evaluation Pg.#: 13 Line#: first bulletCode: C
Comment: The "fugitive dust" has not been defined.
Response: Phrase was changed.
Action: "...fugitive dust" was replaced with "...resuspended soil"

10. Commenting Organization: OEPA Commentor: OFFO
Section#: Summary of Remedial Alternatives Pg.#: 20 Line#: sent. 2, bottom of pg. Code: C
Comment: As part of the selected remedy DOE has committed to EPA to investigate and apply, if appropriate, reinjection." It is Ohio EPA's understanding that DOE's committed to exploring a much more extensive range of innovative technologies such as pulse pumping, lixiviant injection, etc. Please rephrase this sentence so that these methods don't appear to be excluded from consideration.
Response: Don't agree that this section of the Proposed Plan is the place to list innovative technologies that could possibly be applied to groundwater remediation at the FEMP.
Action: Text is essentially unchanged. Text in the FS that indicates DOE's commitment to innovative technologies occurs in Section 3 and Appendix M.

11. Commenting Organization: OEPA Commentor: OFFO
Section#: Alternative 2C-Off-site Shipment Pg.#: 24 Line#: last sent. 1st paragraphCode: C
Comment: "Remediation levels consistent with Alternative 2A were adopted for this alternative also." The use of the term "remediation level" in this context appears to be synonymous with "risk level". Perhaps it would be more clear to use the term "risk level" in this context. It may not be obvious to the public that the columns in the "Summary of Alternatives" tables actually correspond to different risks.
Response: Agree.
Action: Text was revised to "...risk and cleanup levels,..." to be consistent with the summary tables.

12. Commenting Organization: OEPA Commentor: OFFO
Section#: Compliance with ARARs Pg.#: 31 Line#: 4th & 5th lines from bottom of pg.Code: C
Comment: "Additionally, background concentrations of these constituents in groundwater exceed the MCL." Ohio EPA is confused by this statement. According to the OU5 RI, Table 4-8 [lists] the 95th percentile background concentrations for arsenic (0.26 mg/L [filtered] and 0.029 [unfiltered]), radium-226 (1.90 pCi/L [filtered] and 1.5 pCi/L [unfiltered]), and radium-228 (ND [filtered] and 3.6 pCi/L [unfiltered]). We fail to see how the concentration of either isotope of radium exceeds the proposed MCL of 20 pCi/L. We are concerned that the sample distribution arsenic is neither normally nor log-normally distributed and even more concerned

that the arsenic in the filtered samples is statistically higher than in the unfiltered samples. This result seems counter to logic.
We note that the background groundwater quality (Tables A-8 and A-9 in the "Characterization of Background Water Quality for Streams and Groundwater" [DOE FEMP May 1994]) in the Dry Fork background wells is in the range of 0.002 U to 0.004 mg/L and that the Shandon background wells are listed as 0.004 to 0.042 mg/L.
We also note in Table A-2 of the previously referenced document that arsenic concentrations in private wells were all listed as 0.010 mg/L with the exception of one detect at 0.016 mg/L.
Finally, we would like to note that Table 6-4 "Summary statistics of filtered inorganic constituents for background monitoring wells in the GMA" lists the nonparametric 95% UCL as 0.003 mg/L. We are concerned that statistical artifacts can lead to a skewed interpretation of the GMA's water quality.

Response: Agree that the sentence created confusion.

Action: The Compliance with ARARs section was extensively rewritten and the sentence in question was deleted.

13. Commenting Organization: OEPA Commentor: OFFO
Section#: Compliance with ARARs Pg.#: 32 Line#: 2Code: C
Comment: The term "material-specific WACs" has not been defined. It is Ohio EPA's understanding that the WACs are strictly concentration-based and are independent of the media involved and the chemical form of the contaminants. This understanding is based on our February 23 meeting in Chicago as well as public comments on the OU2 proposed plan.
Response: Commentor is correct; "...material-specific waste acceptance criteria..." was incorrectly used.
Action: The rewritten section (see Comment 12) now says "...contaminant-specific waste acceptance criteria,..."

14. Commenting Organization: OEPA Commentor: OFFO
Section#: Compliance with ARARs Pg.#: 32 Line#: 4Code: C
Comment: In addition to groundwater, please give another example of an indicator medium. Ohio EPA is having difficulty conceptualizing environmental media that are useful in demonstrating and evaluating the continued performance of the disposal system. It is easier to conceptually imagine the monitoring of the disposal system itself and using that as an indicator of disposal system performance. For example, in practice one would monitor the leachate detection system (or visually inspect the disposal cell cap) to evaluate performance. These actions would give a quicker indication of system failure than would a down gradient monitoring well (or discovering contaminants in soil or surface water run-off).
Response: Agree.
Action: The phrase in question was deleted when the ARARs section was rewritten; see Comments 12 and 13.

