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ER-002/04
January 7, 2004

Ms. Margaret L. Marks, Acting Director
Miamisburg Closure Project
U.S. Department of Energy
500 Capstone Circle
Miamisburg, OH 45342

SUBJECT: Contract No. DE-AC24-03OH20152
Contract Deliverable 039 – PRS Documents
PHASE I CERCLA DOCUMENTS, FINAL

Dear Ms. Marks:

The following documents are provided for your records:

- Phase I Record of Decision, Final
- Phase I Environmental Summary, Final

These documents include approval signatures and correspondence.

Sincerely,

Monte A. Williams
Deputy Project Manager, Environmental Restoration

MAW/DAR:jdg

Enclosures

cc: David Seely, USEPA, (8) w/attachments
Mary C. Wojciechowski, Tetra Tech EM, Inc., (1) w/attachments
Brian Nickel, OEPA, (2) w/attachments
Ruth Vandegrift, ODH, (2) w/attachments
Paul Lucas, DOE/MCP, (1) w/attachments
Danny Punch, DOE/MCP, (1) w/attachments
Sue Smiley, DOE/OH, (1) w/attachments
Lisa Rawls, DOE/MCP, w/o attachments
Randy Tormey, DOE/OH, (1) w/attachments
Dann Bird, MMCIC, (3) w/attachments
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Karen Arthur, CH2M HILL, w/o attachments
Monte Williams, CH2M HILL, w/o attachments
Public Reading Room, (4) w/attachments
Admin Records, (2) w/attachments
DCC, (1) w/attachments

Phase I

Record of Decision

Final
July 2003

Miamisburg Closure Project

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Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
BDP	Building Data Package
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
COC	chemical of concern
COPC	constituent of potential concern
CSM	Conceptual Site Model
D&D	Decontamination & Decommissioning
DOE	Department of Energy
FFA	Federal Facility Agreement
FOD	frequency of detection
HEAST	Health Effects Assessment Summary Table
HI	Hazard Index
HQ	Hazard Quotient
HTO	tritium oxide
IRIS	Integrated Risk Information System
MCL	Maximum Contaminant Level
MCP	Miamisburg Closure Project
MMCIC	Miamisburg Mound Community Improvement Corporation
NCP	National Contingency Plan
NFA	No Further Assessment
NPL	National Priority List
ODH	Ohio Department of Health
OEPA	Ohio Environmental Protection Agency
O & M	Operations and Maintenance
OSC	On-Scene Coordinator
OU	Operable Unit
ppb	part per billion
ppm	part per million
PRS	Potential Release Site
RA	Removal Action
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision

Acronyms

(continued)

RRE	Residual Risk Evaluation
RREM	Residual Risk Evaluation Methodology
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SM/PP	Special Metallurgical/Plutonium Processing
TCE	trichloroethene(ethylene)
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

This Record of Decision (ROD) documents the remedy selected for Phase I of the Mound Plant, Miamisburg, Ohio. The ROD is organized in three sections: a declaration, a decision summary, and a responsiveness summary.

1.0 DECLARATION

This section summarizes the information presented in the ROD and includes the data certification checklist and authorizing signature page.

1.1 Site Name and Location

The U.S. Department of Energy (DOE) Mound Plant (CERCLIS ID No. 04935) is located within the City of Miamisburg, in southern Montgomery County, Ohio. The Plant is located approximately 10 miles southwest of Dayton and 45 miles north of Cincinnati. This ROD addresses Phase I, which is located on the southern border of the plant. Phase I is generally bound to the south by Parcel 4, which was recently transferred to the Miamisburg Mound Community Improvement Corporation (MMCIC), to the west and north by the plant proper, and to the east by the transferred Release Block D.

1.2 Basis and Purpose

This decision document presents the selected remedy for Phase I of the Mound Plant. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Contingency Plan (NCP). Information used to select the remedy is contained in the Administrative Record file. The file is available for review at the Mound CERCLA Reading Room, Miamisburg Senior Adult Center, 305 Central Avenue, Miamisburg, Ohio.

The State of Ohio concurs with the selected remedy.

1.3 Site Assessment

As documented in the Phase I Residual Risk Evaluation (RRE), (Reference 1), the risks from carcinogens and non-carcinogens to current and future occupants of Phase I were evaluated. In those analyses, land use was limited to industrial/commercial use scenario and the type of occupant was limited to and represented by a construction worker and a site employee (office employee). Based on the RRE, the incremental risks from potential exposure to residual carcinogenic contaminants for current industrial/commercial use are within the acceptable range. The incremental carcinogenic risks for future industrial/commercial use are within the acceptable risk range for the Construction Worker scenario, and are at the upper limit of the acceptable range for the Site Worker scenario. The incremental non-carcinogenic hazards for current industrial/commercial use are less than the target Hazard Index (HI) of one for the Site Employee scenario, and are at the upper limit for the Construction Worker scenario. Non-carcinogenic hazards for future

industrial/commercial use exceed the target HI of one. All exceedances are due to potential exposure to groundwater. In order to ensure that future use of the site conforms to the RRE assumptions, it was necessary to consider a remedy that would prevent the site from being used for non-industrial/commercial purposes.

As described below, the remedy, and other legislative measures (such as compliance with the Safe Drinking Water Act (SDWA)), will protect future occupants of Phase I from the threat of contaminants in the groundwater. The remedy will ensure that Phase I soils are appropriately evaluated prior to any removal of Phase I soils from the Mound Plant National Priority List (NPL) facility boundary (as owned in 1998).

1.4 Description of Selected Remedy

The selected remedy for Phase I is institutional controls in the form of deed restrictions on future land and groundwater use and monitored natural attenuation. DOE or its successors or assigns, as the lead agency for this ROD, has the responsibility to implement, report on, monitor, maintain, and enforce these institutional controls both before and after the transfer. In order to maintain protection of human health and the environment at Phase I in the future, the institutional controls to be adopted will ensure:

- Maintenance of industrial/commercial land use;
- Prohibition against residential use;
- Prohibition against the use of groundwater;
- Site access for federal and state agencies for the purpose of sampling and monitoring; and
- Prohibition against removal of Phase I soils from the DOE Mound property (as owned in 1998) boundary without approval from the Ohio Department of Health (ODH), the Ohio Environmental Protection Agency (OEPA), and the United States Environmental Protection Agency (USEPA).

In addition, DOE will continue to monitor groundwater in Phase I for trichloroethene (TCE) and its degradation products to verify that the concentration of TCE is decreasing due to natural attenuation and is not impacting the Buried Valley Aquifer (BVA). The specifics of the monitoring will be established in a Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. This will become part of the Operation & Maintenance (O&M) Plan required by the ROD. Key elements of the monitoring are outlined in Section 2.9.2 of this ROD. Groundwater monitoring provides assurance that the concentration of TCE observed in Phase I is decreasing and is not impacting the BVA.

Copies of the deeds are included as Appendix C.

1.5 Statutory Determinations

The selected remedy for Phase I is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and

appropriate, is cost-effective, and utilizes a permanent solution to the maximum extent practicable. Because this remedy will result in hazardous substances remaining in Phase I above levels that allow for unlimited use and unrestricted exposure, DOE, in consultation with the USEPA, OEPA, and ODH, will review the effectiveness of the remedial action each year to assure that human health and the environment are being protected by the remedial action being implemented. DOE reserves the right to petition the USEPA, OEPA, and ODH for a modification to the frequency established for conducting the effectiveness reviews.

1.6 ROD Data Certification Checklist

Based on a commitment made by the USEPA to the General Accounting Office, RODs must contain a checklist, which certifies that key information regarding the selection of the remedy has been included in the ROD.

Therefore, note that the following information is located in the Decision Summary (Section 2) of this ROD. Additional information on any of these topics can be found in the Administrative Record for Mound.

- chemicals of concern (COCs) and their respective concentrations,
- guideline levels for the COCs;
- risks represented by the COCs;
- current and future land and groundwater use assumptions used in the risk assessment and ROD;
- land and groundwater uses that will be available at the site as a result of the remedy;
- estimated cost of the remedy; and the
- decisive factor(s) that led to the selection of the remedy.

1.7 Authorizing Signatures and Support Agency Acceptance

This Record of Decision for Phase I of the Mound Plant has been prepared by the DOE. Approval of the USEPA and OEPA is required and has been secured as documented below.

This ROD is authorized for implementation.

for Robert Warther
Ohio Field Office Manager,
U. S. Department of Energy

7/21/03
Date

William E. Muno
Director, Superfund Division,
U. S. Environmental Protection Agency, Region V

7/29/03
Date

Christopher Jones
Director,
Ohio Environmental Protection Agency

7-31-03
Date

2.0 DECISION SUMMARY

This section provides an overview of the site and the alternatives evaluated. The selected remedy, and the basis for its selection, are also described.

2.1 Site Description

The DOE Mound Plant (CERCLIS ID No. 04935) is located within the city limits of Miamisburg, in southern Montgomery County, Ohio (Figure 1). The Mound Plant is located approximately 10 miles southwest of Dayton and 45 miles north of Cincinnati. Miamisburg is predominantly a residential community with supportive commercial facilities and industrial development. The adjacent upland areas are used primarily for residences and agriculture or are undeveloped open spaces.

Originally, the Mound property was divided into nineteen "release blocks," which are contiguous tracts of property designated for transfer of ownership. Release Blocks D and H were transferred to MMCIC in 1999. The remaining release blocks were reconfigured and renamed parcels. Parcel 4 was transferred to MMCIC in 2001. Parcel 3 was transferred to MMCIC in 2002. Recently, the remaining parcels were reconfigured and renamed Phase I, Phase II, Phase III, and the NE Island.

This ROD addresses Phase I which is located on the southern border of the plant (Figure 2). The legal description of Phase I is reproduced in Appendix C. Phase I is generally bound to the south by Parcel 4, which was recently transferred to MMCIC, to the west and north by the plant proper, and to the east by the transferred Release Block D.

There are 10 structures and 40 Potential Release Sites (PRSs) in Phase I.

2.2 Site History and Enforcement Activities

As a result of historic disposal practices and contaminant releases to the environment, the Mound Plant was placed on the NPL on November 21, 1989. DOE signed a CERCLA Section 120 Federal Facility Agreement (FFA) with USEPA, effective October 1990. In 1993, this agreement was modified and expanded to include OEPA. DOE serves as the lead agency for CERCLA-related activities at Mound (Reference 2).

DOE, USEPA, and OEPA had originally planned to address the Mound Plant's environmental restoration issues under a set of Operable Units (OUs), each of which would include a number of PRSs, locations of known or suspected contamination. For each OU, the site would follow the traditional CERCLA process: a Remedial Investigation/Feasibility Study (RI/FS), followed by a ROD, followed by Remedial Design/Remedial Action (RD/RA). After initiating remedial investigations for several OUs, DOE and its regulators realized during a strategic review in 1995 that, for Mound, the OU approach was inefficient. DOE and its regulators agreed that it would be more appropriate to evaluate each PRS or building separately, use removal action authority to remediate them as needed, and establish a goal for no additional remediation other than institutional controls for the final remedy. To evaluate any residual risk after all removals have been completed, an RRE is conducted to ensure the conditions at the parcel do not pose an unacceptable risk to

human health and the environment when the parcel is used for industrial/commercial purposes. This process was named the Mound 2000 Process. DOE and its regulators pursued this approach with the understanding that USEPA and OEPA reserve all rights to enforce all provisions of the FFA and participation in the Mound 2000 Process does not constitute a waiver of USEPA and OEPA rights to enforce the FFA.

The Mound 2000 Process established a Core Team consisting of representatives of the Miamisburg Closure Project (MCP) of DOE, USEPA, and OEPA. The Core Team evaluates each of the PRSs and recommends the appropriate response. The Core Team uses process knowledge, site visits, and existing data to determine whether or not any action is warranted concerning each PRS. If a decision cannot be made, the Core Team identifies specific information needed to make a decision (e.g., data collection, investigations). The Core Team also receives input from technical experts as well as the general public and/or public interest groups. Thus, all stakeholders have the opportunity to express their opinions or suggestions involving each PRS. The details of this process are explained in the Work Plan for Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach (Reference 3).

The Mound 2000 Residual Risk Evaluation Methodology (RREM) (Reference 4) was developed as a framework for evaluating human health risks associated with residual levels of contamination. The RREM is applied to a parcel once necessary remediation has been completed, and the remaining PRSs or buildings in the parcel have been designated as No Further Assessment (NFA). Once these environmental concerns have been adequately addressed by the Core Team, a RRE is performed. The RRE forms part of the basis for determining what restrictions should be placed on the parcel.

After a ROD has been generated for each of the release blocks, parcels or phases, the Core Team plans for a site wide final ROD to address any areas of media associated with the Mound Plant that were not previously addressed.

2.3 Community Participation

Opportunities to comment on the NFA and Removal Action (RA) decisions for the PRSs and buildings were provided. The Phase I Residual Risk Evaluation and Phase I Proposed Plan were also made available for public comment. A listing of those documents and their comment periods is shown in Table 1.

Table 1 identifies the Phase I Proposed Plan that was available for public review in October 2002. A public meeting was held on October 17, 2002 to present the Proposed Plan. Representatives of DOE, OEPA, and ODH were present at the public meeting to answer questions regarding the proposed remedy. The Phase I Proposed Plan was reissued in March 2003 (also identified in Table 1) to enable public comment on the following changes in Phase I:

- The northeast boundary was adjusted to remove any influence of TCE from PRS 87 (see Figure 5 of the Proposed Plan).
- The northwest boundary was adjusted to accommodate traffic safety during the remediation of the remainder of the site (see Figure 5 of the Proposed Plan).

- The description of the preferred alternative (see Sections 7 and 8 of the Proposed Plan) was changed from "Institutional Controls and Groundwater Monitoring" to "Institutional Controls and Monitored Natural Attenuation".

The residual soil risk in Phase I was recalculated using the data from the revised boundaries and compared to the results published previously in the Phase I Residual Risk Evaluation (Reference 1). Table 19 of the Proposed Plan (reproduced in Appendix B of this ROD as Table 11) shows that the boundary changes do not increase the incremental residual risk from soil in Phase I.

The revised Phase I Proposed Plan was made available to the public on March 26, 2003. Copies were distributed to stakeholders and were placed in the Administrative Record file in the CERCLA Public Reading Room, Miamisburg Senior Adult Center, 305 Central Avenue, Miamisburg, Ohio. The notice of the availability of the Plan was published in the ***Miamisburg News*** on March 26, 2003. A public comment period was held from March 26, 2003 through April 24, 2003. Responses to comments on both versions of the Proposed Plan are included in the Responsiveness Summary, which is Section 3 of this ROD.

2.4 Scope and Role of Phase I

Phase I lies within what was once called Operable Unit 5 (OU5). There are ten structures in Phase I. There are 40 PRSs in Phase I. Before transfer of a parcel can be completed, all buildings and PRSs must be evaluated for protectiveness or remediated to be protective. The status of the PRSs in Phase I is summarized in Table 2. The status of the buildings in Phase I is summarized in Table 3. Any residual risks associated with remaining contamination in Phase I have been evaluated and are presented in the Phase I Residual Risk Evaluation (Reference 1).

The PRSs at Mound were identified based on knowledge of historical land use that was considered potentially detrimental and/or an actual sampling result showing elevated concentrations of contaminants. Tables 2 and 3 contain information and close-out status for Phase I PRSs and buildings. Figure 3 depicts buildings and PRSs currently within Phase I.

2.5 Site Characteristics

2.5.1 Geologic Setting

The bedrock section beneath Mound Plant consists of thin, nearly flat-lying beds of alternating shale and limestone of the Richmond Stage of the Cincinnati Group (Upper Ordovician -- about 450 million years ago). The Cincinnati Group is present at the surface at Mound Plant and underlies Phase I. The limestone beds range from two to six inches in thickness and the shale layers are commonly five to eight feet thick.

Pleistocene age (less than about two million years old) glacial deposits at Mound Plant include both till and outwash deposits. The till in the area of Mound Plant is composed of an unsorted, unstratified mixture of clay, silt, sand, and coarser material. Water-lain

deposits consist of outwash composed of well-sorted sand and gravel. The sand and gravel are horizontally layered, and commonly cross-bedded. The outwash in the vicinity of Mound Plant occurs as restricted valley-train deposits that were formed by the aggregation of glacial meltwater streams.

The outwash deposited in the Miami River Valley and the associated tributary valley form the Buried Valley Aquifer and contiguous deposits. A general discussion of the geology is presented in the Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan (Reference 5).

2.5.2 Hydrogeologic Setting

There are two hydrogeologic regimes at Mound Plant: flow through the bedrock beneath the Main Hill and the Special Metallurgical/Plutonium Processing (SM/PP) Hill, and flow within the unconsolidated glacial deposits and alluvium associated with the BVA in the Great Miami River Valley and the tributary valley between the Main Hill and SM/PP Hill. The BVA is a USEPA-designated sole source aquifer. The bedrock system, an interbedded sequence of shale and limestone, is dominated by fracture flow especially in the upper portions of the bedrock. Groundwater movement within the till and sand and gravel, within the buried valley, is through porous media. Groundwater flow from Mound Plant is generally to the west and southwest toward the BVA of the Great Miami River Valley. A discussion of the hydrogeology of Mound is presented in the Remedial Investigation/Feasibility Study, Site-Wide Work Plan (Reference 5), the Hydrogeologic Investigation: Buried Valley Aquifer Report (Reference 6), and the Hydrogeologic Investigation: Bedrock Report (Reference 7).

2.5.3 Wetlands

A small portion (0.03 acres) of the Phase I property is classified as wetlands, i.e., those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Reference 8).

2.5.4 Available Data for Phase I

The PRSs within Phase I have been evaluated by the Core Team and deemed NFA. The following sections discuss the data relevant to Phase I that are available from the general source documents and the PRS Packages.

2.5.4.1 Background Data

Soils. Background concentrations measure the amount of a chemical that is naturally occurring (like metals) or anthropogenic (man-made but, for purposes of evaluating background, originating from sources other than the Mound Plant). Background concentrations are used as a screening tool to determine which contaminants should be

carried through a risk evaluation as described in Section 2.7. Regional background concentrations in soil were determined and are documented in reports titled Background Soils Investigation Soil Chemistry Report (Reference 9) and Regional Soils Investigation Report (Reference 10).

Groundwater. Background concentrations for groundwater were identified in the RREM (Reference 4). These background values were originally reported in Hydrogeologic Investigation: Groundwater Sweeps Report (Reference 11).

2.5.4.2 Groundwater Contaminant Data

Groundwater data consist of water analyses of the Mound production wells (wells 0076 and 0271) screened within the BVA, and analyses of groundwater from monitoring wells screened in the bedrock aquifer on the Mound property. These wells are sampled as part of the site-wide groundwater monitoring network. Appendix B of the RRE for Phase I documents the specific groundwater data analyses used to evaluate the future groundwater profile for Phase I. Summaries of the contaminants detected in Mound Plant groundwater, and those projected to be potentially present in Mound Plant groundwater in the future, are shown in Tables 4 through 7.

2.5.4.3 Soil Contaminant Data

Soil data can be divided into three types: (1) data obtained through commercial analytical laboratory analysis; (2) data obtained through screening techniques conducted in a DOE laboratory; and, (3) data obtained through screening techniques conducted in the field. Analytical laboratory data are obtained using strict methods and are subjected to exacting quality control procedures. These data are of the highest quality and are quantitative. The laboratory screening data are considered to be of lower quality because sample preparation does not occur, and the measuring instruments are less precise. The field screening techniques are the least accurate due to instrument limitations and the effects of ambient conditions on field measurements. Due to these limitations, field screening data were not used for any calculations in the RRE for Phase I.

Soil contaminant data collected for Phase I collected prior to the Mound 2000 Process are documented in the following reports:

- Miscellaneous Sites Limited Field Investigation Report, Volumes 1, 2, and 3 (Purpose was to address areas noted in previous surveys but not thought to endanger human health or the environment.) (Reference 12),

- New Property Extended Phase I Field Investigation Report (Purpose was to augment previous reconnaissance survey with surface and subsurface sampling, groundwater sampling, and sediment sampling in ephemeral streams.) (Reference 13),

- Remedial Investigation Report (Identifies nature and extent of contamination in

groundwater, surface water, soils, and sediment in Operable Unit 5.) (Reference 14),

- Operational Area Phase I Investigation Area 22 (Purpose was to present results of the radiological and soil gas reconnaissance surveys conducted in Area 22 as part of the larger OU5 Phase I investigation and identify potential areas of radiological and chemical contamination. Provide a qualitative screen that can be used to determine a strategy for directing additional investigations.) (Reference 15),

- Operational Area Phase I Investigation Area 13 (Purpose was to present results of the radiological and soil gas reconnaissance surveys conducted in Area 13 as part of the larger OU5 Phase I investigation and identify potential areas of radiological and chemical contamination. Provide a qualitative screen that can be used to determine a strategy for directing additional investigations.) (Reference 16),

- Reconnaissance Sampling Report Decontamination and Decommissioning Areas (Purpose was to characterize the non-radioactive hazardous constituents in the soil areas that were included in the Decontamination & Decommissioning (D&D) Program as of 1989. Some onsite analyses for plutonium-238 and thorium-232 were also reported.) (Reference 17),

- Regional Soils Investigation Report (Purpose was to give a regional soil description without including the impacts of Mound operations) (Reference 10),

- Site Scoping Report, Volume 3 - Radiological Site Survey (a compendium of existing data) (Reference 18).

- Parcel 4/5 Boundary Sampling (Purpose was to assure radioactively contaminated soil had not migrated from the south ridge area (PRS 421) downward towards the Parcel 4 region and possibly across the Parcel 4/5 boundary. These data were collected after implementation of the Mound 2000 Process.) (Reference 29).

In the Mound 2000 Process, radionuclide and chemical contaminants were studied on a PRS basis. There are 40 PRSs located in Phase I. Their locations are shown in Figure 3. The rationale for their designation is included in Appendix G.

Summaries of the contaminants detected in Mound Plant soil are shown in Tables 8 and 9.

2.5.4.4 Building Contaminant Data

The final radiological surveys for the ten buildings remaining in Phase I met all surface contamination guidelines. This information is available in the Building Data Packages (BDPs) listed in Table 3.

2.5.4.5 Air Contaminant Data

For purposes of evaluating cumulative residual risk, air pathway data are also reported in each RRE. Per the Residual Risk Evaluation Methodology document, 1994 data collected at the Mound Plant perimeter air sampling stations are used to bound the concentrations, and, therefore, the risks from inhalation of radionuclides present in the ambient air. The risk data for tritium oxide (HTO), plutonium-238, and plutonium-239/240 reported in the Residual Risk Evaluation, Release Block D (Reference 19) were reviewed and found to require no update or changes. It was observed, however, that the site employee risk calculations did not include an adjustment factor to account for the time spent indoors. While this approach is inconsistent with that applied to analogous outdoor pathways, it is conservative in nature.

2.6 Potential Future Uses for Mound

The Mound Plant will remain in industrial/commercial use into the future. This future use has been determined based upon agreement among DOE, USEPA, OEPA, and interested stakeholders. This land use is reflected in the Mound Comprehensive Reuse Plan of the MMCIC and is currently codified in the City of Miamisburg Zoning Ordinance.

2.7 Summary of Site Risk

The human health risks for Phase I were evaluated using the RREM document developed for Mound. A RRE is a five-step process:

(1) identification of contaminants,

(2) exposure assessment,

(3) toxicity assessment,

(4) risk characterization, and

(5) evaluation of potential cumulative risks.

Steps 1 through 5 are described below. After the Core Team reviews and approves the RRE, it is placed in the public reading room for a formal 30-day public review period.

2.7.1 Identification of Contaminants

The constituents of potential concern (COPCs) for Phase I were identified by reviewing all of the sampling data for the phase. Based on that review, contaminants were eliminated for further evaluation based on criteria established in the RREM. Specifically, only contaminants exceeding (1) certain frequency of detection (FOD) criteria, (2) background, and (3) a base level of potential health concern were carried through the RRE. The contaminants of concern established for Phase I on the basis of risk are listed in Tables 4 through 9.

2.7.2 Exposure Assessment

The Conceptual Site Model (CSM) for Mound provides the basis for evaluating human exposure scenarios. The CSM for Mound was defined in the RREM. Because DOE and its regulators and stakeholders agree that the future use of Phase I will be industrial/commercial in nature, two receptor scenarios from the Mound CSM apply: an onsite construction worker and a site employee engaged in non-construction activities (office work). The routes of exposure applicable to these two receptors are shown in Figure 4. The significant pathways for potential exposure in Phase I include ingestion of groundwater and dermal contact with groundwater (construction worker scenario only) from the BVA extraction point, currently the Mound production wells 0076 and 0271, which supply potable water to the Mound Plant and represent a potential future potable water supply.

Using equations developed to support the CSM, exposures to specific concentrations of contaminants of concern are evaluated based on assuming current and future intake rates for soil, air, and groundwater. Once the intakes are estimated, the human health implications of those intakes are evaluated by reviewing toxicological data for the contaminants of concern.

For groundwater, the possible exposures to current and future contaminants of concern are evaluated by combining current BVA contaminants with additional contamination in the nearby bedrock aquifer. This approach ensures that the cumulative and long-term impacts of the contaminants of concern are adequately characterized.

2.7.3 Toxicity Assessment

The toxicological properties of each contaminant of concern for Phase I were evaluated by reviewing the Integrated Risk Information System (IRIS) and/or Health Effects Assessment Summary Table (HEAST) data for the contaminant of concern. IRIS files provide no-observable effect levels and slope factors (for translating intake into cancer risk) for many of the chemicals encountered at Mound. HEAST provides slope factors for many of the radionuclides encountered at Mound. Based on the information collected from IRIS and HEAST, an adequate understanding of the toxicology of the Phase I contaminants of concern has been developed.

2.7.4 Risk Characterization

Pursuant to the RREM, risks are quantified for both carcinogenic and non-carcinogenic contaminants. The risk associated with the intake of a known or suspected carcinogen is reported in terms of the incremental lifetime cancer risk presented by that contaminant of concern, as estimated using the appropriate slope factor and the amount of material available for uptake. The acceptable risk range as defined by CERCLA and the NCP is 10^{-4} to 10^{-6} (one human in ten-thousand to one human in one-million incremental cancer incidence). Potential human health hazards from exposure to non-carcinogenic contaminants are evaluated by using a Hazard Quotient (HQ). The HQ is determined by the ratio of the intake of a contaminant of concern to a reference dose or concentration for the contaminant of concern that is believed to represent a no-observable effect level. The

specific HQ for each contaminant of concern is then summed to provide an overall HI. USEPA guidance sets a limit of 1.0 for the comprehensive HI.

The incremental carcinogenic risks and hazards associated with residual concentrations of contaminants of concern in Phase I are shown in Table 10 (Reference 1). The incremental carcinogenic risks for the current Construction Worker (2.2×10^{-5}) and current Site Employee (4.3×10^{-5}) are within the acceptable risk range. The incremental carcinogenic risk for the future Construction Worker (4.0×10^{-5}) is within this range. The incremental carcinogenic risk for the future Site Employee (1.1×10^{-4}) is at the upper limit of the acceptable risk range. The HI for the current Construction Worker (1) is at the limit (1). The HI for the current Site Employee (0.55) does not exceed the limit (1). The HI for the future Construction Worker (5.7) and future Site Employee (4.6) exceed the limit (1).

The future risks identified by the HI values for both the future Construction Worker and future Site Employee are in excess of the acceptable levels. These risks are due primarily to potential exposures to the predicted future groundwater contaminant concentrations and do not take into account the implementation of the remedy. The groundwater model is intended to be very conservative and likely overestimates the potential future groundwater contaminant concentrations at the BVA extraction point, currently Mound production wells 0076 and 0271. In addition, regular compliance monitoring will ensure that production well concentrations are acceptable (SDWA) and that the residual risks associated with Phase I remain acceptable. This monitoring will be conducted until the Mound site is connected to the Miamisburg municipal water supply, as currently planned. When this is accomplished, significant exposure pathways to the groundwater from the Phase I parcel will be essentially eliminated. As a result, the overall HIs for both the future Construction Worker and the future Site Employee will fall well below 1, which are considered acceptable.

To prevent a future unacceptable exposure to groundwater due to potential migration from other areas of the Mound Plant, a prohibition on the installation of wells at Phase I is being required as part of this remedy.

Because the scope of the RRE was limited to industrial/commercial use, the soils within Phase I have not been evaluated for unrestricted release (e.g., residential use). Disposition of Phase I soils without proper handling, sampling, and management could create an unacceptable risk to human health and the environment.

2.7.5 Evaluation of Potential Cumulative Risks

For purposes of the RREM, risks resulting from contaminants that originate outside the release block/parcel under consideration are called cumulative risks. In general, cumulative risks are possible via air, surface water, and groundwater. For Mound, cumulative risks from surface waters are not expected because, other than stormwater drainage and some groundwater seeps present year-round, there are no surface water bodies such as ponds or streams flowing through Phase I from other areas. Groundwater and air are therefore the media of concern for cumulative risks.

Current groundwater. The Mound RREM accounts for cumulative groundwater risks by

evaluating current and future groundwater contamination. Since all groundwater currently used at Mound is drawn from the production wells located onsite, the risk posed by current groundwater contamination is equal to the risk resulting from exposure to contaminants found in the production wells. This risk is identical for all release blocks/parcels and represents the cumulative risk from contaminants that migrate to the production wells from all release blocks/parcels. The constituents that contribute to the current groundwater risk can be found in Tables 4 and 5.

Future groundwater. The future risk from groundwater was estimated for Phase I based on the assumption that contaminants found in bedrock will eventually migrate to the Mound Plant production wells located in the BVA. A simple and conservative flow model was used to estimate the concentrations as a function of time. The constituents that contribute to the future groundwater risk can be found in Tables 6 and 7.

Air. The Mound RREM accounts for cumulative residual risk via the air pathway by using data collected in 1994 from the Mound Plant perimeter air sampling stations to bound the concentrations and therefore the risks from inhalation of radionuclides present in ambient air. These values are reported in the Technical Position Report in Support of the Release Block D Residual Risk Evaluation (Reference 20) and are included in Table 10.

The HI and risk values presented in Table 10 for the current groundwater, future groundwater, and air scenarios are therefore believed to adequately bound the potential cumulative risk for Phase I. The potential cumulative risk can be added to the risks from exposures to contaminants within the release block to provide a measure of overall risk. The risk values presented in Table 10 labeled "Current and Future Incremental Residual Risks for Phase I" are therefore believed to adequately bound the potential overall risk.

2.7.6 Comparison of Groundwater Contaminants to MCLs

The groundwater constituents are compared to Maximum Contaminant Levels (MCLs). These results are used in evaluating compliance with Applicable, or Relevant and Appropriate Requirements (ARARs, see Section 2.10.3.1).

There are currently six groundwater monitoring wells and one seep located within the boundary of Phase I that show MCL exceedances. Four of the monitoring wells (0411, 0443, 0445, and 0399) are screened in the bedrock groundwater system, and two of the monitoring wells (0319 and 0400) are screened in the BVA. Wells 0411, 0443, and Seep 0617 exceed the MCL (5 parts per billion (ppb)) for TCE. Well 0445 exceeds the MCL for barium (2 parts per million (ppm)) and the MCL for radium-226 and 228 (5 pCi/L combined). Wells 0400, 0319, 0399, and 0411 exceed the MCLs for nickel (100 ppb) and chromium (100 ppb). The locations of the wells in Phase I are shown in Figure 5. In the last two years (September 2000 to present), the TCE concentrations at well 0411 have ranged from 8 to 16 ppb. The most recent result (Winter 2003) was 13 ppb.

Collectively, the soil data and groundwater data from the wells in the vicinity of well 0411 suggest that the TCE contamination is most likely limited to the area adjacent to well 0411.

There is no known continuing source of TCE contamination in the soil in Phase I. However, TCE is not naturally occurring and was widely used in plant operations. Therefore, TCE is a contaminant of concern (COC) for the groundwater in Phase I and is addressed by the selected remedy.

Collectively, the soil data and groundwater data in the vicinity of well 0445 suggest that the elevated radium and barium concentrations are most likely limited to the area immediately adjacent to well 0445. Other properties (high levels of total dissolved solids, very low tritium level, very high chloride levels) of the groundwater observed at well 0445 are unlike the values typically observed in the bedrock groundwater at Mound, indicating that the groundwater at well 0445 is not representative of overall site conditions.

To further investigate the potential causes of these elevated concentrations, three scenarios that could produce these conditions were recently investigated (Reference 30). These scenarios were: 1) elevated barium and radium concentrations are the result of an unknown waste disposal area not yet identified; 2) isolated areas of the groundwater contain natural brine (i.e. salt) conditions which may mobilize naturally occurring barium and radium within the bedrock geological formation; and 3) a salt source located on the surface leaches into the bedrock formation dissolving naturally occurring barium and radium in a low flow area of the bedrock groundwater aquifer. A salt storage shed (Building SST) is located within the Phase I Parcel and has been used as a storage location for road salt and may have acted as a source of the salt conditions found at well 0445. Additionally, this building had recently undergone significant structural improvements in the last few years which may have prevented this building from continuing to act as a significant source of salt leaching into the groundwater aquifer.

Reference 30 concluded that the groundwater conditions in well 0445 are not consistent with the hypothesis that an unknown waste disposal area is a source of contamination and the elevated barium and radium concentrations are likely due to a salt source interacting with the bedrock to release radium and barium (which occur naturally in the bedrock) into the groundwater in a low flow area of the aquifer. Of the two potential salt sources evaluated, the data is most consistent with leaching of road salt at the surface. However, the potential condition of naturally occurring brine interacting with the bedrock formation to leach barium and radium cannot be excluded as the source of elevated barium and radium concentrations in well 0445. In light of these conclusions and DOE's intention to cease the use of this building in the near future, the salt was removed from the Salt Storage Shed in July 2003.

Based on the results of this study (Reference 30) and the actions taken by DOE to cease the use of the salt storage shed, barium, radium-226, and radium-228 in the Phase I property are not considered contaminants of concern to be addressed in the proposed remedies. To provide assurance that the understanding of the barium, radium-226, and radium-228 in groundwater situation is correct, DOE will continue to monitor for these contaminants on a quarterly basis. If the quarterly monitoring results indicate that the concentrations are not decreasing below the MCLs within a reasonable time, DOE, USEPA, and OEPA will evaluate the need for an active remediation for these contaminants

or if additional characterization efforts are necessary. If the concentrations drop below MCLs for four consecutive sampling events, the monitoring may be discontinued or the frequency decreased upon concurrence with USEPA and OEPA. The specifics of the monitoring will be established in the Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. This will become part of the O&M Plan required by the ROD.

Limited Field Investigations (References 21 and 22) indicate the nickel and chromium concentrations observed at wells 0400, 0319, 0399, and 0411 are the likely result of corrosion of the wellcasing and not the result of plant operations. Therefore, nickel and chromium are not considered contaminants of concern to be addressed in the proposed remedies. However, because the data set supporting this conclusion is limited, DOE will continue to monitor for nickel and chromium. The specifics of the monitoring will be established in the Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. With four consecutive quarters of consistent or decreasing nickel and chromium results, DOE could, with the concurrence of USEPA and OEPA, discontinue monitoring groundwater in Phase I for nickel and chromium.

2.7.7 Ecological Risk Assessment

Based on the site visit that is part of the OEPA procedure; the fact that no threatened or endangered species were observed within Phase I; the fact that no sensitive environments or ecologically important resources were identified within Phase I; the future reuse of Phase I as a research and industrial park; the information developed during the Final Environmental Impact Statement (Reference 23), OU 9 Ecological Characterization Report (Reference 24), Parcel 4 Ecological Assessment (Reference 25), Environmental Assessment for the Commercialization of the Mound Plant (Reference 26), and the several characterization investigations and removal actions performed in the Phase I area; a more detailed assessment of the ecological risk is not warranted. (Reference 27)

2.8 Remediation Objectives

The primary remediation objective for Phase I is to ensure that the residual risk associated with the parcel is acceptable for the defined use scenario of industrial/commercial occupants.

2.9 Description of Alternatives

In light of the planned exit of DOE from the site, and the residual levels of contaminants in the soil and groundwater in Phase I, a remedy must be implemented to protect human health and the environment into the future. Two alternatives were considered for Phase I; they are described below.

2.9.1 No Action

Regulations governing the Superfund program require that the "no action" alternative be evaluated at each site to establish a baseline for comparison. Under this alternative, DOE would take no action to prevent exposure to soil and groundwater contamination associated with Phase I.

2.9.2 Institutional Controls and Monitored Natural Attenuation in Phase I

In this alternative, institutional controls in the form of deed restrictions on future land use would be placed on Phase I. The objective of these institutional controls would be to prevent an unacceptable risk to human health and the environment by restricting the use of Phase I, including Phase I soils and groundwater, to that which is consistent with assumptions in the Phase I RRE. DOE or its successors or assigns, as the lead agency for this ROD, has the responsibility to implement, report on, monitor, maintain, and enforce these institutional controls both before and after the transfer. In order to maintain protection for human health and the environment at Phase I in the future, the institutional controls to be adopted would ensure:

- maintenance of industrial/commercial land use;
- prohibition against residential use;
- prohibition against the use of groundwater;
- site access for federal and state agencies for the purpose of sampling and monitoring; and
- prohibition against removal of Phase I soils from the DOE Mound property (as owned in 1998) boundary without approval from ODH, OEPA, and USEPA.

In addition, DOE will continue to monitor groundwater in Phase I for TCE and its degradation products to verify that the concentration of TCE is decreasing due to natural attenuation and is not impacting the BVA.

According to the guidance *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, April 1999, EPA/540/R-99/009,* there are generally ten factors that should be considered to evaluate the appropriateness of a Monitored Natural Attenuation remedy. The factors, along with a brief explanation of how they relate to Phase I, are presented below:

1. *Whether the contaminants present in soil or groundwater can be effectively remediated by natural attenuation processes*

   The concentration of TCE in the groundwater is expected to decrease to a concentration less than the MCL through a naturally-occurring biodegradation process called reductive dehalogenation. In this process, chlorinated solvent compounds (such as TCE) gradually break down by having a halogen, in this case chlorine atoms, replaced with a hydrogen atom. This progression results in a successively lower number of halogens

(chlorine atoms) attached to the compound structure, shown by:

Trichloroethene (TCE)→ Dichloroethene (DCE) →Vinyl Chloride→ Ethene + Cl^-

The assumption that this process is already taking place in the area is supported by the fact that dichloroethene (DCE) has been detected consistently along with the TCE in well 0411. Although it is expected that the primary natural process for attenuation will be reductive dehalogenation, other natural attenuation processes including dispersion, dilution, sorption, and others may also assist in naturally attenuating the contaminants at the site.

2. *Whether or not the contaminant plume is stable and the potential for the environmental conditions that influence plume stability to change over time*

The wells in the Phase I area have been sampled over a period of several years. Sample results have consistently shown that the TCE contamination is not present as a plume, but is limited to a small area near the location of well 0411.

3. *Whether human health, drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources could be adversely impacted as a consequence of selecting MNA as the remediation option*

There is no indication that the BVA or other environmental resources in the area of Phase I will be adversely affected by selecting MNA as the remediation option for TCE in Phase I.

4. *Current and projected demand for the affected resource over the time period that the remedy will remain in effect*

The bedrock aquifer, where the TCE has been detected above MCLs, is not currently used as a groundwater resource for the Mound Plant, nor is it anticipated to be used in the future. In fact, the Phase I area will be tied into the City of Miamisburg municipal water supply in the near future, further decreasing the likelihood that the bedrock aquifer would be used as a potable water source. Finally, the selected remedy calls for a restriction to be placed on the deed for Phase I that will prohibit the installation of wells in the Phase I area in the future.

5. *Whether the contamination, either by itself or as an accumulation with other*

nearby sources (on-site or off-site), will exert a long-term detrimental impact on available water supplies or other environmental resources

The BVA is designated as a sole source aquifer and serves as the primary potable water supply for the City of Miamisburg. Based upon years of groundwater data collected downgradient of well 0411, there is no indication that the BVA is threatened by the TCE contamination in the well 0411 area. These downgradient locations will be monitored as part of the selected remedy to verify that the BVA remains unaffected.

6. *Whether the estimated timeframe of remediation is reasonable compared to timeframes required for other more active methods of remediation*

The fact that the concentrations are just slightly above the MCL of 5 ppb for TCE (15 ppb in well 0411 and 9 ppb in well 0443) would suggest that the timeframe for remediation should be fairly short. These relatively low concentrations, along with the fact that the bedrock aquifer exhibits relatively low yield rates, make remediation of the bedrock by more active methods an impractical option at this time. If concentrations were to increase, more active treatment methods may be evaluated.

7. *The nature and distribution of sources of contamination and whether these sources have been, or can be, adequately controlled*

There are no known sources of TCE contamination in soil in the Phase I area.

8. *Whether the resulting transformation products present a greater risk, due to increased toxicity and/or mobility, than do the parent contaminants*

Although vinyl chloride, a breakdown product of TCE, generally presents a higher risk to human receptors than TCE and is more persistent in groundwater, it is not anticipated that the original concentration of TCE (15 ppb) will support the production of high enough concentrations of vinyl chloride in the bedrock aquifer in Phase I to pose an unacceptable risk. In any event, there is no current exposure pathway to Phase I groundwater, and the selected remedy prohibits the installation of wells in the Phase I area.

9. *The impact of existing and proposed active remediation measures upon the MNA component of the remedy, or the impact of remediation measures or other operations/activities (e.g. pumping wells) in close proximity to the site*

There are no operations or activities in close proximity to wells 0411 and 0443 that would impact the MNA component of the selected remedy.

10. *Whether reliable site-specific mechanisms for implementing institutional controls (e.g. zoning ordinances) are available, and if an institution responsible for their monitoring and enforcement can be identified*

Institutional Controls will be implemented as part of the selected remedy for the Phase I property. The use of the bedrock groundwater will be prohibited as part of the selected remedy, and DOE, or its successors, have the responsibility to monitor, maintain and enforce these institutional controls in the future.

Based on these factors, it has been determined that Monitored Natural Attenuation is an appropriate remedy for the TCE in the groundwater in Phase I. The specifics of the monitoring will be established in a Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. This will become part of the O&M Plan required by the ROD. Key elements of the monitoring are outlined here.

TCE MONITORING

Objective

Protect the BVA by verifying that the concentrations of TCE in the vicinity of wells 0411, 0443 and seep 0617 are decreasing and that TCE is not impacting the BVA. Demonstrate the TCE in the groundwater of wells 0411, 0443 and seep 0617 does not exceed the MCL.

Locations

Bedrock monitoring wells 0411 and 0443 will be monitored to provide spatial coverage of flow paths in the immediate vicinity of the well 0411. Bedrock monitoring wells 0444, 0445, 0353, and Seep 0617 will be monitored to provide spatial coverage of flow paths downgradient of the well 0411 area. BVA wells 0402, P033, and 0400 will be monitored to assess potential impacts of the bedrock flow system on the BVA flow system.

Frequency

All groundwater wells noted above will be analyzed quarterly for TCE and its degradation products (1,2-dichloroethene, 1,2-cis-dichloroethene, 1,2-trans-dichloroethene, and vinyl chloride) for at least one year. At that point, the frequency may be adjusted.

Termination

When the TCE concentrations observed at wells 0411, 0443 and seep 0617 meet the MCL for four consecutive sampling events, the TCE monitoring may be decreased or

discontinued upon concurrence with USEPA and OEPA.

Contingencies

If the quarterly monitoring results indicate that Monitored Natural Attenuation is not adequately addressing the contamination, DOE, USEPA, and OEPA will evaluate more active remediation approaches. Cases where Monitored Natural Attenuation may not be adequately addressing the contamination may include instances where the contaminant concentrations are not decreasing at a sufficiently rapid rate to meet the remediation objectives, contaminants appear to be migrating to areas not previously impacted, or contaminant concentrations exceed the criteria specified in the following paragraphs.

If quarterly monitoring results for wells 0444, 0445, 0353 exceed the MCL (5 ppb) or if the quarterly monitoring result for Seep 0617 exceeds twice the initial baseline concentration of 8 ppb, DOE will notify USEPA and OEPA. Collectively, they will re-evaluate the situation and determine a course of action which could include the following; increase the frequency of sampling to monthly, and/or evaluate volatile organic compound (VOC) levels in BVA wells.

If the quarterly monitoring result for well 0411 exceeds twice the initial baseline concentration of 15 ppb, or if the quarterly monitoring result for well 0443 exceeds twice the initial baseline concentration of 9 ppb, DOE will notify USEPA and OEPA. Collectively, they will re-evaluate the situation and determine a course of action which could include the following; immediately resample monitoring well, evaluate VOC levels in downgradient flow path wells and BVA wells, and increase frequency of sampling to monthly.

If quarterly monitoring results for wells 0400, 0402, and P033 equal or exceed the MCL (5 ppb), DOE will notify USEPA and OEPA. Collectively, they will re-evaluate the situation and determine a course of action which could include the following; increase frequency of sampling to monthly, and evaluate upgradient well data to determine if a change has occurred in the bedrock system

If the monitoring results for the above wells show an increasing trend for four consecutive sampling events, DOE will notify USEPA and OEPA. Collectively they will re-evaluate the situation and determine a course of action.

2.10 Selected Remedy

2.10.1 Description

The selected remedy for Phase I is Institutional Controls and Monitored Natural Attenuation. Institutional controls in the form of deed restrictions on future land use will be imposed on Phase I. The specific restrictions to be adopted are provided in the deed attached to this ROD as Appendix C. The deed restrictions include:

- Maintenance of industrial/commercial land use;
- Prohibition against residential use;

- Prohibition against the use of groundwater;
- Site access for federal and state agencies for the purpose of sampling and monitoring; and
- Prohibition against removal of Phase I soils from the DOE Mound property (as owned in 1998) boundary without approval from ODH, OEPA, and USEPA.

In addition, DOE will continue to monitor groundwater in Phase I for TCE and its degradation products to verify that the concentration of TCE is decreasing due to natural attenuation and is not impacting the BVA. The specifics of the monitoring will be established in a Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. This will become part of the O&M Plan required by the ROD. Key elements of the monitoring were outlined in Section 2.9.2. Groundwater monitoring provides assurance that the concentration of TCE observed in Phase I is decreasing and is not impacting the BVA.

DOE or its successors or assigns, as the lead agency for this ROD, has the responsibility to implement, report on, monitor, maintain, and enforce these institutional controls both before and after transfer. This responsibility includes the duty to conduct annual assessments of compliance with the deed restrictions and the duty to enforce the deed restrictions if any non-compliance is detected. The assessment and enforcement processes are part of the O&M Plan and are outlined in Appendix D, which is intended to serve as a framework for implementation of operation and maintenance activities for the selected remedy. Within 90 days of the date on which this ROD is signed, DOE shall submit to USEPA and OEPA for their approval a formal proposal regarding operation and maintenance of the institutional controls and Monitored Natural Attenuation and groundwater monitoring plan. This proposal and the annual compliance assessments shall be considered primary documents under the Federal Facilities Agreement. If DOE, USEPA, and OEPA agree, the frequency of the compliance assessments can be changed at any time.

The soils within Phase I have not been evaluated for any use other than on-site industrial/commercial use. Any off-site disposition of the Phase I soil without proper handling, sampling, and management could create an unacceptable risk to off-site receptors. An objective of the preferred alternative is to prevent residual exposure to soils from Phase I.

Copies of the deeds are attached in Appendix C; this is a key element of the remedy for Phase I. DOE will develop an O&M Plan for the remedy. USEPA and OEPA have approval authority for this plan.

2.10.2 Estimated Costs

The initial costs associated with these deed restrictions are those associated with the writing and recording of the restrictions with the deed. The costs associated with monitoring and enforcing the land use and property deed restrictions are estimated to be $5,000 per

year. Sufficient groundwater monitoring wells are in place in Phase I so there are no initial costs anticipated for groundwater monitoring. The costs associated with continuing groundwater monitoring in Phase I are estimated to be $50,000 per year.

2.10.3 Decisive Factors

The USEPA has developed threshold, balancing, and modifying criteria to aid in the selection of the remedy. There are two threshold criteria, five balancing criteria and two modifying criteria. Each is described below.

2.10.3.1 Threshold Criteria

These criteria must be met for an alternative to be eligible for selection:

Criteria 1: Overall protection of human health and the environment
This criterion addresses whether an alternative provides adequate protection of human health and the environment. The "no action" alternative does not meet this criterion in that the level of risk to human health posed by the site was found to be unacceptable for an industrial/commercial scenario primarily due to potential groundwater exposure. In addition, no evaluation was made of the risks posed by unrestricted use of the property. Deed restrictions are required as a mechanism to ensure the continued future use of Phase I is limited to industrial/commercial purposes, to prohibit soil removal off site, and to prohibit groundwater usage. The groundwater monitoring specified for TCE provides the mechanism to demonstrate that the TCE remains localized, does not affect drinking water, and therefore does not impact human health.

Criteria 2: Compliance with applicable or relevant and appropriate requirements
Section 121(d) of CERCLA requires that remedial actions at CERCLA sites attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations that are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable Requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address hazardous substances, the remedial action to be implemented at the site, the location of the site, or other circumstances present at the site. Relevant and Appropriate Requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law which, while not applicable to the hazardous materials found at the site, the remedial action itself, the site location, or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the site.

Compliance with ARARs addresses whether a remedy will meet all the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides the basis for invoking a waiver.

ARARs are of several types: chemical-specific, location-specific, and action-specific. Chemical-specific ARARs are usually health or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. For Phase I, MCLs established under the SDWA constitute chemical-specific ARARs and are listed in Appendix E. They apply to the groundwater beneath Phase I. MCL exceedances for TCE have been observed in groundwater within the Phase I boundary. In the last two years (September 2000 to present), the TCE concentrations at well 0411 have ranged from 8 to 16 ppb. The most recent result (Winter 2003) was 13 ppb. Recent investigations concluded that the TCE contamination is localized and does "not present an unacceptable risk unless it migrates to the BVA in concentrations that would cause levels to rise above the drinking water MCL of 5 parts per billion (ppb)." (Reference 22) The potential for migration appears minimal but will continue to be assessed by monitoring. Although there are currently exceedances of the MCL for TCE in groundwater at Phase I, there are no known remaining sources of contamination in soil and it is expected that the concentration of TCE will fall and remain below the MCL due to natural attenuation. Only Alternative 2 includes the groundwater monitoring necessary to demonstrate that groundwater ARARs will be met in the future at Phase I.