15. Commenting Organization: OEPA Commentor: OFFO
Section#: Preferred Remedial Alternatives Pg.#: 36 Line#: 6th bulletCode: C
Comment: Please define RME in side bar.
Response: Side bar not needed.
Action: The term "reasonable maximally exposed" or RME is introduced in supporting text on pg. 16 under the section heading of Remedial Action Objectives.

16. Commenting Organization: OEPA Commentor: OFFO
Section#: Groundwater Pg.#: 41 Line#: 1st paragraph Code: C
Comment: Ohio EPA would like stronger reassurances that water would be treated to the maximum extent and in the most efficient manner consistent with the design of the expanded AWWT facility. In other words, it should be explicitly stated here that compliance with the 20 ppb discharge

limit is a necessary but not sufficient criteria. Contaminated water would be treated to the design capacity of the AWWT facility and more highly contaminated water would be preferentially treated before the treatment capacity would be expended on less contaminated water. It is not acceptable to Ohio EPA to blend contaminated water with less contaminated water in order to avoid treatment.

Response: The text in question is now near the top of pg. 40. Changes requested are incorporated in the first two full paragraphs on pg. 40.

Action: The following sentence was added: Contaminated groundwater would be treated to the design capacity of the AWWT facility, and more highly contaminated water would be preferentially treated before treatment would be expended on less contaminated water. "Blended" was deleted from the phrase ..."The uranium concentration in the [blended] effluent discharged..."

17. Commenting Organization: OEPA Commentor: OFFO
Section#: Storm Water and Wastewater Pg.#: 41 Line#: 2nd sentenceCode: C
Comment: Storm water runoff should be controlled until after restoration (that is until a vegetative cover has been established) has been completed. Ohio EPA's concerns about surface water quality are not limited to uranium, but also extend to silt and suspended solids.
Response: Agree. The text in question is now in the middle of pg. 40.
Action: Sentence was shortened and now reads: Storm water runoff control will continue throughout the site remediation time period.

18. Commenting Organization: OEPA Commentor: OFFO
Section#: Decontamination and Demolition Pg.#: 41 Line#: last sentenceCode: C
Comment: Ohio EPA believes that DOE's commitment to remove well casings to the extent practical is too weak. After the wells are no longer needed, they should all be over-drilled (or otherwise removed) and permanently sealed.
Response: Agree. Revised sentence is now the last one on pg. 40
Action: Sentence rewritten; Recovery and monitoring well casings and borings would be abandoned in accordance with State of Ohio requirements.

19. Commenting Organization: OEPA Commentor: OFFO
Section#: Site Wide Integration of Remedies Pg.#: 43,44 and 45 Line#: Code: M
Comment: Ohio EPA agrees with DOE's inclusion of a discussion of the risk reduction achievable through implementation of the desired remedy. However, we believe that there are many potential questions left unanswered in the discussion of the risk reduction presented here.
Why is the total non-carcinogenic risk post-remediation so much lower on-site than off-site?
Why is the ILCR to the off-property farmer only reduced by barely half after an enormously expensive and very long cleanup?
Why is the Total Carcinogenic Risk to the post-remediation off-property resident farmer only listed as 1.1×10^{-3}? It is common knowledge that a persons risk of getting cancer is greater than that.
Why is there no discussion of background risk?
Ohio EPA suggests rewriting the entire section with these types of questions in mind. We suggest considering removing the background risk from the figures.
Response: In accordance with the discussion between the agencies and DOE on April 20, it was agreed that Figure 13 (previously Figure 14) would show pre- and postremediation risk to only the undeveloped-park user.
Action: Figure 13 was revised as agreed upon. Text was slightly revised to match new figure.