To prevent a future unacceptable exposure to groundwater due to potential migration from other areas of Mound Plant, a prohibition on the installation of wells at Phase I is being required as part of this remedy.

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are located in specific locations, e.g., flood plains, wetlands, historic places, etc. For Phase I, Ohio has identified three statutory provisions that describe site conditions that would prompt certain response actions. (See Appendix E). These provisions are similar to location-specific ARARs. The selected remedy (institutional controls) meets these requirements.

Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. In this case, the selected remedy is an institutional control in the form of deed restrictions. The ARARs are applicable State requirements concerning the recording of deeds. (See Appendix E). The selected remedy will comply with these requirements.

In addition to the institutional control prohibiting soil removal, it should be noted that any onsite management of Phase I soils, not associated with a CERCLA response action, in a manner inconsistent with State law or any disposition of Phase I soils away from the DOE property boundary (as defined in 1998) would be subject to applicable Ohio regulations, which are independently enforceable from CERCLA.

2.10.3.2 Balancing Criteria

Criteria used to weigh major trade-offs among alternatives include:

Criteria 3: Long-term effectiveness and permanence
Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk and the adequacy and reliability of controls. Only Alternative 2, Institutional Controls and Monitored Natural Attenuation, provides the means to demonstrate long-term protectiveness. The implementation of institutional controls in the form of land use restrictions is necessary to ensure that future use remains compatible with the evaluated residual risk associated with Phase I. Groundwater Monitoring is necessary to demonstrate that the TCE remains localized, its concentration decreases to below MCLs due to monitored natural attenuation, and the BVA is not impacted.

Because this remedy will result in hazardous substances remaining in Phase I above levels that allow for unlimited use and unrestricted exposure, an annual review and report will be submitted to OEPA, ODH, and USEPA (pursuant to CERCLA) determining whether or not the remedy is in effect and being complied with to ensure that it is adequately protective of human health and the environment.

DOE reserves the right to petition the USEPA, OEPA, and ODH for a modification to the frequency established for conducting the effectiveness reviews.

Criteria 4: Reduction of toxicity, mobility, or volume through treatment
Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of the remedy.

Since neither of the alternatives includes treatment, this criterion does not require further evaluation. All necessary remediation in Phase I was accomplished previously on an individual PRS or building basis.

Criteria 5: Short-term effectiveness
Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers and the community during construction and operation of the remedy until clean-up goals are achieved.

Alternative 1, No Action, would not provide short-term effectiveness because there is no assurance of protection of human health and the environment after the property is transferred. The selected remedy, Institutional Controls and Monitored Natural Attenuation, provides this assurance.

Criteria 6: Implementability
Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered. Since Alternative 1 involves no action, there is no time or cost required for implementation. The Institutional Controls portion of the selected remedy is expected to require approximately one month and minimal cost to implement in accordance with the memorandum to file from Randolph Tormey, Deputy Chief Counsel, Ohio Field Office, US

DOE dated February 17, 1999 (Reference 28, reproduced in Appendix F). The Groundwater Monitoring portion of the selected remedy is readily implementable. All of the wells identified in this ROD are already installed and have been sampled. The services required to collect groundwater samples, analyze, and report TCE results are readily available.

Criteria 7: Cost
The range of costs is zero dollars ($0) for Alternative 1, No Action, to approximately $55,000 annually for Institutional Controls and Monitored Natural Attenuation.

2.10.3.3 Modifying Criteria

Criteria to be considered after public comment is received on the Proposed Plan and of equal importance to the balancing criteria:

Criteria 8: State/Support Agency Acceptance
Both USEPA and the State do not believe that Alternative 1, No Action, provides adequate protection of human health and the environment in the future. However, both agencies support the selected remedy, Institutional Controls and Monitored Natural Attenuation.

Criteria 9: Community Acceptance
Based on input received during the public comment period and the public hearing, the community accepts and supports the selected remedy.

2.11 Statutory Determinations

The selected remedy is Alternative 2. Institutional Controls in the form of deed restrictions and Monitored Natural Attenuation for Phase I are protective of human health and the environment, comply with Federal and State requirements that are applicable or relevant and appropriate, are cost-effective, and utilize a permanent solution to the maximum extent practicable. Because this remedy will result in hazardous substances remaining in Phase I above levels that allow for unlimited use and unrestricted exposure, DOE in consultation with USEPA, OEPA, and ODH will review the remedial action each year to assure that human health and the environment are being protected by the remedial action being implemented.

DOE reserves the right to petition the USEPA, OEPA, and ODH for a modification to the frequency established for conducting the effectiveness reviews.

2.12 Documentation of Significant Changes

Although this ROD will be signed and finalized, new information may be received or generated that could affect the implementation of the remedy. DOE, as the lead agency for this ROD, has the responsibility to evaluate the significance of any such new information. The type of documentation required for a post-ROD change depends on the nature of the change. Three categories of changes are recognized by the USEPA: non-

significant, significant, and fundamental. Non-significant post-ROD changes may be documented using a memo to the Administrative Record file. Changes that significantly affect the ROD must be evaluated pursuant to CERCLA Section 117 and the NCP at 40 CFR 300.435(c)(2)(I). Fundamental changes typically require a revised Proposed Plan and an amendment to the ROD. Significant or fundamental changes to the ROD for Phase I are not anticipated.

3.0 RESPONSIVENESS SUMMARY

This section of the ROD presents stakeholder concerns about Phase I and explains how those concerns were addressed prior to issuance of the ROD. No formal comments were received during the public meeting held on October 17, 2002. Stakeholders provided comments during the public review period (October 2002) for the Proposed Plan. The Core Team responded to stakeholder concerns by letter. Comments and responses are presented below.

Comment 1. MMCIC acknowledges that the residual risks calculated in the Residual Risk Evaluation (RRE) for an hypothetical construction worker and site worker in Release Phase 1 exceed the acceptable risk thresholds or ranges for some exposure media, exposure pathways, and/or routes of exposure, given the assumptions incorporated into the Mound 2000 Residual Risk Evaluation Methodology (DOE, January 1997). These exceedances include the incremental and total non-carcinogenic hazards for the future construction worker and future site employee, which exceed a Hazard Index of one due to potential exposure to groundwater. In addition, the total lifetime cancer risk for the future site employee scenario (1.2×10^{-4}) exceeds the acceptable risk range (10^{-4} to 10^{-6}). These risk exceedances are driven by the exposure to groundwater risk calculation.

MMCIC understands that the conservative assumptions incorporated into Mound's groundwater risk model will overestimate risk. These assumptions (that natural attenuation physical and chemical processes are not included in the calculation of the input groundwater concentration term, the use of the maximum detected value (from as much as seventeen years' worth of data), and the assumption that certain contaminants (such as chromium) are present in only their most toxic form) are intended to be conservative and were all accepted and commented upon during the public review period of the *Residual Risk Evaluation Methodology.* With this in mind, MMCIC understands that the actual groundwater risks are likely to be lower and accepts that the proposed action for Phase 1, namely institutional controls that will bar the use of groundwater at the Mound facility and continued groundwater modeling for Trichloroethylene (TCE) in the area of Well 0411, will be protective of human health and the environment under an industrial/commercial exposure scenario.

Response 1. Thank you for your comment and support.

Comment 2. MMCIC concurs with the conclusion of the Ecological Scoping Report, that based on the completion of the Ecological Scoping Checklist (Ohio EPA, April 2001 Procedure), the fact that no threatened or endangered species were observed in Phase

1 and that no sensitive environments or ecologically important resources were identified within Phase 1, and the review of numerous investigation reports performed in the Phase 1 area, a more detailed assessment of the ecological risk is not warranted.

Response 2. Thank you for the comment and concurrence.

Comment 3. MMCIC recommends that the Proposed Plan more clearly state for the public reader the reasons why TCE groundwater monitoring in the vicinity of Well 0411 is incorporated into the preferred remedial alternative for Phase 1, whereas the monitoring of barium, nickel and chromium *will* be performed on an ongoing basis in Phase 1, but is not included as part of the preferred alternative. Please clarify the process of identifying TCE as a *contaminant of concern* for the Phase 1 area, while barium, nickel, and chromium are identified, in this instance, as *constituents of interest*. MMCIC believes this issue could create confusion for the public reader.

Response 3. This ROD is, in effect, the final version of the Proposed Plan. The "Comparison of Groundwater Contaminants to MCLs" section of this ROD was rewritten with your comment in mind. The phrase "constituent of interest" is no longer used in the document. In addition, an MCL exceedance for radium-226 and 228 was recently observed at well 0445. As a result of your comment and the radium exceedance, the last four paragraphs of this section were revised to read:

"There are currently six groundwater monitoring wells and one seep located within the boundary of Phase I that show MCL exceedances. Four of the monitoring wells (0411, 0443, 0445, and 0399) are screened in the bedrock groundwater system, and two of the monitoring wells (0319 and 0400) are screened in the BVA. Wells 0411, 0443, and Seep 0617 exceed the MCL (5 parts per billion (ppb)) for TCE. Well 0445 exceeds the MCL for barium (2 parts per million (ppm)) and the MCL for radium-226 and 228 (5 pCi/L combined). Wells 0400, 0319, 0399, and 0411 exceed the MCLs for nickel (100 ppb) and chromium (100 ppb). The locations of the wells in Phase I are shown in Figure 5. In the last two years (September 2000 to present), the TCE concentrations at well 0411 have ranged from 8 to 16 ppb. The most recent result (Summer 2002) was 14 ppb.

Collectively, the soil data and groundwater data from the wells in the vicinity of well 0411 suggest that the TCE contamination is most likely limited to the area adjacent to well 0411. There is no known continuing source of TCE contamination in the soil in Phase I. However, TCE is not naturally occurring and was widely used in plant operations. Therefore, TCE is a contaminant of concern (COC) for the groundwater in Phase I and is addressed by the selected remedy.

Collectively, the soil data and groundwater data in the vicinity of well 0445 suggest that the elevated barium concentrations are most likely limited to the area immediately adjacent to well 0445. Other properties (high levels of total dissolved solids, very low tritium level, elevated levels of radium-226 and radium-228) of the groundwater observed at well 0445 are unlike the values typically observed in the bedrock groundwater at Mound, indicating that the groundwater at well 0445 may be neither representative of overall site conditions nor the result of plant operations. Therefore, barium, radium-226 and radium-228 in the

Phase I property are not considered contaminants of concern to be addressed in the proposed remedies. To provide assurance that the understanding of the barium, radium-226, and radium-228 in groundwater situation is correct, DOE will continue to monitor for them. The specifics of the monitoring will be established in the Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. This will become part of the O&M Plan required by the ROD. With four consecutive quarters of consistent results for barium, radium-226, and radium-228, DOE could petition USEPA and OEPA to decrease the sampling frequency.

Limited Field Investigations (References 21 and 22) indicate the nickel and chromium concentrations observed at wells 0400, 0319, 0399, and 0411 are the likely result of corrosion of the wellcasing and not the result of plant operations. Therefore, nickel and chromium are not considered contaminants of concern to be addressed in the proposed remedies. However, because the data set supporting this conclusion is limited, DOE will continue to monitor for nickel and chromium. The specifics of the monitoring will be established in the Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. With four consecutive quarters of consistent or decreasing nickel and chromium results, DOE could, with the concurrence of USEPA and OEPA, discontinue monitoring groundwater in Phase I for nickel and chromium."

MMCIC provided a comment during the public review period (March - April 2003) for the Proposed Plan. The Core Team responded to the comment by letter. The comment and response are presented below.

Comment 1. Comments from our previous review of the Phase I Proposed Plan (Public Review Draft dated September 2002 with comments dated October 28, 2002) requested further clarification regarding monitoring of the groundwater. MMCIC had requested that the Proposed Plan more clearly state why the TCE found in the groundwater is incorporated into the preferred remedial alternative while monitoring for barium, nickel and chromium will be performed as part of the O&M plan, but is not included as part of the preferred alternative. MMCIC believes that the revisions made to section 5.5.4 Comparison of Groundwater Contaminants to MCLs (page 10 of 28) sufficiently explains the difference in monitoring criteria for the two scenarios.

Response 1. Thank you for your feedback and support.

4.0 ADMINISTRATIVE RECORD FILE REFERENCES

Information used to select the remedy is contained in the Administrative Record file. The file is available for review at the Mound CERCLA Reading Room, Miamisburg Senior Adult Center, 305 Central Avenue, Miamisburg, Ohio. The Administrative Record File references for Phase I, which are not necessarily directly referred to in the text, include the following:

Reference 1 Phase I Residual Risk Evaluation, Final, March 2003.

Reference 2 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 120 Federal Facility Agreement, August 1993.

Reference 3 Work Plan for Environmental Restoration of the DOE Mound Site, The Mound 2000 Approach, Final, Revision 0, February 1999.

Reference 4 The Mound 2000 Residual Risk Evaluation Methodology (RREM), Mound Plant, Final, Revision 0, January 1997.

Reference 5 Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan, Final, May 1992.

Reference 6 Operable Unit 9; Hydrogeologic Investigation: Buried Valley Aquifer Report, Technical Memorandum, Revision 1, September 1994.

Reference 7 Operable Unit 9; Hydrogeologic Investigation: Bedrock Report, Technical Memorandum, Revision 0, January 1994.

Reference 8 Delineation of Federal Wetlands and Other Waters of the U.S., Final, August 1999.

Reference 9 Operable Unit 9 Background Soils Investigation Soil Chemistry Report, Technical Memorandum, Revision 2, September 1994.

Reference 10 Operable Unit 9 Regional Soils Investigation Report, Revision 2, August 1995.

Reference 11 Operable Unit 9 Hydrogeologic Investigation: Groundwater Sweeps Report, Technical Memorandum, April 1995.

Reference 12 OU-3 Miscellaneous Sites Limited Field Investigation Report, Volumes 1, 2, and 3, Final, Revision 0, July 1993.

Reference 13 OU-5 New Property Extended Phase I Field Investigation Report, Final, Revision 0, July 1995.

Reference 14 OU-5 Remedial Investigation Report, Final, Revision 0, February 1996.

Reference 15 OU-5 Operational Area Phase I Investigation Area 22, Final, Revision 1, June 1995.

Reference 16 OU-5 Operational Area Phase I Investigation Area 13, Final, Revision 1, June 1995.

Reference 17 OU-6 Reconnaissance Sampling Report Decontamination and Decommissioning Areas, Final, Revision 0, May 1992.

Reference 18 OU-9 Site Scoping Report, Volume 3 - Radiological Site Survey, Final, June 1993.

Reference 19 Residual Risk Evaluation, Release Block D, Final, December 1996.

Reference 20 Technical Position Report in Support of the Release Block D Residual Risk Evaluation, Final, January 1999.

Reference 21 Sampling Investigation to Determine the Nature of Elevated Chromium and Nickel Levels in Two Stainless Steel Monitoring Wells at Mound, Final, August 2002.

Reference 22 Summary of the Investigation and Resolution of MCL Exceedences in the Phase I Parcel, Draft, June 2002.

Reference 23 Final Environmental Impact Statement, Mound Facility, US Department of Energy, June 1979.

Reference 24 Operable Unit 9 Ecological Characterization Report, Technical Memorandum, Revision 0, March 1994.

Reference 25 Screening Level Ecological Risk Assessment, Parcel 4, Final, February 2001.

Reference 26 Environmental Assessment for the Commercialization of the Mound Plant, DOE/EA-1001, October 1994.

Reference 27 Phase I Ecological Scoping Report, Final, March 2003.

Reference 28 Memorandum, Randolph Tormey, Deputy Chief Counsel, Ohio Field Office, USDOE dated February 17, 1999 regarding Institutional Controls, Mound.

Reference 29 Sampling & Analysis Plan, Parcel 4/5 Boundary, Final, September 2000.

Reference 30 Geochemical Evaluation of Elevated Ba and Ra in Bedrock at the Miamisburg Closure Project, Draft, WSRC-TR-2003-00281, June 2003.

Reference 31 Phase I Proposed Plan, Public Review Draft, March 2003.

Associated PRS Documents
The following references, though relevant to evaluating Phase I, are not directly referred to in the text.

PRS 16 Package, Final, November 1996.

PRS 73 Package, Final, June 2002.

PRS 74 Package, Final, May 1997.

PRS 258-265 Package, Final, August 2002.

PRS 370 Package, Final, February 1997.

PRS 371 Package, Final, May 1997.

PRS 372 Package, Final, November 1996.

PRS 383 Package, Final, September 1997.

PRS 384 Package, Final, January 1997.

PRS 306/314/406 Package, Final, November 1996.

PRS 418 Package, Final, February 2002.

PRS 419 Package, Final, April 2000.

Action Memorandum, Engineering Evaluation/Cost Analysis, Contingent Removal Action for Contaminated Soil, Final, June 2002.

PRS 304 Action Memorandum, Final, October 1998.

PRS 276 Removal Action On-Scene Coordinator Report, Final, September 2002.

PRS 304 Removal Action On-Scene Coordinator Report, Final, December 1998.

On-Scene Coordinator Report for Building 21 (PRS 284) & Associated Soils (PRS 407 and PRS 281) Decontamination and Decommissioning (D&D) Project, Final, Revision 0, January 2000.

PRS 421 Removal Action On-Scene Coordinator (OSC) Report, Final,September 2002.

Associated Building Documents
The following references, though relevant to evaluating Phase I, are not directly referred to in the text.

Building 3 Building Data Package, Final, June 2002.

Building 87 Building Data Package, Final, November 1997.

Magazines 80-84 Building Data Package, Final, June 2002.

Building 95 Building Data Package, Final, October 2002.

Building 102 Building Data Package, Final, August 2002.

SST Building Data Package, Final, August 2002.

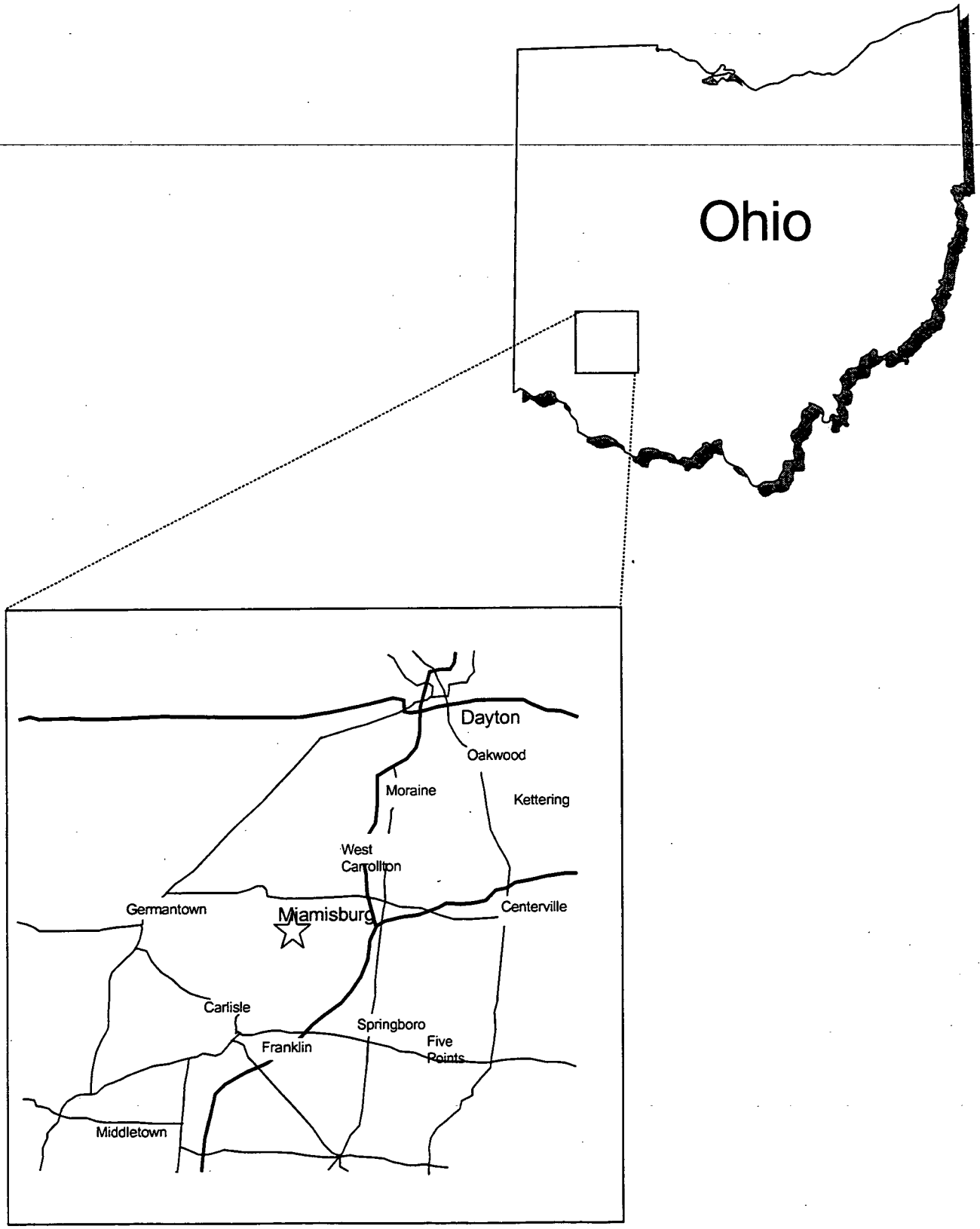
Buildings 35 & 59 Action Memorandum, Final, May 1998.

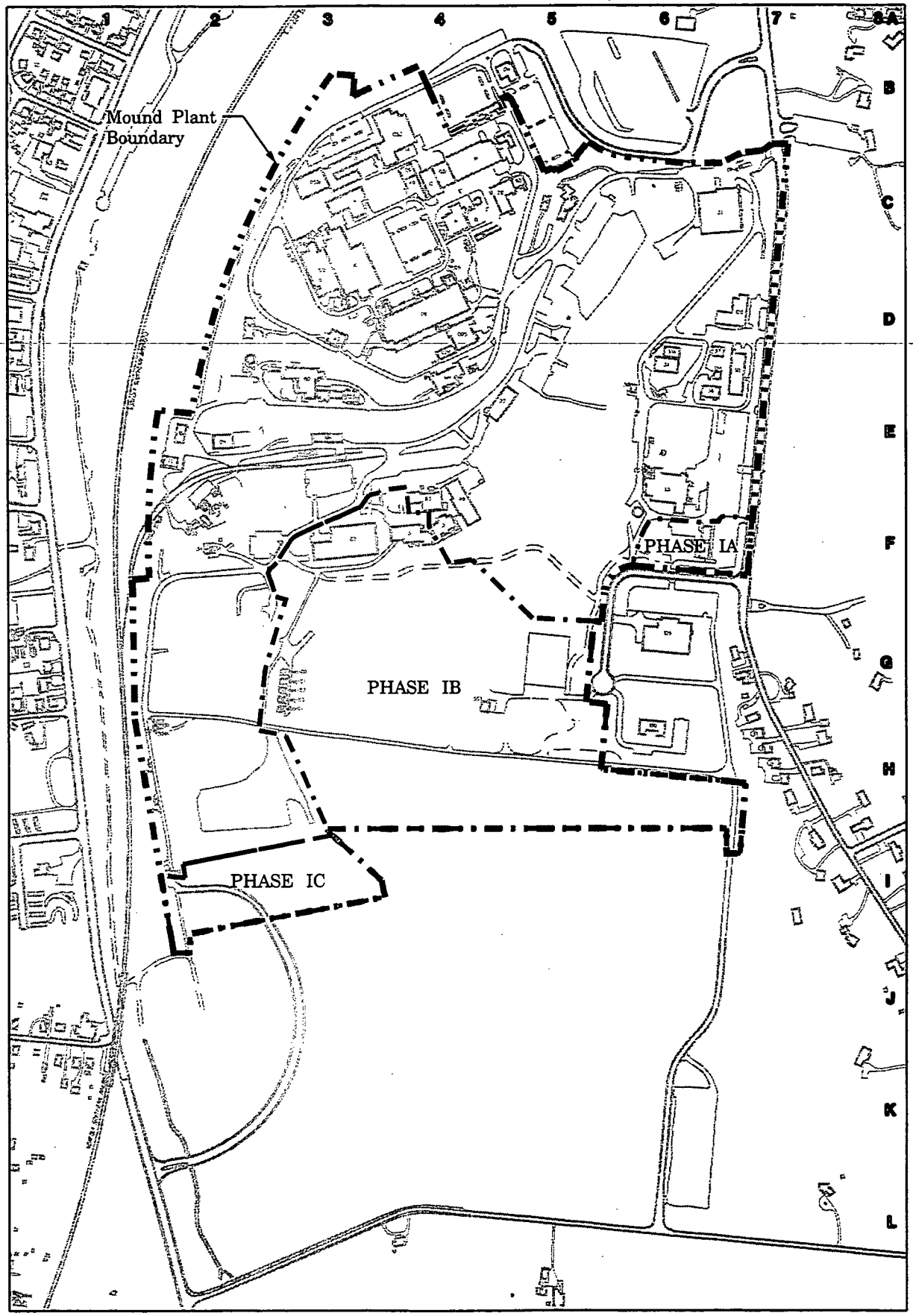
On-Scene Coordinator (OSC) Report for Buildings 35 & 59 Removal Action, Final, April 1999.

APPENDIX A

Figures

Figure 1: Regional Context of the Mound Plant





Legend

- Structures
- Paved roadway
- Unpaved roadway
- Railroad
- Water course
- Fence
- Mound Plant boundary
- Contour line

0 100 200 400 600 800 1000
Scale In Feet

	DATE	REVISION	BY	CHKR	CHG	N
	04/02/03	ISSUE FOR GENERAL USE	SSP			

MOUND
Environmental Restoration Geographic Information System

Figure 2
Location of Phase I

DRAWING CLASSIFICATION: UNCLASSIFIED
SIZE: D
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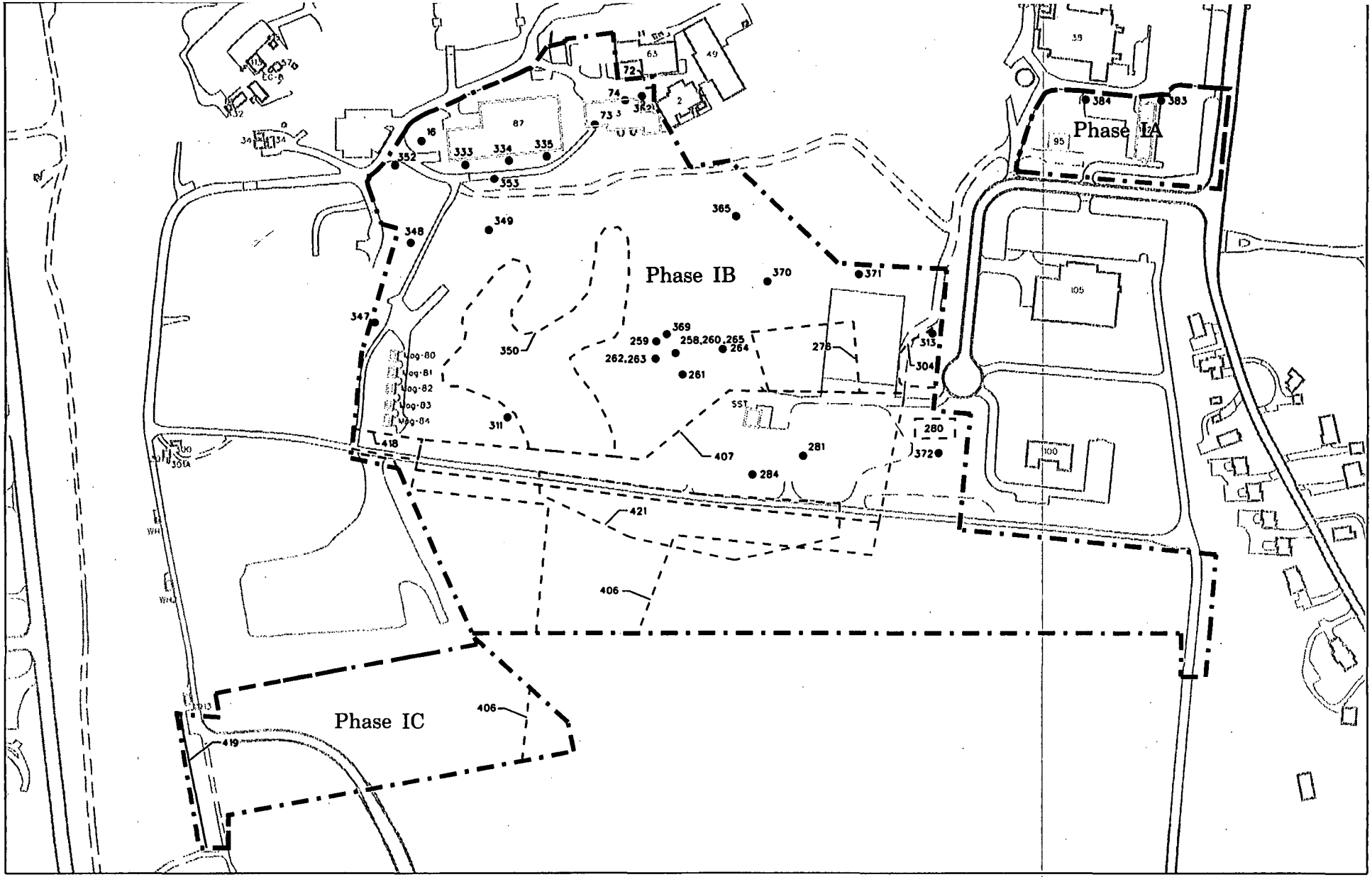
DWG TYPE: SITE
STATUS: MD-REL-09/14/99
ORIGIN: MSTATION / J

gen_site_plan.dgn



MOUND

Environmental Restoration Geographic Information System

ISS	DATE	REVISION	BY	CHKR	ENG	LPM/C	APVD	M
	04/02/03		SSF					

SHEET 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
ISSUE
SHEET 1 2 3 4 5 6
ISSUE *
PART CLASSIFICATION

Figure 3: Phase I Buildings and PRSs

DRAWING CLASSIFICATION: UNCLASSIFIED
SIZE | DRAWING NUMBER: figure3.dgn | JOB NUMBER
DBG TYPE: STE | PRNG: ER-GIS | CAGEC | SCALE | SHEET 1 OF
STATUS: MD-REL-05/08/02 | ORIGIN: MSTATION / J

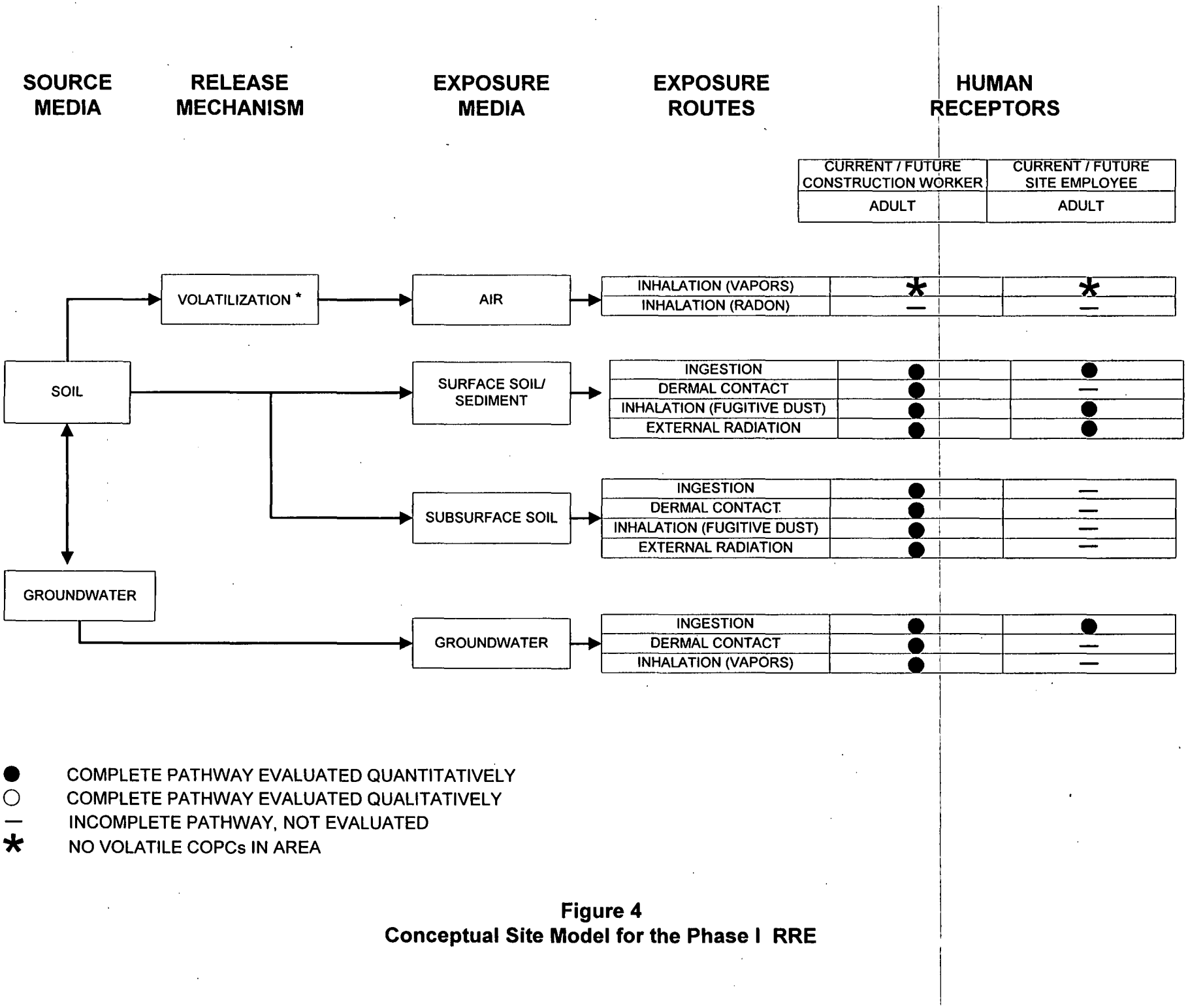
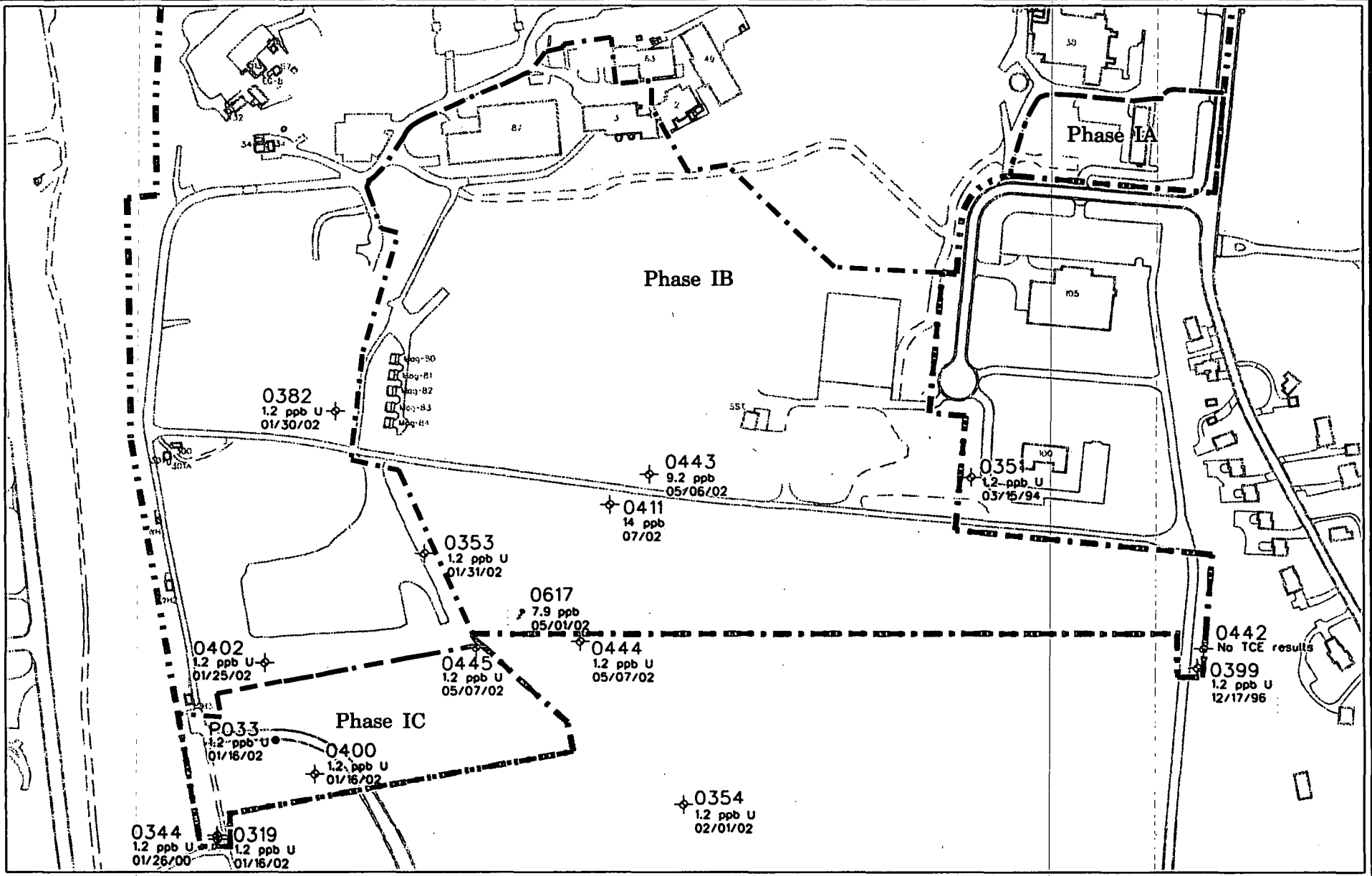


Figure 4
Conceptual Site Model for the Phase I RRE



Bedrock Monitoring Well
BVA Monitoring Well
Phase 1 Boundary
Seep

0 100 200 400 600 800 1000
Scale in Feet

MOUND
Environmental Restoration Geographic Information System

Figure 5: Phase I Wells and Seeps with Latest TCE Results

UNCLASSIFIED

rodfig5.dgn

STATUS MD-REL-05/08/02

ORIGIN MSTATION / J

ISS	DATE	REVISION	BY	CHKR	ENG	LPREC	APVD	N
	04/02/03		SSF					

APPENDIX B

Tables

Table 1: Phase I Documents and Public Comment Periods

Document	Comment Period (Begin)	Comment Period (End)
Phase I Proposed Plan*	26 March 2003	24 April 2003
Phase I Proposed Plan	2 October 2002	31 October 2002
Phase I RRE	25 September 2002	24 October 2002
PRS 16 Package	19 June 1996	17 July 1996
PRS 73 Package	27 March 2002	25 April 2002
PRS 74 Package	3 April 1997	8 May 1997
PRS 258-265 Package	12 June 2002	12 July 2002
PRS 276 CRA AM	2 October 2001	1 November 2001
PRS 304 AM	21 December 1998	25 January 1999
PRS 370 Package	19 December 1996	23 January 1997
PRS 371 Package	3 April 1997	8 May 1997
PRS 372 Package	15 May 1996	17 June 1996
PRS 383 Package	17 June 1997	18 July 1997
PRS 384 Package	19 December 1996	23 January 1997
PRS 406 Package	18 March 1996	1 April 1996
PRS 418 Package	9 August 2000	14 September 2000
PRS 419 Package	19 January 2000	17 February 2000
PRS 421 CRA AM	2 October 2001	1 November 2001
Building 3 BDP	27 March 2002	26 April 2002
Building 35 & 59 AM	20 April 1999	20 May 1999
Building 87 BDP	24 July 1997	23 August 1997
Mags 80-84 BDP	27 March 2002	26 April 2002
Building 95 BDP	4 September 2002	4 October 2002
Building 102 BDP	3 July 2002	2 August 2002
Building SST BDP	27 March 2002	26 April 2002

AM: Action Memo
BDP: Building Data Package
CRA: Contingent Removal Action
PRS: Potential Release Site

Note: Some PRSs are addressed in Building Data Packages or On-Scene Coordinator Reports.

* Proposed Plan reissued to enable public comment on the Monitored Natural Attenuation component of the remedy and the impact of the boundary changes.

Table 2: Phase I PRSs and Core Team Conclusions

PRS	Description	Core Team Decision	Closeout of PRS
16	Area C (Old Building 72)	NFA	Recommendation signed 8 May 1996
73	Evaporator Storage Area	NFA	Recommendation signed 17 January 2002
74	Quonset Hut: former waste storage site	NFA	Recommendation signed 19 February 1997
258-265	Burn Area	NFA	Recommendation signed 20 June 2001
276	Area 22: Orphan Soil from Other Areas	NFA	OSC Report signed 19 September 2002
280	Waste Oil Drum Field	NFA	Recommendation signed 28 February 2002
281	Area E, Waste Oil Spill	NFA	Recommendation signed 12 July 2000
284	Building 21 Thorium Sludge Storage Facility	NFA	Recommendation signed 17 February 2001
304	Excavated Material Disposal Area was	NFA	Recommendation signed 19 February 1997
311	Potential Hot Spot Location S0706	NFA	Recommendation signed 4 March 1996
313	Potential Hot Spot Location S0982	NFA	Recommendation signed 19 February 1997
333	Explosive Surge Tank (Tank 263)	NFA	Recommendation signed 19 March 1997
334	Explosive Surge Tank (Tank 264)	NFA	Recommendation signed 19 March 1997
335	Explosive Surge Tank (Tank 265)	NFA	Recommendation signed 19 March 1997
347	Soil Contamination	NFA	Recommendation signed 20 November 1996
348	Soil Contamination	NFA	Recommendation signed 20 November 1996
349	Soil Contamination	NFA	Recommendation signed 19 February 1996

Table 2: Phase I PRSs and Core Team Conclusions
(continued)

PRS	Description	Core Team Decision	Closeout of PRS
350	Soil Contamination, Area West of Building 21	NFA	Recommendation signed 4 March 1996
352	Soil Contamination	NFA	Recommendation signed 20 November 1996
353	Soil Contamination	NFA	Recommendation signed 20 November 1996
362	Soil Contamination	NFA	Recommendation signed 20 November 1996
365	Soil Contamination	NFA	Recommendation signed 17 December 1996
369	Soil Contamination	NFA	Recommendation signed 20 November 1996
370	Soil Contamination	NFA	Recommendation signed 20 November 1996
371	Soil Contamination	NFA	Recommendation signed 18 December 1996
372	Soil Contamination	NFA	Recommendation signed 8 May 1996
383	Soil Contamination	NFA	Recommendation signed 31 March 1997
384	Soil Contamination	NFA	Recommendation signed 31 March 1997
406	Thorium Sludge Redrumming	NFA	Recommendation signed 14 March 1996
407	Soil Contamination West of Building 21	NFA	Recommendation signed 17 February 2000
418	PRS 418: Overflow Pond South Inlet	NFA	Recommendation signed 21 June 2000
419	Drainage Outflow Reroute	NFA	Recommendation signed 17 November 1999
421	Ridge	NFA	OSC Report signed 19 September 2002

NFA: No Further Assessment

Table 3: Phase I Buildings and Core Team Conclusions

Building	Description	Core Team Decision	Closeout Action
3	EM Test Facility	NFA	Recommendation signed March 2002
87	Component Test Facility	NFA	Recommendation signed March 1997
Mag 80	Magazine	NFA	Recommendation signed March 2002
Mag 81	Magazine	NFA	Recommendation signed March 2002
Mag 82	Magazine	NFA	Recommendation signed March 2002
Mag 83	Magazine	NFA	Recommendation signed March 2002
Mag 84	Magazine	NFA	Recommendation signed March 2002
95	SM/PP Area Chiller Plant	NFA	Recommendation signed July 2002
102	Offices (Process Support Building)	NFA	Recommendation signed June 2002
SST	Salt Storage for Water Treatment and Road Salt	NFA	Recommendation signed March 2002

NFA: No Further Assessment

Table 4: Final Identification of Current Groundwater COPCs for the Construction Worker Scenario

(EPC vs. Background) - Table 7 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Detection Frequency	95% UCL	EPC	Background Concentration	COPC
Inorganics (mg/L)								
Antimony	7440-36-0	0.0028	0.014	3/ 20	0.044	0.014	0.001	YES
Cadmium	7440-43-9w	0.0046	0.008	5/ 25	0.007	0.007		YES
Copper	7440-50-8	0.0016	0.593	15/ 25	0.042	0.042	0.001	YES
Lead	7439-92-1	0.0034	0.040	5/ 25	0.013	0.013		YES
Volatile Organic Compounds (mg/L)								
Tert-butyl methyl ether	1634-04-4	0.0012	0.002	4/ 24	0.001	0.001		YES
Trichloroethylene (TCE)	79-01-6	0.0005	0.006	189/ 219	0.002	0.002		YES
Radionuclides (pCi/L)								
Thorium-230 long lived decay	14269-63-7L	0.0075	1.990	19/ 43	0.476	0.476		YES:2
Uranium-235 long lived decay	15117-96-1L	0.0063	2.300	30/ 53	0.466	0.466	0.814	NO
Uranium-238 long lived decay	7440-61-1L	0.1300	8.250	52/ 59	0.409	0.409	0.688	YES:5

EPC: exposure point concentration
UCL: upper confidence limit
CAS: Chemical Abstract Service

COPC: Constituent of Potential Concern

COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was retained for risk evaluation.

COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to the lower of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 5: Final Identification of Current Groundwater COPCs for the Site Employee Scenario

(EPC vs. Background) - Table 9 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Detection Frequency	95% UCL	EPC	Background Concentration	COPC
Inorganics (mg/L)								
Antimony	7440-36-0	0.0028	0.014	3/ 20	0.0436	0.0144	0.0006	YES
Cadmium	7440-43-9w	0.0046	0.008	5/ 25	0.0066	0.0066		YES
Copper	7440-50-8	0.0016	0.593	15/ 25	0.0416	0.0416	0.0012	YES
Lead	7439-92-1	0.0034	0.040	5/ 25	0.0130	0.0130		YES
Volatile Organic Compounds (mg/L)								
Tert-butyl methyl ether	1634-04-4	0.0012	0.002	4/ 24	0.0006	0.0006		YES
Trichloroethylene (TCE)	79-01-6	0.0005	0.006	189/ 219	0.0023	0.0023		YES
Radionuclides (pCi/L)								
Plutonium-239/240	PU-239/240	0.0018	2.000	5/ 19	9.6400	2.0000	0.1250	YES
Thorium-228	14274-82-9	0.0085	2.170	17/ 46	25.6000	2.1700	0.7790	YES:3
Thorium-228+D	14274-82-9(+D)	0.0085	2.170	17/ 46	25.6000	2.1700	0.7790	YES:3
Thorium-228 long lived decay	14274-82-9L	0.0085	2.170	17/ 46	25.6000	2.1700	0.7790	YES:3
Thorium-230	14269-63-7	0.0075	1.990	19/ 43	0.4760	0.4760		YES:2
Thorium-230 long lived decay	14269-63-7L	0.0075	1.990	19/ 43	0.4760	0.4760		YES:2
Thorium-232 long lived decay	7440-29-1L	0.0025	0.100	8/ 44	0.3380	0.1000	0.3140	YES:4
Tritium	10028-17-8w	30.0000	7200.000	123/ 139	799.0000	799.0000	1485.4700	NO
Uranium-233/234	U-233/234	0.1670	0.361	36/ 36	0.2460	0.2460		YES
Uranium-234	13966-29-5	0.2000	8.140	19/ 24	2.0200	2.0200	0.7920	YES:2
Uranium-235	15117-96-1	0.0063	2.300	30/ 53	0.4660	0.4660	0.8140	NO
Uranium-235+D	15117-96-1(+D)	0.0063	2.300	30/ 53	0.4660	0.4660	0.8140	NO
Uranium-235 long lived decay	15117-96-1L	0.0063	2.300	30/ 53	0.4660	0.4660	0.8140	NO
Uranium-238	7440-61-1	0.1300	8.250	52/ 59	0.4090	0.4090	0.6880	NO
Uranium-238+D	7440-61-1(+D)	0.1300	8.250	52/ 59	0.4090	0.4090	0.6880	NO
Uranium-238 long lived decay	7440-61-1L	0.1300	8.250	52/ 59	0.4090	0.4090	0.6880	YES:5

footnotes on second page

Table 5: Final Identification of Current Groundwater COPCs for the Site Employee Scenario

footnotes

"+D" - incorporates daughter products within the risk calculations
EPC: exposure point concentration
UCL: upper confidence limit
CAS: Chemical Abstract Service
COPC: Constituent of Potential Concern
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). See Appendix H for details. For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was retained for risk evaluation.
COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to the lower of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 6: Final Identification of Future Groundwater COPCs for the Construction Worker Scenario

(Modeled Concentration vs. Background) - Table 11 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
letals (mg/L)				
luminum	7429-90-5	2.0238	0.038	YES
ntimony	7440-36-0	0.0184	0.001	YES
rsenic	7440-38-2	0.0184	0.033	NO
arium	7440-39-3	0.1829	0.310	NO
ismuth	7440-69-9	0.0241		YES
admium	7440-43-9w	0.0080		YES
hromium	7440-47-3	0.9642	0.006	YES
opper	7440-50-8	0.0557	0.001	YES
ead	7439-92-1	0.0194		YES
ithium	7439-93-2	0.1510	0.056	YES
langanese	7439-96-5w	0.2154	0.230	NO
lolybdenum	7439-98-7	0.0149	0.006	YES
ickel	7440-02-0	0.2779	0.035	YES
itrate/Nitrite	14797-65-0nn	6.5098	5.3490	YES
hallium	7440-28-0	0.0036		YES
anadium	7440-62-2	0.0257	0.017	YES
VOCs (mg/L)				
is(2-ethylhexyl)phthalate	117-81-7	0.0176		YES
OCs (mg/L)				
romochloromethane	74-97-5	0.0058		YES
ichloromethane (Methylene Chloride)	75-09-2	0.0154		YES
luorobenzene	462-06-6	0.0087		YES
-Chloroflurobenzene	348-51-6	0.0072		YES
etrachloroethene	127-18-4	0.0015		YES
ert-butyl methyl ether	1634-04-4	0.0006		YES
richloroethylene (TCE)	79-01-6	0.0039		YES
adionuclides (pCi/L)				
lutonium-238	13981-16-3	0.2587	0.087	YES
otassium-40	13966-00-2	48.3052		YES
adium-226	13982-63-3	1.6849	0.996	YES:2
adium-226 +D	13982-63-3(+D)	1.6849	0.996	YES:2
adium-226 long lived decay	13982-63-3L	1.6849	0.996	YES:2
adium-228	15262-20-1	0.4179		YES:3
adium-228 +D	15262-20-1(+D)	0.4179		YES:3
adium-228 long lived decay	15262-20-1L	0.4179		YES:3
trontium-90	10098-97-2	1.4173	0.975	YES
horium-228	14274-82-9	77.5034	0.779	YES:3
horium-228+D	14274-82-9(+D)	77.5034	0.779	YES:3
horium-228 long lived decay	14274-82-9L	77.5034	0.779	YES:3
horium-230	14269-63-7	0.6202		YES:2
horium-230 long lived decay	14269-63-7L	0.6202		YES:2
horium-232	7440-29-1	0.1803	0.314	NO
horium-232 long lived decay	7440-29-1L	0.1803	0.314	YES:4

Table 6: Final Identification of Future Groundwater COPCs for the Construction Worker Scenario

(Modeled Concentration vs. Background) - Table 11 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
Tritium	10028-17-8w	66797.9574	1485.470	YES
Uranium-233	13968-55-3	1.3619		YES:6
Uranium-233 long lived decay	13968-55-3L	1.3619		YES
Uranium-234	13966-29-5	2.6013	0.792	YES:2
Uranium-235	15117-96-1	2.1485	0.814	YES:7
Uranium-235+D	15117-96-1(+D)	2.1485	0.814	YES:7
Uranium-235 long lived decay	15117-96-1L	2.1485	0.814	YES
Uranium-235/236	U-235/236	0.0184		YES:7
Uranium-238	7440-61-1	0.5524	0.688	NO
Uranium-238+D	7440-61-1(+D)	0.5524	0.688	NO
Uranium-238 long lived decay	7440-61-1L	0.5524	0.688	YES:5

D' incorporates daughter products
AS: Chemical Abstract Service
OCs: volatile organic compounds
VOCs: semivolatile organic compounds

OPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it i cluded in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2) r Th-232 (reference 3). For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained ır risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was retained for risk valuation. Analyte is retained as a COPC; however, will not be evaluated individually because it is included in the sk assessment as part of the long lived decay chain of U-233 (reference 6) and U-235 (reference 7).

OPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to the wer of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 7: Final Identification of Future Groundwater COPCs for the Site Employee Scenario

(Future Modeled Concentration vs. Background) - Table 13 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
Inorganics (mg/L)				
Aluminum	7429-90-5	2.0238	0.0375	YES
Antimony	7440-36-0	0.0184	0.0006	YES
Arsenic	7440-38-2	0.0184	0.0330	NO
Barium	7440-39-3	0.1829	0.3102	NO
Bismuth	7440-69-9	0.0241		YES
Cadmium	7440-43-9w	0.0080		YES
Chromium	7440-47-3	0.9642	0.0061	YES
Copper	7440-50-8	0.0557	0.0012	YES
Lead	7439-92-1	0.0194		YES
Lithium	7439-93-2	0.1510	0.0557	YES
Manganese	7439-96-5w	0.2154	0.2296	NO
Molybdenum	7439-98-7	0.0149	0.0056	YES
Nickel	7440-02-0	0.2779	0.0350	YES
Nitrate/Nitrite	14797-65-0nn	6.510	5.3490	YES
Thallium	7440-28-0	0.0036		YES
Vanadium	7440-62-2	0.0257	0.0171	YES
SVOCs (mg/L)				
Bis(2-ethylhexyl)phthalate	117-81-7	0.0176		YES
VOCs (mg/L)				
Bromochloromethane	74-97-5	0.0058		YES
Dichloromethane (Methylene Chloride)	75-09-2	0.0154		YES
Fluorobenzene	462-06-6	0.0087		YES
O-Chloroflurobenzene	348-51-6	0.0072		YES
Tert-butyl methyl ether	1634-04-4	0.0006		YES
Tetrachloroethene	127-18-4	0.0015		YES
Trichloroethylene (TCE)	79-01-6	0.0039		YES
Radionuclides (pCi/L)				
Plutonium-238	13981-16-3	0.2587	0.0870	YES
Potassium-40	13966-00-2	48.3052		YES
Radium-226	13982-63-3	1.6849	0.9960	YES:2
Radium-226 +D	13982-63-3(+D)	1.6849	0.9960	YES:2
Radium-226 long lived decay	13982-63-3L	1.6849	0.9960	YES:2
Radium-228	15262-20-1	0.4179		YES:3
Radium-228 +D	15262-20-1(+D)	0.4179		YES:3
Radium-228 long lived decay	15262-20-1L	0.4179		YES:3
Strontium-90	10098-97-2	1.4173	0.9750	YES
Thorium-228	14274-82-9	77.5034	0.7790	YES:3
Thorium-228+D	14274-82-9(+D)	77.5034	0.7790	YES:3
Thorium-228 long lived decay	14274-82-9L	77.5034	0.7790	YES:3
Thorium-230	14269-63-7	0.6202		YES:2
Thorium-230 long lived decay	14269-63-7L	0.6202		YES:2
Thorium-232	7440-29-1	0.1803	0.3140	NO
Thorium-232 long lived decay	7440-29-1L	0.1803	0.3140	YES:4
Tritium	10028-17-8w	66797.9574	1485.4700	YES

Table 7: Final Identification of Future Groundwater COPCs for the Site Employee Scenario

(Future Modeled Concentration vs. Background) - Table 13 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
Uranium-233	13968-55-3	1.3619		YES:6
Uranium-233 long lived decay	13968-55-3L	1.3619		YES
Uranium-234	13966-29-5	2.6013	0.7920	YES:2
Uranium-235	15117-96-1	2.1485	0.8140	YES:7
Uranium-235+D	15117-96-1(+D)	2.1485	0.8140	YES:7
Uranium-235 long lived decay	15117-96-1L	2.1485	0.8140	YES
Uranium-238	7440-61-1	0.5524	0.6880	NO
Uranium-238+D	7440-61-1(+D)	0.5524	0.6880	NO
Uranium-238 long lived decay	7440-61-1L	0.5524	0.6880	YES:5

+D' incorporates daughter products
CAS: Chemical Abstract Service
VOCs: volatile organic compounds
SVOCs: semivolatile organic compounds
RBGV: Risk-Based Guideline Value, value is the lower of 10^{-6} cancer risk or 0.1 hazard index
a - carcinogen value, b - noncarcinogen value, c - maximum contaminant level (MCL)
COPC: Constituent of Potential Concern
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it s included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). For reference 4, Th-232 screens out but the Th-232 long lived decay chain was etained for risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was etained for risk evaluation. Analyte is retained as a COPC; however, will not be evaluated individually because it s included in the risk assessment as part of the long lived decay chain of U-233 (reference 6) and U-235 reference 7).
COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to he lower of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 6. Final Identification of Current and Future Soil COPCs for the Construction Worker Scenario
(EPC vs. Background) - Table 3 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Inorganics (mg/kg)									
Aluminum	7429-90-5	589.000	23000.000	N	145/ 146	15400.000	15400.000	19000.000	NO
Antimony	7440-36-0	0.210	44.500	D	64/ 209	8.460	8.460		YES
Arsenic	7440-38-2	0.490	19.500	X	137/ 143	8.220	8.220	8.600	NO
Bismuth	7440-69-9	0.820	72.700	X	33/ 59	133.000	72.700		YES
Copper	7440-50-8	1.800	1100.000	X	143/ 146	22.100	22.100	26.000	NO
Lead	7439-92-1	1.600	220.000	X	242/ 256	15.400	15.400	48.000	NO
Lithium	7439-93-2	2.300	34.100	N	53/ 55	18.300	18.300	26.000	NO
Manganese	7439-96-5s	65.200	8190.000	X	137/ 138	679.000	679.000	1400.000	NO
Thallium	7440-28-0	0.200	3.500	D	29/ 142	1.140	1.140	0.460	YES
Pesticides (mg/kg)									
Chlordane	57-74-9	0.019	0.098	D	2/ 23	0.016	0.016		YES
SVOCs (mg/kg)									
Benzo(a)anthracene	56-55-3	0.023	4.200	D	31/ 174	0.321	0.321		YES
Benzo(a)pyrene	50-32-8	0.023	3.600	D	29/ 174	0.316	0.316		YES
Benzo(g,h,i)perylene	191-24-2	0.027	2.100	D	16/ 174	0.304	0.304		YES
Phenanthrene	85-01-8	0.027	11.000	D	32/ 174	0.348	0.348		YES
Radionuclides (pCi/g)									
Actinium-227 +D	14952-40-0(+D)	0.050	2.110	D	37/ 282	0.304	0.304		YES:1
Actinium-227 long lived decay	14952-40-0L	0.050	2.110	D	37/ 282	0.304	0.304		YES
Actinium-228	14331-83-0	0.762	1.380	D	7/ 7	1.230	1.380		YES:3
Bismuth-214	14733-03-0	0.699	0.926	N	10/ 10	0.858	0.926		YES:2
Cesium-137 +D	10045-97-3(+D)	0.021	1.600	D	276/ 564	0.159	0.159	0.420	NO
Cesium-137 long lived decay	10045-97-3L	0.021	1.600	D	276/ 564	0.159	0.159	0.420	NO
Lead-210	14255-04-0	0.487	3.730	X	180/ 344	1.150	1.150		YES:2
Lead-210+D	14255-04-0(+D)	0.487	3.730	X	180/ 344	1.150	1.150		YES:2
Lead-210 long lived decay	14255-04-0L	0.487	3.730	X	180/ 344	1.150	1.150		YES:2
Lead-214	15067-28-4	0.570	1.120	N	20/ 20	0.921	0.921		YES:2
Plutonium-238	13981-16-3	0.012	396.400	D	665/1545	25.900	25.900	0.130	YES
Plutonium-239/240	PU-239/240	0.004	1.010	D	79/ 254	0.044	0.044	0.180	NO
Radium-224	13233-32-4	0.073	6.270	X	190/ 190	1.250	1.250		YES:3
Radium-226	13982-63-3	0.179	3.700	X	494/ 567	1.240	1.240	2.000	NO
Radium-226+D	13982-63-3(+D)	0.179	3.700	X	494/ 567	1.240	1.240	2.000	NO

(EPC vs. Background) - Table 3 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Radium-226 long lived decay	13982-63-3L	0.179	3.700	X	494/ 567	1.240	1.240	2.000	NO
Radium-228	15262-20-1	0.309	1.990	N	80/ 81	1.220	1.220		YES:3
Radium-228+D	15262-20-1(+D)	0.309	1.990	N	80/ 81	1.220	1.220		YES:3
Radium-228 long lived decay	15262-20-1L	0.309	1.990	N	80/ 81	1.220	1.220		YES:3
Thallium-208	14913-50-9	0.156	0.401	N	10/ 10	0.377	0.401		YES:3
Thorium-228+D	14274-82-9(+D)	0.037	4.520	X	342/ 384	1.640	1.640	1.500	YES:3
Thorium-228 long lived decay	14274-82-9L	0.037	4.520	X	342/ 384	1.640	1.640	1.500	YES:3
Thorium-230 long lived decay	14269-63-7L	0.100	7.510	X	340/ 595	2.830	2.830	1.900	YES:2
Thorium-232	7440-29-1	0.045	80.100	D	789/1805	0.832	0.832	1.400	NO
Thorium-232 long lived decay	7440-29-1L	0.045	80.100	D	789/1805	0.832	0.832	1.400	YES:4
Uranium-238 long lived decay	7440-61-1L	0.408	1.950	X	72/ 119	1.880	1.880	1.200	YES

"+D" : incorporates daughter products within the risk calculations
CAS: Chemical Abstract Service
UCL: upper confidence limit
EPC: Exposure Point Concentration
SVOCs: semivolatile organic compounds
Dist.: distribution where:
N = normal, L = lognormal, D = distribution not determined due to less than 20 or less than 50% detects, and
X = significantly different from lognormal or normal distribution
COPC: Constituent of Potential Concern, evaluation based on EPC vs. background
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). See Appendix H for details. For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation.
COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to RBGV, and/or 4 = analyte is an essential human nutrient

Table 5. Final Identification of Current and Future Soil COPCs for the Site Employee Scenario
(EPC vs. Background) - Table 5 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Inorganics (mg/kg)									
Arsenic	7440-38-2	0.4900	19.500	X	9.9E-01	8.880	8.880	8.600	YES
Bismuth	7440-69-9	12.6000	72.700	X	26/ 36	104.000	72.700		YES
Lead	7439-92-1	1.6000	220.000	X	179/ 186	16.700	16.700	48.000	NO
Lithium	7439-93-2	2.3000	26.900	N	31/ 31	16.600	16.600	26.000	NO
Pesticides (mg/kg)									
Chlordane	57-74-9	0.0190	0.098	D	2/ 23	0.016	0.016		YES
SVOCs (mg/kg)									
Benzo(a)pyrene	50-32-8	0.0240	3.600	D	22/ 134	0.350	0.350		YES
Benzo(g,h,i)perylene	191-24-2	0.0270	2.100	D	12/ 134	0.333	0.333		YES
Phenanthrene	85-01-8	0.0270	11.000	D	25/ 134	0.398	0.398		YES
Radionuclides (pCi/g)									
Actinium-227 +D	14952-40-0(+D)	0.0500	2.110	D	36/ 219	0.354	0.354		YES
Actinium-227 long lived decay	14952-40-0L	0.0500	2.110	D	36/ 219	0.354	0.354		YES
Actinium-228	14331-83-0	0.7620	1.380	D	7/ 7	1.230	1.380		YES:3
Bismuth-214	14733-03-0	0.6990	0.926	N	10/ 10	0.858	0.926		YES:2
Cesium-137 +D	10045-97-3(+D)	0.0211	1.600	X	258/ 461	0.179	0.179	0.420	NO
Cesium-137 long lived decay	10045-97-3L	0.0211	1.600	X	258/ 461	0.179	0.179	0.420	NO
Lead-210	14255-04-0	0.6300	3.730	X	146/ 262	1.290	1.290		YES:2
Lead-210+D	14255-04-0(+D)	0.6300	3.730	X	146/ 262	1.290	1.290		YES:2
Lead-210 long lived decay	14255-04-0L	0.6300	3.730	X	146/ 262	1.290	1.290		YES:2
Lead-214	15067-28-4	0.8270	1.120	N	10/ 10	1.030	1.120		YES:2
Plutonium-238	13981-16-3	0.0122	396.400	D	592/1308	24.900	24.900	0.130	YES
Plutonium-239/240	PU-239/240	0.0039	1.010	D	64/ 230	0.044	0.044	0.180	NO
Radium-224	13233-32-4	0.0730	6.270	X	186/ 186	1.260	1.260		YES:3
Radium-226+D	13982-63-3(+D)	0.1790	3.700	X	411/ 466	1.250	1.250	2.000	NO
Radium-226 long lived decay	13982-63-3L	0.1790	3.700	X	411/ 466	1.250	1.250	2.000	NO
Radium-228	15262-20-1	0.5450	1.990	N	74/ 75	1.260	1.260		YES:3
Radium-228+D	15262-20-1(+D)	0.5450	1.990	N	74/ 75	1.260	1.260		YES:3
Radium-228 long lived decay	15262-20-1L	0.5450	1.990	N	74/ 75	1.260	1.260		YES:3
Thallium-208	14913-50-9	0.1560	0.401	N	10/ 10	0.377	0.401		YES:3
Thorium-228+D	14274-82-9(+D)	0.0370	4.520	X	319/ 356	1.700	1.700	1.500	YES:3
Thorium-228 long lived decay	14274-82-9L	0.0370	4.520	X	319/ 356	1.700	1.700	1.500	YES:3
Thorium-230 long lived decay	14269-63-7L	0.1000	7.510	X	317/ 499	2.700	2.700	1.900	YES:2

Table 9. Final Identification of Current and Future Soil COPCs for the Site Employee Scenario
(EPC vs. Background) - Table 5 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Thorium-232	7440-29-1	0.0450	80.100	D	675/1518	0.873	0.873	1.400	NO
Thorium-232 long lived decay	7440-29-1L	0.0450	80.100	D	675/1518	0.868	0.868	1.400	YES:4
Uranium-238 long lived decay	7440-61-1L	0.4760	1.950	X	50/ 91	2.030	1.950	1.200	YES

"+D" : incorporates daughter products within the risk calculations
CAS: Chemical Abstract Service
UCL: upper confidence limit
EPC: Exposure Point Concentration
SVOCs: semivolatile organic compounds
Dist.: distribution where:
N = normal, L = lognormal, D = distribution not determined due to less than 20 or less than 50% detects, and
X = significantly different from lognormal or normal distribution
COPC: Constituent of Potential Concern, evaluation based on EPC vs. background
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). See Appendix H for details. For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation.

COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to RBGV, and/or
4 = analyte is an essential human nutrient

Table 10: Incremental Residual Risk Summary

Table 36 of the RRE

Scenario and Receptor	Media	Constituents	Pathway	Total Non-Cancer Hazard or HI	Total Cancer Risk
Construction Worker Scenario	Current & Future Soil (all depths)	Chemical & Radiological	Oral	1.4E-01	**7.4E-06**
			Dermal Contact	1.6E-03	3.5E-07
			Inhalation of Dust	NA	2.0E-08
			Inhalation of VOCs	NA	NA
			External	NA	**9.5E-06**
			Soil Total Risk	1.4E-01	**1.7E-05**
	Current Groundwater	Chemical & Radiological	Oral	5.5E-01	**3.5E-06**
			Dermal Contact	3.1E-01	**1.3E-06**
			Inhalation While Showering	4.8E-07	NA
			Current Groundwater Total Risk	**8.6E-01**	**4.8E-06**
	Future Groundwater	Chemical & Radiological	Oral	**4.6E+00**	**2.0E-05**
			Dermal Contact	9.3E-01	**2.3E-06**
			Inhalation While Showering	1.4E-05	4.5E-08
			Future Groundwater Total Risk	**5.5E+00**	**2.2E-05**
	Air*	Radiological	Inhalation	NA	2.0E-07
			Air Total Risk	NA	2.0E-07
			Cumulative Incremental Current Risk	1.0E+00	**2.2E-05**
			Cumulative Incremental Future Risk	**5.7E+00**	**4.0E-05**
Site Employee Scenario	Current & Future Soil (0-2 feet bls)	Chemical & Radiological	Oral	4.6E-04	**4.0E-06**
			Inhalation of Dust	NA	9.7E-08
			Inhalation of VOCs	NA	NA
			External	NA	**1.2E-05**
			Soil Total Risk	4.6E-04	**1.6E-05**
	Current Groundwater	Chemical & Radiological	Oral	5.5E-01	**2.6E-05**
			Current Groundwater Total Risk	5.5E-01	**2.6E-05**
	Future Groundwater	Chemical & Radiological	Oral	**4.6E+00**	**9.3E-05**
			Future Groundwater Total Risk	**4.6E+00**	**9.3E-05**
	Air*	Radiological	Inhalation	NA	9.9E-07
			Air Total Risk	NA	9.9E-07
			Cumulative Incremental Current Risk	5.5E-01	**4.3E-05**
			Cumulative Incremental Future Risk	**4.6E+00**	**1.1E-04**

I: Hazard Index
A: not applicable
RRE values for air were brought forward from the Technical Position Report for Release Blocks D and H. (Reference 20).
olded values exceed cancer risk of 10^{-6} or non-cancer Hazard Index greater than 1.
s: below land surface
OCs: volatile organic compounds
umbers written as 1.0E-3 equal 1x10-3 and 0.001

Table 11: Impact of Boundary Changes on Incremental Residual Soil Risk

Table 19 of the Proposed Plan

Scenario and Receptor	Media	Constituents	Pathway	Total Non-Cancer Hazard or HI	Total Non-Cancer Hazard or HI	Total Cancer Risk	Total Cancer Risk
				Boundary in October 2002	Current Boundary	Boundary in October 2002	Current Boundary
Construction Worker Scenario	Current & Future Soil (all depths)	Chemical & Radiological	Oral	1.4E-01	1.4E-01	**7.4E-06**	**7.4E-06**
			Dermal Contact	1.6E-03	2.2E-02	3.5E-07	3.5E-07
			Inhalation of Dust	NA	NA	2.0E-08	1.9E-08
			Inhalation of VOCs	NA	NA	NA	NA
			External	NA	NA	**9.5E-06**	**9.6E-06**
			Soil Total Risk	1.4E-01	1.6E-01	**1.7E-05**	**1.7E-05**
Site Employee Scenario	Current & Future Soil (0-2 feet bls)	Chemical & Radiological	Oral	4.6E-04	4.6E-04	**4.0E-06**	**4.0E-06**
			Inhalation of Dust	NA	NA	9.7E-08	9.7E-08
			Inhalation of VOCs	NA	NA	NA	NA
			External	NA	NA	**1.2E-05**	**1.2E-05**
			Soil Total Risk	4.6E-04	4.6E-04	**1.6E-05**	**1.6E-05**

HI: Hazard Index
NA: not applicable
bolded values exceed cancer risk of 10^{-6} or non-cancer Hazard Index greater than 1.
bls: below land surface
VOCs: volatile organic compounds
numbers written as 1.0E-3 equal 1x10-3 and 0.001

APPENDIX C

Quit Claim Deeds for Phase I with Legal Descriptions of Phase I

The 2.5 acre portion of Phase I that is closest to Building 38 may not be transferred until after the demolition of Building 38 and associated soil remediation are complete. Therefore, two Quit Claim deeds are presented in this appendix. The contents of the appendix are:

Quit Claim Deed for Parcels IB and IC

- Exhibit A – Description of Parcel IB
- Exhibit B – Description of Parcel IC
- Exhibit C – Phase I Environmental Summary (Available July 2003)

Quit Claim Deed for Parcel IA

- Exhibit A – Description of Parcel IA
- Exhibit B – Phase I Environmental Summary (Available July 2003)

QUIT CLAIM DEED

The UNITED STATES OF AMERICA, acting by and through the Secretary of the Department of Energy (hereinafter sometimes called "Grantor"), under and pursuant to the authority of the Atomic energy Act of 1954, Section 161 (g) (42U.S.C. §2201(g)), in consideration of the covenants contained herein, and other good and valuable consideration, duly paid by the Miamisburg Mound Community Improvement Corporation, a not-for-Profit corporation subsisting under the laws of Ohio and recognized by the Secretary of Energy as the agent for the community wherein the former Mound Facility is located (hereinafter sometimes called "Grantee"), the receipt of which is hereby acknowledged, hereby QUIT CLAIMS unto Grantee its successors and assigns, subject to the reservations, covenants, and conditions hereinafter set forth, all of its right, title and interest, together with all improvements thereon and appurtenances thereto, in the following described real property (hereinafter the "Premises), commonly known as Phase I Parcel IB and IC:

Situate in Section 30 and 36, Town 2, Range 5, M.Rs., City of Miamisburg, County of Montgomery, State of Ohio, being part of a 87.28 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 12 of the Deed Records of Montgomery County, Ohio, said 87.28 acre tract being comprised of a 59.75 acre tract, also a 19.40 acre tract, also a 9.97 acre tract, also a 0.78 acre tract and a 0.78 acre tract all known as Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, also being part of a 79.74 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-376A01 of the Deed Records of Montgomery County, Ohio, said 79.74 acre tract being comprised of a 24.197 acre tract and known as Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, also a 35.50 acre tract known as Lot Numbered 6127 of the consecutive numbered lots of the City of Miamisburg, and a 24.24 acre tract known as Lot Numbered 4777 of the consecutive numbered lots of the City of Miamisburg, also being part of a 20.46 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1215, Page 347 and part of a 17.58 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 248, all of the Deed Records of Montgomery County, Ohio, said 20.46 acre tract and 17.58 acre tract being known as Lot Numbered 2290 of the consecutive numbered lots of the City of Miamisburg, being a new division of 42.882 acres from said 87.28 acre tract, 79.74 acre tract, 20.46 acre tract and 17.58 acre tract and being more fully bounded and described in Exhibit A attached hereto and incorporated herein:

Situate in Section 36, Town 2, Range 5, MRs., City of Miamisburg, County of Montgomery, State of Ohio, being part of a 79.74 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-376A01 of the Deed Records of Montgomery County, Ohio, said 79.74 acre tract being comprised of a 24.197 acre tract and known as Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, also a 35.50 acre tract known as Lot Numbered 6127 of the consecutive numbered lots of the City of Miamisburg, and a 24.24 acre tract known as Lot Numbered 4777 of the consecutive numbered lots of the City of Miamisburg, also being part of a 42.56 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-323A11 of the Deed Records of Montgomery County, Ohio, said 42.56 acre tract being comprised of a 46.313 acre tract known as Lot Numbered 4778 of the consecutive numbered lots of the City of Miamisburg, said 42.56 acre tract being all the remainder of an 80 acre tract as conveyed from Ray C. Dunaway and Thelma Mae Dunaway to Oak Knoll Development and Investment Co., Inc., as recorded in Microfiche No. 71-513B06 of the Deed Records of Montgomery County, Ohio, being a new division of 6.568 acres from said 79.74 acre tract and 42.56 acre tract and being more fully described in Exhibit B attached hereto and incorporated herein.

RESERVING UNTO Grantor, the United States Environmental Protection Agency (USEPA) and the State of Ohio, acting by and through the Director of the Ohio Environmental Protection Agency (OEPA) or the Ohio Department of Health (ODH), their successors and assigns, an easement to, upon or across the Premises in conjunction with the covenants of Grantor and/or Grantee in paragraphs numbered 1.1-1.3, 3.2 and 3.3 of this Deed and as otherwise needed for purposes of any response action as defined under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, including but not limited to, environmental investigation or remedial action on the Premises or on property in the vicinity thereof, including the right of access to, and use of, to the extent permitted by applicable law, utilities at reasonable cost to Grantor. Grantee understands that any such response action will be conducted in a manner so as to attempt to minimize interfering with the ordinary and reasonable use of the Premises.

This Deed and conveyance is made and accepted without warranty of any kind, either expressed or implied, except for the warranty in paragraph 3.3 of this Deed, and is expressly made under and subject to all reservations, restrictions, rights, covenants, easements, licenses, and permits, whether or not of public record, to the extent that the same affect the Premises.

1. The parties hereto intend the following restrictions and covenants to run with the land and to be binding upon the Grantee and its successors, transferees, and assigns or any other person acquiring an interest in the Premises, for the benefit of Grantor, USEPA and the State of Ohio, acting by and through the Director of OEPA or ODH, their successors and assigns.

   1.1 Grantee covenants that any soil from the Premises shall not be placed on any property outside the boundaries of that described in instruments recorded at Deed Book (1214, pages 10, 12, 15, 17 and 248; Deed Book 1215, page 347; Deed Book 1246, page 45; Deed Book 1258, pages 56 and 74; Deed Book 1256, page 179; Micro-Fiche 81-376A01; and Micro-Fiche 81-323A11) of the Deed Records of Montgomery County, Ohio (and as illustrated in the Phase I Parcel Environmental Summary, Notices of Hazardous Substances, Mound Plant, Miamisburg, Ohio dated_____ without prior written approval from ODH, OEPA, and USEPA, or successor agencies.

   1.2 Grantee covenants not to use, or allow the use of the Premises for any residential or farming activities, or any other activities which could result in the chronic exposure of children under eighteen years of age to soil or groundwater from the Premises. Restricted uses shall include, but not be limited to:

      (1) single or multi family dwellings or rental units;
      (2) day care facilities;
      (3) schools or other educational facilities for children under eighteen years of age; and
      (4) community centers, playgrounds, or other recreational or religious facilities for children under eighteen years of age.

      Grantor shall be contacted to resolve any questions which may arise as to whether a particular activity would be considered a restricted use.

1.3 Grantee covenants not to extract, consume, expose, or use in any way the groundwater underlying the premises without the prior written approval of the United States Environmental Protection Agency (Region V) and the OEPA.

2. The Grantor hereby grants to the State of Ohio and reserves and retains for itself, its successors and assigns an irrevocable, permanent, and continuing right to enforce the covenants of this Quitclaim Deed through proceedings at law or in equity, including resort to an action for specific performance, as against and at the expense of Grantee, its successors and assigns, including reasonable legal fees, and to prevent a violation of, or recover damages from a breach of, these covenants, or both. Any delay or forbearance in enforcement of said restrictions and covenants shall not be deemed to be a waiver thereof.

3. Pursuant to Section 120(h)(3) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. §9620(h)(3)), the following is notice of hazardous substances, the description of any remedial action taken, and a covenant concerning the Premises.

   3.1 **Notice of Hazardous Substance:** Grantor has made a complete search of its files and records concerning the Premises. Those records indicate that the hazardous substances listed in Exhibit "B," attached hereto and made a part hereof, have been stored for one year or more or disposed of on the Premises and Exhibit B also shows the dates that such storage/disposal took place.

   3.2 **Description of Remedial Action Taken:** Institutional Controls are established. The Institutional Controls are set forth as covenants in Sections 1.1, 1.2, and 1.3 of this Deed.

   3.3 **Covenant:** Grantor covenants and warrants that all remedial action necessary for the protection of human health and the environment with respect to any hazardous substances remaining on the property has been taken, and any additional remedial action found to be necessary after the date of this Deed regarding hazardous substances existing prior to the date of this Deed shall be conducted by Grantor, provided, however, that the foregoing covenant shall not apply in any case in which the presence of hazardous substances on the property is due to the activities of Grantee, its successors, assigns, employees, invitees, or any other person subject to Grantee's control or direction.

4. Unless otherwise specified, all the covenants, conditions, and restrictions to this Deed shall be binding upon, and shall inure to the benefit of the assigns of Grantor and the successors and assigns of Grantee.

IN WITNESS WHEREOF, the United States of America, acting by and through its Secretary of the Department of Energy, has caused these presents to be executed this _____day of _____, 2003.

UNITED STATES OF AMERICA

_____

State of Ohio)
County of Montgomery) SS.

Before me, a Notary Public in and for said State and County, appeared this _____ day of _____, 2003, _____, who acknowledged that he is the Manager of the Ohio Field Office for the United States Department of Energy, with full authority to execute the foregoing on behalf of the United States of America, and who acknowledged the above to be his signature and his free act and deed.

SEAL

_____
Notary Public

Prepared by: Randolph T. Tormey
1 Mound Rd., Miamisburg, Oh 45343
(937) 865-3025
OH Atty. Regis. 0007803

Exhibit "A"
DESCRIPTION OF

42.882 Acres

Parcel IB

located in
Section 30 and 36, Town 2, Range 5, M.Rs.
City of Miamisburg, Montgomery County, Ohio

Situate in Section 30 and 36, Town 2, Range 5, M.Rs., City of Miamisburg, County of Montgomery, State of Ohio, ***being part of a 87.28 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 12*** of the Deed Records of Montgomery County, Ohio, said 87.28 acre tract being comprised of a 59.75 acre tract, also a 19.40 acre tract, also a 9.97 acre tract, also a 0.78 acre tract and a 0.78 acre tract all known as Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, ***also being part of a 79.74 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-376A01*** of the Deed Records of Montgomery County, Ohio, said 79.74 acre tract being comprised of a 24.197 acre tract and known as Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, also a 35.50 acre tract known as Lot Numbered 6127 of the consecutive numbered lots of the City of Miamisburg, and a 24.24 acre tract known as Lot Numbered 4777 of the consecutive numbered lots of the City of Miamisburg, ***also being part of a 20.46 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1215, Page 347 and part of a 17.58 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 248***, all of the Deed Records of Montgomery County, Ohio, said 20.46 acre tract and 17.58 acre tract being known as Lot Numbered 2290 of the consecutive numbered lots of the City of Miamisburg, ***being a new division of 42.882 acres from said 87.28 acre tract, 79.74 acre tract, 20.46 acre tract and 17.58 acre tract*** and being more fully bounded and described as follows:

Commencing at a "DOE" concrete monument found, said monument being the southwest corner of the Miami Mound Plat as recorded in Record Plat Book Volume 94, Page 34 of the Plat Records of Montgomery County, Ohio, said monument being the southeast corner of a 12.429 acre tract, known as Part lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio, said monument lying in the north line of a 79.74 acre tract, known as City Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, Ohio, conveyed to the United States of America, as recorded in Microfiche No. 81-0376A01 of the Deed Records of Montgomery County, Ohio, said "DOE" monument being the **True Point of Beginning** of the hereinafter described new division of 42.882 acres;

Thence with the south line of the Miami Mound Plat, **South 83° 59' 35" East**, a distance of **34.06 feet to a "DOE" concrete monument found**, said monument being the northeast corner of said United States of America 79.74 acre tract, said monument being the northwest corner of a 7.502 acre tract conveyed to Daniel R. Shell, as recorded in Deed Microfiche No. 85-443D02 of the Deed Records of Montgomery County, Ohio, said 7.502 acre tract being known as Lot Numbered 6130 of the consecutive numbered lots of the City of Miamisburg, Ohio;

Thence with the east line of said United States of America 79.74 acre tract and the west line of said Shell 7.502 acre tract, **South 04° 42' 45" West**, a distance of **311.82 feet to a 5/8" capped**

"Schram" iron pin set by previous survey by myself, Timothy W. Schram, Sr. for a new division of 94.838 acre tract, known as Parcel 4 of the Mound Complex, said iron pin being the northeasterly corner of said new division of 94.838 acre tract;

Thence with said new division line of said 94.838 acre tract on the following three (3) courses,

1) **Due West**, a distance of **62.54 feet to a 5/8" capped "Schram" iron pin set by previous survey**;

2) **Thence, Due North**, a distance of **111.18 feet to a 5/8" capped "Schram" iron pin set by previous survey**;

3) **Thence** with said new division line of 94.838 acres and a new division line of the herein described 45.259 acres, **South 89° 59' 52" West**, passing a point on the west line of Section 30 and the east line of Section 36 at 1249.47 feet, reference from said point a railroad spike found, South 05° 16' 42" West, 1682.63 feet, said spike being the south section corner of Section 30 and 36, also a concrete monument found, disturbed, North 05° 16' 42" East, 3724.33 feet, said concrete monument being the north corner of Section 30 and 36, also passing a 5/8" capped "Schram" iron pin set by previous survey at 1767.43 feet, said iron pin being a northerly corner of said new division of 94.838 acres, in all a distance of **1784.02 feet to a 5/8" iron pin set**, said iron pin being the southwest corner of the herein described new division of 45.259 acres, said iron pin also being a northerly corner of a new division of 6.568 acre tract, known as Parcel IC of the Mound Complex;

Thence with a new division line on the following twenty-three (23) courses,

1) **North 24° 17' 45" West**, a distance of **458.95 feet to a 5/8" iron pin set**;
2) **Thence, North 83° 58' 45" West**, a distance of **109.56 feet to a 5/8" iron pin set**;
3) **Thence, North 05° 38' 00" East**, a distance of **284.12 feet to a 5/8" iron pin set**;
4) **Thence, North 08° 45' 53" East**, a distance of **94.64 feet to a 5/8" iron pin set**;
5) **Thence, North 21° 05' 14" East**, a distance of **206.77 feet to a 5/8" iron pin set**;
6) **Thence, North 75° 37' 35" West**, a distance of **22.86 feet to a 5/8" iron pin set**;
7) **Thence, North 14° 15' 45" West**, a distance of **152.26 feet to a 5/8" iron pin set**;
8) **Thence, North 50° 25' 32" East**, a distance of **58.44 feet to a 5/8" iron pin set**;
9) **Thence, North 25° 13' 50" East**, a distance of **88.97 feet to a 5/8" iron pin set**;
10) **Thence, North 50° 57' 41" East**, a distance of **58.71 feet to a 5/8" iron pin set**;
11) **Thence, North 63° 34' 44" East**, a distance of **106.77 feet to a railroad spike set**;
12) **Thence, North 67° 55' 35" East**, a distance of **195.36 feet to a railroad spike set**;
13) **Thence, North 32° 10' 07" East**, a distance of **60.19 feet to a 5/8" iron pin set**;
14) **Thence, North 80° 03' 26" East**, a distance of **45.82 feet to a 5/8" iron pin set**;
15) **Thence, North 01° 21' 45" West**, a distance of **10.36 feet to a 5/8" iron pin set**;
16) **Thence, North 82° 56' 15" East**, a distance of **120.55 feet to a 5/8" iron pin set**;
17) **Thence, South 05° 28' 44" East**, a distance of **114.21 feet to a 5/8" iron pin set**;
18) **Thence, North 84° 30' 00" East**, a distance of **56.66 feet to a 5/8" iron pin set**;
19) **Thence, South 27° 23' 24" East**, a distance of **170.96 feet to a 5/8" iron pin set**;
20) **Thence, South 26° 26' 49" East**, a distance of **82.75 feet to a 5/8" iron pin set**;
21) **Thence, North 82° 42' 58" East**, passing a point on the west line of Section 30 and the east line of Section 36 at 101.51 feet, reference from said point a railroad spike found, South 05° 16' 42" West, 2878.31 feet, said spike being the south section corner of Section 30 and 36, also a concrete monument found, disturbed, North 05° 16' 42" East, 2528.66 feet, said concrete monument being the north corner of Section 30 and 36, in all a distance of **158.83 feet to a 5/8" iron pin set**;

22) **Thence, South 39° 17' 18" East**, a distance of **324.25 feet to a 5/8" iron pin set**;

23) **Thence, South 84° 30' 40" East**, a distance of **292.51 feet to a 5/8" iron pin set**, said iron pin being a westerly corner of a 12.429 acre tract, known as Part Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio;

Thence with the westerly line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract on the following three (3) courses,

1) **South 05° 34'05" West**, a distance of **360.00 feet to a 5/8" iron pin set**;

2) **Thence, South 84° 25' 51" East**, a distance of **93.50 feet to a 5/8" iron pin set**;

3) **Thence, South 05° 34' 05" West**, a distance of **291.47 feet to a 5/8" capped "LeRoy" iron pin found**, said iron pin being set by William C. LeRoy, Professional Surveyor number 7664 of the State of Ohio by prior survey as recorded in the Montgomery County Engineer's Record of Land Surveys, Volume 1999, Page 0326, said iron pin being the southwest corner of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, said iron pin lying in the south line of said United States of America 87.28 acre tract, said iron pin lying in the north line of said Untied State of America 79.74 acre tract;

Thence with the south line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, the south line of said United States of America 87.28 acre tract and the north line of said Untied State of America 79.74 acre tract, **South 84° 32' 54" East**, a distance of **613.34 feet to the True Point of Beginning**, containing **42.882 acres**, more or less, of which ***18.230 acres lying in Section 30, 24.652 acres lying in Section 36,*** of which ***3.032 acres being part of Lot Numbered 6128, 5.088 acres being part of Lot Numbered 6127, 5.365 acres being part of Lot Numbered 4777, 10.109 acres being part of Lot Numbered 2259 and 19.288 acres being part of Lot Numbered 2290***, all of the consecutive numbered lots of the City of Miamisburg, Ohio, and being subject to all easements, highways and right of ways of record.

Bearing basis established as Grid North by GPS observation August 7th & 8th , 2002 at Latitude N39° 38' 25.81", Longitude W084° 17' 28.09" (Coast & Geodetic Survey Monument #G-139, 1947); Ohio State Plane Coordinate system, Ohio South Zone 3402 (NAD 83), True North being 01° 08' 11" east of Grid North.

This description prepared from an actual field survey performed under my direct supervision, Timothy W. Schram, Sr., Registered Professional Surveyor number 7299 of the State of Ohio, and that all monuments referenced herein and placed on the ground represents the boundaries of the herein described tract, and based on a Plat of Survey as recorded in the Montgomery County Engineer's Record of Land Surveys in Record Volume number **2003**, Page **XXXX**.

Timothy W. Schram, Sr., Regist. Prof. Surveyor No. 7299
of the State of Ohio, March 21, 2003.
F: 030026 Mound Parcel IB Revised

Exhibit "B"
DESCRIPTION OF

6.568 Acres

Parcel IC

located in
Section 36, Town 2, Range 5, MRs.
City of Miamisburg, Montgomery County, Ohio

Situate in Section 36, Town 2, Range 5, MRs., City of Miamisburg, County of Montgomery, State of Ohio, ***being part of a 79.74 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-376A01*** of the Deed Records of Montgomery County, Ohio, said 79.74 acre tract being comprised of a 24.197 acre tract and known as Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, also a 35.50 acre tract known as Lot Numbered 6127 of the consecutive numbered lots of the City of Miamisburg, and a 24.24 acre tract known as Lot Numbered 4777 of the consecutive numbered lots of the City of Miamisburg, ***also being part of a 42.56 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-323A11*** of the Deed Records of Montgomery County, Ohio, said 42.56 acre tract being comprised of a 46.313 acre tract known as Lot Numbered 4778 of the consecutive numbered lots of the City of Miamisburg, said 42.56 acre tract being all the remainder of an 80 acre tract as conveyed from Ray C. Dunaway and Thelma Mae Dunaway to Oak Knoll Development and Investment Co., Inc., as recorded in Microfiche No. 71-513B06 of the Deed Records of Montgomery County, Ohio, ***being a new division of 6.568 acres from said 79.74 acre tract and 42.56 acre tract*** and being more fully bounded and described as follows:

Commencing at a "DOE" concrete monument found, said monument being the southwest corner of the Miami Mound Plat as recorded in Record Plat Book Volume 94, Page 34 of the Plat Records of Montgomery County, Ohio, said monument being the southeast corner of a 12.429 acre tract, known as Part lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio, said monument lying in the north line of a 79.74 acre tract, known as City Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, Ohio, conveyed to the United States of America, as recorded in Microfiche No. 81-0376A01 of the Deed Records of Montgomery County, Ohio, thence with the south line of the Miami Mound Plat, South 83° 59' 35" East, a distance of 34.07 feet to a "DOE" concrete monument found, said monument being the northeast corner of said United States of America 79.74 acre tract, said monument being the northwest corner of a 7.502 acre tract conveyed to Daniel R. Shell, as recorded in Deed Microfiche No. 85-443D02 of the Deed Records of Montgomery County, Ohio, said 7.502 acre tract being known as Lot Numbered 6130 of the consecutive numbered lots of the City of Miamisburg, Ohio; thence with the east line of said United States of America 79.74 acre tract and the west line of said Shell 7.502 acre tract, South 04° 42' 45" West, a distance of 311.82 feet to a 5/8" capped "Schram" iron pin set by previous survey by myself, Timothy W. Schram, Sr. for a new division of 94.838 acre tract, known as Parcel 4 of the Mound Complex, said iron pin being the northeasterly corner of said new division of 94.838 acres; thence with said new division line of said 94.838 acre tract on the following three (3) courses, 1) Due West, a distance of 62.54 feet to a 5/8" capped "Schram" iron pin set by previous survey; 2) thence, Due North, a distance of 111.18 feet to a 5/8" capped "Schram" iron pin set by previous survey; 3) thence, South 89° 59' 52" West, passing a point on the west line of Section 30 and

the east line of Section 36 at 1249.47 feet, reference from said point a railroad spike found, South 05° 16' 42" West, 1682.63 feet, said spike being the south section corner of Section 30 and 36, also a concrete monument found, disturbed, North 05° 16' 42" East, 3724.33 feet, said concrete monument being the north corner of Section 30 and 36, in all a distance of 1767.43 feet to a 5/8" capped "Schram" iron pin set by previous survey, said iron pin being a northerly corner of said new division of 94.838 acres, said iron pin being the **True Point of Beginning** of the hereinafter described new division of 6.568 acres;

Thence with said new division line of said 94.838 acre tract on the following six (6) courses,

1) **South 23° 53' 27" West**, a distance of **12.17 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
2) **Thence, South 47° 17' 05" East**, a distance of **318.93 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
3) **Thence, South 10° 55' 31" East**, a distance of **75.93 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
4) **Thence, South 79° 34' 35" West**, a distance of **878.76 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
5) **Thence, Due South**, a distance of **82.39 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
6) **Thence, Due West**, a distance of **72.92 feet to a 5/8" capped "Schram" iron pin set by previous survey**, said iron pin lying in the northeasterly line of a 5.481 acre tract conveyed to the Consolidated Railroad Corporation, as recorded in Microfiche No. 78-502A01 of the Deed Records of Montgomery County, Ohio, said Consolidated Railroad Corporation 5.481 acre tract also known as Lot Numbered 4780 of the consecutive numbered lots of the City of Miamisburg, Ohio;

Thence with the northeasterly line of said Consolidated Railroad Corporation 5.481 acre tract, **North 09° 33' 38" West**, a distance of **351.85 feet to a 5/8" iron pin set,** said iron pin lying in the north line of said United States of America 42.56 acre tract, said iron pin being the southwest corner of a 1.6 acre tract, known as Tract number A-112, conveyed to the United States of America, as recorded in Deed Book Volume 1258, Page 74 of the Deed Records of Montgomery County, Ohio;

Thence with the north line of said Untied State of America 42.56 acre tract and the south line of said Untied States of America 1.6 acre tract, **South 84° 25' 01" East**, a distance of **100.51 feet to a 5/8" iron pin set**, said iron pin being the southeast corner of said Untied States of America 1.6 acre tract;

Thence with the easterly line of said Untied States of America 1.6 acre tract, **North 09° 26' 26" West**, a distance of **60.47 feet to a 5/8" iron pin set**, said iron pin being the northwesterly corner of the herein described new division of 6.568 acres;

Thence with a new division line on the following two (2) courses,

1) **North 79° 08' 30" East**, a distance of **666.53 feet to a 5/8" iron pin set**;
2) **Thence, North 24° 17' 45" West**, a distance of **23.06 feet to a 5/8" iron pin set**, said iron pin being a northerly corner of the herein described 6.568 acre tract, said iron pin being the southwest corner of a new division of 45.259 acre tract, known as Parcel IB of the Mound Complex;

Thence with the south line of said new division of 45.259 acres, **North 89° 59' 52" East**, a distance of **16.59 feet to the True Point of Beginning**, containing **6.568 acres**, more or less, and being subject to all easements, highways and right of ways of record..

Bearing basis established as Grid North by GPS observation August 7th & 8th , 2002 at Latitude N39° 38' 25.81", Longitude W084° 17' 28.09" (Coast & Geodetic Survey Monument #G-139, 1947); Ohio State Plane Coordinate system, Ohio South Zone 3402 (NAD 83), True North being 01° 08' 11" east of Grid North.

This description prepared from an actual field survey performed under my direct supervision, Timothy W. Schram, Sr., Registered Professional Surveyor number 7299 of the State of Ohio, and that all monuments referenced herein and placed on the ground represents the boundaries of the herein described tract, and based on a Plat of Survey as recorded in the Montgomery County Engineer's Record of Land Surveys in Record Volume number _____, Page _____.

_____

Timothy W. Schram, Sr., Regist. Prof. Surveyor No. 7299
of the State of Ohio, September 11, 2002.
F: 02088 Mound Parcel 5 Surv Parcel IC

QUIT CLAIM DEED

The UNITED STATES OF AMERICA, acting by and through the Secretary of the Department of Energy (hereinafter sometimes called "Grantor"), under and pursuant to the authority of the Atomic Energy Act of 1954, Section 161 (g) (42U.S.C. §2201(g)), in consideration of the covenants contained herein, and other good and valuable consideration, duly paid by the Miamisburg Mound Community Improvement Corporation, a not-for-Profit corporation subsisting under the laws of Ohio and recognized by the Secretary of Energy as the agent for the community wherein the former Mound Facility is located (hereinafter sometimes called "Grantee"), the receipt of which is hereby acknowledged, hereby QUIT CLAIMS unto Grantee its successors and assigns, subject to the reservations, covenants, and conditions hereinafter set forth, all of its right, title and interest, together with all improvements thereon and appurtenances thereto, in the following described real property (hereinafter the "Premises), commonly known as Phase I Parcel IA:

Situated in the Northwest Quarter of Section 30, Town 2, Range 5, M.R.S., City of Miamisburg, County of Montgomery, State of Ohio, being part of a 87.28 acre tract conveyed to the United States of America, as recorded in Deed Book volume 1214, Page 12 of the Deed Records of Montgomery County, Ohio, said 87.28 acre tract being comprised of a 59.75 acre tract, also a 19.40 acre tract, also a 9.97 acre tract, also a 0.78 acre tract and a 0.78 acre tract all known as Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, being a new division of 2.542 acres from said 87.28 acre tract and being more full bounded and described in Exhibit A attached hereto and incorporated herein.

RESERVING UNTO Grantor, the United States Environmental Protection Agency (USEPA) and the State of Ohio, acting by and through the Director of the Ohio Environmental Protection Agency (OEPA) or the Ohio Department of Health (ODH), their successors and assigns, an easement to, upon or across the Premises in conjunction with the covenants of Grantor and/or Grantee in paragraphs numbered 1.1-1.3, 3.2 and 3.3 of this Deed and as otherwise needed for purposes of any response action as defined under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, including but not limited to, environmental investigation or remedial action on the Premises or on property in the vicinity thereof, including the right of access to, and use of, to the extent permitted by applicable law, utilities at reasonable cost to Grantor. Grantee understands that any such response action will be conducted in a manner so as to attempt to minimize interfering with the ordinary and reasonable use of the Premises.

This Deed and conveyance is made and accepted without warranty of any kind, either expressed or implied, except for the warranty in paragraph 3.3 of this Deed, and is expressly made under and subject to all reservations, restrictions, rights, covenants, easements, licenses, and permits, whether or not of public record, to the extent that the same affect the Premises.