CHANGE PAGES IN RESPONSE TO OEPA COMMENTS ON THE MARCH 1995 OPERABLE UNIT 5 FS REPORT

TABLE B.1 (Continued)
OPERABLE UNIT 5 POTENTIAL CHEMICAL-SPECIFIC REQUIREMENTS

Citation	Requirement	ARAR/TBC	Rationale
MCLs for Resource Conservation and Recovery Act, Subtitle C and D			
Chemicals in Drinking Water (Solid Waste Disposal Facility) 40 CFR 257.4 Ohio Solid Waste Regulations OAC 3745-27-10(D) Chemicals in Drinking Water (Hazardous Waste Disposal Facility) 40 CFR 264.94 Ohio Hazardous Waste Regulations OAC 3745-54-94	A solid waste disposal facility shall not contaminate an underground drinking water source beyond the solid waste boundary (outermost perimeter of the waste). The concentration of chemicals shall not exceed background levels or listed MCLs, whichever is higher. A hazardous waste disposal facility must comply with the requirements specified in the facility permit for the uppermost aquifer underlying the waste management area beyond the point of compliance, which is a vertical surface located at the hydraulically downgradient limit of waste management that extends down into the uppermost aquifer underlying the regulated area. The concentration of chemicals in groundwater shall not exceed background levels or the listed maximum concentration level (MCL) of the constituent for groundwater protection, whichever is higher. **Inorganic Chemicals** — Solid Waste RCRA MCL (mg/L) / Hazardous Waste RCRA MCL (mg/L) Arsenic: 0.05 / 0.05 Barium: 1.00 / 1.00 Cadmium: 0.01 / 0.01 Chromium: 0.05 / 0.05 Lead: 0.05 / 0.05 Mercury: 0.002 / 0.002 Selenium: 0.01 / 0.01 Silver: 0.05 / 0.05 **Organic Chemicals** Benzene: .005 / NA Carbon tetrachloride: .005 / NA 1,2-Dichloroethane: .005 / NA 1,1-Dichloroethene: .007 / NA Trichloroethylene: .005 / NA **Radionuclides** Combined Ra-226 & Ra-228: 5 pCi/L Gross alpha particle activity (excluding radon & uranium): 15 pCi/L	Relevant and Appropriate	40 CFR 257.4 and 40 CFR 264.94 and their Ohio equivalents are relevant and appropriate because OU5 contains several of the chemicals listed in the regulation. Compliance with the MCLGs and MCLs under the Safe Drinking Water Act (SDWA) will assure compliance with these RCRA MCLs as discussed in the NCP. The RCRA MCLs reflect earlier versions of the SDWA but the intent is to follow the updated standards of the SDWA (Compliance With Other Laws Manual). These regulations are pertinent to remedial alternatives that involve the use of capping systems or engineered cells. On-property disposal of remediation waste might cause migration into the underlying aquifer and potentially contaminate drinking water systems as a consequence of remedial actions. NA = Not Available
Total trihalomethanes in community water systems OAC 3745-81-12(A) 40 CFR 141.12	The maximum contaminant level for total trihalomethanes is 0.10 mg/L and applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water process.	Relevant and appropriate	This requirement would be relevant and appropriate if DOE managed a community water system for a population of 10,000 or more individuals.

below. Figures 4-4 and 4-5 provide overviews of the RCRA compliance decisions to be made in the field to identify and track the RCRA-regulated constituents, and to implement the key elements of the on-site and off-site strategies.

On-site LDR Compliance Strategy

256 For the alternatives that contemplate disposal of RCRA-contaminated soil on property, the FEMP would use the RCRA Subtitle C corrective action management unit (CAMU) provisions for defining compliance measures for the LDR requirements. Under this strategy, the excavated soil is considered "remediation wastes" meeting the definition set forth at 40 CFR 260.10. In order to be placed within the respective on-property disposal facility under consideration for each on-site alternative, the excavated soil must meet specific WAC that are deemed protective of human health and the environment. By virtue of their definition as remediation wastes, the excavated soil would not need to meet the specific LDR treatment standards provided they meet the protectiveness requirement for disposal. Materials that do not meet the specific WAC for the RCRA-regulated constituents would thus need to be treated before placement in the facility, or alternatively, sent off site for disposal. This strategy would apply to both listed and characteristic RCRA-regulated constituents present in the Operable Unit 5 environmental media. For the ***nonradioactive*** inorganic constituents, cement stabilization would be used as the representative treatment technology for meeting the respective WAC. For the organic constituents, low temperature thermal treatment would be used as the representative treatment technology. In the event that the treated soil does not attain the WAC, the soil would require off-site disposal.

The CAMU-based approach to satisfying LDR requirements for RCRA-contaminated soil is analogous to the compliance strategy embodied in the "area of contamination" (AOC) concept defined in OSWER Directive 9347.1-02 (Policy for Superfund Compliance with the RCRA Land Disposal Restrictions, April 17, 1989), with the exception that the CAMU provisions allow for locating the management facility in an on-property area adjacent to (rather than immediately within) the area of contamination. In developing the CAMU refinements to the original AOC concept, EPA recognized that locating the facility in an adjacent area (termed a "facilitation area" in the RCRA CAMU provisions) would generally enhance remedy implementation by providing additional working space for the excavation and handling of materials. Other than this location-based modification, the CAMU and AOC concepts envision identical approaches for determining the applicability of LDR requirements for CERCLA actions. Both concepts rely on the concept of "placement" to define when the LDR treatment requirements are applicable for remediation wastes. For the disposal actions that do not constitute placement (and thus do not trigger LDR treatment standards), both the CAMU and the AOC concepts require that the remediation wastes be managed so as to be protective of human health and the environment.