1. The parties hereto intend the following restrictions and covenants to run with the land and to be binding upon the Grantee and its successors, transferees, and assigns or any other person acquiring an interest in the Premises, for the benefit of Grantor, USEPA and the State of Ohio, acting by and through the Director of OEPA or ODH, their successors and assigns.

1.1 Grantee covenants that any soil from the Premises shall not be placed on any property outside the boundaries of that described in instruments recorded at Deed Book (1214, pages 10, 12, 15, 17 and 248; Deed Book 1215, page 347; Deed Book 1246, page 45; Deed Book 1258, pages 56 and 74; Deed Book 1256, page 179; Micro-Fiche 81-376A01; and Micro-Fiche 81-323A11) of the Deed Records of Montgomery County, Ohio (and as illustrated in the Phase I Parcel Environmental Summary, Notices of Hazardous Substances, Mound Plant, Miamisburg, Ohio dated_____ without prior written approval from ODH, OEPA, and USEPA, or successor agencies.

1.2 Grantee covenants not to use, or allow the use of the Premises for any residential or farming activities, or any other activities which could result in the chronic exposure of children under eighteen years of age to soil or groundwater from the Premises. Restricted uses shall include, but not be limited to:

(1) single or multi family dwellings or rental units;
(2) day care facilities;
(3) schools or other educational facilities for children under eighteen years of age; and
(4) community centers, playgrounds, or other recreational or religious facilities for children under eighteen years of age.

Grantor shall be contacted to resolve any questions which may arise as to whether a particular activity would be considered a restricted use.

1.3 Grantee covenants not to extract, consume, expose, or use in any way the groundwater underlying the premises without the prior written approval of the United States Environmental Protection Agency (Region V) and the OEPA.

2. The Grantor hereby grants to the State of Ohio and reserves and retains for itself, its successors and assigns an irrevocable, permanent, and continuing right to enforce the covenants of this Quitclaim Deed through proceedings at law or in equity, including resort to an action for specific performance, as against and at the expense of Grantee, its successors and assigns, including reasonable legal fees, and to prevent a violation of, or recover damages from a breach of, these covenants, or both. Any delay or forbearance in enforcement of said restrictions and covenants shall not be deemed to be a waiver thereof.

3. Pursuant to Section 120(h)(3) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. §9620(h)(3)), the following is notice of hazardous substances, the description of any remedial action taken, and a covenant concerning the Premises.

3.1 **Notice of Hazardous Substance:** Grantor has made a complete search of its files and records concerning the Premises. Those records indicate that the hazardous substances listed in Exhibit "B," attached hereto and made a part hereof, have been stored for one year or more or disposed of on the Premises and

Exhibit B also shows the dates that such storage/disposal took place.

3.2 **Description of Remedial Action Taken:** Institutional Controls are established. The Institutional Controls are set forth as covenants in Sections 1.1, 1.2, and 1.3 of this Deed.

3.3 **Covenant:** Grantor covenants and warrants that all remedial action necessary for the protection of human health and the environment with respect to any hazardous substances remaining on the property has been taken, and any additional remedial action found to be necessary after the date of this Deed regarding hazardous substances existing prior to the date of this Deed shall be conducted by Grantor, provided, however, that the foregoing covenant shall not apply in any case in which the presence of hazardous substances on the property is due to the activities of Grantee, its successors, assigns, employees, invitees, or any other person subject to Grantee's control or direction.

4. Unless otherwise specified, all the covenants, conditions, and restrictions to this Deed shall be binding upon, and shall inure to the benefit of the assigns of Grantor and the successors and assigns of Grantee.

IN WITNESS WHEREOF, the United States of America, acting by and through its Secretary of the Department of Energy, has caused these presents to be executed this _____day of _____, 2003.

UNITED STATES OF AMERICA

_____

State of Ohio)
County of Montgomery) SS.

Before me, a Notary Public in and for said State and County, appeared this _____day of _____, 2003, _____, who acknowledged that he is the Manager of the Ohio Field Office for the United States Department of Energy, with full authority to execute the foregoing on behalf of the United States of America, and who acknowledged the above to be his signature and his free act and deed.

SEAL

_____
Notary Public

Prepared by: Randolph T. Tormey
1 Mound Rd., Miamisburg, Oh 45343
(937) 865-3025
OH Atty. Regis. 0007803

Exhibit "A"
DESCRIPTION OF

2.542 Acres

Parcel IA

located in
Section 30, Town 2, Range 5, MRs.
City of Miamisburg, Montgomery County, Ohio

Situate in the Northwest Quarter of Section 30, Town 2, Range 5, MRs., City of Miamisburg, County of Montgomery, State of Ohio, ***being part of a 87.28 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 12*** of the Deed Records of Montgomery County, Ohio, said 87.28 acre tract being comprised of a 59.75 acre tract, also a 19.40 acre tract, also a 9.97 acre tract, also a 0.78 acre tract and a 0.78 acre tract all known as Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, ***being a new division of 2.542 acres from said 87.28 acre tract*** and being more fully bounded and described as follows:

Commencing at a "DOE" concrete monument found, said monument being the southwest corner of the Miami Mound Plat as recorded in Record Plat Book Volume 94, Page 34 of the Plat Records of Montgomery County, Ohio, said monument being the southeast corner of a 12.429 acre tract, known as Part lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio, said monument lying in the north line of a 79.74 acre tract, known as City Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, Ohio, conveyed to the United States of America, as recorded in Microfiche No. 81-0376A01 of the Deed Records of Montgomery County, Ohio, reference a "DOE" concrete monument found, South 83° 59' 35" East, 34.07 feet, said monument being the northeast corner of said United States of America 79.74 acre tract; thence with the easterly line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, the westerly line of the Miami Mound Plat, the westerly line of a 0.7 acre tract conveyed to Melissa A. Wilson, as recorded in Deed Microfiche No. 89-0125D01, the westerly line of a 0.26 acre tract conveyed to Betty J. Eckhart, as recorded in Deed Microfiche No. 98-0834C09, and the westerly line of a 0.78 acre tract conveyed to Randall and Rita Hilgefort, as recorded in Deed Microfiche No. 97-0746A08, all of the Deed Records of Montgomery County, Ohio, North 07° 06' 56" West, a distance of 714.44 feet to a 5/8" capped "LeRoy" iron pin found, said iron pin being set by William C. LeRoy, Professional Surveyor number 7664 of the State of Ohio by prior survey as recorded in the Montgomery County Engineer's Record of Land Surveys, Volume 1999, Page 0326, said iron pin being the northwest corner of said Hilgefort 0.78 acre tract, said iron pin lying in the north line of said original 19.4 acre tract and the south of said original 59.75 acre tract; thence with the north line of said Hilgefort 0.78 acre tract, South 85° 28' 23" East, a distance of 111.00 feet to a Mag nail set, said mag nail being the northeast corner of said Hilgefort 0.78 acre tract, said mag nail being the southeast corner of said original 59.75 acre tract, said mag nail being a center line of deflection point in the original center line of Mound Road; thence with the center line of Mound Road, the east line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract and the east line of said original 59.75 acre tract, North 05° 32' 42" East, a distance of 218.17 feet to a Mag nail set, said mag nail being the northeast corner of said Miamisburg Mound Community Improvement Corp.

12.429 acre tract and the **True Point of Beginning** of the hereinafter described new division of 2.542 acres;

Thence with the north line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, **North 85° 05' 35" West**, passing a Mag nail set at 30.00 feet, said mag nail lying in the west right of way line of Mound Road, in all a distance of **496.88 feet to a 5/8" iron pin set**, said iron pin being a point of curvature in the northwesterly line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract;

Thence with a new division line on the following eleven (11) courses,

1) **North 10° 39' 51" East**, a distance of **144.96 feet to a 5/8" iron pin set**;
2) **Thence, North 29° 43' 26" East**, a distance of **62.93 feet to a 5/8" iron pin set**;
3) **Thence, North 69° 33' 41" East**, a distance of **26.88 feet to a railroad spike set**;
4) **Thence, North 85° 25' 03" East**, a distance of **16.15 feet to a railroad spike set**;
5) **Thence, South 85° 59' 22" East**, a distance of **168.77 feet to a railroad spike set**;
6) **Thence, South 01° 34' 34" East**, a distance of **4.60 feet to a Mag nail set**;
7) **Thence, North 88° 51' 18" East**, a distance of **68.48 feet to a chiseled cross notch set**;
8) **Thence, North 06° 06' 00" East**, a distance of **16.15 feet to a 5/8" iron pin set**;
9) **Thence, South 85° 06' 10" East**, a distance of **31.61 feet to a 5/8" iron pin set**;
10) **Thence**, with a curve to the right, said tangent bearing being South 65° 24' 00" East, having a **delta angle of 69° 33' 41", a radius of 26.90 feet, an arc length of 32.78 feet** and **a chord bearing and distance of North 59° 30' 28" East, *30.79* feet to a 5/8" iron pin set**;
11) **Thence, South 85° 35' 05" East**, passing a 5/8" iron pin set at 94.16 feet, said iron pin lying in the west right of way line of Mound Road, in all a distance of **124.16 feet to a Mag nail set**, said mag nail lying in the east line of said original 59.75 acre tract, the east line of said United States of America 87.28 acre tract and the center line of Mound Road;

Thence with the east line of said original 59.75 acre tract, the east line of said United States of America 87.28 acre tract and the center line of Mound Road, **South 05° 32' 42" West**, a distance of **255.87 feet to the True Point of Beginning**, containing **2.542 acres**, more or less, being subject to all easements, highways and right of ways of record..

Bearing basis established as Grid North by GPS observation August 7th & 8th , 2002 at Latitude N39° 38' 25.81", Longitude W084° 17' 28.09" (Coast & Geodetic Survey Monument #G-139, 1947); Ohio State Plane Coordinate system, Ohio South Zone 3402 (NAD 83), True North being 01° 08' 11" east of Grid North.

This description prepared from an actual field survey performed under my direct supervision, Timothy W. Schram, Sr., Registered Professional Surveyor number 7299 of the State of Ohio, and that all monuments referenced herein and placed on the ground represents the boundaries of the herein described tract, and based on a Plat of Survey as recorded in the Montgomery County Engineer's Record of Land Surveys in Record Volume number _____, Page _____.

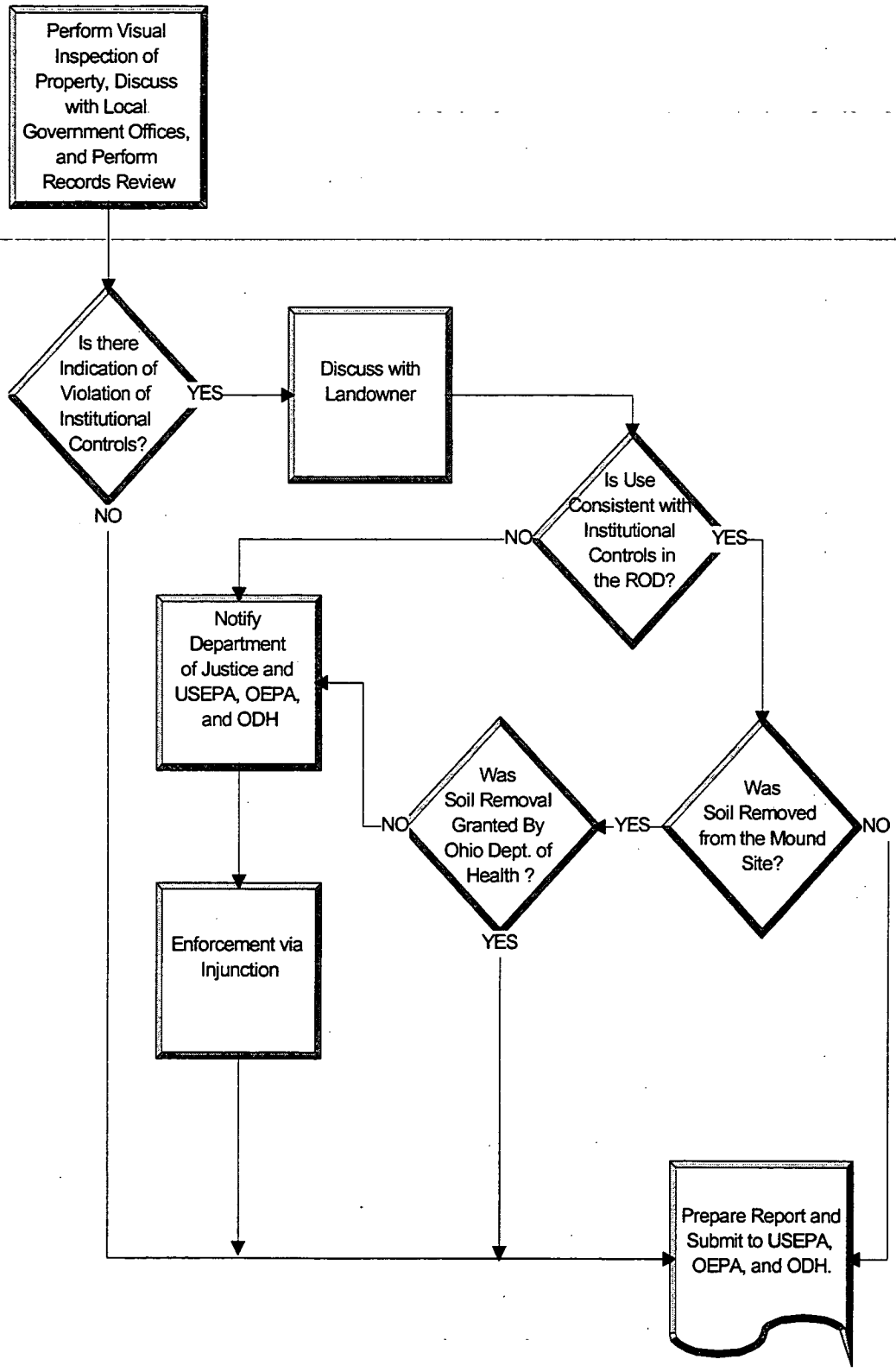
_____

Timothy W. Schram, Sr., Regist. Prof. Surveyor No. 7299
of the State of Ohio, September 11, 2002.
F: 02088 Mound Parcel 5 Surv Parcel IA

APPENDIX D

Mound Plant O&M Plan for the Implementation of Institutional Controls

Mound Plant O&M Plan for the Implementation of Institutional Controls



APPENDIX E

ARARs for Phase I

Appendix E

ARARs for Phase I

Chemical Specific ARARs

OAC 3745-81-11,	Maximum Contaminant Levels for Inorganic Chemicals
OAC 3745-81-12,	Maximum Contaminant Levels for Organic Chemicals
OAC 3745-81-13,	Maximum Contaminant Levels for Turbidity
OAC 3745-81-15,	Maximum Contaminant Levels for Radium 226, 228, Gross Alpha
OAC 3745-81-16,	Maximum Contaminant Levels for Beta Particle & Photon Radioactivity

Location Specific ARARs

ORC 6111.03,	Protection of Waters of the State
ORC 3734.20,	Description of OEPA Director's power for Protection of Public Health and the Environment
OAC 3745-66-15	Certification of Closure

Action Specific ARARs

ORC 317.08,	Criteria for County Recording of Deeds
ORC 5301.25(A),	Proper Recording of Land Encumbrances

APPENDIX F

Memorandum to File

MEMORANDUM

Date: 2/17/99
To: File
From: Randolph Tormey, Deputy Chief Counsel, Ohio Field Office, US DOE
Subject: Institutional Controls, Mound Facility, Miamisburg, Ohio

A question has arisen as to the validity and method of enforcement of restrictive covenants ("institutional controls") in deeds of conveyance for real property at the DOE Mound Facility, Miamisburg, Ohio. Currently in question are restrictive covenants to be placed upon a portion of the real property known as "Parcel D" as follows:

> "The parties hereto intend the following restrictions and covenants to run with the land and to be binding upon the Grantee and its successors, transferees, and assigns or any other person acquiring an interest in the Premises, for the benefit of Grantor, USEPA and the State of Ohio, acting by and through the Director of the Ohio EPA or ODH, their successors and assigns.
>
> Grantee covenants that any soil from the Premises shall not be placed on any property outside the boundaries of that described in instruments recorded at Deed Book 1214, pages 10, 12, 15, 17 and 248; Deed Book 1215, page 347; Deed Book 1246, page 45; Deed Book 1258, pages 56 and 74; Deed Book 1256, page 179; Micro-Fiche 81-376A01; and Micro-Fiche 81-323A11 of the Deed Records of Montgomery County, Ohio (and as illustrated in the CERCLA 120(h) Summary, Notices of Hazardous Substances Release Block D, Mound Plant, Miamisburg, Ohio dated January, 1999) without prior written approval from the Ohio Department of Health (ODH), or a successor agency.
>
> Grantee covenants not to use, or allow the use of, the Premises for any residential or farming activities, or any other activities which could result in the chronic exposure of children under eighteen years of age to soil or groundwater from the Premises. Restricted uses shall include, but not be limited to:
>
> (1) single or multifamily dwellings or rental units;
> (2) day care facilities;
> (3) schools or other educational facilities for children under eighteen years of age; and
> (4) community centers, playgrounds, or other recreational or religious facilities for children under eighteen years of age.
>
> Grantor shall be contacted to resolve any questions which may arise as to whether a particular activity would be considered a restricted use.
>
> Grantee covenants not to extract, consume, expose, or use in any way the groundwater underlying the premises without the prior written approval of the United States Environmental Protection Agency (Region V) and the Ohio Environmental Protection Agency."

Under Ohio law there is no uniform or standard manner to encumber property since there are as many valid reasons for restricting the use of property as there are means to effect those purposes. Recordation of the

restrictions with the county recorder for the county in which the land is situated is generally required for the restrictions to be enforced so as to provide knowledge of their existence. While all courts disfavor restrictions upon the free use of land, Ohio law provides that "courts must enforce a restriction where it is clearly and unambiguously found in a covenant." Brooks v. Orshoski, 1998 WL 484560 (Oh App. 6 Dist.) In general, the court will "construe the language of the restriction by giving it its common and ordinary meaning, and read the restrictive covenants as a whole to ascertain the intent of the creator." Id. This states the basic rule followed by courts in Ohio. It also seems that restrictive covenants are viewed more favorably when they serve some public purpose. The above covenants seem to be of this nature. Based upon the case law in Ohio, the above-stated restrictive covenants are in a form that is acceptable in Ohio and should be enforced by the courts in this state.

Ohio Revised Code (ORC) § 5301.25(A) provides "All ... instruments of writing properly executed for the conveyance or encumbrance of lands ... shall be recorded in the office of the county recorder of the county in which the premises are situated..." Further, Note 2 under this section mentions that "Proper recording of instrument serves as constructive notice of interest or encumbrance to all who claim through or under grantor by whom such deed was executed," citing Thames v. Asia's Janitorial Service, Inc., (Lucas 1992) 81 Oh App. 3d 579, 611 N.E. 2d 948, motion overruled 65 Ohio State 3d 1458. Furthermore, under ORC § 5301.48 to have "marketable record title" a landowner must have an unbroken chain of title of record for forty years or more. This places upon the buyer of property the need to search the record title for at least the past 40 years, which typically reveals any "cloud" on the title. Of course, the above-mentioned covenants would be such a cloud and would be noted by the subsequent buyer. In a subsequent sale that buyer would then place the covenants in the following deed thereby perpetuating this notice. It should be noted that the lack of a cloud for the forty-year period would normally eliminate the restriction, except under ORC § 5301.53(G) any right, title or interest of the United States may not be extinguished in this manner. This indicates that the restrictive covenants will run with the land and will be enforced against any property owner who takes the property through a deed in the chain of title from DOE.

Enforcement of the restrictive covenants would be through an injunctive action which could be brought by any party for whose benefit the restrictions were put in place. Brooks v. Orshoski, 1998 WL 484560 (Ohio App. 6 Dist.), Meisse v. Family Recreation Club, Inc., 1998 WL 70503 (Ohio App. 2 Dist.). Obviously the governmental agencies mentioned in the draft deed for Parcel D would be such a party, however it is also conceivable that any other party intended as the beneficiary of the restrictive covenants could likewise bring an action for enforcement. In view of the public purposes served by the above-mentioned covenants this class of persons could be quite large. As the grantor creating the restrictive covenants, the United States would likely take the lead in their enforcement, probably through the Department of Justice or the local US Attorney's office.

Based upon the foregoing, I conclude that restrictive covenants (institutional controls) are enforced by the courts of Ohio, particularly when they serve a public purpose. The covenants suggested would run with the land and recordation would assure notice of their existence. They are typically enforced through an injunctive action by any party intended to be a beneficiary of the restrictions. In this case, most likely by the United States.

Randy Torney

APPENDIX G

PRS Information

PRS 16. Area C (Old Building 72) was a former Hazardous Waste Storage Area dismantled in accordance with an Ohio Environmental Protection Agency approved RCRA closure plan. Core Team decided that PRS 16 requires No Further Assessment.

PRS 73. PRS 73, the Evaporator Storage Area, was an equipment storage area located in the Test Fire Valley. Further Assessment sampling in July 2001 identified no levels of concern. Core Team decided that PRS 73 requires No Further Assessment.

PRS 74. Quonset Hut (former), placed on a potentially contaminated concrete floor shows no indication that its shell was ever contaminated. The concrete floor was removed in 1963. Core Team decided that PRS 74 requires No Further Assessment.

PRS 258-265. PRSs 258-265 refer to the waste storage and treatment facilities formerly located in the "Burn Area" where a variety of wastes such as explosive powders, pyrotechnic materials, solid wastes contaminated with energetic materials, and non-radiological weapons components were thermally treated. Beryllium was the only COC identified as exceeding its Guideline Value during sampling events. There are no reported recent historical events to indicate other reasons for concern. Core Team decided that PRSs 258-265 require No Further Assessment.

PRS 276. Area 22, Orphan Soil from Other Areas, was a potentially contaminated site due to its use as a temporary storage area for contaminated soils. The soils were removed in accordance with the Core Team recommendation. Core Team decided that PRS 276 requires No Further Assessment.

PRS 280. Further Assessment sampling in the Waste Oil Drum Field yielded only low-level and isolated exceedances were noted above 10^{-6} RBGVs/screening levels; however, none were above cleanup objectives (10^{-5} RBGV + background). Core Team decided that PRS 280 requires No Further Assessment.

PRS 281. Area E, identified as a historical, isolated waste oil spill, produced levels of radiological contamination over Mound soils guidelines for radium-226. The area was subject to the removal action associated with the Building 21 demolition. Core Team decided that PRS 281 requires No Further Assessment.

PRS 284. The Building 21 Thorium Sludge Storage Facility held 4,914 drums of thorium oxalate from 1966-1975 and 1,258 drums of Cotter Concentrate (high-level nuclear waste) until 1987. Cleanup and removal of Building 21 was completed 31 March 1997. Core Team decided that PRS 284 requires No Further Assessment.

PRS 304. This Excavated Material Disposal Area was created due to the dumping of low-level thorium soils. Sampling in 1984 found plutonium and thorium levels below the risk-based guideline values. Core Team decided that PRS 304 requires No Further Assessment.

PRS 311. Potential Hot Spot Location S0706 was identified during a 1983 site survey project, which discovered an isolated plutonium-238 reading of 29 pCi/g. This level is below all associated cleanup levels and guideline values. Core Team decided that PRS 311 requires No Further Assessment.

PRS 313. Potential Hot Spot Location S0982 was identified as a thorium hot spot during

the Radiological Site Survey Project. Results from sampling in 1995 indicated no radioactive contamination in excess of guideline criteria. Core Team decided that PRS 313 requires No Further Assessment.

PRS 333. PRS 333 is an explosive surge tank (Tank 263) located along the southern border of Building 87,a previous explosives testing area that has since undergone Safe Shutdown. Core Team decided that PRS 333 requires No Further Assessment.

PRS 334. PRS 334 is an explosive surge tank (Tank 264) located along the southern border of Building 87,a previous explosives testing area that has since undergone Safe Shutdown. Core Team decided that PRS 334 requires No Further Assessment.

PRS 335. PRS 335 is an explosive surge tank (Tank 265) located along the southern border of Building 87,a previous explosives testing area that has since undergone Safe Shutdown. Core Team decided that PRS 335 requires No Further Assessment.

PRS 347. PRS 347 was identified according to qualitative hydrocarbon detections found during the PETREX soil gas portion of OU5, Non Area of Concern investigation. The 1996 Soil Gas confirmation sampling effort discovered no contamination above the 10^{-6} risk range. Core Team decided that PRS 347 requires No Further Assessment.

PRS 348. PRS 348 was identified according to qualitative hydrocarbon detections found during the PETREX soil gas portion of OU5, Non Area of Concern investigation. The 1996 Soil Gas confirmation sampling effort discovered no contamination above the 10^{-6} risk range. Core Team decided that PRS 348 requires No Further Assessment.

PRS 349. PRS 349 was identified due to plutonium detections found during the Mound Soil Screening Analysis performed as part of the June 1994 OU5, Operational Area Phase I Investigation. All concentrations are below the 10^{-5} Risk Based Guideline Value. Core Team decided that PRS 349 requires No Further Assessment.

PRS 350. Soil Contamination, Area West of Building 21, consists of detectable plutonium concentrations; however, concentrations were below all associated cleanup levels and guideline values. Core Team decided that PRS 350 requires No Further Assessment.

PRS 352. PRS 352 was identified as an elevated soil gas location due to an elevated PETREX passive soil gas portion of the OU5, Non Area of Concern investigation. Soil gas confirmation sampling indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 352 requires No Further Assessment.

PRS 353. PRS 353 was identified as an elevated soil gas location due to an elevated PETREX passive soil gas portion of the OU5, Non Area of Concern investigation. Soil gas confirmation sampling indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 353 requires No Further Assessment.

PRS 362. PRS 362 was identified as an elevated soil gas location due to an elevated

PETREX passive soil gas portion of the OU5, Non Area of Concern investigation. Soil gas confirmation sampling indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 362 requires No Further Assessment.

PRS 365. PRS 365 was identified as an elevated soil gas location due to an elevated PETREX passive soil gas survey result in 1994. A soil gas confirmation sample collected within 50 feet of this PRS indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 365 requires No Further Assessment.

PRS 369. PRS 369 was identified as an elevated soil gas location due to elevation qualitative PETREX hydrocarbon levels. During the 1996 soil gas confirmation sampling, all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 369 requires No Further Assessment.

PRS 370. PRS 370 was identified according to qualitative hydrocarbon detections found during the PETREX soil gas portion of OU5, Non Area of Concern investigation. The 1996 Soil Gas confirmation sampling effort discovered no contamination above the 10^{-6} risk range. Core Team decided that PRS 370 requires No Further Assessment.

PRS 371. PRS 371 was identified due to a single, elevated plutonium-238 detection during the OU5, Operational Area Phase I Investigation in 1994. In 1996, a sample was collected within approximately 25 feet of PRS 371 during the Soil Gas Confirmation Investigation. All concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 371 requires No Further Assessment.

PRS 372. PRS 372 was identified due to elevated soil gas measurements. Subsequent quantitative sampling showed that all soil samples taken in the area were at or below their respective 10^{-6} Risk Based Guideline Value. Core Team decided that PRS 372 requires No Further Assessment.

PRS 383. PRS 383 was identified as an area of possible organic contamination during the 1992 PETREX Survey. However, additional sampling in 1995 quantitatively determined that no volatile, semivolatile, PCBs, pesticides, metals, radionuclides, or explosives exceeded applicable guideline values. Core Team decided that PRS 383 requires No Further Assessment.

PRS 384. PRS 384 was identified due to elevated qualitative PETREX hydrocarbon levels. However, the soil gas confirmation investigation in 1996 determined that no volatile, semivolatile, PCBs, pesticides, metals, radionuclides, or explosives exceeded applicable guideline values. Core Team decided that PRS 384 requires No Further Assessment.

PRS 406. The southern portion of PRS 283 became a PRS due to potential thorium dust from the thorium sludge redrumming. However, radionuclides in the soils were

scattered and infrequent, and all occurrences were below the 10^{-5} risk-based guideline values. Core Team decided that PRS 406 requires No Further Assessment.

PRS 407. Soil Contamination West of Building 21 resulted in a removal action in which one to two feet of soil was excavated and disposed of via railcar shipments to Envirocare. PRS 407 was later binned No Further Action in 2000. Core Team decided that PRS 407 requires No Further Assessment.

PRS 418. PRS 418, the Overflow Pond South Inlet, was created to address potential plutonium-238, thorium-228, thorium-232, and Radium-226 contamination from PRS 407. Since the PRS 407 removal action, there are no known PRSs draining into the inlet. Although sample results for benzo(a)pyrene exceed the 10^{-6} guideline value, they are below the 10^{-5} risk-based guideline value. All other constituents are below guideline criteria. Core Team decided that PRS 418 requires No Further Assessment.

PRS 419. The Mound Plant Drainage Outflow Reroute, constructed during the Miami-Erie Canal Remediation Project, is monitored for radiological parameters under DOE Order 5400.1 and the DOE Regulatory Guide. It is also monitored for non-radiological parameters in accordance with the site's NPDES permit. To address potential radiological releases, the Outflow Reroute is also monitored daily for gross alpha and tritium, and bi-weekly from flow-proportional 24-hour composite samples for multiple radionuclides. Core Team decided that PRS 419 requires No Further Assessment.

PRS 421. PRS 421 is "The Ridge" across the road south of the location of the former Building 21. It was identified as a PRS when historical sampling data indicated the presence of contaminated soil. Contamination was confirmed during the verification sampling for PRS 407. The source of the contamination was surface runoff from the PRS 407 cleanup that followed preferential and intermediate drainage pathways south to the PRS 421 area. The removal action resulted in the excavation and containerization for disposal of approximately 105,133 cubic feet of soil, concrete, and asphalt. The cleanup objectives were 55 pCi/g for plutonium-238, 2.1 pCi/g for thorium-232, and 2.6 pCi/g for thorium-228. The OSC report documented that all verification sample results were below cleanup objectives.

APPENDIX H

Building Information

BUILDING INFORMATION

Phase I includes approximately 52 acres of land located in three distinct sections or parcels of the site property (Figure 2). The first parcel, the largest block of property in Phase I includes lands located on the south central part of the original 182 acres of the site that was purchased in 1947. This piece of property also contains a portion of the South Property (purchased in 1982). The second parcel of property included in Phase I is situated to the south of the Spoils Area and the site well pump houses, in the area designated as the South Property. The third parcel of property in Phase I lies to the south-southwest of Building 38.

Phase I includes 10 existing buildings and explosives magazines and 25 former production-era building sites including buildings, explosives storage magazines, and an electrical generator. Since the plant became operational, the properties in Phase I, with the exception of the South Property, have supported a number of plant related operations. Included in the activities that once took place in Phase I is explosives testing and production-related activities, administrative activities (i.e., offices and site security operations), utilities operations, waste processing operations (the Burn Area), and cleanup waste storage operations.

In addition to the production-era buildings noted above, Phase I also includes building sites dating from the construction era (a storage warehouse, a quonset-type hut building, and some temporary buildings).

Phase I lands have also been used for various waste and non-waste storage activities including waste container management, equipment management, and for other general plant uses.

BUILDINGS CURRENTLY LOCATED IN PHASE I

There are 10 existing buildings located within Phase I (as shown in Figure 3), including two buildings located in the Test Fire Area that have supported detonator and explosives testing operations (Buildings 3 and 87). In addition to the two Test Fire Area buildings, there are five explosives magazines located to the southwest of the Test Fire Area (Magazines 80, 81, 82, 83, and 84). Both of the buildings in the Test Fire Area and the explosives magazines are currently operated under users agreements that are being administered by MMCIC.

The remaining three buildings located in Phase I include Building 95, which is a chiller and steam plant that is located on the SM/PP Hill; Building 102, an office building located on the SM/PP Hill; and the Salt Storage (SST) Building.

Buildings currently located in Phase I are described below.

Building 3. Building 3 was constructed in 1963 and is an explosives material destructive test firing and environmental testing laboratory. With four additions to the building, including two attached corrugated fiberglass faced metal framed storage sheds, the square footage of Building 3 is currently 12,400 square feet.

When operated by DOE and the contractor, Building 3 included 17 environmental chambers for thermal testing, six systems for mechanical testing operations, two vibration testing systems, one centrifuge testing system, and three shock testing systems.

Building 3 was used as a facility for the destructive and environmental testing of explosives materials from the time of construction in 1963 until the building was turned over to EG&G Star City (now Perkin-Elmer) in 1994 under a lease agreement with the DOE. Building 3 has operated under that agreement since that time.

Building 87. Building 87 (or CTF-the Component Test Facility) is a two-story, 38,882 square foot, concrete structure, built slab-on-grade. The CTF offices and support facilities and other operational control/testing facilities that supported the testing cells were located on the first floor. The mechanical penthouse, on the second floor, contains HVAC heating and air conditioning, air handling units for the test cell areas, and a heat exchanger for hot water. The mechanical area occupies approximately 600 square feet. Building 87 was constructed in the 1980s and underwent shut down in about 1995.

Building 87 is currently being renovated by MMCIC for use by private industry.

Building 95. Building 95, the "SM/PP Chiller" consists of one larger building (Building 95) with 2,000 square feet of floor space, and two smaller ancillary buildings (Buildings 95-A and 95-B, each having 450 square feet of floor space. Buildings 95 (collectively) was constructed in the mid-1980s, in order to supplement P Building (Power Plant) operations, and in order to satisfy the demand for a chiller on the SM/PP Hill.

Building 102. Building 102 is a 10,982 square-foot two-story office building that was constructed in 1987 to support Mound's Decontamination and Decommissioning Program (D&D Program), and to provide an administrative area to house cleanup related staff. Through time, Building 102 has continued in its mission as an office, however, the building tenants have differed, including staff members from the PST Program, Soil Project team staff, as well as D&D Program staff members.

SST Building. SST Building was constructed in the early 1970s and is located in the vicinity of the former Burn Area, just to the southwest of where that area was located, and just to the east of the former Building 21 location. SST has been used for salt storage for snow control on site.

SST Building is a one-story, 590 square-foot, slab-on grade structure with wood framing for the walls and roof. The front of SST Building is open from wall to wall and from the ground to the roof. A 3-foot high concrete wall separates the wood structure from the slab and divides the area into two sections. Wood siding and the roof are covered with tar paper. SST Building was renovated in 2000.

Magazines 80, 81, 82, 83, and 84. Magazines 80, 81, 82, 83, and 84, are smaller explosives storage bunkers (explosives magazines) that were constructed in 1985.

Magazines 80, 81, 82, 83, and 84 each contain two-units or compartments. Each of the magazines is constructed of reinforced concrete as a box-shaped structure and considered non-standard earthen-covered magazines. The configuration of Magazines 80, 81, 82, 83, and 84 appears to be one unit. These magazines were used for the storage of energetic materials, and were used for that purpose, until they were transferred to EG&G Star City (now Perkin-Elmer) under a user agreement initiated with DOE.

The transition of Magazines 80, 81, 82, 83, and 84 to private industry took place in the mid-1990s, and these magazines have continued to operate under a user lease agreement since that time.

FORMER PRODUCTION ERA BUILDING SITES

There are numerous sites where production era buildings were once located within Phase I. Included in the former buildings that were located in Phase I are 4 buildings (Buildings 13, 14, 35, and 59) in the Test Fire Area that supported detonator and explosives testing operations. In addition to the Test Fire buildings, there were six explosives storage magazines to the southwest of the Test Fire Area (Magazines 4, 5, 8, 9, 10, and 20) that supported explosive operations.

Buildings 12 and 18 were located near the current Building 87 location into the 1980s. These buildings were apparently storage warehouses that were used to support explosives operations.

An additional four buildings or facilities were located in an area designated as the "Burn Area." This area was located to the northwest of SST Building, and included the Pyroshed Energetic Materials Waste Storage Unit, the Open Burn Energetic Materials Treatment Unit, Building 90 and the retort unit (an explosives treatment unit), and Magazine 53 (an explosives storage area).

Other building sites in Phase I also include the location for Building 39, a maintenance building, the location for an emergency electrical generator (Electric Generator Number 7), a process material storage building (Building 21), and four modular office buildings (Buildings 77, 78, 97, and 101).

The buildings once located on the former building sites within Phase I are described below.

Buildings 12 and 18. Building 12, titled the "Detonator Storage Building" was constructed in 1960, as a 57' x 32' long "Armco" steel building. Building 18, constructed in 1963, was similar in size and construction to Building 12. Both buildings were used to support explosives operations and were located about where Building 87 is currently located. Buildings 12 and Building 18 were demolished in the 1980s.

Building 13. Building 13 was a one-story, 44 square-foot wood-framed asbestos-coated steel structure on a concrete slab. Building 13 was located to the west of Building 21, and was used to support a program for remote monitoring of energetic materials

destructed in the Burn Area, located to the east. Building 13 contained a video monitor and electrical initiation equipment for firing explosive materials treatment devices. The building use, as described in 1990, was a "firing shed." Building 13 was demolished in 1997.

Building 14. Building 14 was a 42 square-foot, one-story, structure. This building was constructed with a wood and metal-frame and asbestos-coated sidewalls, with concrete deck roof on concrete footings. This building was used as an observation post in association with the former Burn Area to the east. The facility had no heating, cooling, or electrical services. The building use, as described in 1990, was metal melting. Building 14 was demolished in 1997.

Building 21. Building 21 was used for the storage of materials associated with two of Mound's processing missions, including thorium ores and protactinium ores (Cotter Concentrates). This structure was located along the south central border of the improved plant property; adjacent to the area designated as the Burn Area.

Building 21 was a 4,032 square-foot concrete structure with 10-inch thick floors and 14- to 16-inch thick walls. The roof was constructed of iron and steel. The facility was designed to ensure liquid tightness and was divided into two separate isolated bay areas. Building 21 became operational in 1964. Storage operations ended in 1987. Beginning in 1964, 1,338 drums of thorium oxalate were dumped in bulk form into the small bay area, while 3,576 drums of thorium hydroxide sludge were dumped in bulk form into the larger bay. The thorium sludge was ultimately sold to General Atomic Company for reclamation and was removed from Building 21 in 1975. Following removal of the thorium sludge, the building was cleaned and used as a staging area for Cotter Concentrates (high-level waste resulting from uranium milling). Approximately 1,258 drums of Cotter Concentrate were stored in Building 21. These drums were eventually shipped to the Nevada Test Site (NTS) in 1987 and use of Building 21 ceased. Since 1987, the building and surrounding area were maintained in a safe mode until the building was demolished in 1997.

Building 35. Building 35 was a 2,500 square-foot single-story structure built of concrete block. Building 35 was designed to provide x-ray and eddy current non-destructive testing of explosives. Building 35 was also used as the control room for the californium-252 multiplier (CFX) neutron radiography facility that was located in adjacent Building 59. Building 35 was demolished in the spring of 1998.

Building 39. Building 39, constructed in 1969, was a one-story structure constructed of prefabricated metal with a metal roof.

Initially, the eastern end of Building 39 was used by the Decontamination and Decommissioning project, which worked to produce fiberglass wooden boxes that were used for radioactive trash. The turntable used for this operation is still in place. Indications are that the facility was also used to perform gamma spectroscopy on these boxes.

From 1984 to 1988, the building was either inactive or used for storage.

In 1988, Building 39 was converted to a maintenance shop, and was divided into three sections: the east end was a machine shop; the middle was a break room; and the west end was used primarily for storage of building materials, parts, paints, and some solvents.

Building 39 was demolished in 1998.

Building 59. Building 59, the neutron radiography facility, was a 700 square-foot, two-story reinforced concrete structure with a rolled roof. Building 59 was constructed in 1970 to provide neutron radiography capability to the site.

Building 59 housed a neutron-radiation source (californium-252) that was used to supply neutrons to an assembly of uranium plates. The californium-252 source was stored remotely from the core when not in use; when radiography operations were to be conducted, the source would be transported via a hand-cranked source transfer system into its proper location within the core assembly. The californium-252 source was removed from the facility and transported to Oak Ridge National Lab in 1995. Building 59 was demolished in the spring of 1998.

Building 77 and 78. Building 77 and 78, both located to the north of Building 39 were modular office structures that were used in the early 1980s. Both Building 77 and Building 78 contained 12 rooms, each with overall dimensions of 23.5 feet by 60 feet, and a combined square footage of 2,995. Both of these buildings were removed from service or were dismantled by the 1990s.

Building 97. Building 97 was a 12-room, 7,410 square-foot, 23.5 foot by 60 foot modular office structure, located to the south of Building 39. Building 97 was constructed in the early to late 1980s and was removed from service and dismantled in the 1990s.

Building 101. Building 101 was a single-story modular building with wooden exterior and Hypalon roof. The square footage of Building 101 was 1,815. Building 101 was brought on site in 1986, and was used as offices for the area maintenance foreman and planner. It was sold and removed from the site in 1999.

Building 120. Building 120 was a 350 square-foot, one-story, wood-sided building with a metal roof. Building 120 was located just to the south of Building 102 and was used as an administrative office for the Decontamination and Decommissioning (D&D) Group. It was dismantled in 1998.

Burn Area Buildings. The Burn Area, excluding Magazine 53, described below, included three buildings and/or areas, as follows:

1. Pyroshed Energetic Materials Waste Storage Unit. This structure, known as the "Pyroshed" was used for the storage of pyrotechnic wastes and other energetic materials prior to their treatment at the Burn Area. The Pyroshed was located inside the fenced Burn Area and was constructed on a concrete pad measuring approximately 9 feet by 15 feet. The shed was approximately 7 feet high, with

chain-link fence walls. A locked entry gate was located in the front side of the structure.

2. Open Burn Energetic Materials Treatment Unit. The open burn unit was used for open burning of non-liquid explosive waste, pyrotechnic waste, and thermal treatment of explosive-contaminated material.

   The open burn unit consisted of a 12.3-foot by 18-foot base encircled by a 10-foot high composite metal wall with a sand core. The treatment zone measured approximately 12 feet by 12 feet, and the remainder of the floor space was occupied by an access-way. The entrance consisted of a 4-foot wide aisle that turned at a right angle to enter the treatment zone. The unit was developed on an 18-inch wide by 30-inch deep continuous, concrete footing developed on native soil. The enclosure's sides consisted of 0.25-inch thick milled steel plates.

3. Building 90. Building 90, constructed in 1984 and demolished in 1997, was a pre-engineered sheet metal building constructed on a reinforced concrete slab. The retort unit part of this building was located within a rectangular enclosure attached to the east side of Building 90 that was approximately 30 feet long and 15 feet wide with 9-foot high walls. Building 90 was designed to house the unit controls and waste feed operations for the Retort Unit (rotary-kiln-thermal-treatment-unit). Operations in Building 90 were suspended in January 1996, and the building was demolished in 1996-1997.

The buildings and facilities within the Burn Area were used for the destruction of pyrotechnics and energetic materials, including regulated hazardous waste explosives. Consequently, these operations underwent a RCRA closure, and as a part of that process were demolished in 1997 and 1998.

Electrical Generator 7. EG-7 (emergency generator) was constructed in 1972 to provide emergency electrical power to the Test Fire Area. The generator was an internal combustion key-starting engine generator housed in an 80-foot square metal structure, which was located just to the north of Building 63. EG-7 remained available as an emergency generator until the 1990s, when it was taken out of use. EG-7 was sold in 1998.

Magazines 5, 8, 10, and 20. Magazines 5, 8, 10, and 20 were smaller explosive storage magazines or bunkers that were constructed in the mid-1950s and into the early 1960's. These magazines were located in the Test Fire Area, in a fenced area behind the former Building 85 site and behind Building 87. The purpose of these structures was for the storage of Mounds energetic materials. These buildings were demolished.

Magazine 53. Magazine 53 was a one-story, 239 square-foot reinforced concrete structure. The roof was made of reinforced steel, and the structure was covered with earth. Magazine 53 was constructed in 1970 and was used for the storage of pyrotechnics and energetic materials that were destroyed in the Burn Area. Magazine 53 was also used as a storage area for hazardous waste regulated explosives, and

consequently underwent a RCRA closure. Magazine 53, as part of this closure, was demolished in January 1998.

Magazines 4 and 9. Magazine 4, the bulk storage magazine, was constructed in 1962 as an earthen covered magazine. Magazine 53 was constructed in an area adjacent to Magazine 9. Magazine 4 contained 4 units, with the front of the structure measuring 53 feet across. Magazine 9 was constructed in 1956, also as an earthen covered magazine. Magazine 9 contained a single cell that measured 17-feet by 14-feet. Both magazines were in the vicinity of Building 87. Magazines 4 and 9 were demolished by the 1980s.

FORMER CONSTRUCTION-ERA BUILDING SITES LOCATED IN PHASE I

There are three locations within Phase I that were used during the time that the original 1948-era buildings were constructed on the Mound site. These locations are summarized below:

Warehouse 12. Warehouse 12 was located in the approximate vicinity of the Building 39 site and was constructed by Maxon Construction Company to provide an administrative area (i.e., storage warehouse) in 1947 during the construction era for Mound's original buildings. Later plant records do not indicate any mission-related uses for Warehouse 12. Based upon comparisons of site photographs and available information, Warehouse 12 was likely demolished in the late 1940s or the early 1950s.

Tropical Huts and other Temporary Buildings. A number of shacks and tents (tropical huts) were used in conjunction with the construction of the original plant buildings in the very early 1950s for the storage of debris and other polonium contaminated materials. Little information is available on these buildings. However, based upon early photographs, there were three of these structures located near the current location of Building 2.

Building 19 Quonset Hut. The Quonset Hut is a 40-foot by 60-foot Stransteel brand structure that was originally located at Dayton Unit III and was relocated to the Mound site. When Unit III was being cleaned up, this building was disassembled and was moved from Unit III. In 1949, it was relocated to the lower valley of the Mound Laboratory site where the existing Building 3 is now located.

The Quonset Hut was used for shipping, receiving, and storing of radioactive field materials in the 1950s.

The Quonset Hut was also used for storage of bismuth-chloride sludges from the polonium separations. At that time, 500 to 600 drums of sludge generated by the hydrolysis process were stored in the Quonset Hut awaiting a determination on potential reuse or shipment to the Oak Ridge site for burial.

The Quonset Hut was also used for the storage of thorium in 1952 and for the storage of Purex residues from 1949 to 1954.

In 1963, the Quonset Hut was again relocated when it was moved to its current location near the western property boundary.

OTHER LAND USE AREAS IN PHASE I

In addition to uses of the Test Fire Area (i.e., around Building 2) for the management of materials during the construction era and use of those same areas for early production era uses, the lands in Phase I have also been used for the following purposes:

SM/PP Pad. The SM/PP Pad is a concrete pad that was used by waste management for the management of low-level waste boxes containing soil and debris, as well as being used as a staging site for unused or empty low-level waste boxes. This pad is located to the east of the former Building 21 site and north of the SST Building.

Fenced Location for Storage of Equipment and Drums near Building 21. A fenced area to the east-southeast of Building 21 was used for the management of low-level waste drums and potentially contaminated equipment. This area was addressed as part of the Building 21 cleanup activities.

Building 21 soils management area, east of SST Building. This area was used for the management of soils excavated after the Building 21 operations ceased and was addressed as part of the Building 21 cleanup activities.

South Property Portions of Phase I. The portions of the south property included in Phase I are part of two property parcels containing 124 acres of rolling hills to the south of the main processing related areas. DOE had purchased the South Property (also called the "New Property") in 1981 in part as a buffer and in part for possible future expansions. Despite its purchase for possible future expansion, it has for the most part remained unused since the date of purchase. The only plant uses that have taken place in the areas to be transferred in Phase I are the installation of boundary fences, the grading of the surface and the associated filling in of low-lying areas, and road installation and mobile laboratory operations in support of the Canal Removal Action.

An older unimproved road. The road running from the vicinity of Building 105 to the area behind Buildings 2, 3, and 87 was improved and the curves banked to utilize the area as a haul road in support of clean up activities in the Building 21 area and in the Burn Area.

Unidentified trailers near Building 21 and the SST Building. A grouping of office-type trailers existed in the vicinity of Building 21 and the SST Building were removed from this location by the 1990s.

Concrete Pad West of Building 35. The Building 35 concrete pad area was used by waste management for the management of low-level waste boxes of soil and debris.

P Building Soils Management Area-"Petro Piles". In the early 1990s, soil that was removed in conjunction with the removal of the P Building fuel oil tank removal were staged in the vicinity of Building 87 and Building 85 for treatment in a biodegradation facility for petroleum contaminated soils.

Management Area for Equipment. In 1996 and 1997, along the current property line for (previously transferred) Release Block D and Phase I (west of Building 100), an area was used to store portable office trailers, modular guard shacks, portable utility buildings, and various types of equipment that had been removed from an equipment management area in the Spoils Area.

Storage of Bird-Cage Drums. In the mid-1990s, empty blue transport drums that had been used for the transportation of fissile (product) material were located along the current property line for Release Block D and Phase I (west of Building 100). These drums were constructed with an internal framework that suspended the material contained in the drum in the drums' center, allowing the placement of the drums in a manner that was consistent with the criticality requirements for the contained material.

APPENDIX I

Geochemical Evaluation of Elevated Ba and Ra in Bedrock at the Miamisburg Closure Project, Draft, WSRC-TR-2003-00281, June 2003

Denham, Looney, and Gilliat

June, 2003 **DRAFT**

Introduction

The Miamisburg Closure Project (MCP, or the Mound Plant) is located near the southern border of the city of Miamisburg and about one half mile from the Great Miami River. This river and tributaries/seeps in the drainage basin of this river serve as the primary discharges for groundwater in the vicinity of the Mound Plant. The 306-acre site is located on a ridge complex that overlooks the city. Beginning in the 1950s, MCP served as an integrated research, development, and production facility in support of DOE weapon and nonweapon programs, especially in the areas of chemical explosives and nuclear technology. The principal mission of MCP was research, development, and manufacture of nonnuclear explosive components for nuclear weapons that were assembled at other DOE sites. Other major operations at MCP included:

- Manufacture of stable (nonradioactive) isotopes for medical, industrial, and general research.
- Recovery and purification of tritium from scrap materials generated by MCP and other DOE sites.
- Development and fabrication of radioisotopic thermoelectric generators fueled with plutonium-238 to provide power sources for such projects as lunar experiments, satellites, and spacecraft.
- Surveillance of explosive and radioactive weapons components received from other DOE sites.

Currently, the facility is being readied for reuse as a public technological and industrial park – the Mound Advanced Technology Center. This transition is facilitated by core teams of local governments, environmental protection and regulatory personnel, and Mound Plant representatives. The industrial park will be implemented through a public-private partnership known as the Miamisburg Mound Community Improvement Corporation (MMCIC). A key factor in the transition is documenting that the site and facilities are sufficiently clean to support the intended "brownfield" industrial park reuse plans. The transfer documentation and determination process is being performed on a parcel-by-parcel basis to support steady progress by making areas available for redevelopment as soon as possible. Notably, information on the levels of contamination in groundwater is one evaluation factor used in determining the readiness for parcel transfer. In many cases, these data are evaluated by determining that the levels of process related chemicals are below their relevant standards.

Recent groundwater data collected for both routine monitoring and to support parcel transfer yielded some unusual and unexpected results. For example, relatively high concentrations of radium and barium were observed in low-yielding bedrock wells (primarily in wells 0445 and 0335, and to a lesser degree in several bedrock wells near these two). The wells are located in two different areas of Mound. Neither of the subject areas is located in the central MCP production and material handling areas. While this does not eliminate Mound processes as a potential source of the elevated concentrations, it suggests that alternative hypotheses about the origins of the water should be systematically examined. Cursory examination of the data suggested that the overall

water chemistry profile from both areas was similar to natural midcontinental basinal brines – salt-rich water that retains characteristics associated the deposition of sedimentary rock and/or with specific types of geochemical interactions of a solution with the rock. The continued presence of basinal brine over an extended period of time can occur only if the water trapped in a rock is not part of the active hydrologic system where rainfall would flush the system. Finally, large-scale storage of salt for road deicing and for other non-process uses could generate a relatively pure sodium chloride solution that may sink and interact with the minerals in the bedrock, shifting solution composition in predictable ways. Fortunately, there is a large body of literature on the geochemistry of basinal brines, and on the chemical interaction of salt water and wastes with various types of rock. This literature provides a solid scientific foundation to help determine the source of the brine in the bedrock in general, and the source of the radium and barium in this water in particular.

To perform the scientific examination, a hypothesis testing approach was used. For each hypothesis, the original source of the observed brine was postulated and the resulting geochemical signatures (using various types of data -- isotope ratios, elemental ratios, age dating, and the like) were predicted based on theory. The actual measured water chemistry was then compared to the predictions for each type of data and the results were tabulated in terms of answers to simple questions. Did the actual data from the wells uniquely match a hypothesis and provide strong support for that hypothesis? Was the data simply "consistent with" one or more hypotheses? Was the data inconsistent with one or more hypotheses? While none of the individual measurements provided a definitive result, the data from the various methods taken together provide strong evidence to predict the most probable source(s) of the "contaminated" bedrock well water using a weight of evidence approach. The specific hypotheses tested and details of the examination are provided below.

Relevent Groundwater Hydrology

Morphologically, the MCP consists of two hills (the "Main Hill" and the "SM/PP Hill") steeply sloping down into a central valley feature. The MCP is underlain by unconsolidated glacial deposits within a deeper bedrock valley. On the hills, a thin layer of heterogeneous unconsolidated sediments (glacial deposits and fill) is present above the bedrock. The central valley is filled with a thicker sequence of glacial till and outwash sediments and is connected to a larger regional aquifer commonly called the Buried Valley Aquifer (Figure 1).

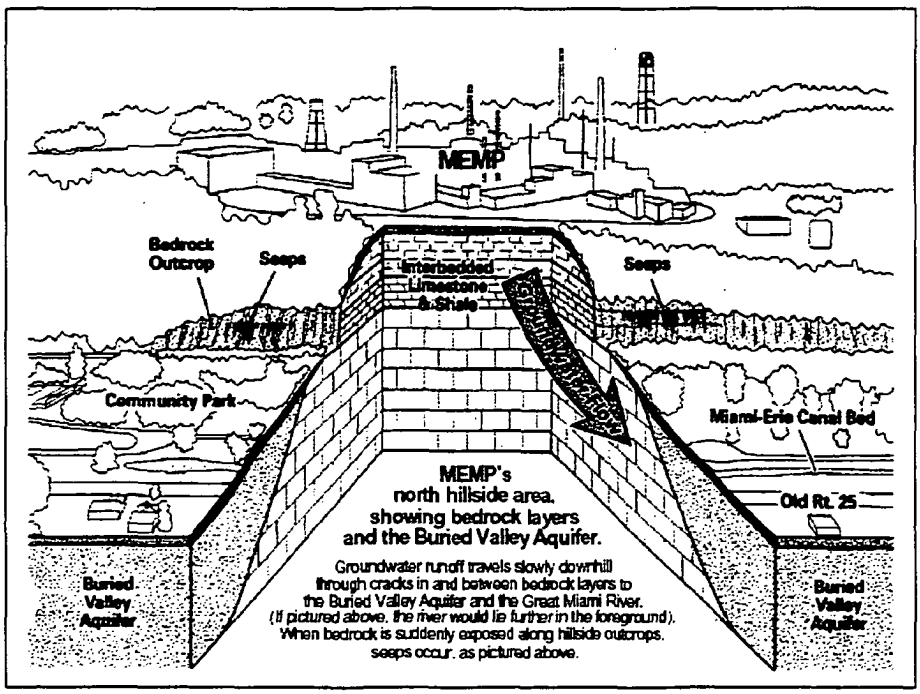


Figure 1. Photograph of the Mound Plant and conceptual hydrology diagram

The bedrock valley itself is a layered sequence of shale and limestone. The upper portion of the bedrock contains secondary permeability in the form of bedding planes and vertical fractures. The uppermost portion of the fractured bedrock zone participates in the regional and subregional flow system. The thickness of the fractured portion of the bedrock is reported to be a few tens of feet thick and is underlain by bedrock that has lower primary permeability and lower fracture frequency. As depth increases in the bedrock, the water may be isolated from active flow by lack of permeability or lack of connection (Figure 2).

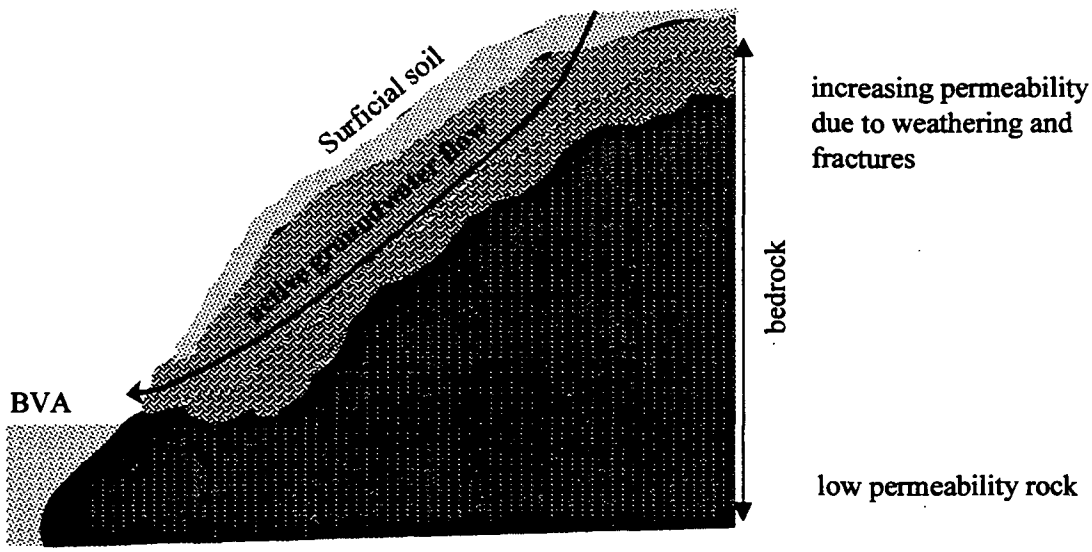


Figure 1. Simplified diagram of flow to support alternative hypothesis development

As shown in Figure 2, water enters the subsurface of the Mound Plant primarily through recharge from rainfall. Water entering the subsurface moves vertically in the vadose zone and into the water table. Once in the water table, flow is both lateral and vertical (downward) in recharge areas, eventually curving upward as groundwater drains to outcrops (seeps and surface water). Thus, in some areas flow trajectories will reach their maximum depths in the upper portion of the complex fractured rock zone (but limited by the relatively impermeable underlying bedrock). These flow paths are generally toward local seeps and the BVA and ultimately the Great Miami River.

Bedrock wells that have similar brine chemistry are located in two areas of the Mound. Figure 3 is an overhead photograph of MCP that outlines these two areas. Each of the areas is designated identified by a rectangle and identified using the well name of the bedrock well with the highest brine concentration. Figures 4 and 5 show a closer view of the two areas and the location of the nearby wells, many of which were utilized in the geochemical examination.

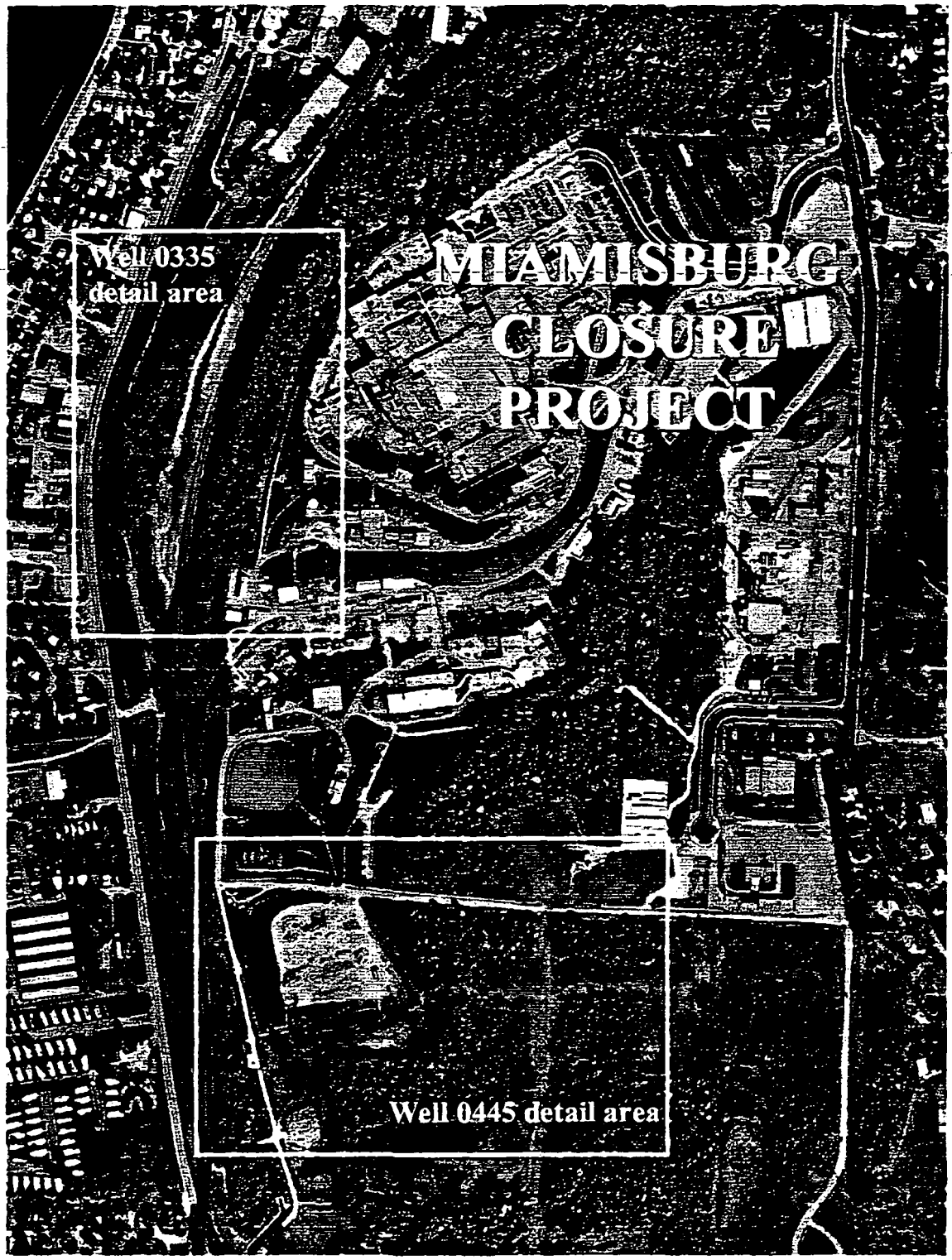


Figure 3. MCP showing the two areas where bedrock wells exhibit similar brine rich chemistry

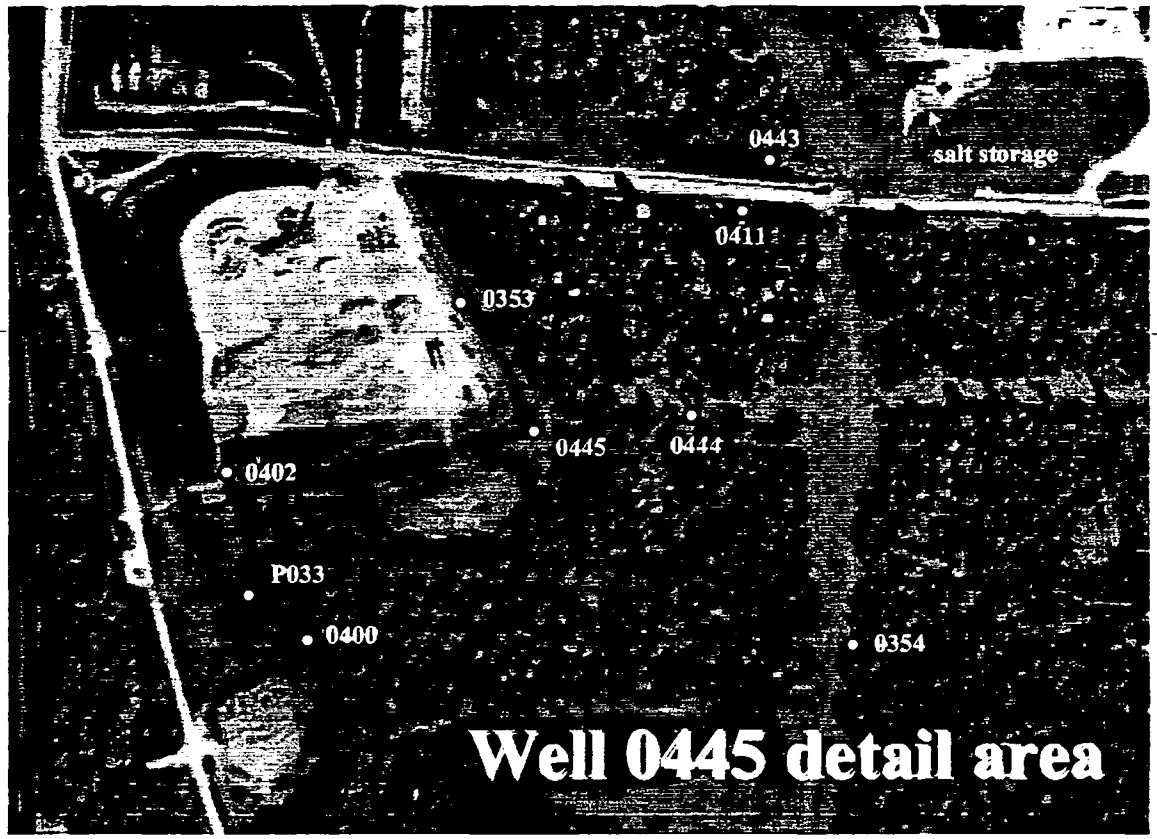


Figure 4. Detail Area showing wells in the vicinity of 0445

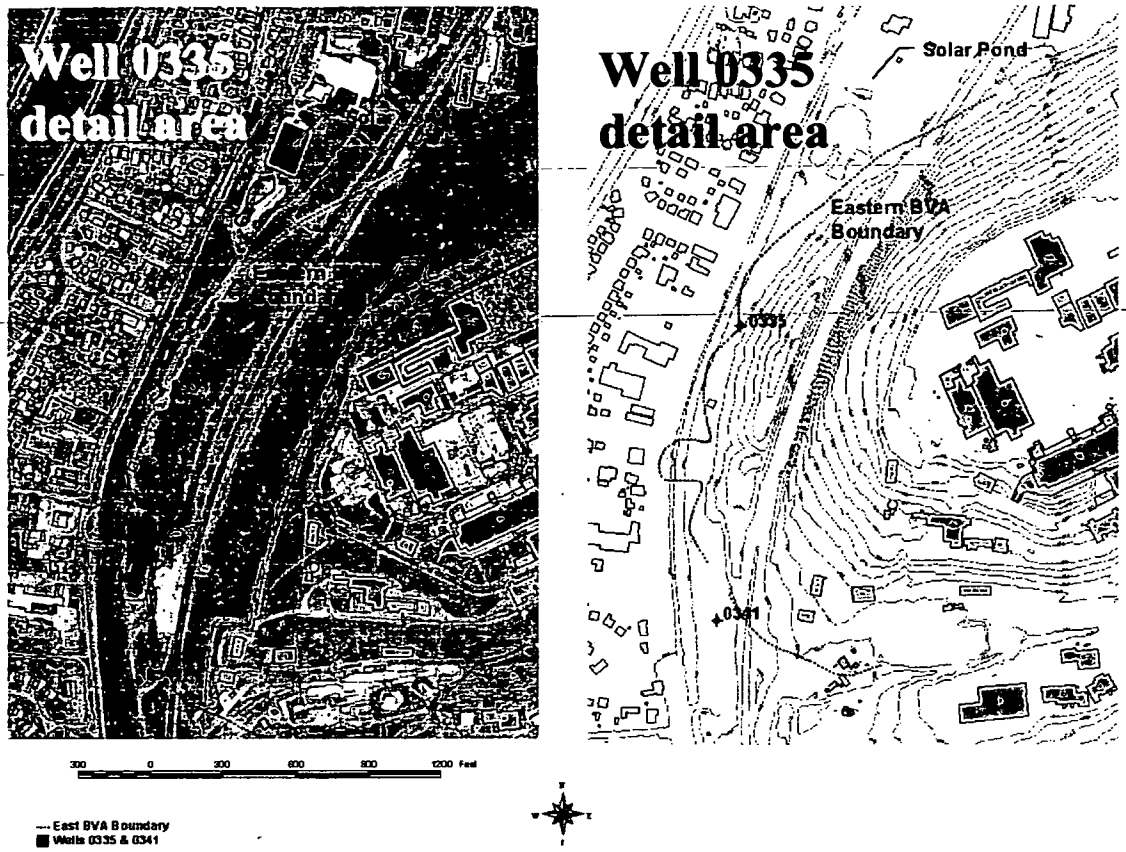


Figure 4. Detail Area showing wells in the vicinity of 0335

There is a potential for installing bedrock monitoring wells below the active hydrologic system. These wells would be ideally configured to sample natural or anthropogenic brines that are isolated by depth and density. In a general sense, there are only three plausible hypotheses for the origin of the brine observed in the subject bedrock wells at Mound. These are shown in Figures 6 through 8. Each of these figures is superimposed on the simplified hydrology described above. In all cases, the figures show a dense sodium chloride rich brine that is present, or that has accumulated, in an isolated area of the bedrock. This zone is not participating in the active flow of infiltrating rainfall ("meteoric water") as it moves toward seeps and outcrops. The differences in the figures relate to the origin of the brine. In the first hypothesis (Figure 6), the brine is natural – a midcontinental basinal brine or solution of evaporite minerals. These types of brines have been observed in Ohio and other upper midwestern areas of the United States (references). In the second hypothesis (Figure 7), the brine is anthropogenic in origin and results from the dissolution of common sodium chloride salt (from road salt and other similar sources). The resulting solution is dense and migrates downward due to gravity and accumulates in deep zones that are accessible vertically to dense solutions but are not participating in the active lateral flow of water. Once emplaced, the brine can not flow out of the deep zone but only diffuse out at a slow rate. The salt solution interacts and equilibrates with the minerals in the rock to alter the simple sodium chloride chemistry in predictable ways. The third hypothesis (Figure 8) is similar to the second, except that the origin of the brine is assumed to be a historical Mound process or process waste or sludge. Importantly, while similar in emplacement mechanism, the waste hypothesis can be distinguished from the salt hypothesis using specific predictable and credible differences in isotopic ratios and flow/timing considerations.

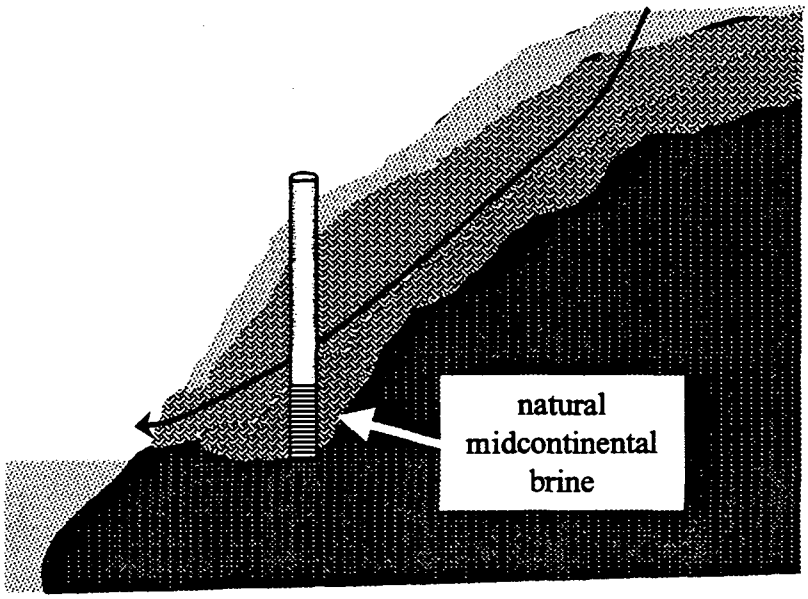


Figure 6. Hypothesis showing an isolated area of natural brine

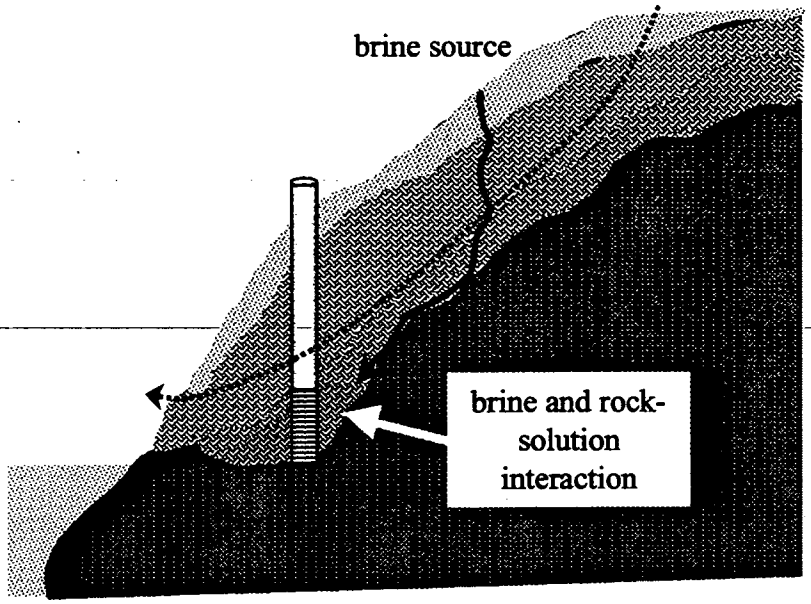


Figure 7. Hypothesis showing an isolated area of brine accumulation due to anthropogenic salt

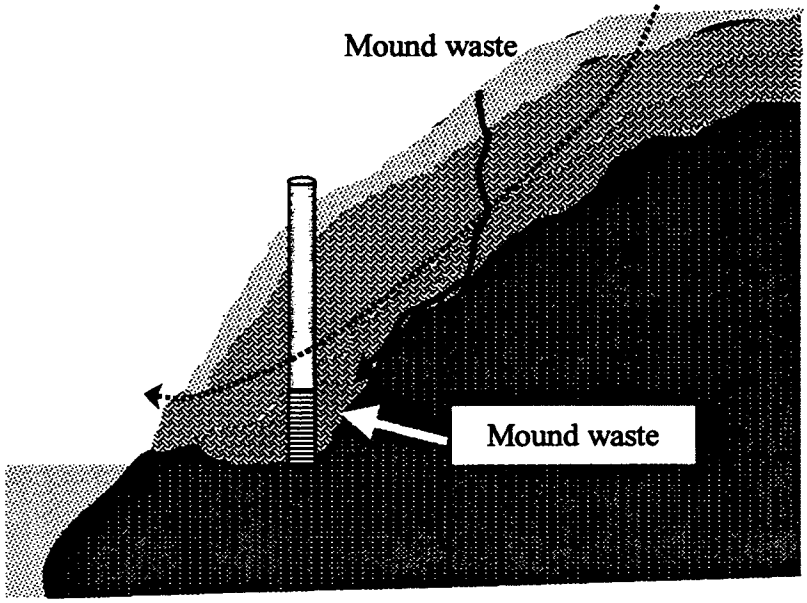


Figure 8. Hypothesis showing an isolated area of brine accumulation due to Mound wastes

The objective of this study was to discern the most likely source of radium and barium in the groundwater based on geochemical evidence. This evidence includes data on the origin of the actual water, the origin of the dissolved salts, and radium isotope systematics.

Ratios of stable hydrogen and oxygen isotopes were used to indicate the source of water. These are reported as:

$$\delta D_{(sample)} = \frac{\frac{^2H}{^1H}(sample) - \frac{^2H}{^1H}(standard)}{\frac{^2H}{^1H}(standard)} \times 1000$$

$$\delta^{18}O_{(sample)} = \frac{\frac{^{18}O}{^{16}O}(sample) - \frac{^{18}O}{^{16}O}(standard)}{\frac{^{18}O}{^{16}O}(standard)} \times 1000$$

In groundwater that originates as atmospheric precipitation and has experienced little evaporation or exchange with aquifer rocks, δD is linearly related to δ18O (Craig, 1961). This relationship, known as the Global Meteoric Water Line, after the designation for this type of water is:

$\delta D = 8.13\delta^{18}O + 10.8$ (Rozanski et al., 1993)

Evaporation tends to concentrate the heavy isotopes and drives water composition toward heavier values of dD and d18O (Figure 9). Basinal brines are often the result of a combination of evaporation and fluid-rock interactions that result in isotopic compositions that differ from the Global Meteoric Water Line. Fluid-rock interactions, such as exchange of oxygen with aquifer rocks, tend to drive the isotopic composition of the groundwater toward that of the rock. This could mimic an evaporation trend, or conversely, could drive a groundwater composition toward lighter isotopic values.

Tritium concentration is also a useful indicator of groundwater origin. Prior to atmospheric testing of hydrogen bombs in the 1950s, tritium concentrations in rainfall were very low. Therefore, groundwater that recharged prior to this time contains little tritium. This is the case for basinal brines formed from connate waters. Groundwater that has recharged since atmospheric testing contains higher tritium concentrations that reflect recent atmospheric precipitation. For example, shallow groundwaters from "ambient wells" in Ohio contain tritium concentrations that range from 15 to 140 pCi/L (Ohio EPA, www.epa.state.oh.us). "Old" groundwater would contain tritium concentrations of less than 25 pCi/L.

The composition of dissolved solids in groundwater also reflects its origin. Elemental ratios are often used to distinguish between processes such as evaporation, dissolution/precipitation of minerals, and ion exchange. Enrichment of bromide and iodide relative to chloride may indicate a groundwater has experienced considerable evaporation. Sodium bromide and sodium iodide are more soluble than sodium chloride. Therefore, if evaporation occurs beyond the point of halite saturation the water will become enriched in bromide and iodide relative to chloride. Other elemental ratios can be used in similar ways to differentiate between processes responsible for the evolution of a groundwater.

Radium isotopes are an important indicator of the origin of elevated radium concentrations in groundwater. ^{228}Ra is a daughter of ^{232}Th and has a half-life of 5.75 years. Less than 60 years are required for ^{228}Ra to reach secular equilibrium with ^{232}Th. ^{226}Ra is a daughter in the decay chain of ^{238}U and has a half-life of 1600 years. Over 2 million years are required for ^{226}Ra to reach secular equilibrium with ^{238}U. At a site where processed ^{232}Th was disposed, ^{228}Ra concentrations may be elevated from decay of the ^{232}Th. In contrast, elevated concentrations of ^{226}Ra can not be derived from disposal of processed ^{238}U. Thus, an explanation for elevated radium concentrations must account for the ^{228}Ra/^{226}Ra ratio, as well as the actual concentrations.

Mineralogy and chemical composition of the aquifer rocks are fundamental controls on the chemical evolution of a groundwater. Interaction of groundwater with aquifer rocks will drive the groundwater composition toward that of the rock. However, this is complicated by differing solubilities of aquifer minerals, differing exchange capacities, and kinetics of reactions. Nevertheless, understanding the mineralogy and chemistry of aquifer rocks allows assessment of reaction possibilities.

Determining the origin of a groundwater conclusively is difficult, particularly when only a few well samples are available. Different groundwater evolution paths can often result in similar chemical and isotopic trends. There is rarely a definitive test for a particular hypothesis, and thus conclusions must be based on a preponderance of the evidence. This includes groundwater flow paths, location of wells and screen zones, proximity of potential sources of dissolved constituents, as well as the chemical and isotopic trends. The problem is compounded by sampling issues. Samples obtained from wells with 10-foot screens are composites of water entering the screen over the entire interval. This can lead to mixing of different water types and blurring of distinct geochemical trends. The goal of this study was to assemble sufficient evidence to identify the most probable cause of elevated radium and barium in groundwater from wells 0445 and 0335.

Table 1 shows a matrix of the geochemical evidence versus the trends expected for each of the major hypotheses. At the conclusion of this report the matrix is repeated with an assessment of whether the actual data were consistent or inconsistent with each of the hypotheses.

Table 1: Matirx of geochemical evidence versus the major hypotheses of brine formation.

	Natural Brine			
Evidence	**Evaporation**	**Dissolution of Evaporite**	**Dissolution of Salt at Surface**	**Waste Disposal**
General Considerations	Regional Influence	Regional Influence	Point Source	Point Source
Oxygen and Hydrogen Isotopes	Trend Toward Heavier Values than Meteoric	Probable Meteoric Trend	Meteoric Trend	Not Definitive (many processes produce evaporative trends)
Tritium	<25 pCi/L	<25 pCi/L	>25 pCi/L	>25 pCi/L
Bedrock Composition	Must be Consistent with Observed Water Composition	Must be Consistent with Observed Water Composition	Must be Consistent with Observed Water Composition	Must be Consistent with Observed Water Composition
Major Ions	Similar to Altered Seawater	Similar to Altered Seawater	Similar to Altered Seawater	Possibly Similar to Altered Seawater
Bromide and Iodide	Possible Enrichment	Probable Enrichment	Probable Enrichment	Not Definitive
Radium Systematics	Must be Consistent with Natural Origin	Must be Consistent with Natural Origin	Must be Consistent with Salt Origin or Derivation from Interaction of Brine with Bedrock	Must be Consistent with Waste Origin or Derivation from Interaction of Brine with Bedrock

Methods

The locations of wells sampled are shown in Figures 4 and 5 and screen zones, aquifers sampled and sampling methods are listed in Table 2. Wells that maintained sufficient flow were purged until field parameters stabilized. For those that went dry during purging, sampling was done after water levels had recovered. Temperature, pH, specific conductance, redox potential, and dissolved oxygen were measured in the field using a YSI 556 water quality meter. Turbidity was measured in the field with a Hach 2100P turbidity meter. Alkalinity titrations were done in the field using a Hach alkalinity kit. Samples were not filtered. Laboratory analytical methods are summarized in Table __.

Table 2: List of wells sampled, screen zones elevations, elevations of contacts between bedrock and till/BVA, aquifers sampled, and sampling methods (SP = submersible pump, B = bailer).

Well ID	Screen Zone Elev. (ft. msl)	Contact Elev. (ft. msl)	Aquifer Sampled	Method
0411	808.7 – 798.7	822.6	Bedrock	SP
0443	829.2 – 819.0	855.9	Bedrock	SP
0444	749.2 – 740.0	769.7	Bedrock	B
0445	710.9 – 700.8	716.3	Bedrock	B
0354	754.9 – 744.9	755.9	Bedrock	B
0341	661.4 – 651.4	665.4	Bedrock	SP
0335	656.9 – 651.9	683.9	Bedrock	B
0353	731.9 – 726.9	728.9	Till + Bedrock	SP
0400	682.8 – 672.8	<671.3	BVA	SP
0402	683.8 – 673.6	<671.6	BVA	SP
P033	681.7 – 676.7	598.7	BVA	SP

Table 2: Summary of analytical methods.

Analysis	Location	Method
Metals	Mound	Inductively Coupled Plasma Emission Spectrometry (ICP-ES)
Major Anions	Mound	Ion Chromatography
Radium Isotopes	Mound	Gamma Spectroscopy
Deuterium/oxygen Isotopes	Savannah River Ecology Lab	Mass Spectroscopy
Low-level Br and I	Savannah River Ecology Lab	Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
Tritium (>300 pCi/L)	Mound	Liquid Scintillation
Tritium (<300 pCi/L)	Savannah River Technology Center	Gas Proportional Counting

Results and Discussion

There are three ways that a groundwater can become saline. Seawater or saline lake water can be evaporated at the surface and seep into groundwater or be incorporated into pore spaces during deposition. Salt can be dissolved from natural evaporite deposits or from man-made sources (including industrial processes). This dissolution may occur at the surface and the resultant brine may then infiltrate and mix with groundwater. Alternatively, the groundwater may directly encounter a source of salt. Finally, ultrafiltration in deep basins is thought to produce some oil field brines (Bredehoeft et al., 1963; Hitchon et al., 1971). Ultrafiltration is similar to reverse osmosis and occurs when groundwater is driven up through clay layers that act as a permeable membrane to water, but only a semipermeable membrane to dissolved ions. This can concentrate dissolved ions in the groundwater that does not pass through the clay. However, substantial pressure gradients are required to sustain this process and several researchers have questioned whether sufficent pressure gradients exist even in deep basins (Hanor, 1987). It is unlikely that such pressure gradients were achieved in the bedrock beneath the Mound facility.

The other general observation regarding the origin of saline groundwater in wells 0335 and 0445 is that purely natural sources of such groundwater tend to be regional rather than confined to specific wells. Figure 10 shows chloride concentrations in bedrock wells sampled. Groundwater in well 0445 has a chloride concentration 50 to 160 times those in near-by wells 0411, 0443, and 0444. Likewise, chloride concentrations in well 0335 are 8 times higher than in near-by well 0341. This does not eliminate natural sources of brine from consideration, but the areal distribution of high concentrations of dissolved salts is more compatible with a surface source of salt.

Each of the processes that can produce brines affects the chemical and isotopic composition of the groundwater in a different way. Yet a unique imprint on specific constituents may not be evident. Thus, it was the goal of this study to provide several lines of evidence that, together, will point to the most likely origin of the saline groundwater in wells 0335 and 0445.

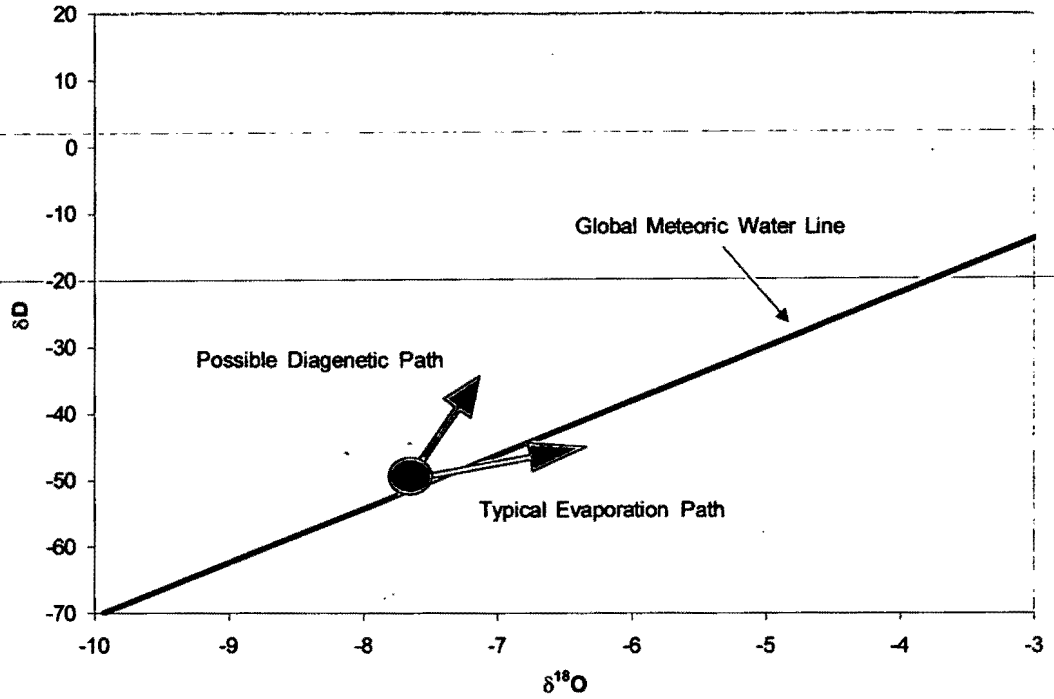


Figure 9: Model of expected stable isotope trends.

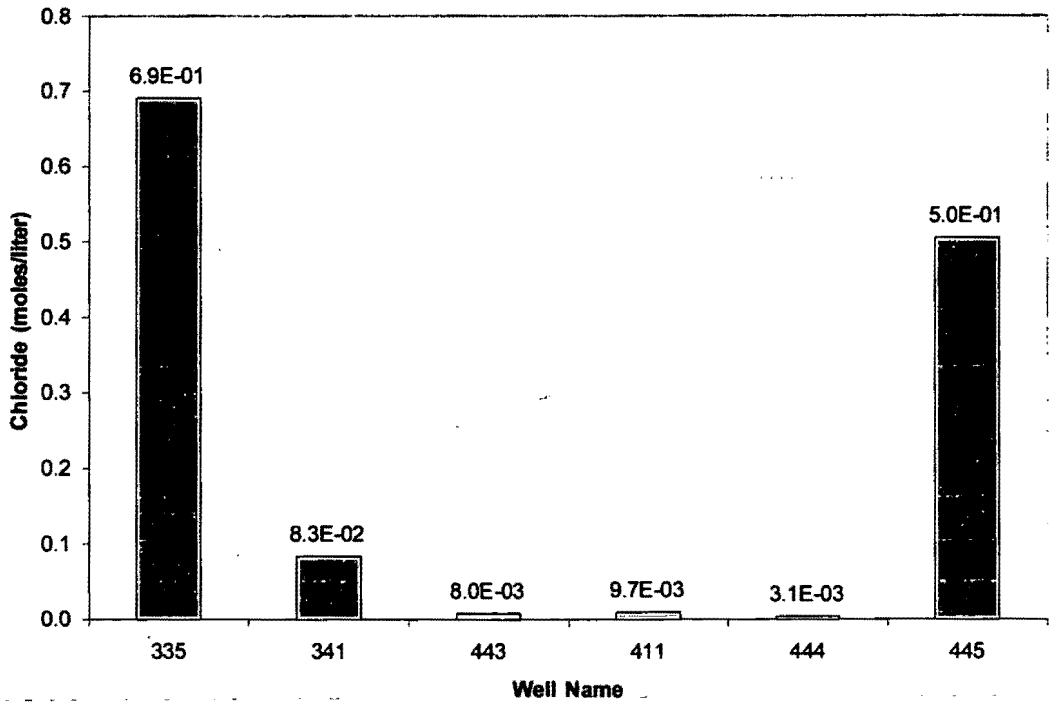


Figure 10: Chloride concentrations (moles/liter) in bedrock wells.

Origin of Groundwater

Hydrogen and Oxygen Isotopes

The stable isotopes of hydrogen and oxygen suggest the Mound groundwaters originated as meteoric water. With the exception of one sample, the groundwaters plot near the Global Meteoric Water Line (GMWL) at values consistent with local Ohio surface waters Figure 11. The sample that plots off of the GMWL is from well 0341 located near well 0335. It's isotopic composition is consistent with evaporation, and in fact, water from well 0335 may have experienced slight evaporation. However, Figure 12 shows that any evaporation of water sampled from well 0335 is not commensurate with the chloride concentration. During evaporation of a chloride solution, the chloride concentration should increase in proportion to the $\delta^{18}O$ value of the water. The chloride concentration of groundwater from well 0335 is much higher than other local groundwater, but the $\delta^{18}O$ value is similar to other local groundwater. In contrast, water from well 0341 follows the expected trend for evaporation.

The evaporation trend observed in water from well 0341 and the hint of evaporation observed in water from well 0335 may reflect leakage from a solar evaporation pond located to the north of these wells. It may also reflect evaporation associated with recharge ponds or other bodies of surface water that may seep into groundwater.

There is no indication that groundwater sampled from well 0445 experienced evaporation. It's composition lies near the GMWL, though it's chloride concentration is much higher than other local groundwater (Figure 12). Likewise, there is no evidence of isotopic fractionation by ultrafiltration. Coplen and Hanshaw (1973) found experimentally that ultrafiltration produces a slope of 3:1 on a δD versus $\delta^{18}O$ plot. This could explain the isotopic composition of water from wells 0335 and 0341, but not that of water from well 0445. Thus, the origin of the salinity in groundwater from well 0445 is more likely to be dissolution of a salt source than evaporation of seawater or ultrafiltration. Given the high pressure gradients required and the lack of any isotopic evidence for ultrafiltration, this process will be eliminated from further consideration.

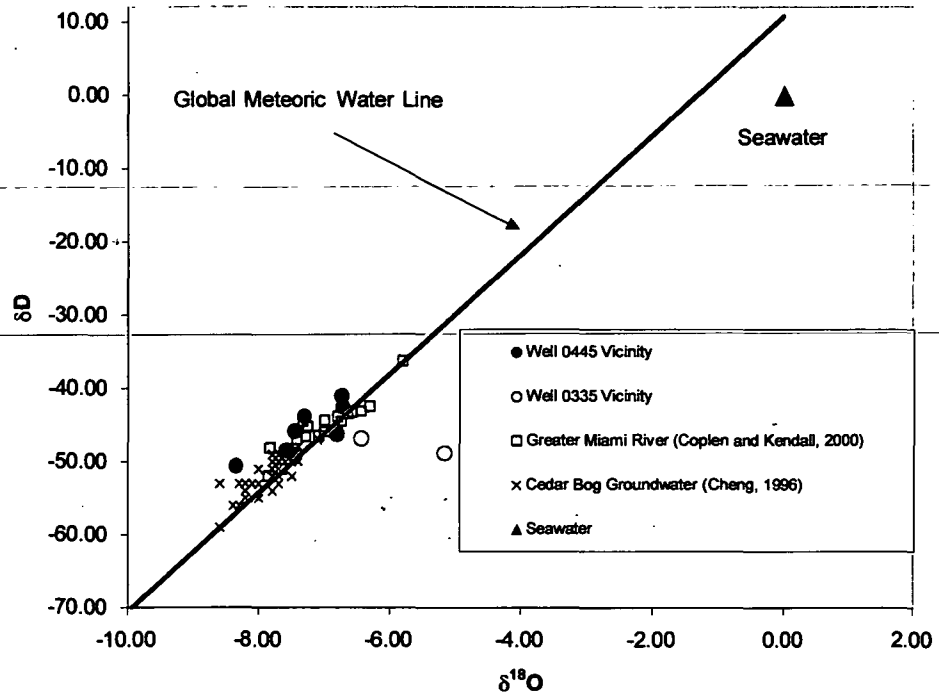


Figure 11: Stable isotope trends in MCP groundwater.

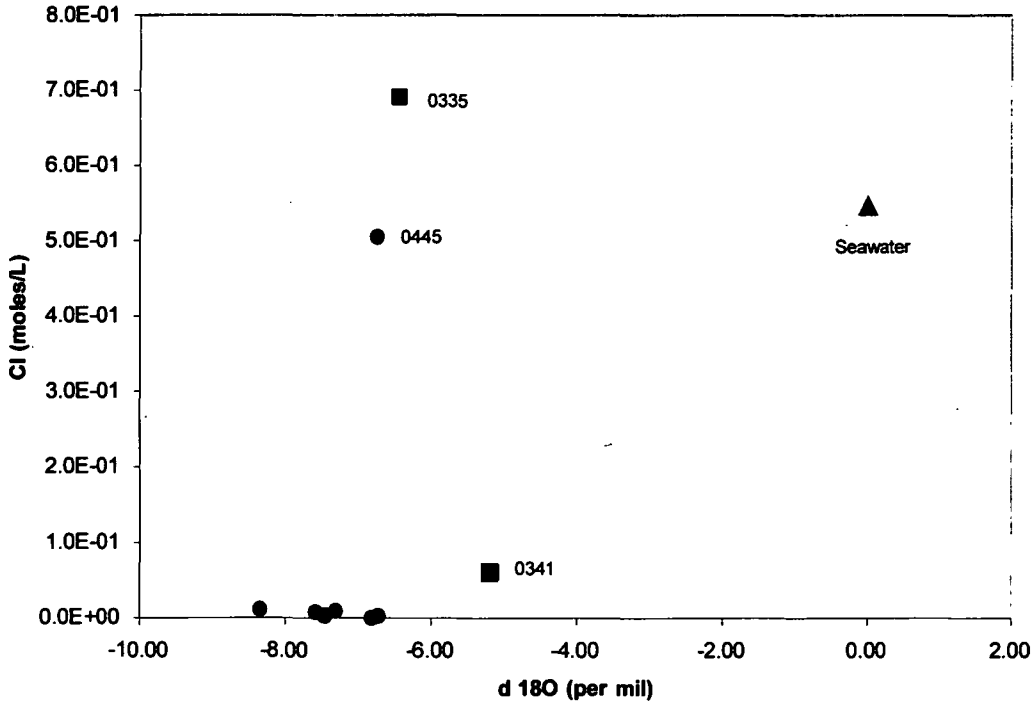


Figure 12: Chloride concentration (moles/liter) versus $\delta^{18}O$.

Tritium

Tritium concentrations in the groundwater vary from <5 to 1050 pCi/L, but the only 2 groundwater samples with concentrations less than 50 pCi/L are from wells 0335 and 0445 (Figure 13). Groundwater from well 0335 has a tritium concentration of 43 pCi/L, consistent with recent precipitation or a mixture of recent precipitation with older groundwater. However, the <5 pCi/L tritium in groundwater from well 0445 indicates a component of "old" pre-nuclear age groundwater in this well. This could be evidence that the groundwater is a natural basinal brine that is unaffected by modern influences. The potential for significant decay of tritium (half-life = 12.3 years) over the span of a few decades means that other origins for the groundwater must be considered as well. Decay curves for tritium, Figure 14, show that for initial tritium concentrations less than 50 pCi/L, decay over 40 years will result in tritium values less than 5 pCi/L.

Figure 15 shows the historical trends for tritium in precipitation in Ottawa Canada. The Ottawa data collection was initiated by R.M. Brown of Atomic Energy Canada Limited (AECL) and has continued through time. This is the longest and most detailed continuous available record of tritium concentrations in precipitation. The resulting dataset, along with several other long-term records from around the world and numerous supplemental short term records from peak input years between 1960 and 1980, are publicly available through the International Atomic Energy Agency (IAEA) <www.iaea.or.at:80/programs/ri/gnip/gnipmain.htm>. The Ottawa data provide a relatively complete record of tritium increases through the period of weapons testing and the subsequent tritium declines due to radioactive decay and assimilation into the earth's hydrosphere (Figure 15). One notable feature of the data is the consistent annual fluctuation in ^{3}H. The greatest transfer of tritium from the stratosphere to the troposphere occurs during the spring in mid-latitude zones. This is due to seasonal changes in boundary between these layers caused by displacement of the jet stream in the spring. This "spring leak" annually recharges tritium from the upper atmosphere into the hydrosphere. As shown, tritium levels are typically two to 10 times lower in the fall and winter (a time when road salt use would predominate) than in the spring. Non-spring seasonal generation of dense sodium chloride brine that accumulates in isolated zones may result in measured tritium values substantially below annual averages. The observed seasonality in tritium levels in the atmosphere and the tendency of dense brines to remain isolated (allowing for decay) are potentially significant factors that could contribute to low tritium values in an isolated deep zone that are low relative to average precipitation

The U.S. Environmental Protection Agency operates a separate radiation monitoring program and database (Environmental Radiation Monitoring System (ERAMS) -- http://www.epa.gov/narel/erams/aboutus.html) that has a short period of record for Painesville OH. The relevant data from Ohio are shown in Figure 16 and are tabulated in Appendix ***. Of particular note in the Ohio data is a similar seasonality to the reference Ottawa data and the low concentrations during parts of the year (reported as

negative numbers indicating the samples contain less tritium than the laboratory blank water).

Another alternative is that "modern" water infiltrated from the surface and mixed with "old" groundwater, lowering the initial tritium concentration to less than 50 pCi/L. Decay over the course of 20-40 years could have reduced the tritium concentration to below 5 pCi/L.

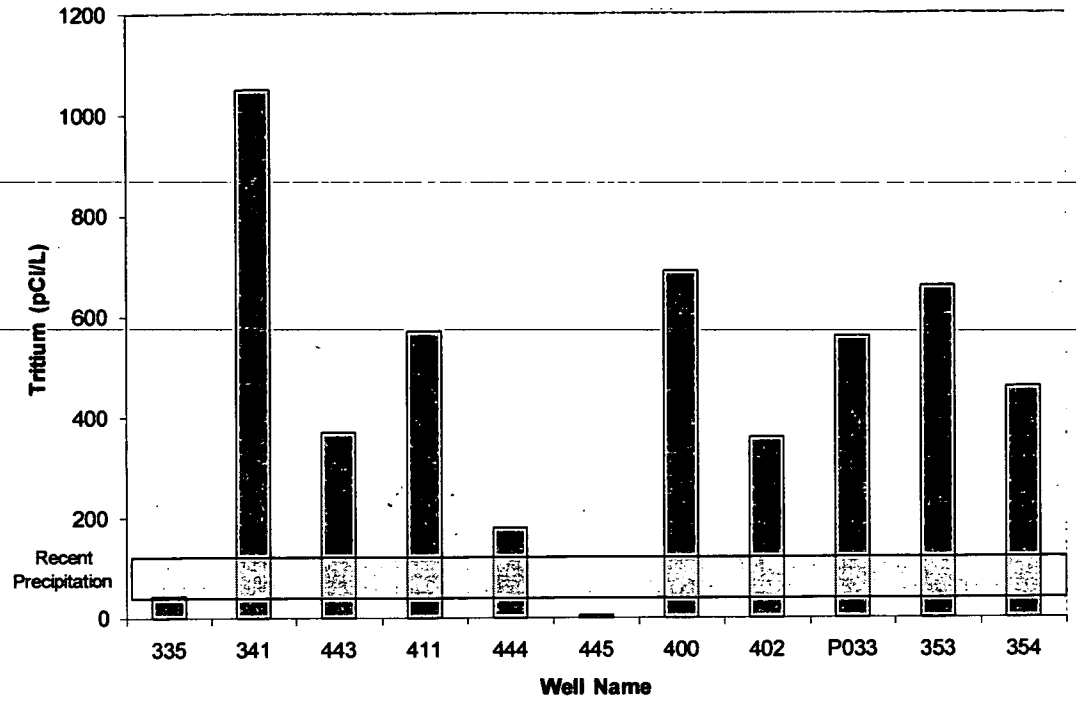


Figure 13: Tritium concentrations (pCi/L) in MCP wells.

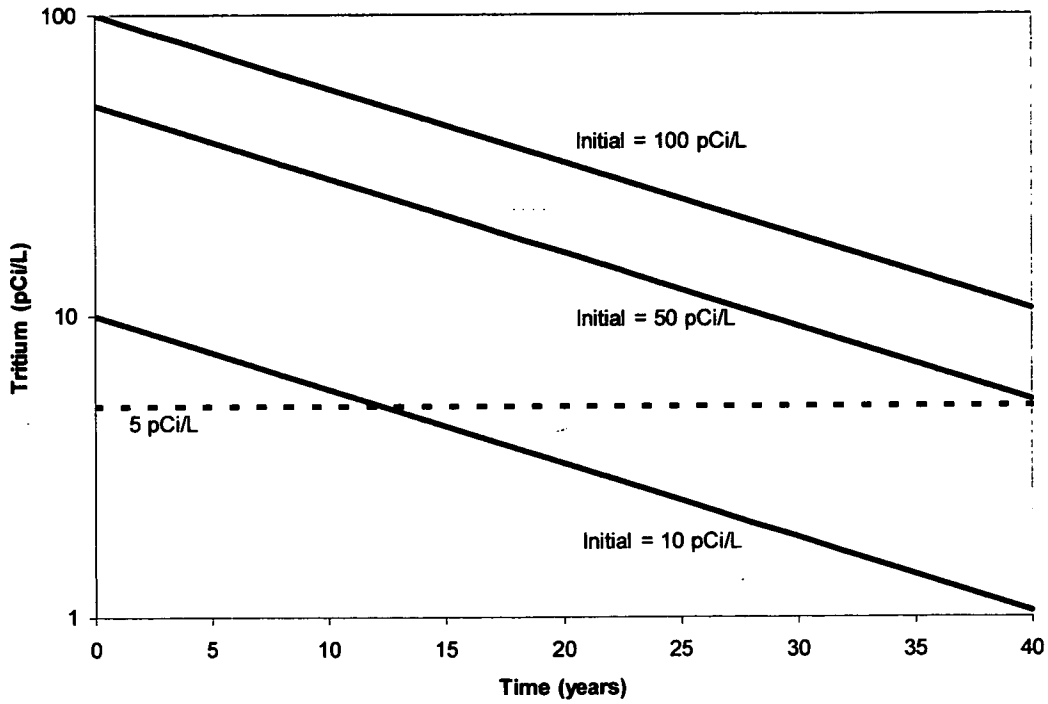


Figure 14: Tritium decay curves.

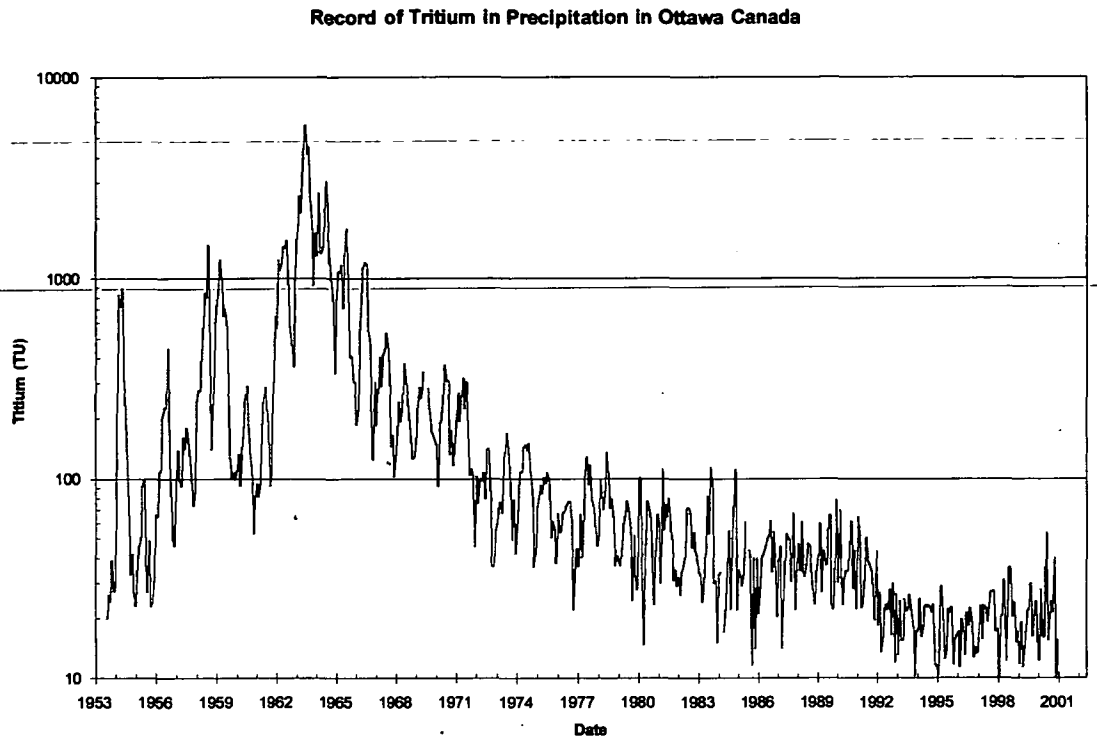


Fig. 15 Tritium in precipitation at Ottawa Canada as measured by AECL in composite monthly samples and reported in the IAEA database

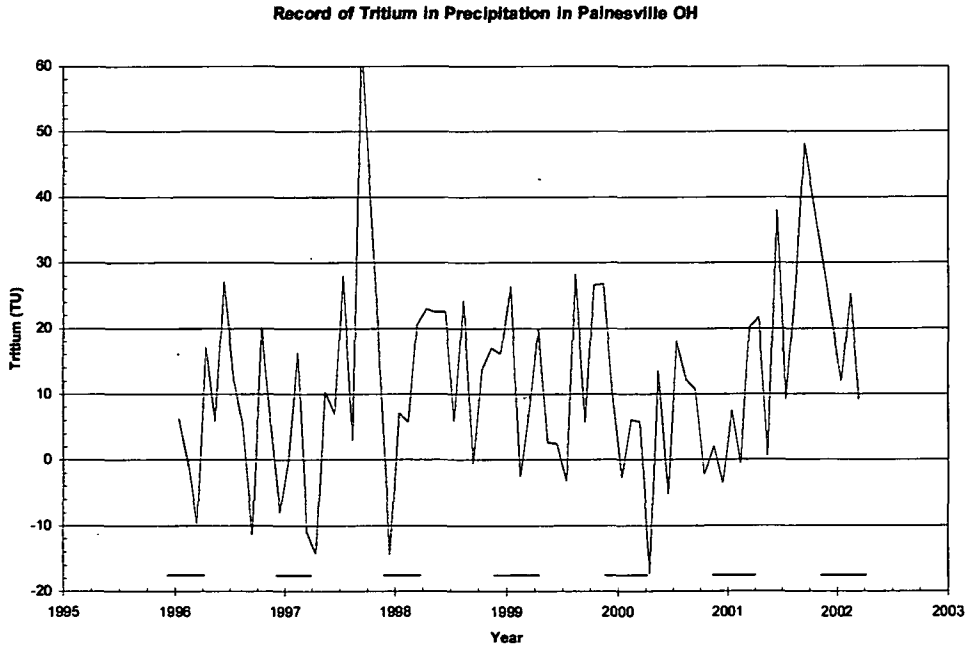


Fig. 16 Tritium in precipitation at Painesville OH as measured by EPA and reported in EPA ERAMS database. (November through March approximated by dashes)

Bedrock Characterization

X-ray diffraction analysis showed the presence of 5 dominant minerals in the bedrock – chlorite, calcite, ankerite, pyrite, muscovite and quartz. A representative x-ray diffraction pattern is shown in Figure 17. This does not exclude the presence of other minerals at low concentrations. Typically, powder x-ray diffraction detects minerals present at about 5 wt.%.

The x-ray diffraction analysis together with x-ray fluorescence analysis of the bulk chemical composition allows a normative mineralogy to be calculated for the bedrock. This was done by assuming that all Ca is from calcite, all Mg is from chlorite, all Fe is from pyrite, and all K is from muscovite. Al and Si were partitioned between chlorite and muscovite. Remaining Si was assumed to be as quartz. This is somewhat simplistic because some Fe, Mg, and Ca exists as ankerite. Nevertheless, the normative mineralogy was calculated to evaluate trends between mineralogy, radium isotopes, and barium. Table 4 lists the calculated normative mineralogy. The bedrock becomes more calcareous with depth and at a depth of 40 feet approaches the composition of a shaley limestone. Well 0445 is screened between 30 and 40 feet and is thus screened within the more calcareous section.

Table 4: Normative mineralogy of three bedrock samples based on x-ray diffraction and x-ray fluorescence.

Sample	Chlorite (wt.%)	Muscovite (wt.%)	Pyrite (wt.%)	Calcite (wt.%)	Quartz (wt.%)
445-25	38.8	27.9	5.3	6.5	21.4
445-35	33.2	24.9	6.4	15.8	19.9
445-40	22.8	13.3	2.8	48.8	12.2

Based on the 3 bedrock samples, ^{226}Ra and ^{228}Ra reside in different phases. ^{226}Ra is correlated with the calcite content of the rock (Figure 18), whereas ^{228}Ra is not. ^{228}Ra is correlated with Ba which is inversely correlated with calcite content (Figure 19). This suggests that the phase from which ^{226}Ra is predominantly derived has a different Th/U ratio or a different age (or both) than the phase from which ^{228}Ra is predominantly derived. Figure 20 indicates that the Th/U ratio is different for calcite and the rest of the rock.

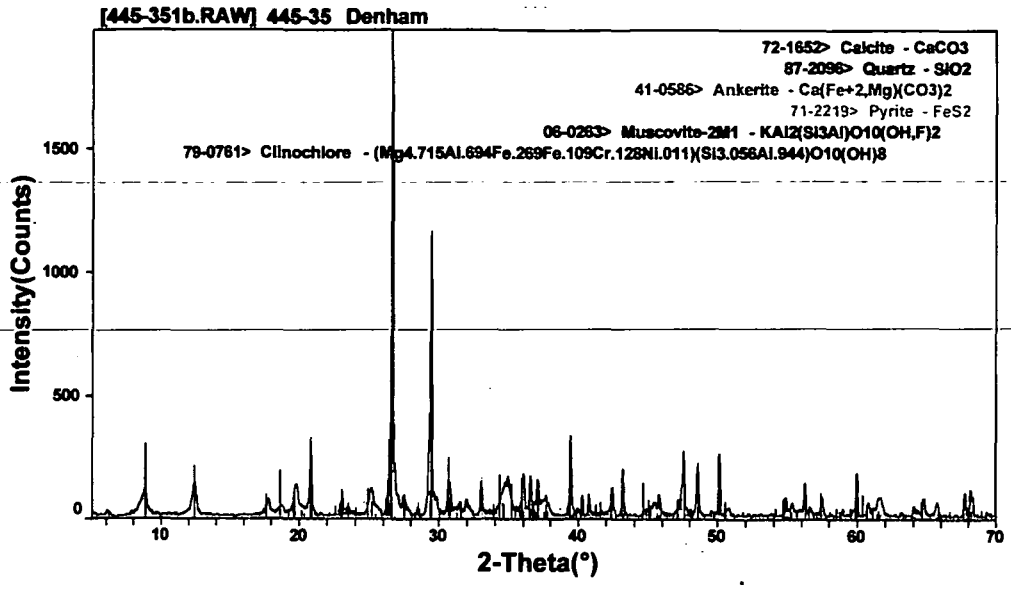


Figure 17: Representative powder x-ray diffraction pattern.

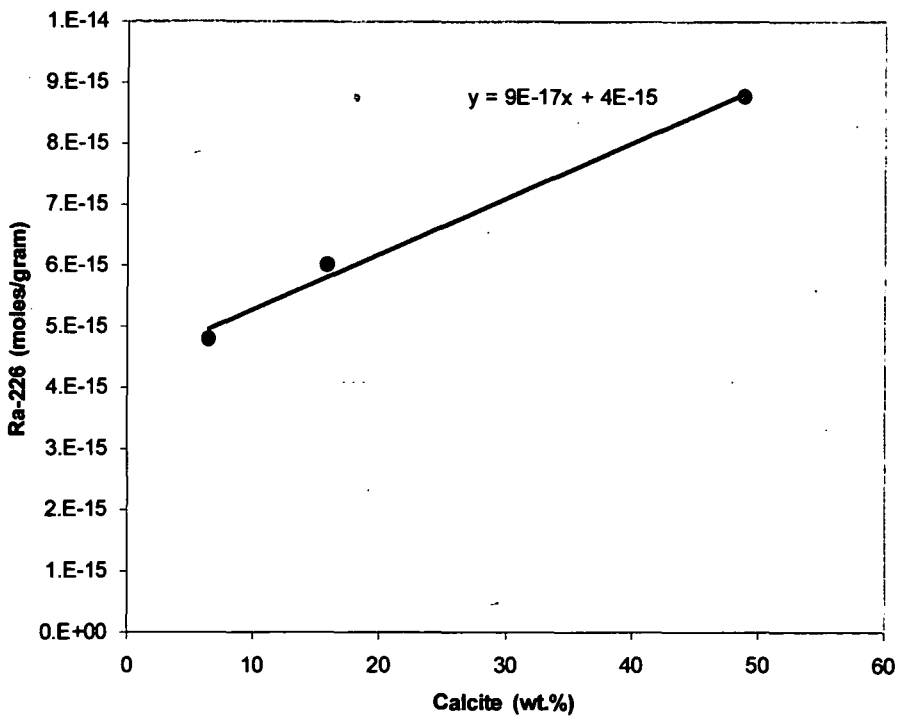


Figure 18: ^{226}Ra concentration (moles/gram) versus normative calcite in bedrock.

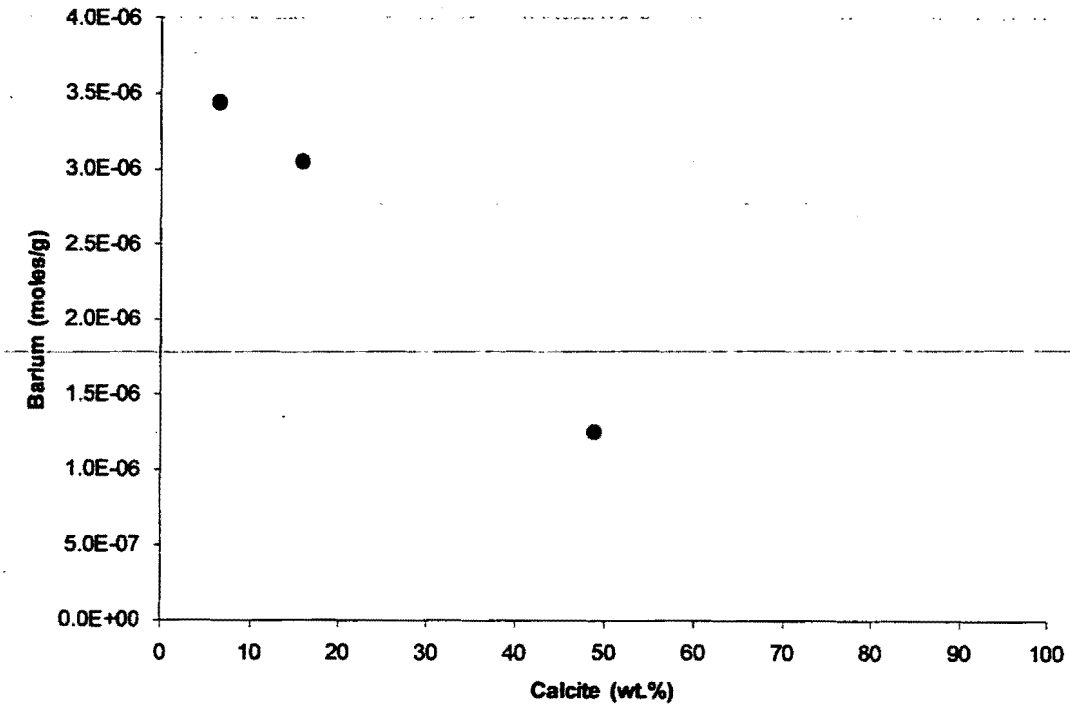


Figure 19: Barium concentration (moles/gram) versus normative calcite in bedrock.

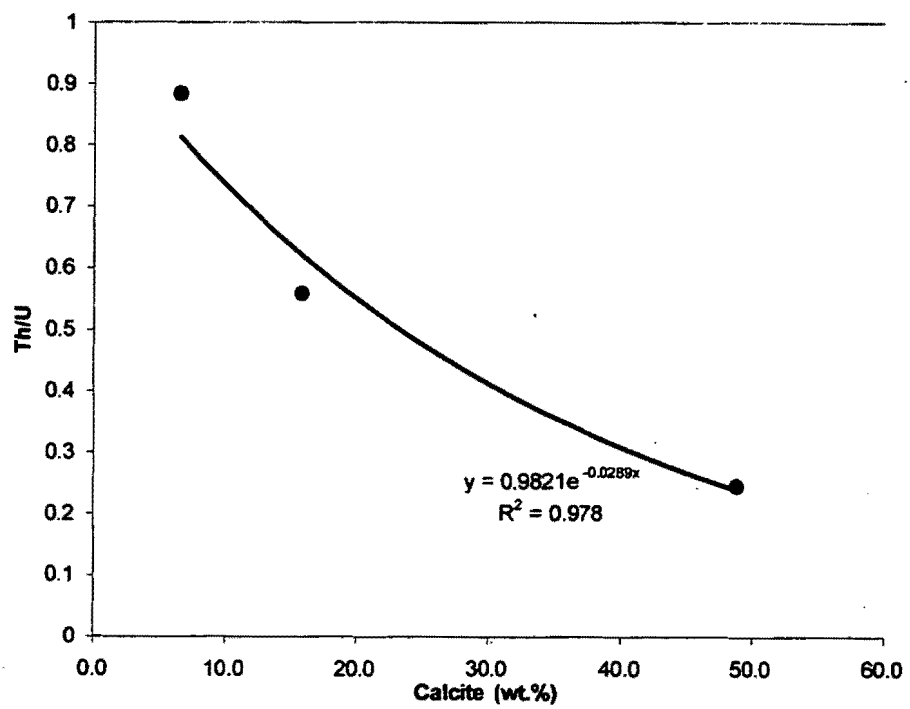


Figure 20: Th/U ratio versus normative calcite in bedrock.

In terms of the three initial hypotheses, the dissolved constituents in groundwater from wells 0335 and 0445 may be natural, anthropogenic, or a mixture of both. A basinal brine migrating into the area of these wells would be of purely natural origin. Saline water originating from waste disposal or dissolution of salt at the surface would be of anthropogenic origin. Leaching of radium and barium from bedrock by interaction with brine infiltrating from the surface would be of mixed origin. The ratios of various constituents relative to each other can indicate which of these processes is most probable.

Major Ions

Groundwater from wells 0335 and 0445 are NaCl brines that are similar to each other in major ion composition. Figures 21 and 22 show the concentrations of several constituents in the groundwater relative to two potential brine sources. When compared to seawater, the groundwater is depleted in SO_4^{-2}, K^+, Mg^{+2}, and Na^+ and enriched in the rest of the ions shown. For a similar comparison, road salt from a storage pile near well 0445 was dissolved so that the chloride concentration was equal to that of groundwater from well 0445. When compared to this solution, the groundwater is depleted in SO_4^{-2}, Al^{+3}, and Na^+ and enriched in the other ions. These plots suggest that the origin of the groundwater is more complicated than simple evaporation of seawater or dissolution of salt. In evaporated seawater, all constituents should be enriched relative to seawater. In contrast, groundwater derived from dissolution of road salt should have constituent concentrations similar to those of the prepared salt solution. That this is not the case indicates processes such as precipitation, dissolution, adsorption, and ion exchange altered the composition of the brines from the original source of salt.

Geochemical modeling using the program PHREEQC 2.6 (Parkhurst, 1995) was used to determine thermodynamically feasible reactions that might account for the major ion concentrations. Figure 23 shows the saturation indices of several potential interacting minerals in groundwater from wells 0335 and 0445. These indicate potential reactions that might account for the brine chemistry. Phases that are below saturation, and thus can not precipitate have negative values. These are subject to dissolution if they are present in the bedrock. In contrast, precipitation of those phases with positive saturation indices could have occurred. It is important to note that the saturation indices do not indicate what has occurred, but only what is possible.

The compositional differences between the groundwater and road salt solution are easier to explain by interaction with bedrock than the differences between the groundwater and seawater. The groundwater is depleted in Na, Al, and SO4-2 relative to road salt solution. Alunite [$KAl_3(SO_4)_2(OH)_6$] is one of two minerals (barite is the other) that are oversaturated in groundwater. Though the alunite in these calculations is a K form, Na forms are common (Dill, 2001) and these would be expected to be oversaturated in groundwater from wells 0335 and 0445. Precipitation of Na-alunite would explain the loss of Na, Al, and SO_4^{-2} relative to road salt solution.

Occurrence of ankerite in the bedrock is consistent with oxidation of pyrite in the presence of calcite by the reaction:

$$\text{Pyrite} + 3O_2 + 5\text{Calcite} + 4H_2O = \text{Ankerite} + 2\text{Gypsum} + 4HCO_3^- + 2Ca^{+2}$$

When road salt solution contacts the bedrock it may react with gypsum or some other source of sulfate and a clay to produce Na-alunite:

$$2\text{Gypsum} + 3\text{Gibbsite} + Na^+ + 3H^+ = \text{Na-alunite} + 2Ca^{+2} + 7H_2O$$

In addition to explaining Na, Al, and SO_4^{-2} concentrations relative to road salt solution, these reactions contribute Ca, as well as minor Mg and K, to the groundwater. However, they can not account for the total increase in Ca, Mg, and K. Nor do they account for the total decrease in Na. Thus, these reactions are probably accompanied by exchange of Na from solution with Ca, Mg, and K on surfaces of the bedrock.

Groundwater in wells 0335 and 0445 is also slightly oversaturated with barite and undersaturated with radium carbonate and sulfate. Barium released from the bedrock by the above reactions may have partially precipitated as barite. Radium released by these processes may have been partially incorporated into the barite, but would not have precipitated as a radium phase.

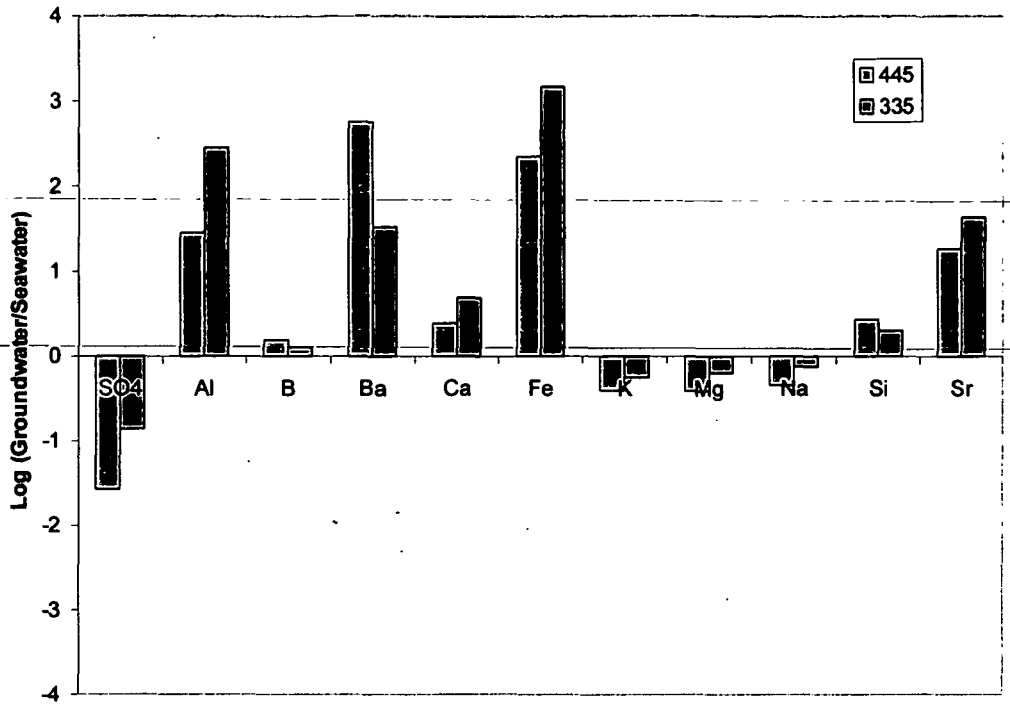


Figure 21: Major ion composition of groundwater from wells 0335 and 0445 relative to seawater.

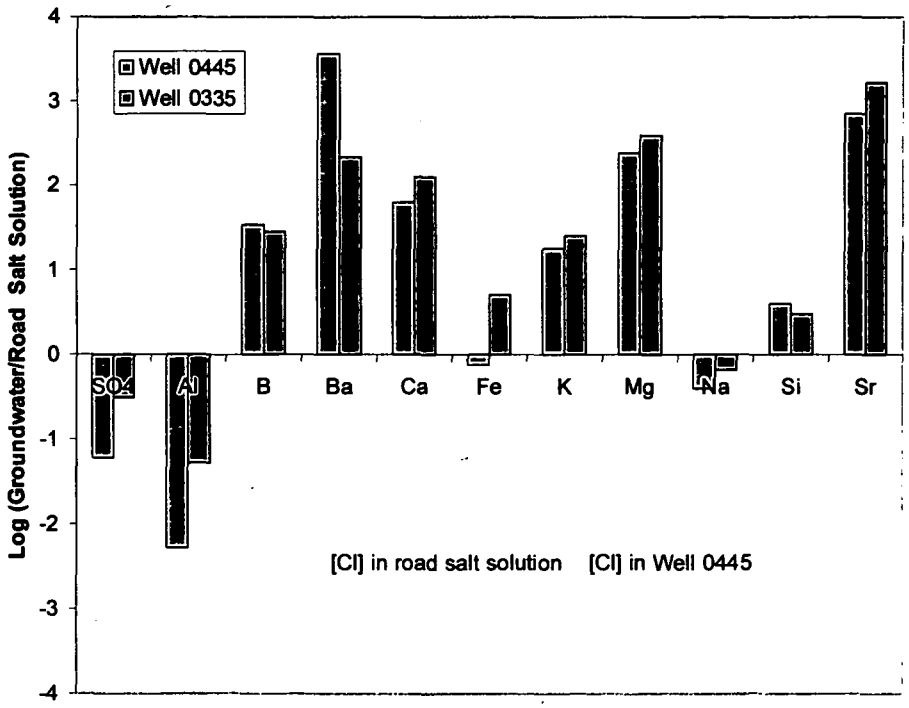


Figure 22: Major ion composition of groundwater from wells 0335 and 0445 relative to road salt solution.

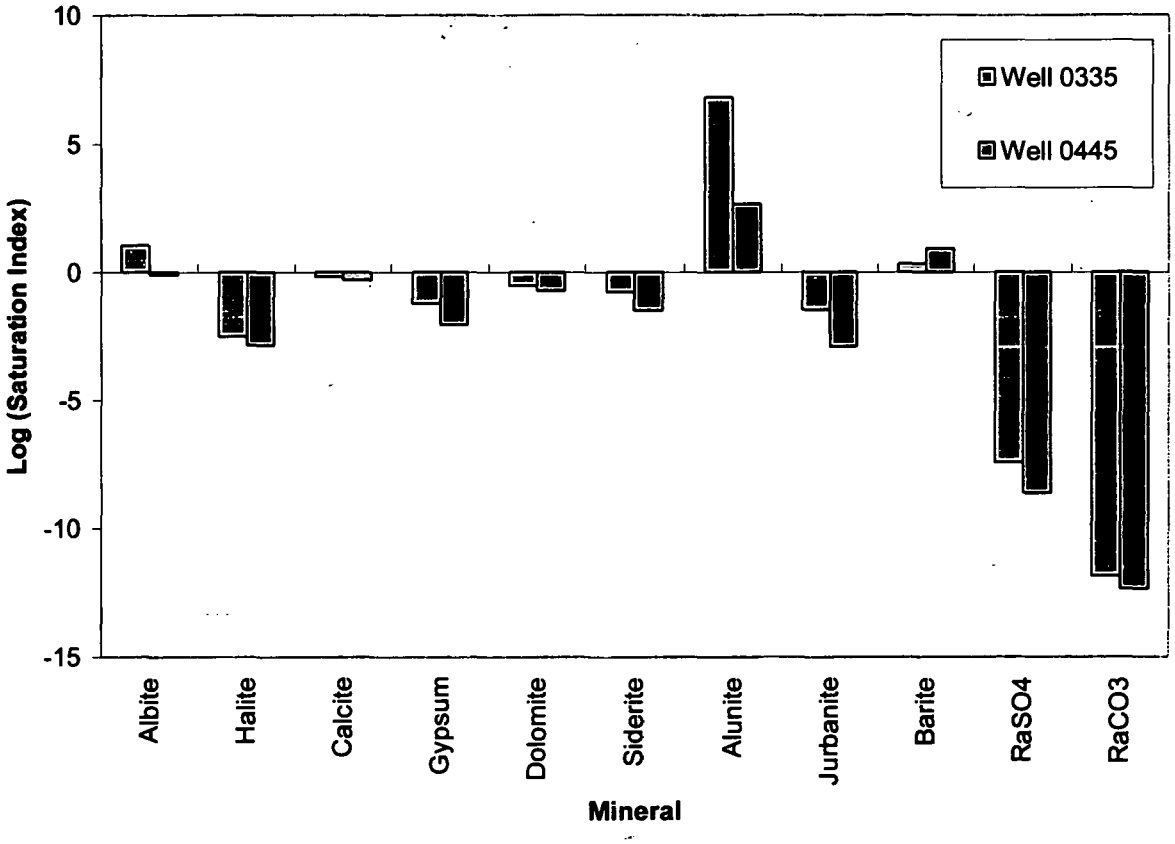


Figure 23: Saturation indices of common minerals in groundwater from wells 0335 and 0445.

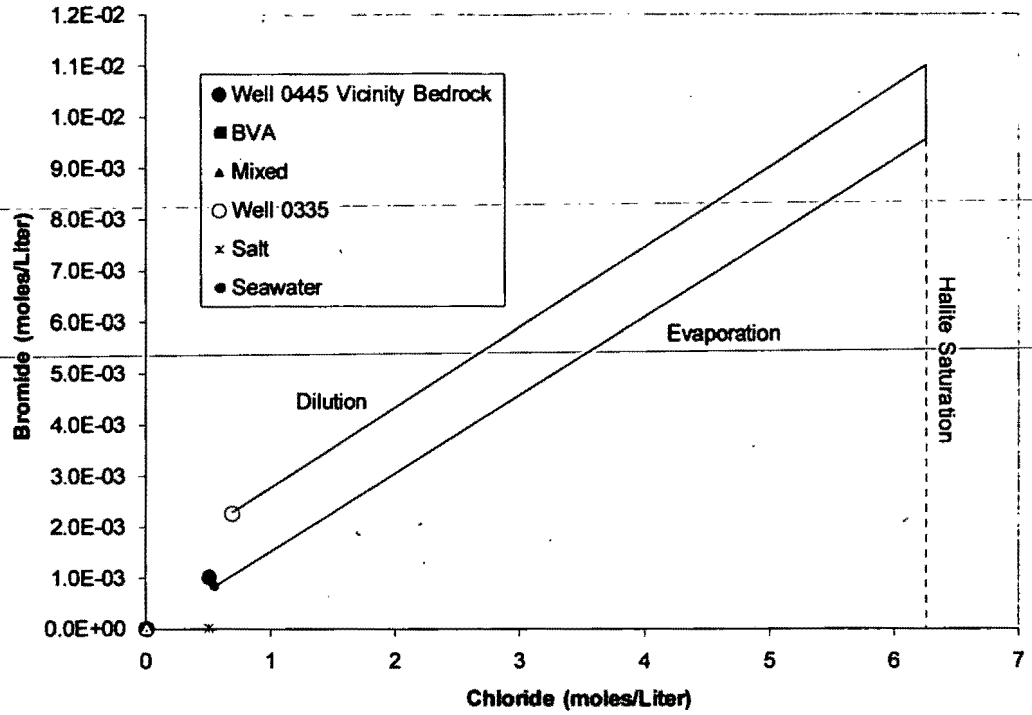


Figure 24: Bromide versus chloride concentrations (moles/liter) in MCP groundwater.

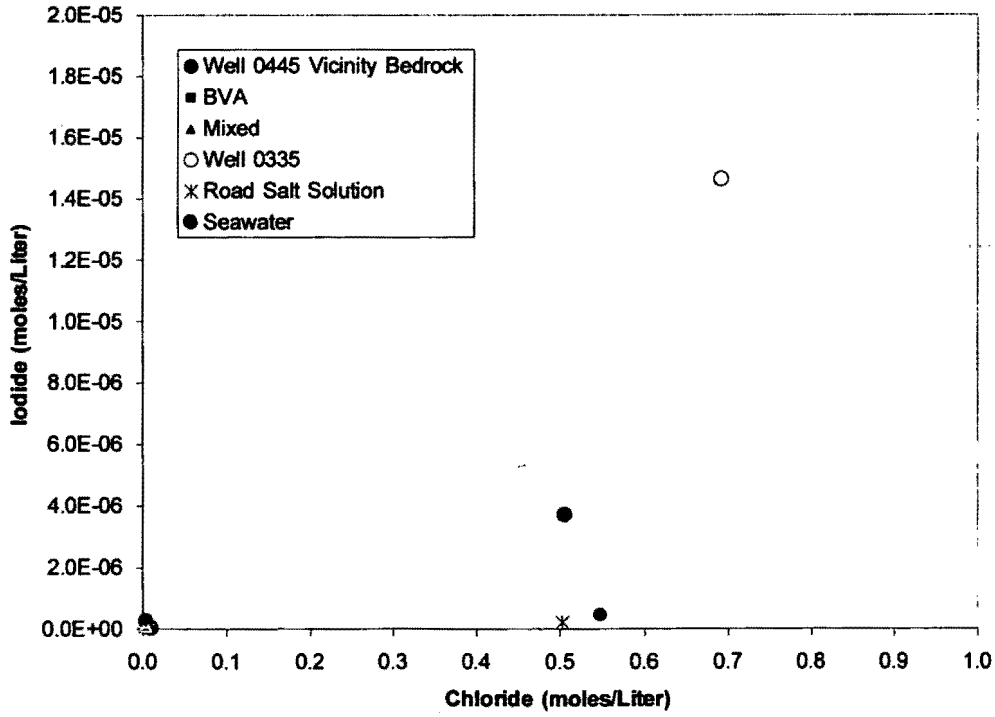


Figure 25: Iodide versus chloride concentrations (moles/liter) in MCP groundwater.

Bromide and Iodide in Groundwater

Groundwater from wells 0335 and 0445 is enriched in iodide and bromide relative to chloride in seawater and road salt solution. This suggests that the brine originated from dissolution of a salt (natural or man-made) rather than partial evaporation of seawater. Figure 24 shows that the chloride concentration of groundwater in wells 0335 and 0445 is similar to seawater. Thus, the only way for partial evaporation of seawater to account for the bromide concentration of groundwater from well 0335 is evaporating beyond halite saturation, enriching the water in bromide relative to chloride, and then diluting the water back to near seawater chloride concentrations. Obtaining the observed iodide concentrations relative to chloride is even more difficult for partial evaporation of seawater. Groundwater from both wells 0335 and 0445 is enriched in iodide relative to seawater (Figure 25). To achieve the observed iodide concentrations relative to chloride, seawater would have to be evaporated beyond halite saturation. Then, different amounts of halite would have to precipitate to produce the differences between wells 0335 and 0445. Finally, the resulting water would have to be diluted back to the observed concentrations.

It is much more likely that partial dissolution of salt would produce the observed trends. NaBr and NaI are much more soluble that NaCl. When water encounters NaCl with minor Br and I in the lattice, it may be expected that these minor constituents will dissolve preferentially. Partial dissolution of this salt would result in a solution enriched in I and Br relative to Cl. Differences between wells 0335 and 0445 would be produced by different degrees of dissolution.

Radium Isotope Systematics

The radium isotopes are only consistent with bedrock as the source of radium. Figure 26 shows that $^{228}Ra/^{226}Ra$ ratios are similar across most of the MCP. A point source of contamination would not produce this trend because of the short half-life of ^{228}Ra (5.7 years). To maintain a constant $^{228}Ra/^{226}Ra$ ratio, ^{228}Ra must be supported by continued decay of ^{232}Th. Yet, there is no detectable ^{232}Th in the groundwater. Hence, the support must come from decay of ^{232}Th in the bedrock. In other words, in waste disposed at the surface, the $^{228}Ra/^{226}Ra$ ratio would decrease by a factor of 4 within 12 years (Figure 27). To maintain the similarity in ratios across the site would require that this waste migrate across the entire site in less than 12 years. This would include migrating against known groundwater flow directions.

Figures 28 and 29 show that, in bedrock, ^{232}Th and ^{238}U are near secular equilibrium with their respective Ra daughters. This also suggests that Ra coming from the bedrock is natural and not related to disposed waste. ^{232}Th will come to secular equilibrium with ^{228}Ra within about 60 years, whereas ^{238}U takes about 2 million years to reach secular equilibrium with ^{226}Ra.

Though the Ra must have originated in the bedrock, the $^{228}Ra/^{226}Ra$ ratios in groundwater are different from those in bedrock. The average bedrock ratio is 0.43 whereas the average groundwater ratio is 2.0. This is consistent with ^{228}Ra and ^{226}Ra originating from different phases in the bedrock. Different solubilities of these phases could yield a different $^{228}Ra/^{226}Ra$ ratio in groundwater. Alternatively, the timing of secondary phase precipitation may be important. For example, a secondary phase that inherits a $^{232}Th/^{238}U$ ratio of 0.05 from a precursor would have an evolving $^{228}Ra/^{226}Ra$ ratio for about a million years after its precipitation (Figure 30). In this case, the ratio would reach 2 in about 50,000 years.

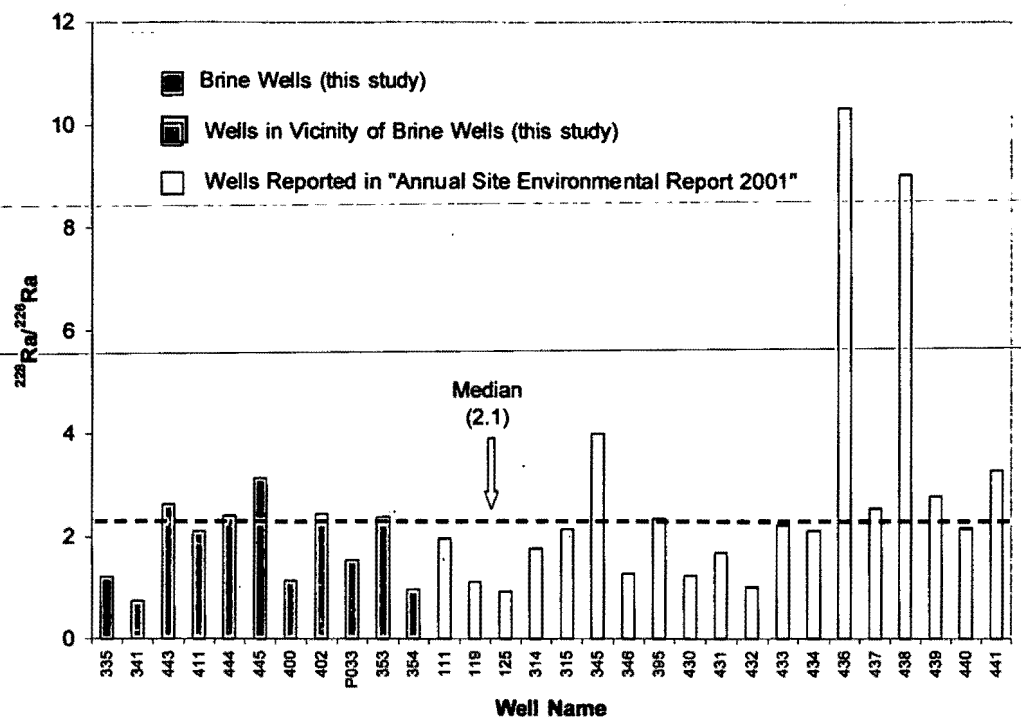


Figure 26: $^{228}Ra/^{226}Ra$ ratio in groundwater at MCP.

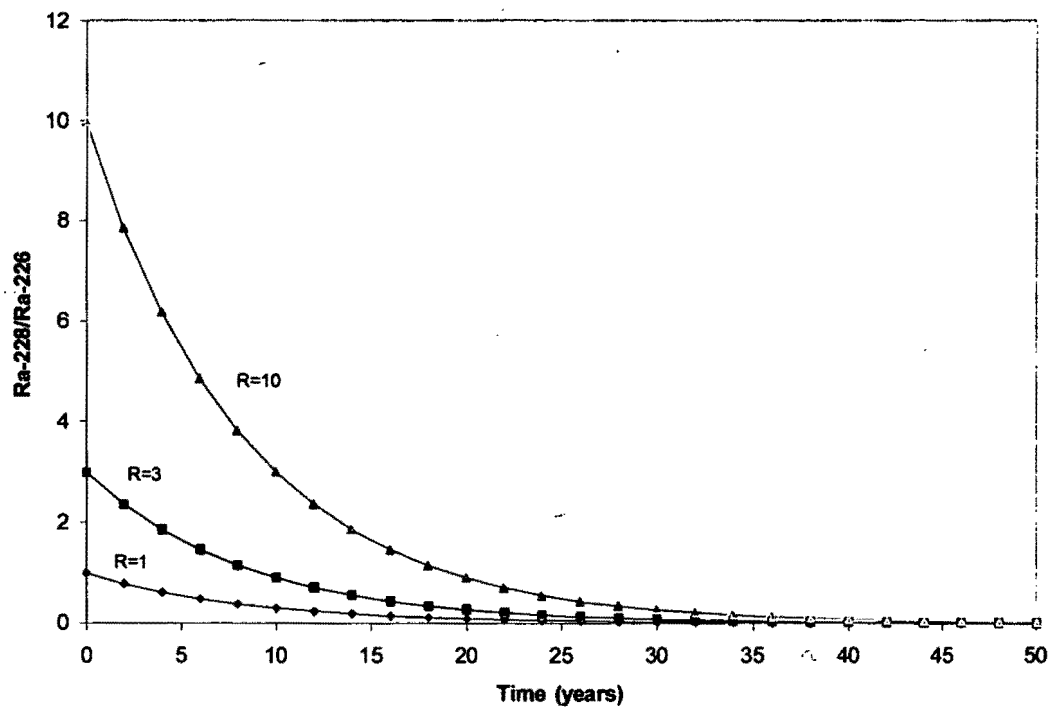


Figure 27: Change in $^{228}Ra/^{226}Ra$ ratio with time. R is the initial ratio.

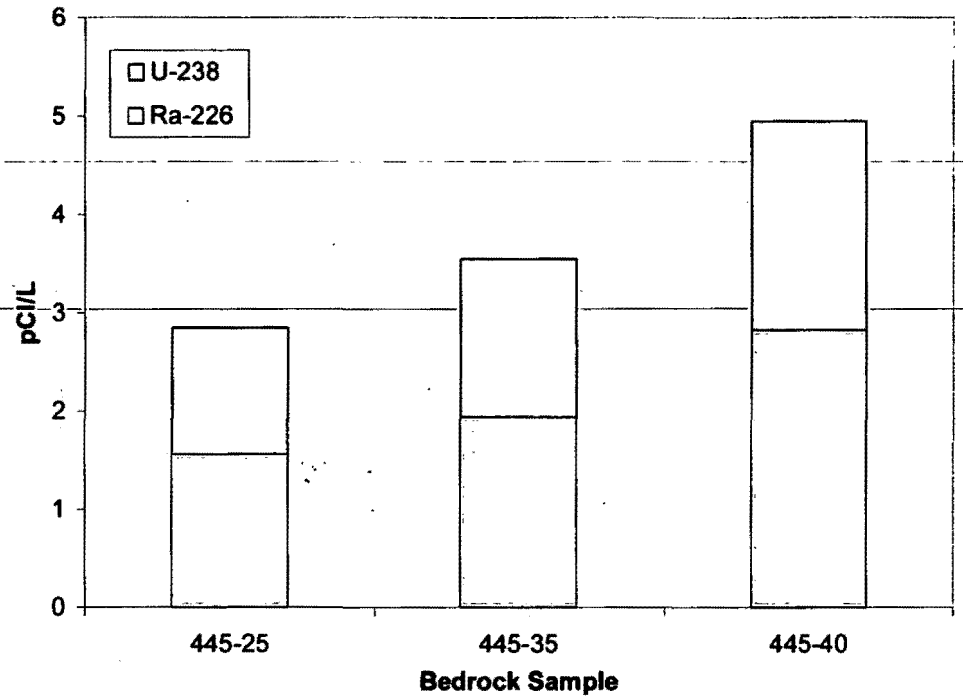


Figure 28: Secular equilibrium between ^{238}U and ^{226}Ra in bedrock.

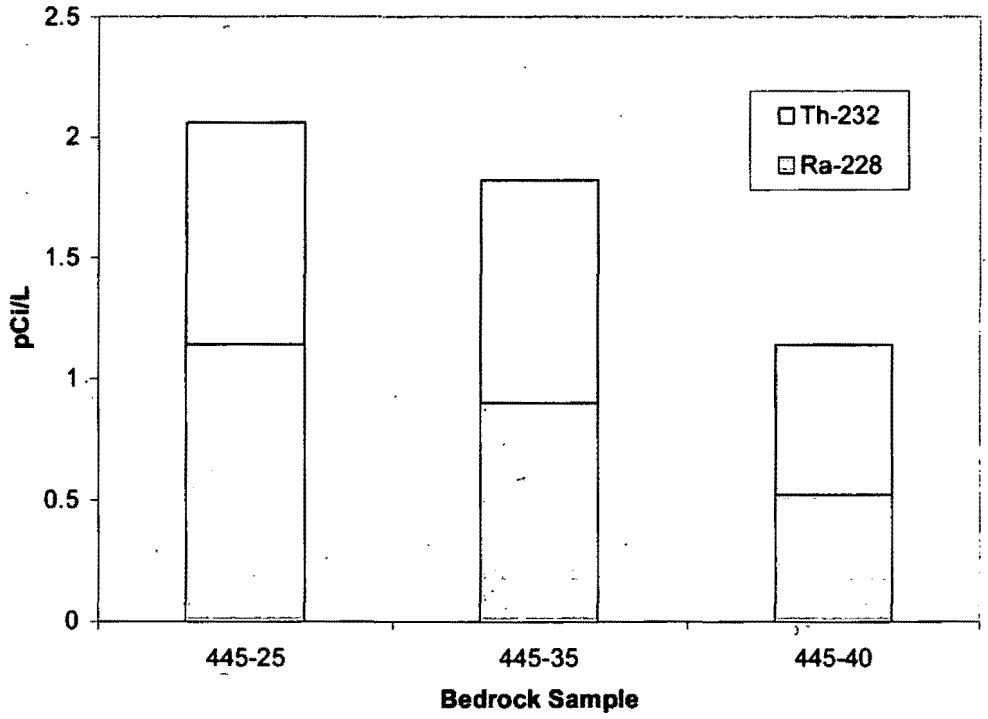


Figure 29: Secular equilibrium between ^{232}Th and ^{228}Ra in bedrock.

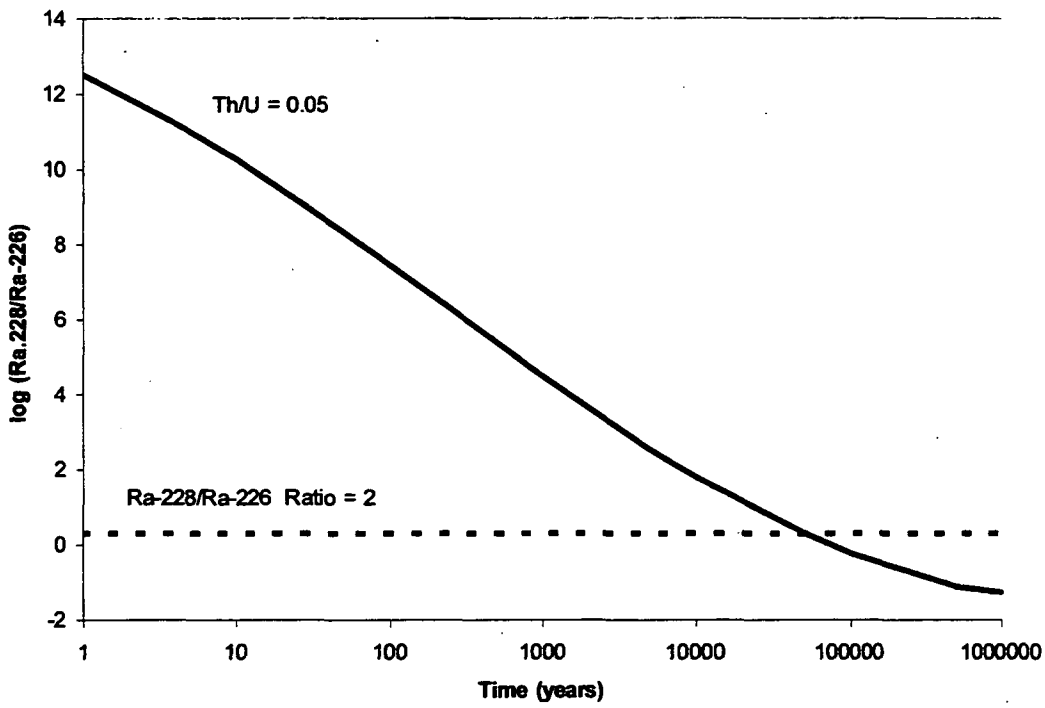


Figure 30: Change in $^{228}Ra/^{226}Ra$ ratio with time in a secondary mineral.

Mass Balance Considerations

Analysis of the bedrock indicates there is far more barium, ^{228}Ra, and ^{226}Ra in the bedrock than required to account for the concentrations of these constituents in groundwater. However, not all of the mass of these constituents is available for transfer from the solid phase to the groundwater. One way to estimate the available amount is to assume that all of these constituents in the groundwater came from cation exchange with sodium in the infiltrating brine. Bedrock data indicate that Ba and ^{228}Ra are positively correlated with Mg concentration and ^{226}Ra is positively correlated with Ca concentration. Neglecting differences in strength of adsorption, it is assumed that the Ba/Mg, ^{228}Ra/Mg, and ^{226}Ra/Ca ratios in the bedrock are maintained in the groundwater. If it is further assumed that groundwater in well 0443 represents the composition before significant brine influx, then the difference between Mg and Ca concentrations in this well and well 0445 are the amounts of these constituents released during interaction of the brine with the bedrock. From these amounts and the bedrock ratios, the expected concentrations of Ba, ^{228}Ra, and ^{226}Ra can be estimated. These are listed in Table 5 with the total mass of each constituent present in a volume of bedrock containing a pore volume of 1 liter.

Table 5: Modeled concentrations of Ba, ^{228}Ra, and ^{226}Ra in groundwater from well 0445.

Constituent	Total in 1 Liter Pore Volume of Bedrock	Modeled Constituent Concentration in 0445 Groundwater	Measured Constituent Concentration in 0445 Groundwater
Ba	2.8×10^6 ug	12357 ug/L	7320 ug/L
^{228}Ra	6396 pCi	9.3 pCi/L	30.8 pCi/L
^{226}Ra	16458 pCi	3.8 pCi/L	9.8 pCi/L

There are several uncertainties inherent in this estimate of concentrations in groundwater. The assumption that all Ba and ^{228}Ra come from a single Mg-rich phase and all ^{226}Ra comes from a Ca-rich phase is simplistic. Likewise, the different constituents probably do adsorb to different degrees. If Ca and Mg adsorption is weaker than adsorption of Ba and Ra, then the bedrock surfaces may become progressively enriched in Ba and Ra relative to Ca and Mg. Thus, the Ba/Mg, ^{228}Ra/Mg, and ^{226}Ra/Ca ratios on surfaces would be higher than ratios in the actual bedrock. This would result in an underestimation of the Ba and Ra concentrations available for exchange. During precipitation of a mineral such as alunite, magnesium and calcium may be incorporated preferentially to Ba and Ra. If this is true then the estimates are also low. Thus, the fact that modeled Ra concentrations are within a factor of 3 of the measured values suggests that there is sufficient ^{228}Ra and ^{226}Ra available for transfer from the bedrock to the groundwater to account for the measured concentrations. An additional intriguing observation is that the modeled $^{228}Ra/^{226}Ra$ ratio is 2.4, very similar to the actual ratios in MCP groundwater.

Conceptual Model

A conceptual model must explain the available data with geologically reasonable processes and principles. Generally, the simplest model that achieves this can be assumed to be the best one (Occam's razor), but the model may evolve as additional data becomes available. A 3-stage model for the origin of elevated concentrations of Ba and Ra in wells 0335 and 0445 is most consistent with the data collected in this study.

Stage I – Oxidation of Bedrock Pyrite

Infiltration of oxygenated "old" meteoric water oxidizes pyrite in the bedrock. Acid produced during this process is neutralized by dissolution of calcite and chlorite. Increased concentrations of constituents from the dissolved phases result in increased amounts of these constituents adsorbed to bedrock surfaces. In addition, the oxidation of pyrite results in precipitation of ankerite and possibly minor amounts of sulfate minerals.

Stage II – Infiltration of Brine from Salt Dissolution

Dense brine (density between 1.02 and 1.20 g/cm^3) infiltrates into a low flow zone. This causes alunite precipitation that removes some Na, Al, and SO_4^{-2} from groundwater. Additional Na is removed by cation exchange for adsorbed Ca and Mg. Ba and Ra are also desorbed during this process. Mixing with the "old" meteoric water reduces tritium concentrations. In addition, tritium concentrations in the infiltrating brine may be relatively low because of seasonal effects.

Stage III – Time

The time between brine infiltration and sampling has allowed the tritium to decay even further, to values generally associated with "old" groundwater.

Conclusions

The hypothesis that is most consistent with all of the geochemical evidence is that the brines in wells 0335 and 0445 originate from dissolution of salt stored at the surface. The dense brine infiltrated into an area of the bedrock that is relatively isolated from the main groundwater flow regime. Interactions of this brine with the bedrock released radium and barium to the groundwater. This hypothesis can explain the following observations and data:

- The brine occurs in only a few wells that are located near salt sources at the surface
- The groundwater in these wells is predominantly of meteoric origin

- Tritium concentrations are low
- The major ion composition resembles seawater
- Bromide and iodide concentrations suggest dissolution of salt rather than evaporation
- Radium isotopes indicate the origin of radium is the bedrock
- Bedrock contains sufficient radium and barium to cause the concentrations in the groundwater

Table 5 shows the data matrix presented earlier with an assessment of the consistency of each hypothesis with the data. Though the data is most consistent with leaching of road salt at the surface, leaching of a natural evaporite can not be excluded. The observations that weaken this hypothesis are the meteoric origin of the groundwater and the limited areal extent of brine occurrence. Neither of these eliminates this hypothesis. Nevertheless, there is no evidence that the elevated radium and barium concentrations in groundwater came from disposed waste.

Table 5: Data matrix with assessment of each hypothesis.

	Natural Brine			
Evidence	**Evaporation**	**Dissolution of Evaporite**	**Dissolution of Salt at Surface**	**Waste Disposal**
General Considerations	Regional Influence	Regional Influence	Point Source	Point Source
Oxygen and Hydrogen Isotopes	Inconsistent	Consistent	Consistent	Not Definitive
Tritium	Consistent	Consistent	Inconsistent	Inconsistent
Bedrock Composition	Consistent with groundwater composition	Consistent with groundwater composition	Consistent with groundwater composition	Not applicable
Major Ions	Similar to Altered Seawater	Similar to Altered Seawater	Similar to Altered Seawater	Improbable
Bromide and Iodide	Inconsistent	Consistent	Consistent	Improbable
Radium Systematics	Consistent	Consistent	Consistent	Inconsistent

Phase I

Environmental Summary

CERCLA 120(h) SUMMARY
NOTICE OF HAZARDOUS SUBSTANCES

Final
December 2003

Miamisburg Closure Project

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

DEC 11 2003

REPLY TO THE ATTENTION OF: S-6J

Mr. Robert F. Warther
U.S. Department of Energy
Ohio Field Office
175 Tri County Parkway
Springdale, Ohio 45246

RE: DOE Mound Plant - Phase I Parcel Request for Concurrence to Transfer

Dear Mr. Warther:

Thank you for your letter requesting concurrence to transfer the Phase I Parcel at the United States Department of Energy (DOE) Mound Plant in Miamisburg, Ohio.

In evaluation of U.S. DOE's request, the United States Environmental Protection Agency (EPA) has reviewed the Phase I Record of Decision (ROD) signed by DOE, EPA, and the Ohio Environmental Protection Agency (OEPA), and the draft Proposed Final Phase I Environmental Summary - Notice of Hazardous Substances dated August 2003. David Seely of my staff has been coordinating the resolution of any outstanding issues relating to this request with DOE representatives at the Mound facility.

The Phase I ROD requires institutional controls be adopted that will ensure: 1) Maintenance of industrial/commercial land use; 2) Prohibition against residential use; 3) Prohibition against the use of ground water; 4) Site access for Federal and State Agencies for the purpose of sampling and monitoring; and 5) Prohibition against removal of Phase I soils from the DOE Mound property (as owned in 1998) boundary without approval from Ohio Department of Health , OEPA and EPA. In accordance with the Phase I ROD, these institutional controls will be included within the Quit Claim Deeds used to transfer the Phase I Parcel.

The Phase I ROD also identifies the use of Monitored Natural Attenuation (MNA) to address isolated elevated concentrations of trichloroethylene detected just above EPA drinking water standards. Ground water monitoring data over a period of several years have consistently shown that this contamination is not present as a contaminant plume. The ROD documents the appropriateness of selecting MNA as a remedy and specifies key elements of the ground water monitoring efforts that will be continued until such time that the contaminant groundwater concentrations are consistently below EPA drinking water standards.

In accordance with § 120 (h)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for transfer of any real property owned by the United States on which any hazardous substance was stored for one year or more, known to have been released, or disposed of, DOE is required to provide a covenant in the deeds for Parcel 1 warranting that all remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken. Other requirements include: a covenant warranting that any additional remedial action found to be necessary after the date of such transfer shall be conducted by the United States; and a clause

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granting the United States access to the property in any case in which remedial action or corrective action is found to be necessary after the date of such transfer.

Based upon the above information, EPA concurs that DOE has demonstrated that the remedy selected in the Phase I Parcel ROD is operating properly and successfully. Therefore, EPA concurs that all remedial action necessary to protect public health and the environment with respect to any hazardous substance remaining within the Phase I Parcel has been taken and that transfer of the Phase I parcel may proceed.

EPA fully supports redevelopment and reuse of the structures and other property available at the Mound Plant. However, assurances must be provided that all property and building leases and transfers will be protective of public health and the environment. If you have any questions or concerns about this or future economic development issues at the site, please contact David Seely at (312) 886-7058.

Sincerely yours,

for William E. Muno, Director
Superfund Division

cc: Brian Nickel, OEPA
Paul Lucas, DOE-MCP

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Acronyms

BDP	Building Data Package
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
COPC	Constituent of Potential Concern
D&D	Decontamination & Decommissioning
EA	Environmental Assessment
FONSI	Finding of No Significant Impact
HI	Hazard Index
HQ	Hazard Quotient
MMCIC	Miamisburg Mound Community Improvement Corporation
NCP	National Contingency Plan
NFA	No Further Assessment
NWP	Nationwide Permit
O&M	Operations & Maintenance
ODH	Ohio Department of Health
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
OSC	On-Scene Coordinator
PCB	polychlorinated biphenyl
PCN	pre-construction notification
PRS	Potential Release Site
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RRE	Residual Risk Evaluation
RREM	Residual Risk Evaluation Methodology
TCE	trichloroethene(ethylene)
USACE	United States Army Corps of Engineers
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
WQC	Water Quality Certification

1.0 PURPOSE

The information contained in this notice is required under the authority of regulations promulgated under section 120 (h) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This summary is intended to support a transfer by deed to new ownership for economic development by documenting that the U.S. Department of Energy's (US DOE) Mound Plant has met the requirements of CERCLA 120 (h) for Phase I. A copy shall be provided to all future owners.

2.0 PROPERTY DESCRIPTION

2.1 Description of Property Suitable for Transfer

This Environmental Summary addresses Phase I, which is located on the southern border of the Mound Plant as shown in Figure 1. Phase I is generally bound to the south by Parcel 4, which was recently transferred to the Miamisburg Mound Community Improvement Corporation (MMCIC), to the west and north by the plant proper, and to the east by the transferred Release Block D.

The legal description of Phase I, as recorded in the Phase I Record of Decision (Reference 1) is included as Appendix A of this Environmental Summary.

2.2 Regional Context of the Mound Plant and Transferred Property

The Mound Plant is in Montgomery County within the City of Miamisburg, Ohio as shown in Figure 2. At one time, the Mound Plant occupied approximately 306 acres. Prior to the transfer of Parcel 4, Benner Road formed the southern boundary of the plant. The Norfolk Southern Railroad roughly parallels the western boundary at a distance of 50-200 feet. At one time, the Mound Plant consisted of approximately 130 buildings with a total of 1.4 million square feet of floor space (although the number of buildings is constantly diminishing as buildings are decommissioned and demolished). Since 1999, approximately 126 acres have been transferred to MMCIC. Phase I occupies approximately 52 of the remaining 180 acres.

2.3 Historical Uses of Phase I

Phase I includes approximately 52 acres of land located in three distinct sections or parcels of the site property. The first parcel, the largest block of property in Phase I, includes lands located on the south central part of the original 182 acres of the site that was purchased in 1947. This piece of property also contains a portion of the south property (purchased in 1982) that was excluded from the transfer of Parcel 4. The second parcel of property included in Phase I is situated to the south of the Spoils Area and the site well pump houses, in the area designated as the south property. The third parcel of property in Phase I lies to the south-southeast of Building 38, and to the north of Parcel D that was transferred to the MMCIC in 1999.

Phase I includes 10 existing buildings and explosives magazines and 25 former production-era building sites including buildings, explosives storage magazines, and an electrical generator. Current and historic buildings are detailed in Appendix D. Included in

the activities that once took place in Phase I are explosives testing and production-related activities, administrative activities (i.e., offices and site security operations), utilities operations, waste processing operations (the Burn Area), and cleanup waste storage operations.

In addition to the 35 production-era buildings noted above, Phase I also includes building sites dating from the construction era (storage warehouse, a quonset-type building, and some other temporary buildings).

Phase I lands have also been used for various waste and non-waste storage activities including waste container management, equipment management, and for other general plant uses.

3.0 ENVIRONMENTAL FINDINGS

3.1 Methodology

In accordance with Section 120 (h)(3) of CERCLA, to the extent that information is available based on a complete search of DOE files, the following shall be placed in deeds: (1) a notice of the type and quantity of hazardous substances stored, disposed of, or released; (2) a notice of the time at which such storage, disposal, or release took place; and (3) a description of any remedial action taken. Information sources reviewed to obtain the information include:

- federal Government records,
- recorded chain of title documents,
- reasonably obtainable aerial photographs,
- visual inspection of the property and adjacent properties,
- reasonably obtainable records of releases on adjacent properties,
- interviews with current or former employees, and
- sampling, if appropriate under the circumstances.

Phase I includes 40 Potential Release Sites (PRSs). These PRSs were identified on the basis of potential radiological and/or chemical (non-radioactive) contamination, knowledge of historical land use, or on actual sample data. The locations of the PRSs in Phase I are shown in Figure 3 and detailed in Appendix E. Before transfer of a parcel can be completed, all buildings and PRSs must be evaluated for protectiveness or remediated to a protective level. Residual risks associated with remaining contamination in Phase I have been evaluated.

A Core Team with representatives from the DOE, US Environmental Protection Agency (USEPA), and Ohio Environmental Protection Agency (OEPA) performs a joint agency evaluation of each PRS. The Core Team uses process knowledge, site visits, and existing data to determine whether any action is warranted concerning the PRS and recommends the appropriate response(s).

Information in the following documents was used to support this Environmental Summary.

3.1.1 PRS and Building Documents for the PRSs and buildings located within Phase I (References 2-27 and 36-43). These PRSs were identified on the basis of potential radiological and/or chemical (non-radioactive) contamination using knowledge of historical land use or actual sample data. PRS and Building Data Packages (References 2-13, 20-25, and 36-43) provide a summary of information sufficient for the Core Team to make recommendations or change the status of the PRS or building. Action Memoranda (References 14, 15, and 26) provide a plan for addressing removal actions. On-Scene Coordinator (OSC) Reports (References 16-19 and 27) document completion of the removal action. The locations of the PRSs and buildings in Phase I are shown on Figure 3. Table 1 lists the Core Team conclusions for these PRSs. Table 2 lists the Core Team conclusions for these buildings.

3.1.2 Residual Risk Evaluation (RRE), Phase I (Reference 28). The RRE provides the evaluation of human health risks associated with any residual contamination that may remain in the parcel after all remedies within a parcel have been addressed. The evaluation, used in conjunction with the Proposed Plan, ensures that future users of the land will not be exposed to contamination levels that would pose unacceptable health risks.

3.1.3 Ecological Scoping Report, Phase I (Reference 35). This report was prepared in accordance with an OEPA procedure to determine if an ecological assessment is warranted at a site. Based on the site visit that is part of the OEPA procedure, the fact that no threatened or endangered species were observed within Phase I, and that no sensitive environments or ecologically important resources were identified within Phase I, the future reuse of Phase I as a research and industrial park, and the information developed during several characterization investigations and removal actions performed in the Phase I area, the report concluded that a more detailed assessment of the ecological risk is not warranted.

3.1.4 Proposed Plan for Phase I (Reference 29 and 34). The Proposed Plan identifies for the public the preferred option for addressing residual contamination at the Mound Plant, Phase I, by briefly summarizing the alternatives studied and highlighting the key factors that led to identifying the preferred alternative. The Phase I Proposed Plan was reissued in March 2003 to enable public comment on the following changes in Phase I:

- The northeast boundary was adjusted to remove any influence of trichloroethene (TCE) from PRS 87 (see Figure 5 of Reference 34).
- The northwest boundary was adjusted to accommodate traffic safety during the remediation of the remainder of the site (see Figure 5 of Reference 34).
- The description of the preferred alternative (see Sections 7 and 8 of Reference 34) was changed from "Institutional Controls and Groundwater Monitoring" to "Institutional Controls and Monitored Natural Attenuation".

The residual soil risk in Phase I was recalculated using the data from the revised boundaries and compared to the results published previously in the Phase I Residual Risk Evaluation (Reference 28). Table 19 of the Proposed Plan (reproduced in Appendix C as Table 12) shows that the boundary changes did not increase the incremental residual risk from soil in Phase I.

3.1.5 Record of Decision (ROD) for Phase I (Reference 1). The ROD documents the remedial action plan for the parcel and serves the following three functions: (1) certifies the remedy selection process was carried out in accordance with CERCLA, (2) describes the technical parameters of the remedy by specifying the treatment, engineering, and institutional components as well as cleanup levels, and (3) provides the public with a consolidated summary of information about the parcel and the chosen remedy, including the rationale behind the selection.

3.2 Building Analysis Summary

There are 10 DOE-owned buildings within Phase I (see Figure 3). These buildings were evaluated by the Core Team and determined to warrant No Further Assessment (NFA). Consequently, there is no building-related contamination warranting remedial action or environmental concern. The information in the following sections is summarizd in Table 13.

3.2.1 Asbestos

There are asbestos containing materials in some of the buildings in Phase I. There are no areas requiring asbestos abatement prior to transfer. Appropriate management practices may be required in the future for the buildings to remain protective. The situation in Phase I buildings with respect to asbestos can be summarized as follows:
Present, no remediation needed – Building 3
Asbestos bearing items removed – Building 87
None identified - Magazine 80-84, Building 95
Unlikely – Building 102
For more information consult the appropriate Building Data Package.

3.2.2 Lead

There is lead based paint in some of the buildings in Phase I. There are no areas in any of the buildings requiring lead abatement prior to transfer. Appropriate management practices may be required in the future for the buildings to remain protective. The situation in Phase I buildings with respect to lead based paint can be summarized as follows:
Present, no remediation needed – Building 3
None identified - Building 87, Magazine 80-84, Building 95
Unlikely – Building 102
For more information consult the specific Building Data Package.

3.2.3 Radon

Radon studies are presented in a 1989-90 Mound Indoor Radon study for buildings. There are no areas in any of the buildings requiring radon abatement prior to transfer.

3.2.4 Radiological Surveys

The final radiological surveys for the ten buildings remaining in Phase I met all surface contamination guidelines. This information is available in the building data packages (BDPs) listed in Section 7.0.

3.2.5 PCBs

There are no areas within Phase I requiring polychlorinated biphenyl (PCB) cleanup. There may be PCB containing ballasts in the fluorescent lights in some of the buildings in Phase I. Appropriate management practices may be required in the future for the buildings to remain protective. However, the situation in Phase I buildings with respect to lead based paint can be summarized as follows:
May be present in fluorescent lamp ballasts – Building 3
None identified - Building 87, Magazine 80-84, Building 95, Building 102
For more information consult the specific Building Data Package.

3.3 PRS Summary

The USDOE, USEPA, and OEPA have jointly decided that no additional remedial action for the PRSs in Phase I is necessary with the placement of Institutional Controls in the form of deed restrictions on future land use and Monitored Natural Attenuation for Phase I. As part of the remedy, DOE will continue to monitor groundwater in Phase I for TCE and its degradation products to verify that the concentration of TCE is decreasing due to natural attenuation an is not impacting the BVA. In addition, to provide assurance that the understanding of the barium, radium, nickel, and chromium in groundwater situation at specific wells in Phase I is correct, DOE will continue to monitor for these contaminants also.

Appendix E contains a brief summary of the history of the PRSs in Phase I and their contaminants. For a more detailed description of these PRSs, refer to the PRS data packages (References 2-13 and 36-43).

PRSs at Mound were identified based on either knowledge of historical land use that was considered potentially detrimental, or an actual sampling result showing elevated concentrations of contaminants. The locations of the PRSs in Phase I are shown in Figure 3.

3.4 RRE Summary

Pursuant to the Residual Risk Evaluation Methodology (RREM) (Reference 30), risks are quantified for both carcinogenic (cancer-causing) and non-carcinogenic (non-cancer-causing) contaminants. All analytes (carcinogenic and non-carcinogenic) detected at least once in soil and/or groundwater in Phase I were identified as constituents of potential concern (COPCs) and are listed in Appendix F. The maximum concentration of each COPC for soil and groundwater was compared to and screened against criteria established in the RREM and presented in the Phase I Residual Risk Evaluation (Reference 28). COPC tables for both groundwater and soil are presented in Tables 3 through 8 of Appendix C. COPCs that were carried through the RRE process are identified in the tables. The risk associated with the intake of a known or suspected carcinogen is reported in terms of the incremental lifetime cancer risk presented by that COPC, as estimated using the appropriate slope factor and the amount of material available for uptake. The acceptable risk range as defined by CERCLA and the National Contingency Plan (NCP) is 10^{-4} to 10^{-6} (one human in ten-thousand to one human in one-million incremental cancer

incidence). Potential human health hazards from exposure to non-carcinogenic contaminants are evaluated by using a Hazard Quotient (HQ). The HQ is determined by the ratio of the intake of a COPC to a reference dose or concentration for the contaminant of concern that is believed to represent a no-observable effect level. The contaminant of concern-specific HQs are then summed to provide an overall Hazard Index (HI). USEPA guidance sets a limit of 1.0 for the Comprehensive HI. The incremental carcinogenic risks and hazards associated with residual concentrations of COPCs in Phase I are also shown in Table 9 of Appendix C.

Evaluation of residual soil and groundwater contaminants within Phase I has resulted in a determination that future users of the land will not be exposed to contaminant levels that would pose unacceptable risks as long as compliance with the deed restrictions described in the Phase I Record of Decision are maintained. The soils within Phase I have not been evaluated for any use other than onsite industrial/commercial use. Any offsite disposition of the Phase I soil without proper handling, sampling, and management could create an unacceptable risk to offsite receptors.

3.5 Other Factors Considered

DOE developed a generic checklist of the issues to be considered in evaluating property to be transferred. The checklist was modified from that used by the Department of Defense in releasing property for sale. The checklist includes environmental problems from Mound Plant that are likely to concern a potential purchaser as well as items relating to the operational concerns from ongoing and future remedial actions. Table 10 contains a brief summary and references for all factors considered. Results of only those factors which affect Phase I are presented as follows:

3.5.1 Monitoring Equipment

Both DOE and OEPA operate air monitoring stations within Phase I. These are expected to operate through the end of the Mound Closure Project. There are also several monitoring wells within Phase I. Since continued groundwater monitoring is part of the selected remedy for Phase I, DOE will continue to have access to these locations via easements.

3.5.2 National Environmental Policy Act

Phase I lies within the boundaries of the Mound Plant described in the Environmental Assessment (EA) for Commercialization of the Mound Plant (Reference 31) and the resulting Finding of No Significant Impact (FONSI) issued on October 27, 1994 (Reference 32). The land use described in the EA is consistent with the institutional controls in the ROD for Phase I.

3.5.3 Resource Conservation and Recovery Act

A Resource Conservation and Recovery Act (RCRA) amended closure plan for the former "Burn Area" unit was approved by the Director of Ohio EPA on July 26, 1999. A modification to this approval requires that a deed restriction limiting future land-use scenarios be initiated for the parcel in which the former RCRA unit was located. In

accordance with the Director's approval, Ohio EPA will monitor compliance to ensure that the above noted institutional control is maintained.

3.5.4 Wetlands

Three characteristics must be present for an area to be classified as a jurisdictional wetland: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. One site in Phase I (Site HH, 0.03 acre) constitutes a jurisdictional wetland (Reference 33). In addition, Reference 33 indicated Site EE was constructed as a sedimentation basin and continues to be used for storm water runoff and silt control. Accordingly, it is not regulated. However, if the use of Site EE changes it could become regulated as a jurisdictional wetland.

Pursuant to 10 CFR Part 1022.5(d), when DOE property is proposed for disposal to non-Federal public or private parties, DOE must identify those uses that are restricted under Federal, state, or local wetlands regulations. Accordingly, the future owner of the site would be made aware of the following regulations governing activities in or near the wetlands.

According to the federal Clean Water Act, anyone who wishes to discharge dredged or fill material into the waters of the U.S., regardless of whether on private or public property, must obtain a Section 404 permit from the U.S. Army Corps of Engineers (USACE) and a Section 401 Water Quality Certification (WQC) from the state.

The USACE governs the discharges of dredged or fill material into headwaters and isolated waters of the United States with activity-specific Nationwide Permits (NWPs). The terms and conditions of the NWPs ensure that the activities result in minimal adverse effects on the aquatic environment. The NWPs require notification to the USACE district engineer for activities that result in the loss of greater than 0.1 acre of waters of the United States. Regional conditions may be added to the NWPs by division engineers to lower notification thresholds. Because the wetlands in question are less than 0.1 acre, a pre-construction notification (PCN) to the USACE will not be necessary.

OEPA has pre-granted Section 401 Water Quality Certifications to 404 permits for certain types of projects that are similar in nature and cause minimal degradation to waters of the state. These permits are called Nationwide Permits and substantially expedite the permitting process. To determine if a project qualifies for Nationwide Permits coverage, or requires an individual section 401 WQC from OEPA, applicants should contact the USACE first to discuss the project.

Existing wetland uses, as defined in rule 3745-1-53 of the Administrative Code, shall be maintained and protected in accordance with rules 3745-1-50 to 3745-1-54 of the Administrative Code [3745-1-05(C)(1)].

3.5.5 Clean Air Act

OEPA placed the roads and parking lots at Mound on permanent registration status with air permit F001. The roads and parking lots in Phase I are included under that permit.

4.0 FINDINGS OF SUITABILITY TO TRANSFER

In accordance with the provisions of CERCLA Section 120 (h), contaminated property can only be transferred if one of the following applies:

(1) a decision has been made that no remedial action is necessary ,

(2) all remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of transfer and any such remedy has been demonstrated to the Administrator to be operating properly and successfully, or

(3) Early Transfer Authority, which allows for transfer before all necessary action is complete, has been granted by USEPA with concurrence from the Governor of the State of Ohio pursuant to CERCLA Section 120(h)(3)(C).

The future industrial use of the Mound Plant has been determined based upon agreement among USDOE, USEPA, and OEPA, and interested stakeholders. This land use is reflected in the MMCIC Mound Comprehensive Reuse Plan and is currently codified in the City of Miamisburg Zoning Ordinance for industrial/commercial use.

A joint agency decision among the USDOE, USEPA, and OEPA has been made that a remedial action has been taken that protects human health and the environment. EPA deems this condition to be satisfied if the institutional controls are implemented and operating successfully. Institutional controls in the form of deed restrictions on future land use will be placed on Phase I upon transfer as part of the remedy. The objective of these institutional controls is to prevent an unacceptable risk to human health and the environment by restricting the use of Phase I, including Phase I soils and groundwater, to that which is consistent with assumptions in the Phase I RRE. DOE or its successors or assigns, as the lead agency for this ROD, has the responsibility to implement, report on, monitor, maintain, and enforce these institutional controls both before and after the transfer. The following property deed restrictions and requirements will be imposed on the property to maintain protection of human health and the environment in the future:

- Maintenance of industrial/commercial land use;
- Prohibition against residential use;
- Prohibition against the use of groundwater;
- Site access for federal and state agencies for the purpose sampling and monitoring; and,
- Prohibition against removal of Phase I soils from the DOE Mound property (as owned in 1988) boundary without approval from the Ohio Department of Health (ODH), OEPA, and USEPA.

The Monitored Natural Attenuation of TCE at well 0411 portion of the remedy is also considered to be operating properly and successfully. This judgement is based on: the declining levels of TCE and DCE at well 0411, well 0443, and seep 0617 (Figures 4, 5, and 6); the lack of a source term; the small, limited area affected; and the lack of TCE migration. In addition, the monitoring data (Figures 4, 5, and 6) continue to support the analysis originally presented in the Phase I Record of Decision that indicated Monitored

Natural Attenuation is appropriate for Phase I. That analysis is reproduced here:

"According to the guidance *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, April 1999, EPA/540/R-99/009,* there are generally ten factors that should be considered to evaluate the appropriateness of a Monitored Natural Attenuation remedy. The factors, along with a brief explanation of how they relate to Phase I, are presented below:

1. *Whether the contaminants present in soil or groundwater can be effectively remediated by natural attenuation processes*

   The concentration of TCE in the groundwater is expected to decrease to a concentration less than the MCL through a naturally-occurring biodegradation process called reductive dehalogenation. In this process, chlorinated solvent compounds (such as TCE) gradually break down by having a halogen, in this case chlorine atoms, replaced with a hydrogen atom. This progression results in a successively lower number of halogens (chlorine atoms) attached to the compound structure, shown by:

   Trichloroethene (TCE)→ Dichloroethene (DCE) →Vinyl Chloride→ Ethene + Cl^-

   The assumption that this process is already taking place in the area is supported by the fact that dichloroethene (DCE) has been detected consistently along with the TCE in well 0411. Although it is expected that the primary natural process for attenuation will be reductive dehalogenation, other natural attenuation processes including dispersion, dilution, sorption, and others may also assist in naturally attenuating the contaminants at the site.

2. *Whether or not the contaminant plume is stable and the potential for the environmental conditions that influence plume stability to change over time*

   The wells in the Phase I area have been sampled over a period of several years. Sample results have consistently shown that the TCE contamination is not present as a plume, but is limited to a small area near the location of well 0411.

3. *Whether human health, drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources could be adversely impacted as a consequence of selecting MNA as the remediation option*

   There is no indication that the BVA or other environmental resources in the area of Phase I will be adversely affected by selecting MNA as the remediation option for TCE in Phase I.

4. *Current and projected demand for the affected resource over the time period that the remedy will remain in effect*

The bedrock aquifer, where the TCE has been detected above MCLs, is not currently used as a groundwater resource for the Mound Plant, nor is it anticipated to be used in the future. In fact, the Phase I area will be tied into the City of Miamisburg municipal water supply in the near future, further decreasing the likelihood that the bedrock aquifer would be used as a potable water source. Finally, the selected remedy calls for a restriction to be placed on the deed for Phase I that will prohibit the installation of wells in the Phase I area in the future.

5. *Whether the contamination, either by itself or as an accumulation with other nearby sources (on-site or off-site), will exert a long-term detrimental impact on available water supplies or other environmental resources*

   The BVA is designated as a sole source aquifer and serves as the primary potable water supply for the City of Miamisburg. Based upon years of groundwater data collected downgradient of well 0411, there is no indication that the BVA is threatened by the TCE contamination in the well 0411 area. These downgradient locations will be monitored as part of the selected remedy to verify that the BVA remains unaffected.

6. *Whether the estimated timeframe of remediation is reasonable compared to timeframes required for other more active methods of remediation*

   The fact that the concentrations are just slightly above the MCL of 5 ppb for TCE (15 ppb in well 0411 and 9 ppb in well 0443) would suggest that the timeframe for remediation should be fairly short. These relatively low concentrations, along with the fact that the bedrock aquifer exhibits relatively low yield rates, make remediation of the bedrock by more active methods an impractical option at this time. If concentrations were to increase, more active treatment methods may be evaluated.

7. *The nature and distribution of sources of contamination and whether these sources have been, or can be, adequately controlled*

   There are no known sources of TCE contamination in soil in the Phase I area.

8. *Whether the resulting transformation products present a greater risk, due to increased toxicity and/or mobility, than do the parent contaminants*

   Although vinyl chloride, a breakdown product of TCE, generally presents a higher risk to human receptors than TCE and is more persistent in groundwater, it is not anticipated that the original concentration of TCE (15 ppb) will support the production of high enough concentrations of vinyl chloride in the bedrock aquifer in Phase I to pose an unacceptable risk. In any event, there is no current exposure pathway to Phase I groundwater, and the selected remedy prohibits the installation of wells in the Phase I area.

9. *The impact of existing and proposed active remediation measures upon the MNA component of the remedy, or the impact of remediation measures or other operations/activities (e.g. pumping wells) in close proximity to the site*

   There are no operations or activities in close proximity to wells 0411 and 0443 that would impact the MNA component of the selected remedy.

10. *Whether reliable site-specific mechanisms for implementing institutional controls (e.g. zoning ordinances) are available, and if an institution responsible for their monitoring and enforcement can be identified*

    Institutional Controls will be implemented as part of the selected remedy for the Phase I property. The use of the bedrock groundwater will be prohibited as part of the selected remedy, and DOE, or its successors, have the responsibility to monitor, maintain and enforce these institutional controls in the future. "

In addition, DOE will continue to monitor groundwater in Phase I for TCE and its degradation products to verify that the concentration of TCE is decreasing due to natural attenuation and is not impacting the Buried Valley Aquifer (BVA). The specifics of the monitoring will be established in a Phase I Groundwater Monitoring Plan that will require approval by USEPA and OEPA. This will become part of the Operations & Maintenance (O&M) Plan required by the ROD. Key elements of the monitoring were outlined in Section 2.9.2 of the ROD. Groundwater monitoring provides assurance that the concentration of TCE observed in Phase I is decreasing and is not impacting the BVA. In addition, to provide assurance that the understanding of the barium, radium, nickel, and chromium in groundwater situation at specific wells in Phase I is correct, DOE will continue to monitor for these contaminants also.

5.0 ENVIRONMENTAL COVENANTS

DOE is committed to include a covenant in accordance with Section 120 (h)(3) of CERCLA in the deed for the sale or transfer of the property that warrants that:

A. All remedial action necessary to protect human health and the environment has been taken as long as the deed restrictions limiting land and groundwater use are in effect and enforced.

B. Any additional response action or corrective action found to be necessary after the date of sale or transfer shall be conducted by the United States [Section 120(h)(4)(D)(i)]. The requirements of the covenant shall not apply in any case in which the person or entity to whom the property is transferred is a potentially responsible party with respect to the property.

C. A clause granting the United States access to the property in any case in which a response action or corrective action is found to be necessary or such access is necessary to carry out a response action or corrective action on the adjoining property [Section 120 (h)(4)(D)(ii)].

6.0 NOTIFICATION / PUBLIC PARTICIPATION

The community has been an active participant in this process to date. Comments from the public on the PRS recommendation have been incorporated as part of the remedy evaluation. DOE believes all comments have been resolved with the commentor and the documents, comments, and responses have been placed in the CERCLA Public Reading Room.

Table 11 lists the Phase I PRS packages, Phase I Building Data Packages, Phase I RRE, and Phase I Proposed Plan along with the dates they were made available for public comment.

7.0 REFERENCES

Reference 1 Phase I Record of Decision, Final, July 2003.

Reference 2 PRS 16 Package, Final, November 1996.

Reference 3 PRS 73 Package, Final, August 2002.

Reference 4 PRS 74 Package, Final, May 1997.

Reference 5 PRS 258-265 Package, Final, August 2002.

Reference 6 PRS 370 Package, Final, February 1997.

Reference 7 PRS 371 Package, Final, May 1997.

Reference 8 PRS 372 Package, Final, November 1996.

Reference 9 PRS 383 Package, Final, September 1997.

Reference 10 PRS 384 Package, Final, January 1997.

Reference 11 PRS 306/314/406 Package, Final, November 1996.

Reference 12 PRS 418 Package, Final, February 2002.

Reference 13 PRS 419 Package, Final, April 2000.

Reference 14 Action Memorandum, Engineering Evaluation/Cost Analysis, Contingent Removal Action for Contaminated Soil, Final, August 2002.

Reference 15 PRS 304 Action Memorandum, Final, October 1998.

Reference 16 PRS 276 Removal Action On-Scene Coordinator (OSC) Report, Final, September 2002.

Reference 17 PRS 304 Removal Action On-Scene Coordinator (OSC) Report, Final, December 1998.

Reference 18 On-Scene Coordinator (OSC) Report for Building 21 (PRS 284) & Associated Soils (PRS 407 and PRS 281) Decontamination and Decommissioning (D&D) Project, Final, Revision 0, January 2000.

Reference 19 PRS 421 Removal Action On-Scene Coordinator (OSC) Report, Final, September 2002.

Reference 20 Building 3 Building Data Package, Final, August 2002.

Reference 21 Building 87 Building Data Package, Final, November 1997.

Reference 22 Magazines 80-84 Building Data Package, Final, August 2002.

Reference 23 Building 95 Building Data Package, Final, October 2002.

Reference 24 Building 102 Building Data Package, Final, August 2002.

Reference 25 SST Building Data Package, Final, August 2002.

Reference 26 Buildings 35 & 59 Action Memorandum, Final, May 1998.

Reference 27 On-Scene Coordinator (OSC) Report for Buildings 35 & 59 Removal Action, Final, April 1999.

Reference 28 Phase I Residual Risk Evaluation (RRE), Final, March 2003.

Reference 29 Phase I Proposed Plan, Public Review Draft, September 2002.

Reference 30 Residual Risk Evaluation Methodology (RREM), Final, Revision 0, January 6, 1997.

Reference 31 Environmental Assessment for Commercialization of the Mound Plant, October 1994.

Reference 32 Finding of No Significant Impact (FONSI), October 27, 1994.

Reference 33 Delineation of Federal Wetlands and Other Waters of the U.S., Final, August 1999.

Reference 34 Phase I Proposed Plan, Public Review Draft, March 2003. (Reissued to enable public comment on the Monitored Natural Attenuation component of the remedy and the impact of the boundary change.)

Reference 35 Phase I Ecological Scoping Report, Final, March 2003.

Reference 36 PRS 280 Package, Final, June 2002.

Reference 37 PRS 311/350 Package, Final, November 1996.

Reference 38 PRS 304/313 Package, Final, July 1997.

Reference 39 PRS 346/347/348/355/370 Package, Final, June 1997.

Reference 40 PRS 349 Package, Final, April 1997.

Reference 41 PRS 351/352/353/357/359/360/361/362/385/386/387 Package, Final, January 1997.

Reference 42 PRS 365 Package, Final, April 1997.

Reference 43 PRS 369 Package, Final, January 1997.

APPENDIX A

Legal Description of Phase I

The 2.5 acre portion of Phase I that is closest to Building 38 may not be transferred until after the demolition of Building 38 and associated soil remediation are complete. Therefore, the legal descriptions of the components of Phase I are labeled as exhibits for two Quit Claim Deeds. The contents of the appendix are:

Exhibit A of Quit Claim Deed for Parcel IA - Description of Parcel IA

Exhibit A of Quit Claim Deed for Parcels IB and IC - Description of Parcel IB

Exhibit B Quit Claim Deed for Parcels IB and IC - Description of Parcel IC

Exhibit "A"
DESCRIPTION OF

2.542 Acres
Parcel IA

located in
Section 30, Town 2, Range 5, MRs.
City of Miamisburg, Montgomery County, Ohio

Situate in the Northwest Quarter of Section 30, Town 2, Range 5, MRs., City of Miamisburg, County of Montgomery, State of Ohio, ***being part of a 87.28 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 12*** of the Deed Records of Montgomery County, Ohio, said 87.28 acre tract being comprised of a 59.75 acre tract, also a 19.40 acre tract, also a 9.97 acre tract, also a 0.78 acre tract and a 0.78 acre tract all known as Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, ***being a new division of 2.542 acres from said 87.28 acre tract*** and being more fully bounded and described as follows:

Commencing at a "DOE" concrete monument found, said monument being the southwest corner of the Miami Mound Plat as recorded in Record Plat Book Volume 94, Page 34 of the Plat Records of Montgomery County, Ohio, said monument being the southeast corner of a 12.429 acre tract, known as Part lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio, said monument lying in the north line of a 79.74 acre tract, known as City Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, Ohio, conveyed to the United States of America, as recorded in Microfiche No. 81-0376A01 of the Deed Records of Montgomery County, Ohio, reference a "DOE" concrete monument found, South 83° 59' 35" East, 34.07 feet, said monument being the northeast corner of said United States of America 79.74 acre tract; thence with the easterly line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, the westerly line of the Miami Mound Plat, the westerly line of a 0.7 acre tract conveyed to Melissa A. Wilson, as recorded in Deed Microfiche No. 89-0125D01, the westerly line of a 0.26 acre tract conveyed to Betty J. Eckhart, as recorded in Deed Microfiche No. 98-0834C09, and the westerly line of a 0.78 acre tract conveyed to Randall and Rita Hilgefort, as recorded in Deed Microfiche No. 97-0746A08, all of the Deed Records of Montgomery County, Ohio, North 07° 06' 56" West, a distance of 714.44 feet to a 5/8" capped "LeRoy" iron pin found, said iron pin being set by William C. LeRoy, Professional Surveyor number 7664 of the State of Ohio by prior survey as recorded in the Montgomery County Engineer's Record of Land Surveys, Volume 1999, Page 0326, said iron pin being the northwest corner of said Hilgefort 0.78 acre tract, said iron pin lying in the north line of said original 19.4 acre tract and the south of said original 59.75 acre tract; thence with the north line of said Hilgefort 0.78 acre tract, South 85° 28' 23" East, a distance of 111.00 feet to a Mag nail set, said mag nail being the northeast corner of said Hilgefort 0.78 acre tract, said mag nail being the southeast corner of said original 59.75 acre tract, said mag nail being a center line of deflection point in the original center line of Mound Road; thence with the center line of Mound Road, the east line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract and the east line of said original 59.75 acre tract, North 05° 32' 42" East, a distance of 218.17 feet to a Mag nail set, said mag nail being the northeast corner of said Miamisburg Mound Community Improvement Corp.

12.429 acre tract and the **True Point of Beginning** of the hereinafter described new division of 2.542 acres;

Thence with the north line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, **North 85° 05' 35" West**, passing a Mag nail set at 30.00 feet, said mag nail lying in the west right of way line of Mound Road, in all a distance of **496.88 feet to a 5/8" iron pin set**, said iron pin being a point of curvature in the northwesterly line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract;

Thence with a new division line on the following eleven (11) courses,

1) **North 10° 39' 51" East**, a distance of **144.96 feet to a 5/8" iron pin set;**
2) **Thence, North 29° 43' 26" East**, a distance of **62.93 feet to a 5/8" iron pin set;**
3) **Thence, North 69° 33' 41" East**, a distance of **26.88 feet to a railroad spike set;**
4) **Thence, North 85° 25' 03" East**, a distance of **16.15 feet to a railroad spike set;**
5) **Thence, South 85° 59' 22" East**, a distance of **168.77 feet to a railroad spike set;**
6) **Thence, South 01° 34' 34" East**, a distance of **4.60 feet to a Mag nail set;**
7) **Thence, North 88° 51' 18" East**, a distance of **68.48 feet to a chiseled cross notch set;**
8) **Thence, North 06° 06' 00" East**, a distance of **16.15 feet to a 5/8" iron pin set;**
9) **Thence, South 85° 06' 10" East**, a distance of **31.61 feet to a 5/8" iron pin set;**
10) **Thence**, with a curve to the right, said tangent bearing being South 65° 24' 00" East, having a **delta angle of 69° 33' 41", a radius of 26.90 feet, an arc length of 32.78 feet** and **a chord bearing and distance of North 59° 30' 28" East, *30.79* feet to a 5/8" iron pin set;**
11) **Thence, South 85° 35' 05" East**, passing a 5/8" iron pin set at 94.16 feet, said iron pin lying in the west right of way line of Mound Road, in all a distance of **124.16 feet to a Mag nail set**, said mag nail lying in the east line of said original 59.75 acre tract, the east line of said United States of America 87.28 acre tract and the center line of Mound Road;

Thence with the east line of said original 59.75 acre tract, the east line of said United States of America 87.28 acre tract and the center line of Mound Road, **South 05° 32' 42" West**, a distance of **255.87 feet to the True Point of Beginning**, containing **2.542 acres**, more or less, being subject to all easements, highways and right of ways of record..

Bearing basis established as Grid North by GPS observation August 7th & 8th , 2002 at Latitude N39° 38' 25.81", Longitude W084° 17' 28.09" (Coast & Geodetic Survey Monument #G-139, 1947); Ohio State Plane Coordinate system, Ohio South Zone 3402 (NAD 83), True North being 01° 08' 11" east of Grid North.

This description prepared from an actual field survey performed under my direct supervision, Timothy W. Schram, Sr., Registered Professional Surveyor number 7299 of the State of Ohio, and that all monuments referenced herein and placed on the ground represents the boundaries of the herein described tract, and based on a Plat of Survey as recorded in the Montgomery County Engineer's Record of Land Surveys in Record Volume number _____, Page _____.

_____

Timothy W. Schram, Sr., Regist. Prof. Surveyor No. 7299
of the State of Ohio, September 11, 2002.
F: 02088 Mound Parcel 5 Surv Parcel IA

Exhibit "A"
DESCRIPTION OF

42.882 Acres

Parcel IB

located in
Section 30 and 36, Town 2, Range 5, M.Rs.
City of Miamisburg, Montgomery County, Ohio

Situate in Section 30 and 36, Town 2, Range 5, M.Rs., City of Miamisburg, County of Montgomery, State of Ohio, ***being part of a 87.28 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 12*** of the Deed Records of Montgomery County, Ohio, said 87.28 acre tract being comprised of a 59.75 acre tract, also a 19.40 acre tract, also a 9.97 acre tract, also a 0.78 acre tract and a 0.78 acre tract all known as Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, ***also being part of a 79.74 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-376A01*** of the Deed Records of Montgomery County, Ohio; said 79.74 acre tract being comprised of a 24.197 acre tract and known as Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, also a 35.50 acre tract known as Lot Numbered 6127 of the consecutive numbered lots of the City of Miamisburg, and a 24.24 acre tract known as Lot Numbered 4777 of the consecutive numbered lots of the City of Miamisburg, ***also being part of a 20.46 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1215, Page 347 and part of a 17.58 acre tract conveyed to the United States of America, as recorded in Deed Book Volume 1214, Page 248***, all of the Deed Records of Montgomery County, Ohio, said 20.46 acre tract and 17.58 acre tract being known as Lot Numbered 2290 of the consecutive numbered lots of the City of Miamisburg, ***being a new division of 42.882 acres from said 87.28 acre tract, 79.74 acre tract, 20.46 acre tract and 17.58 acre tract*** and being more fully bounded and described as follows:

Commencing at a "DOE" concrete monument found, said monument being the southwest corner of the Miami Mound Plat as recorded in Record Plat Book Volume 94, Page 34 of the Plat Records of Montgomery County, Ohio, said monument being the southeast corner of a 12.429 acre tract, known as Part lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio, said monument lying in the north line of a 79.74 acre tract, known as City Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, Ohio, conveyed to the United States of America, as recorded in Microfiche No. 81-0376A01 of the Deed Records of Montgomery County, Ohio, said "DOE" monument being the **True Point of Beginning** of the hereinafter described new division of 42.882 acres;

Thence with the south line of the Miami Mound Plat, **South 83° 59' 35" East**, a distance of **34.06 feet to a "DOE" concrete monument found**, said monument being the northeast corner of said United States of America 79.74 acre tract, said monument being the northwest corner of a 7.502 acre tract conveyed to Daniel R. Shell, as recorded in Deed Microfiche No. 85-443D02 of the Deed Records of Montgomery County, Ohio, said 7.502 acre tract being known as Lot Numbered 6130 of the consecutive numbered lots of the City of Miamisburg, Ohio;

Thence with the east line of said United States of America 79.74 acre tract and the west line of said Shell 7.502 acre tract, **South 04° 42' 45" West, a distance of 311.82 feet to a 5/8" capped**

"Schram" iron pin set by previous survey by myself, Timothy W. Schram, Sr. for a new division of 94.838 acre tract, known as Parcel 4 of the Mound Complex, said iron pin being the northeasterly corner of said new division of 94.838 acre tract;

Thence with said new division line of said 94.838 acre tract on the following three (3) courses,

1) **Due West**, a distance of **62.54 feet to a 5/8" capped "Schram" iron pin set by previous survey**;

2) **Thence, Due North**, a distance of **111.18 feet to a 5/8" capped "Schram" iron pin set by previous survey**;

3) **Thence** with said new division line of 94.838 acres and a new division line of the herein described 45.259 acres, **South 89° 59' 52" West**, passing a point on the west line of Section 30 and the east line of Section 36 at 1249.47 feet, reference from said point a railroad spike found, South 05° 16' 42" West, 1682.63 feet, said spike being the south section corner of Section 30 and 36, also a concrete monument found, disturbed, North 05° 16' 42" East, 3724.33 feet, said concrete monument being the north corner of Section 30 and 36, also passing a 5/8" capped "Schram" iron pin set by previous survey at 1767.43 feet, said iron pin being a northerly corner of said new division of 94.838 acres, in all a distance of **1784.02 feet to a 5/8" iron pin set**, said iron pin being the southwest corner of the herein described new division of 45.259 acres, said iron pin also being a northerly corner of a new division of 6.568 acre tract, known as Parcel IC of the Mound Complex;

Thence with a new division line on the following twenty-three (23) courses,

1) **North 24° 17' 45" West**, a distance of **458.95 feet to a 5/8" iron pin set**;
2) **Thence, North 83° 58' 45" West**, a distance of **109.56 feet to a 5/8" iron pin set**;
3) **Thence, North 05° 38' 00" East**, a distance of **284.12 feet to a 5/8" iron pin set**;
4) **Thence, North 08° 45' 53" East**, a distance of **94.64 feet to a 5/8" iron pin set**;
5) **Thence, North 21° 05' 14" East**, a distance of **206.77 feet to a 5/8" iron pin set**;
6) **Thence, North 75° 37' 35" West**, a distance of **22.86 feet to a 5/8" iron pin set**;
7) **Thence, North 14° 15' 45" West**, a distance of **152.26 feet to a 5/8" iron pin set**;
8) **Thence, North 50° 25' 32" East**, a distance of **58.44 feet to a 5/8" iron pin set**;
9) **Thence, North 25° 13' 50" East**, a distance of **88.97 feet to a 5/8" iron pin set**;
10) **Thence, North 50° 57' 41" East**, a distance of **58.71 feet to a 5/8" iron pin set**;
11) **Thence, North 63° 34' 44" East**, a distance of **106.77 feet to a railroad spike set**;
12) **Thence, North 67° 55' 35" East**, a distance of **195.36 feet to a railroad spike set**;
13) **Thence, North 32° 10' 07" East**, a distance of **60.19 feet to a 5/8" iron pin set**;
14) **Thence, North 80° 03' 26" East**, a distance of **45.82 feet to a 5/8" iron pin set**;
15) **Thence, North 01° 21' 45" West**, a distance of **10.36 feet to a 5/8" iron pin set**;
16) **Thence, North 82° 56' 15" East**, a distance of **120.55 feet to a 5/8" iron pin set**;
17) **Thence, South 05° 28' 44" East**, a distance of **114.21 feet to a 5/8" iron pin set**;
18) **Thence, North 84° 30' 00" East**, a distance of **56.66 feet to a 5/8" iron pin set**;
19) **Thence, South 27° 23' 24" East**, a distance of **170.96 feet to a 5/8" iron pin set**;
20) **Thence, South 26° 26' 49" East**, a distance of **82.75 feet to a 5/8" iron pin set**;
21) **Thence, North 82° 42' 58" East**, passing a point on the west line of Section 30 and the east line of Section 36 at 101.51 feet, reference from said point a railroad spike found, South 05° 16' 42" West, 2878.31 feet, said spike being the south section corner of Section 30 and 36, also a concrete monument found, disturbed, North 05° 16' 42" East, 2528.66 feet, said concrete monument being the north corner of Section 30 and 36, in all a distance of **158.83 feet to a 5/8" iron pin set**;

22) **Thence, South 39° 17' 18" East,** a distance of **324.25 feet to a 5/8" iron pin set;**

23) **Thence, South 84° 30' 40" East,** a distance of **292.51 feet to a 5/8" iron pin set,** said iron pin being a westerly corner of a 12.429 acre tract, known as Part Lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio;

Thence with the westerly line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract on the following three (3) courses,

1) **South 05° 34'05" West,** a distance of **360.00 feet to a 5/8" iron pin set;**

2) **Thence, South 84° 25' 51" East,** a distance of **93.50 feet to a 5/8" iron pin set;**

3) **Thence, South 05° 34' 05" West,** a distance of **291.47 feet to a 5/8" capped "LeRoy" iron pin found,** said iron pin being set by William C. LeRoy, Professional Surveyor number 7664 of the State of Ohio by prior survey as recorded in the Montgomery County Engineer's Record of Land Surveys, Volume 1999, Page 0326, said iron pin being the southwest corner of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, said iron pin lying in the south line of said United States of America 87.28 acre tract, said iron pin lying in the north line of said Untied State of America 79.74 acre tract;

Thence with the south line of said Miamisburg Mound Community Improvement Corp. 12.429 acre tract, the south line of said United States of America 87.28 acre tract and the north line of said Untied State of America 79.74 acre tract, **South 84° 32' 54" East,** a distance of **613.34 feet to the True Point of Beginning,** containing **42.882 acres,** more or less, of which ***18.230 acres lying in Section 30, 24.652 acres lying in Section 36,*** of which ***3.032 acres being part of Lot Numbered 6128, 5.088 acres being part of Lot Numbered 6127, 5.365 acres being part of Lot Numbered 4777, 10.109 acres being part of Lot Numbered 2259 and 19.288 acres being part of Lot Numbered 2290,*** all of the consecutive numbered lots of the City of Miamisburg, Ohio, and being subject to all easements, highways and right of ways of record.

Bearing basis established as Grid North by GPS observation August 7th & 8th, 2002 at Latitude N39° 38' 25.81", Longitude W084° 17' 28.09" (Coast & Geodetic Survey Monument #G-139, 1947); Ohio State Plane Coordinate system, Ohio South Zone 3402 (NAD 83), True North being 01° 08' 11" east of Grid North.

This description prepared from an actual field survey performed under my direct supervision, Timothy W. Schram, Sr., Registered Professional Surveyor number 7299 of the State of Ohio, and that all monuments referenced herein and placed on the ground represents the boundaries of the herein described tract, and based on a Plat of Survey as recorded in the Montgomery County Engineer's Record of Land Surveys in Record Volume number **2003**, Page **XXXX**.

Timothy W. Schram, Sr., Regist. Prof. Surveyor No. 7299
of the State of Ohio, March 21, 2003.
F: 030026 Mound Parcel IB Revised

Exhibit "B"
DESCRIPTION OF

6.568 Acres
Parcel IC

located in
Section 36, Town 2, Range 5, MRs.
City of Miamisburg, Montgomery County, Ohio

Situate in Section 36, Town 2, Range 5, MRs., City of Miamisburg, County of Montgomery, State of Ohio, ***being part of a 79.74 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-376A01*** of the Deed Records of Montgomery County, Ohio, said 79.74 acre tract being comprised of a 24.197 acre tract and known as Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, also a 35.50 acre tract known as Lot Numbered 6127 of the consecutive numbered lots of the City of Miamisburg, and a 24.24 acre tract known as Lot Numbered 4777 of the consecutive numbered lots of the City of Miamisburg, ***also being part of a 42.56 acre tract conveyed to the United States of America, as recorded in Microfiche No. 81-323A11*** of the Deed Records of Montgomery County, Ohio, said 42.56 acre tract being comprised of a 46.313 acre tract known as Lot Numbered 4778 of the consecutive numbered lots of the City of Miamisburg, said 42.56 acre tract being all the remainder of an 80 acre tract as conveyed from Ray C. Dunaway and Thelma Mae Dunaway to Oak Knoll Development and Investment Co., Inc., as recorded in Microfiche No. 71-513B06 of the Deed Records of Montgomery County, Ohio, ***being a new division of 6.568 acres from said 79.74 acre tract and 42.56 acre tract*** and being more fully bounded and described as follows:

Commencing at a "DOE" concrete monument found, said monument being the southwest corner of the Miami Mound Plat as recorded in Record Plat Book Volume 94, Page 34 of the Plat Records of Montgomery County, Ohio, said monument being the southeast corner of a 12.429 acre tract, known as Part lot Numbered 2259 of the consecutive numbered lots of the City of Miamisburg, Ohio, also known as Parcel "D" of the Mound Complex, conveyed to the Miamisburg Mound Community Improvement Corporation, as recorded in Deed Microfiche No. 99-0852B05 of the Deed Records of Montgomery County, Ohio, said monument lying in the north line of a 79.74 acre tract, known as City Lot Numbered 6128 of the consecutive numbered lots of the City of Miamisburg, Ohio, conveyed to the United States of America, as recorded in Microfiche No. 81-0376A01 of the Deed Records of Montgomery County, Ohio, thence with the south line of the Miami Mound Plat, South 83° 59' 35" East, a distance of 34.07 feet to a "DOE" concrete monument found, said monument being the northeast corner of said United States of America 79.74 acre tract, said monument being the northwest corner of a 7.502 acre tract conveyed to Daniel R. Shell, as recorded in Deed Microfiche No. 85-443D02 of the Deed Records of Montgomery County, Ohio, said 7.502 acre tract being known as Lot Numbered 6130 of the consecutive numbered lots of the City of Miamisburg, Ohio; thence with the east line of said United States of America 79.74 acre tract and the west line of said Shell 7.502 acre tract, South 04° 42' 45" West, a distance of 311.82 feet to a 5/8" capped "Schram" iron pin set by previous survey by myself, Timothy W. Schram, Sr. for a new division of 94.838 acre tract, known as Parcel 4 of the Mound Complex, said iron pin being the northeasterly corner of said new division of 94.838 acres; thence with said new division line of said 94.838 acre tract on the following three (3) courses, 1) Due West, a distance of 62.54 feet to a 5/8" capped "Schram" iron pin set by previous survey; 2) thence, Due North, a distance of 111.18 feet to a 5/8" capped "Schram" iron pin set by previous survey; 3) thence, South 89° 59' 52" West, passing a point on the west line of Section 30 and

the east line of Section 36 at 1249.47 feet, reference from said point a railroad spike found, South 05° 16' 42" West, 1682.63 feet, said spike being the south section corner of Section 30 and 36, also a concrete monument found, disturbed, North 05° 16' 42" East, 3724.33 feet, said concrete monument being the north corner of Section 30 and 36, in all a distance of 1767.43 feet to a 5/8" capped "Schram" iron pin set by previous survey, said iron pin being a northerly corner of said new division of 94.838 acres, said iron pin being the **True Point of Beginning** of the hereinafter described new division of 6.568 acres;

Thence with said new division line of said 94.838 acre tract on the following six (6) courses,

1) **South 23° 53' 27" West**, a distance of **12.17 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
2) **Thence, South 47° 17' 05" East**, a distance of **318.93 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
3) **Thence, South 10° 55' 31" East**, a distance of **75.93 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
4) **Thence, South 79° 34' 35" West**, a distance of **878.76 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
5) **Thence, Due South**, a distance of **82.39 feet to a 5/8" capped "Schram" iron pin set by previous survey**;
6) **Thence, Due West**, a distance of **72.92 feet to a 5/8" capped "Schram" iron pin set by previous survey**, said iron pin lying in the northeasterly line of a 5.481 acre tract conveyed to the Consolidated Railroad Corporation, as recorded in Microfiche No. 78-502A01 of the Deed Records of Montgomery County, Ohio, said Consolidated Railroad Corporation 5.481 acre tract also known as Lot Numbered 4780 of the consecutive numbered lots of the City of Miamisburg, Ohio;

Thence with the northeasterly line of said Consolidated Railroad Corporation 5.481 acre tract, **North 09° 33' 38" West**, a distance of **351.85 feet to a 5/8" iron pin set**, said iron pin lying in the north line of said United States of America 42.56 acre tract, said iron pin being the southwest corner of a 1.6 acre tract, known as Tract number A-112, conveyed to the United States of America, as recorded in Deed Book Volume 1258, Page 74 of the Deed Records of Montgomery County, Ohio;

Thence with the north line of said Untied State of America 42.56 acre tract and the south line of said Untied States of America 1.6 acre tract, **South 84° 25' 01" East**, a distance of **100.51 feet to a 5/8" iron pin set**, said iron pin being the southeast corner of said Untied States of America 1.6 acre tract;

Thence with the easterly line of said Untied States of America 1.6 acre tract, **North 09° 26' 26" West**, a distance of **60.47 feet to a 5/8" iron pin set**, said iron pin being the northwesterly corner of the herein described new division of 6.568 acres;

Thence with a new division line on the following two (2) courses,

1) **North 79° 08' 30" East**, a distance of **666.53 feet to a 5/8" iron pin set**;
2) **Thence, North 24° 17' 45" West**, a distance of **23.06 feet to a 5/8" iron pin set**, said iron pin being a northerly corner of the herein described 6.568 acre tract, said iron pin being the southwest corner of a new division of 45.259 acre tract, known as Parcel IB of the Mound Complex;

Thence with the south line of said new division of 45.259 acres, **North 89° 59' 52" East**, a distance of **16.59 feet to the True Point of Beginning**, containing **6.568 acres**, more or less, and being subject to all easements, highways and right of ways of record..

Bearing basis established as Grid North by GPS observation August 7th & 8th , 2002 at Latitude N39° 38' 25.81", Longitude W084° 17' 28.09" (Coast & Geodetic Survey Monument #G-139, 1947); Ohio State Plane Coordinate system, Ohio South Zone 3402 (NAD 83), True North being 01° 08' 11" east of Grid North.

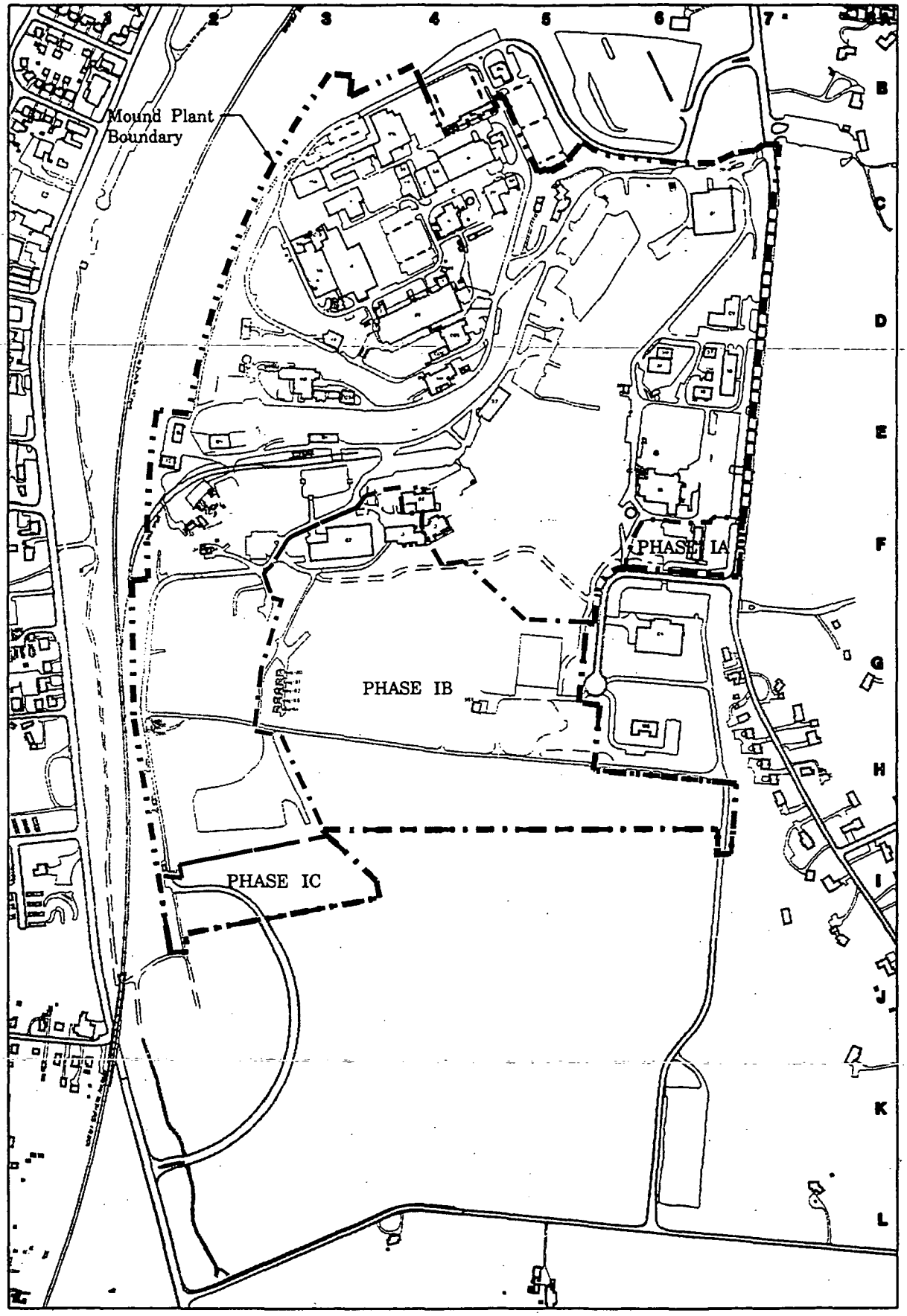
This description prepared from an actual field survey performed under my direct supervision, Timothy W. Schram, Sr., Registered Professional Surveyor number 7299 of the State of Ohio, and that all monuments referenced herein and placed on the ground represents the boundaries of the herein described tract, and based on a Plat of Survey as recorded in the Montgomery County Engineer's Record of Land Surveys in Record Volume number _____, Page _____.

_____

Timothy W. Schram, Sr., Regist. Prof. Surveyor No. 7299
of the State of Ohio, September 11, 2002.
F: 02088 Mound Parcel 5 Surv Parcel IC

APPENDIX B

Figures



Legend

Structures
Paved roadway
Unpaved roadway
Railroad
Water course
Fence
Mound Plant boundary
Contour line

0 100 200 400 600 800 1000
Scale In Feet

04/02/03	ISSUE FOR GENERAL USE	SSP				

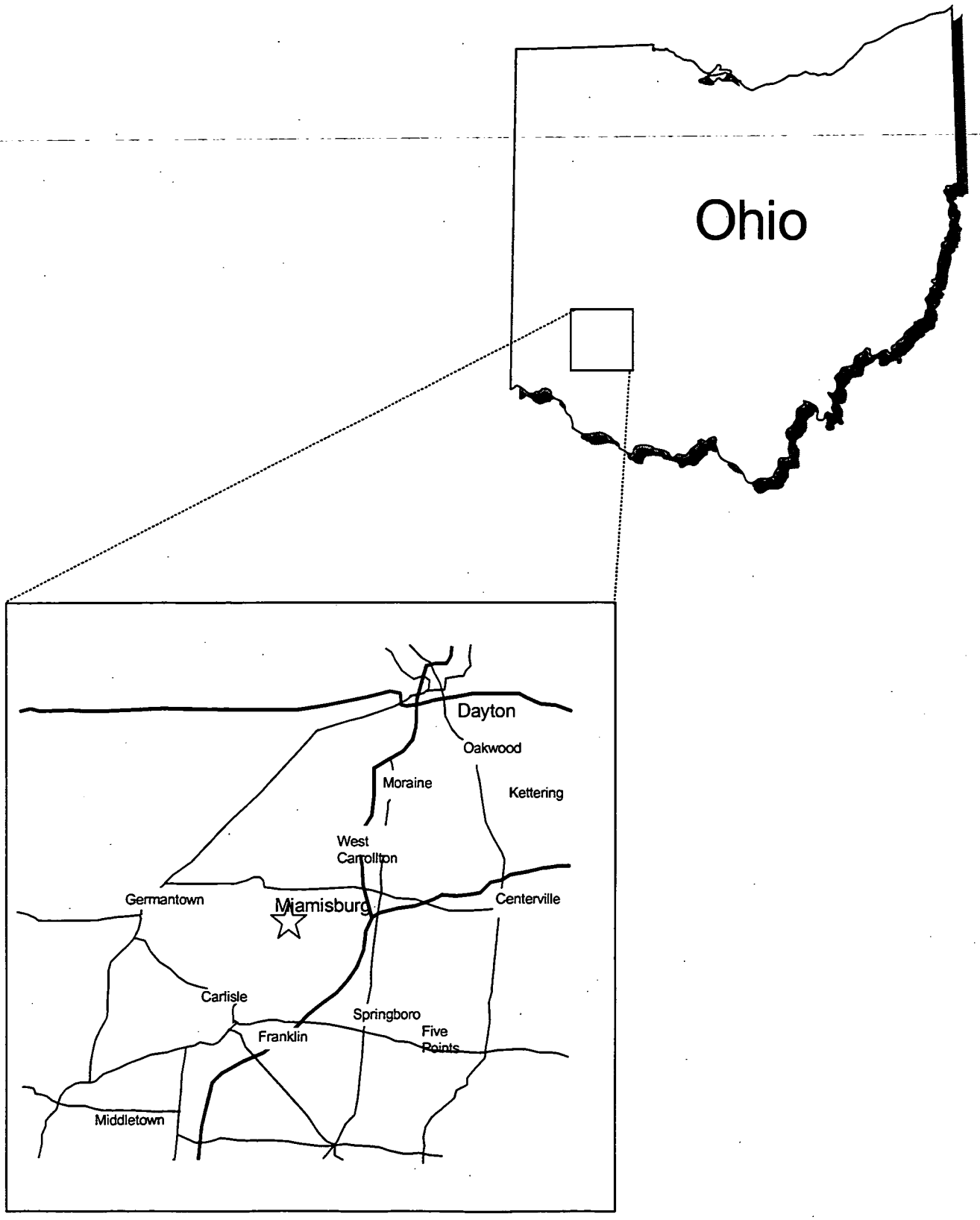
MOUND
Environmental Restoration Geographic Information System

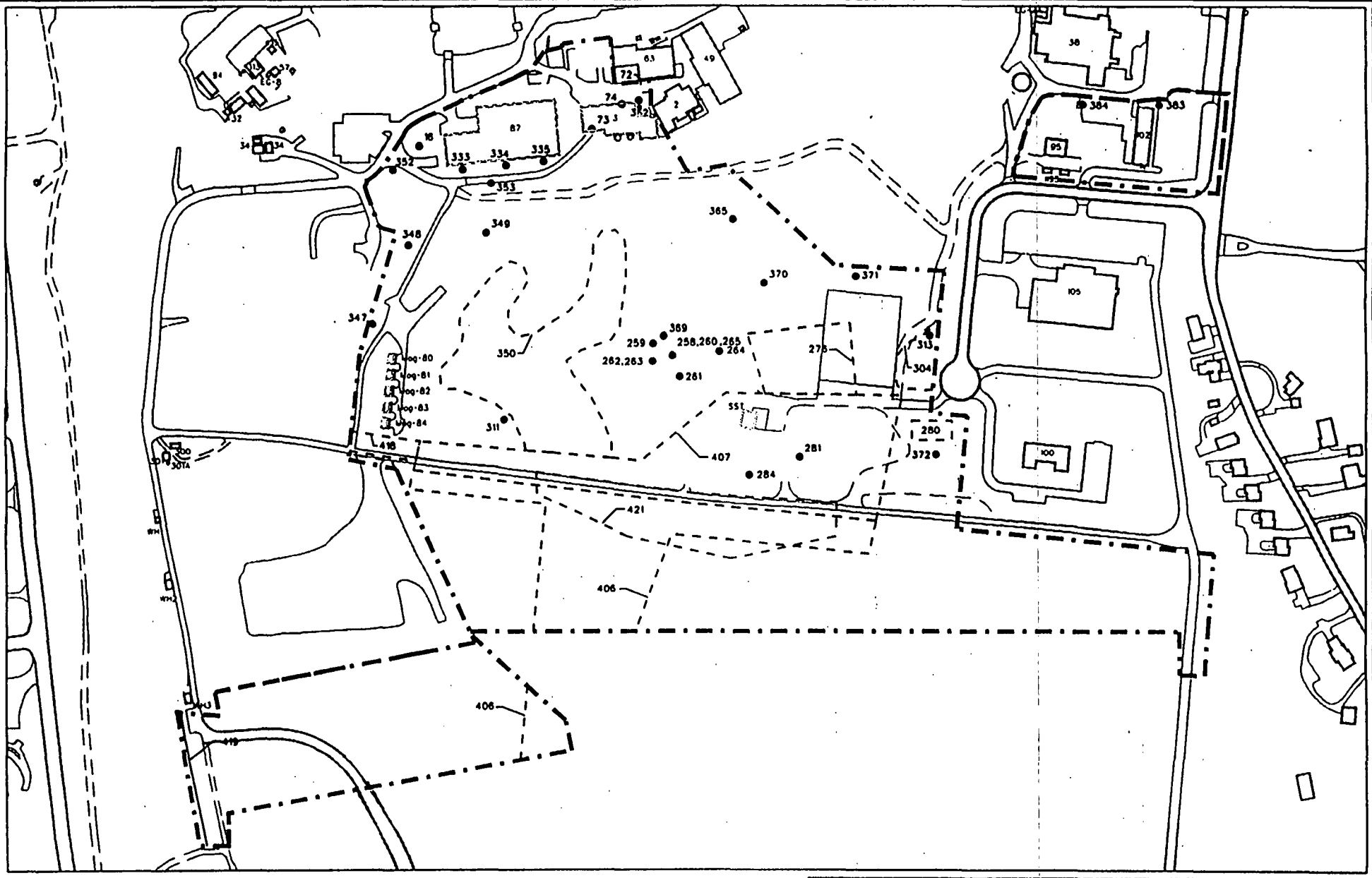
UNCLASSIFIED

Figure 1
Location of Phase I

open_site_plan.dgn

Figure 2: Regional Context of the Mound Plant





MOUND

Environmental Restoration Geographic Information System

SHEET	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
ISSUE																					
SHEET	1	2	3	4	5	6															
ISSUE																					

PART CLASSIFICATION

DRAWING CLASSIFICATION: UNCLASSIFIED

DATE | DRAWING NUMBER: figure3.dgn | JOB NUMBER

DWG TYPE: STE | PROJ: ER-GIS | CALC. | SCALE | SHEET 1 OF

STATUS: MD-REL-05/08/02 | ORIGIN: MSTATION

Figure 3: Phase I Buildings and PRSs

ISS	DATE	REVISION	BY	CHKR	ENG	UPDT	APVD	B
	03/04/03		SSF					

Figure 4 TCE and DCE in Monitoring Well 0411

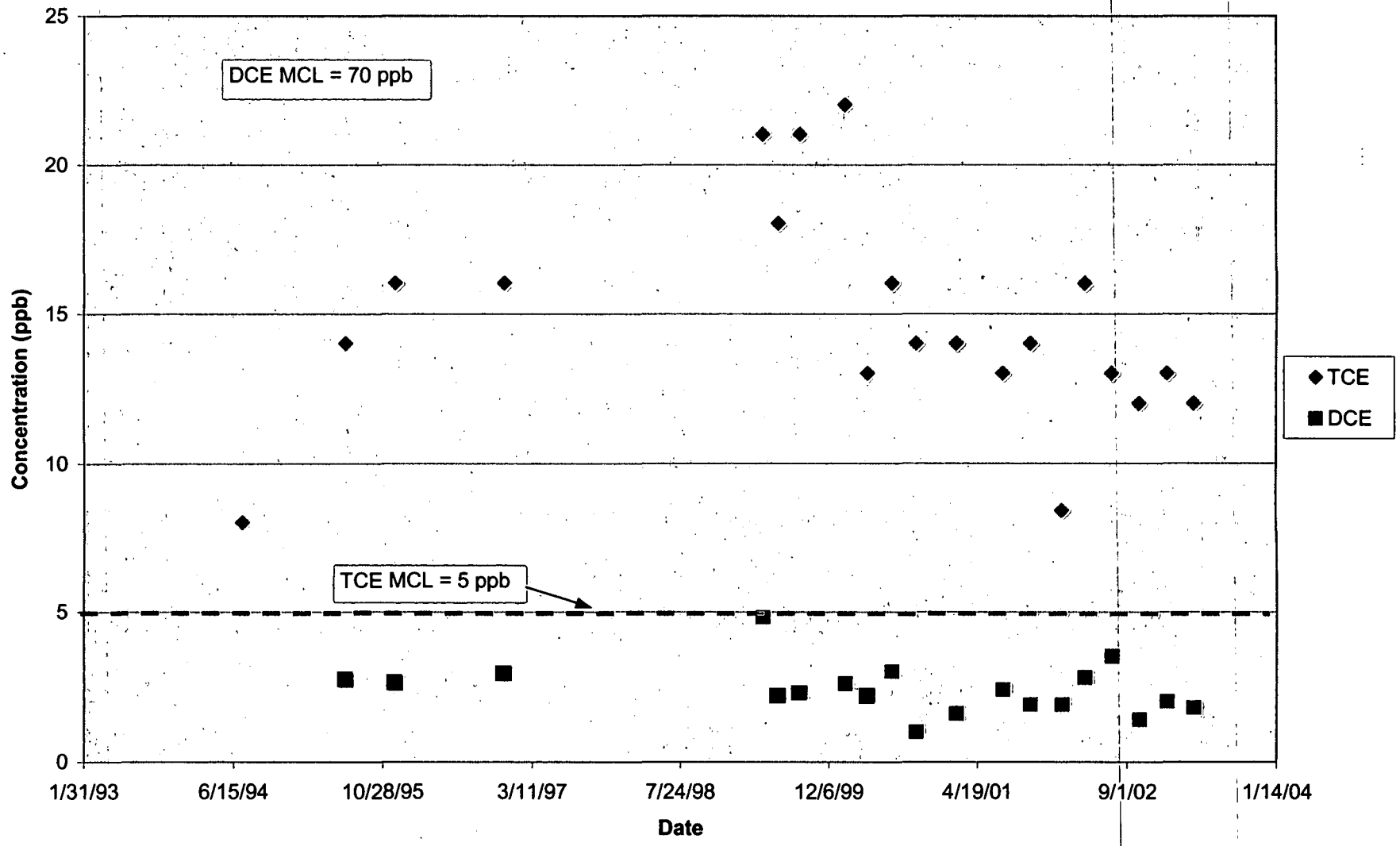


Figure 6 TCE and DCE in Seep 617

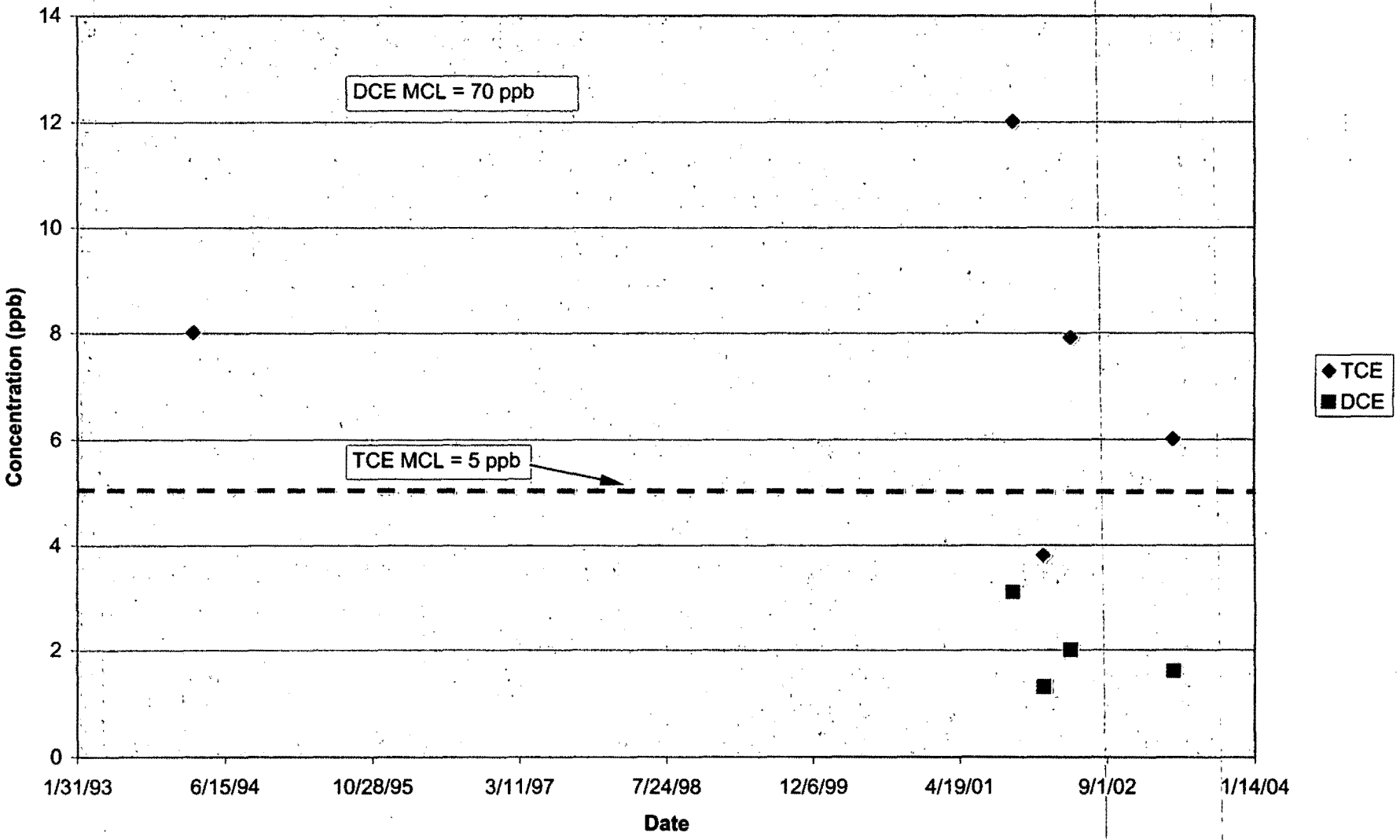
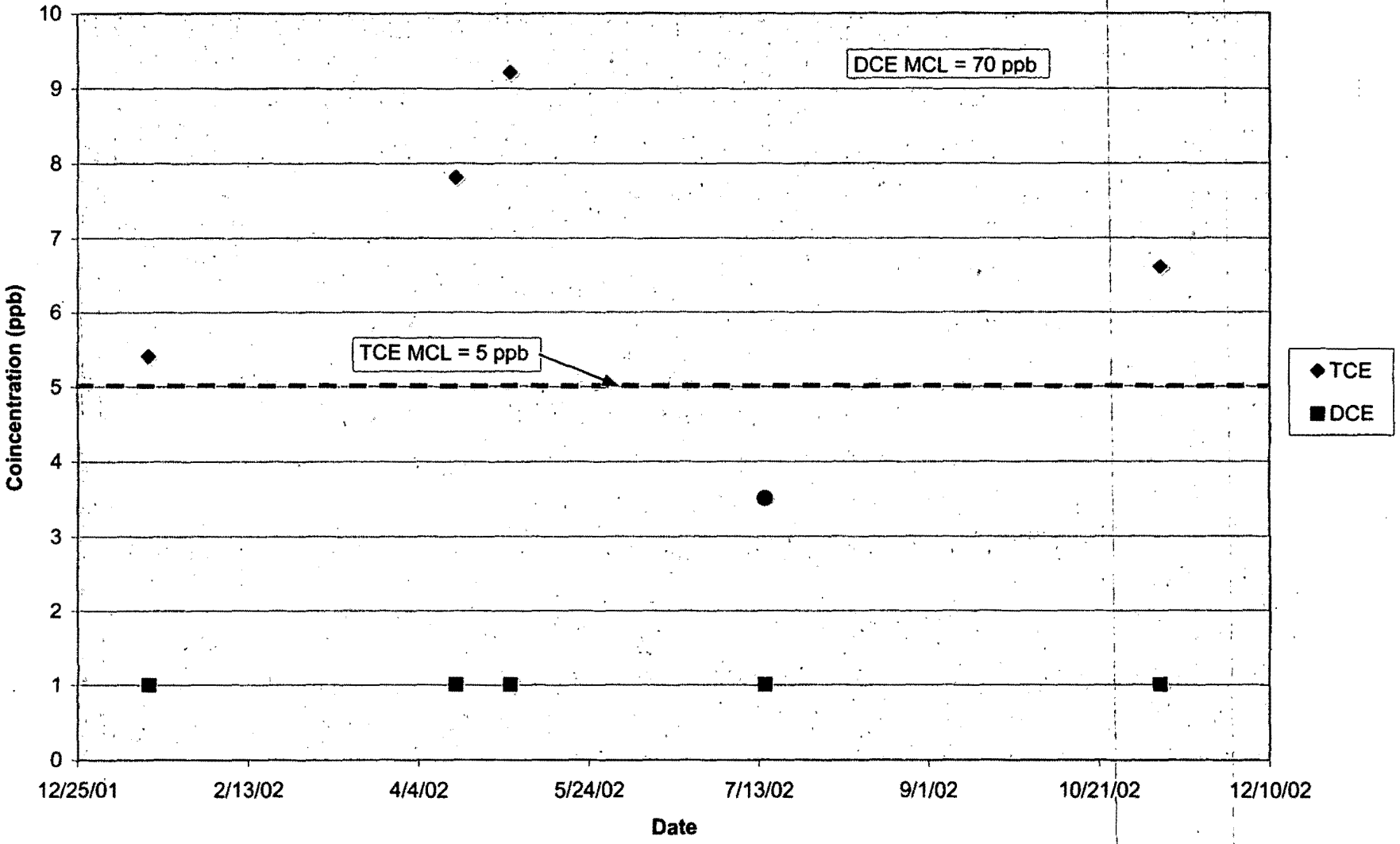


Figure 5 TCE and DCE in Monitoring Well 0443



APPENDIX C

Tables

Table 1: Phase I PRSs and Core Team Conclusions

PRS	Description	Core Team Decision	Closeout of PRS
16	Area C (Old Building 72)	NFA	Recommendation signed 8 May 1996
73	Evaporator Storage Area	NFA	Recommendation signed 17 January 2002
74	Quonset Hut: former waste storage site	NFA	Recommendation signed 19 February 1997
258-265	Burn Area	NFA	Recommendation signed 20 June 2001
276	Area 22: Orphan Soil from Other Areas	RA Complete	OSC Report signed 19 September 2002
280	Waste Oil Drum Field	NFA	Recommendation signed 28 February 2002
281	Area E, Waste Oil Spill	NFA	Recommendation signed 12 July 2000
284	Building 21 Thorium Sludge Storage Facility	RA Complete	OSC Report signed 17 February 2000
304	Excavated Material Disposal Area	RA Complete	OSC Report signed 21 December 1998
311	Potential Hot Spot Location S0706	NFA	Recommendation signed 4 March 1996
313	Potential Hot Spot Location S0982	NFA	Recommendation signed 19 February 1997
333	Explosive Surge Tank (Tank 263)	NFA	Recommendation signed 19 March 1997
334	Explosive Surge Tank (Tank 264)	NFA	Recommendation signed 19 March 1997
335	Explosive Surge Tank (Tank 265)	NFA	Recommendation signed 19 March 1997
347	Soil Contamination	NFA	Recommendation signed 20 November 1996
348	Soil Contamination	NFA	Recommendation signed 20 November 1996
349	Soil Contamination	NFA	Recommendation signed 19 February 1996

Table 1: Phase I PRSs and Core Team Conclusions
(continued)

PRS	Description	Core Team Decision	Closeout of PRS
350	Soil Contamination, Area West of Building 21	NFA	Recommendation signed 4 March 1996
352	Soil Contamination	NFA	Recommendation signed 20 November 1996
353	Soil Contamination	NFA	Recommendation signed 20 November 1996
362	Soil Contamination	NFA	Recommendation signed 20 November 1996
365	Soil Contamination	NFA	Recommendation signed 17 December 1996
369	Soil Contamination	NFA	Recommendation signed 20 November 1996
370	Soil Contamination	NFA	Recommendation signed 20 November 1996
371	Soil Contamination	NFA	Recommendation signed 18 December 1996
372	Soil Contamination	NFA	Recommendation signed 8 May 1996
383	Soil Contamination	NFA	Recommendation signed 31 March 1997
384	Soil Contamination	NFA	Recommendation signed 31 March 1997
406	Thorium Sludge Redrumming	NFA	Recommendation signed 14 March 1996
407	Soil Contamination West of Building 21	RA Complete	OSC Report signed 17 February 2000
418	PRS 418: Overflow Pond South Inlet	NFA	Recommendation signed 21 June 2000
419	Drainage Outflow Reroute	NFA	Recommendation signed 17 November 1999
421	Ridge	RA Complete	OSC Report signed 19 September 2002

NFA: No Further Assessment
RA: Removal Action

Table 2: Phase I Buildings and Core Team Conclusions

Building	Description	Core Team Decision	Closeout Action
3	EM Test Facility	NFA	Recommendation signed March 2002
87	Component Test Facility	NFA	Recommendation signed March 1997
Mag 80	Magazine	NFA	Recommendation signed March 2002
Mag 81	Magazine	NFA	Recommendation signed March 2002
Mag 82	Magazine	NFA	Recommendation signed March 2002
Mag 83	Magazine	NFA	Recommendation signed March 2002
Mag 84	Magazine	NFA	Recommendation signed March 2002
95	SM/PP Area Chiller Plant	NFA	Recommendation signed July 2002
102	Offices (Process Support Building)	NFA	Recommendation signed June 2002
SST	Salt Storage for Water Treatment and Road Salt	NFA	Recommendation signed March 2002

NFA: No Further Assessment

Table 3: Final Identification of Current and Future Soil COPCs for the Construction Worker Scenario
(EPC vs. Background) - Table 3 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Inorganics (mg/kg)									
Aluminum	7429-90-5	589.000	23000.000	N	145/ 146	15400.000	15400.000	19000.000	NO
Antimony	7440-36-0	0.210	44.500	D	64/ 209	8.460	8.460		YES
Arsenic	7440-38-2	0.490	19.500	X	137/ 143	8.220	8.220	8.600	NO
Bismuth	7440-69-9	0.820	72.700	X	33/ 59	133.000	72.700		YES
Copper	7440-50-8	1.800	1100.000	X	143/ 146	22.100	22.100	26.000	NO
Lead	7439-92-1	1.600	220.000	X	242/ 256	15.400	15.400	48.000	NO
Lithium	7439-93-2	2.300	34.100	N	53/ 55	18.300	18.300	26.000	NO
Manganese	7439-96-5s	65.200	8190.000	X	137/ 138	679.000	679.000	1400.000	NO
Thallium	7440-28-0	0.200	3.500	D	29/ 142	1.140	1.140	0.460	YES
Pesticides (mg/kg)									
Chlordane	57-74-9	0.019	0.098	D	2/ 23	0.016	0.016		YES
SVOCs (mg/kg)									
Benzo(a)anthracene	56-55-3	0.023	4.200	D	31/ 174	0.321	0.321		YES
Benzo(a)pyrene	50-32-8	0.023	3.600	D	29/ 174	0.316	0.316		YES
Benzo(g,h,i)perylene	191-24-2	0.027	2.100	D	16/ 174	0.304	0.304		YES
Phenanthrene	85-01-8	0.027	11.000	D	32/ 174	0.348	0.348		YES
Radionuclides (pCi/g)									
Actinium-227 +D	14952-40-0(+D)	0.050	2.110	D	37/ 282	0.304	0.304		YES:1
Actinium-227 long lived decay	14952-40-0L	0.050	2.110	D	37/ 282	0.304	0.304		YES
Actinium-228	14331-83-0	0.762	1.380	D	7/ 7	1.230	1.380		YES:3
Bismuth-214	14733-03-0	0.699	0.926	N	10/ 10	0.858	0.926		YES:2
Cesium-137 +D	10045-97-3(+D)	0.021	1.600	D	276/ 564	0.159	0.159	0.420	NO
Cesium-137 long lived decay	10045-97-3L	0.021	1.600	D	276/ 564	0.159	0.159	0.420	NO
Lead-210	14255-04-0	0.487	3.730	X	180/ 344	1.150	1.150		YES:2
Lead-210+D	14255-04-0(+D)	0.487	3.730	X	180/ 344	1.150	1.150		YES:2
Lead-210 long lived decay	14255-04-0L	0.487	3.730	X	180/ 344	1.150	1.150		YES:2
Lead-214	15067-28-4	0.570	1.120	N	20/ 20	0.921	0.921		YES:2
Plutonium-238	13981-16-3	0.012	396.400	D	665/1545	25.900	25.900	0.130	YES
Plutonium-239/240	PU-239/240	0.004	1.010	D	79/ 254	0.044	0.044	0.180	NO
Radium-224	13233-32-4	0.073	6.270	X	190/ 190	1.250	1.250		YES:3
Radium-226	13982-63-3	0.179	3.700	X	494/ 567	1.240	1.240	2.000	NO
Radium-226+D	13982-63-3(+D)	0.179	3.700	X	494/ 567	1.240	1.240	2.000	NO

Table 3: Final Identification of Current and Future Soil COPCs for the Construction Worker Scenario

(EPC vs. Background) - Table 3 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Radium-226 long lived decay	13982-63-3L	0.179	3.700	X	494/ 567	1.240	1.240	2.000	NO
Radium-228	15262-20-1	0.309	1.990	N	80/ 81	1.220	1.220		YES:3
Radium-228+D	15262-20-1(+D)	0.309	1.990	N	80/ 81	1.220	1.220		YES:3
Radium-228 long lived decay	15262-20-1L	0.309	1.990	N	80/ 81	1.220	1.220		YES:3
Thallium-208	14913-50-9	0.156	0.401	N	10/ 10	0.377	0.401		YES:3
Thorium-228+D	14274-82-9(+D)	0.037	4.520	X	342/ 384	1.640	1.640	1.500	YES:3
Thorium-228 long lived decay	14274-82-9L	0.037	4.520	X	342/ 384	1.640	1.640	1.500	YES:3
Thorium-230 long lived decay	14269-63-7L	0.100	7.510	X	340/ 595	2.830	2.830	1.900	YES:2
Thorium-232	7440-29-1	0.045	80.100	D	789/1805	0.832	0.832	1.400	NO
Thorium-232 long lived decay	7440-29-1L	0.045	80.100	D	789/1805	0.832	0.832	1.400	YES:4
Uranium-238 long lived decay	7440-61-1L	0.408	1.950	X	72/ 119	1.880	1.880	1.200	YES

"+D" : incorporates daughter products within the risk calculations
CAS: Chemical Abstract Service
UCL: upper confidence limit
EPC: Exposure Point Concentration
SVOCs: semivolatile organic compounds
Dist.: distribution where:
N = normal, L = lognormal, D = distribution not determined due to less than 20 or less than 50% detects, and
X = significantly different from lognormal or normal distribution
COPC: Constituent of Potential Concern, evaluation based on EPC vs. background
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). See Appendix H for details. For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation.
COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to RBGV, and/or 4 = analyte is an essential human nutrient

Table 4: Final Identification of Current and Future Soil COPCs for the Site Employee Scenario
(EPC vs. Background) - Table 5 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Inorganics (mg/kg)									
Arsenic	7440-38-2	0.4900	19.500	X	9.9E-01	8.880	8.880	8.600	YES
Bismuth	7440-69-9	12.6000	72.700	X	26/ 36	104.000	72.700		YES
Lead	7439-92-1	1.6000	220.000	X	179/ 186	16.700	16.700	48.000	NO
Lithium	7439-93-2	2.3000	26.900	N	31/ 31	16.600	16.600	26.000	NO
Pesticides (mg/kg)									
Chlordane	57-74-9	0.0190	0.098	D	2/ 23	0.016	0.016		YES
SVOCs (mg/kg)									
Benzo(a)pyrene	50-32-8	0.0240	3.600	D	22/ 134	0.350	0.350		YES
Benzo(g,h,i)perylene	191-24-2	0.0270	2.100	D	12/ 134	0.333	0.333		YES
Phenanthrene	85-01-8	0.0270	11.000	D	25/ 134	0.398	0.398		YES
Radionuclides (pCi/g)									
Actinium-227 +D	14952-40-0(+D)	0.0500	2.110	D	36/ 219	0.354	0.354		YES
Actinium-227 long lived decay	14952-40-0L	0.0500	2.110	D	36/ 219	0.354	0.354		YES
Actinium-228	14331-83-0	0.7620	1.380	D	7/ 7	1.230	1.380		YES:3
Bismuth-214	14733-03-0	0.6990	0.926	N	10/ 10	0.858	0.926		YES:2
Cesium-137 +D	10045-97-3(+D)	0.0211	1.600	X	258/ 461	0.179	0.179	0.420	NO
Cesium-137 long lived decay	10045-97-3L	0.0211	1.600	X	258/ 461	0.179	0.179	0.420	NO
Lead-210	14255-04-0	0.6300	3.730	X	146/ 262	1.290	1.290		YES:2
Lead-210+D	14255-04-0(+D)	0.6300	3.730	X	146/ 262	1.290	1.290		YES:2
Lead-210 long lived decay	14255-04-0L	0.6300	3.730	X	146/ 262	1.290	1.290		YES:2
Lead-214	15067-28-4	0.8270	1.120	N	10/ 10	1.030	1.120		YES:2
Plutonium-238	13981-16-3	0.0122	396.400	D	592/1308	24.900	24.900	0.130	YES
Plutonium-239/240	PU-239/240	0.0039	1.010	D	64/ 230	0.044	0.044	0.180	NO
Radium-224	13233-32-4	0.0730	6.270	X	186/ 186	1.260	1.260		YES:3
Radium-226+D	13982-63-3(+D)	0.1790	3.700	X	411/ 466	1.250	1.250	2.000	NO
Radium-226 long lived decay	13982-63-3L	0.1790	3.700	X	411/ 466	1.250	1.250	2.000	NO
Radium-228	15262-20-1	0.5450	1.990	N	74/ 75	1.260	1.260		YES:3
Radium-228+D	15262-20-1(+D)	0.5450	1.990	N	74/ 75	1.260	1.260		YES:3
Radium-228 long lived decay	15262-20-1L	0.5450	1.990	N	74/ 75	1.260	1.260		YES:3
Thallium-208	14913-50-9	0.1560	0.401	N	10/ 10	0.377	0.401		YES:3
Thorium-228+D	14274-82-9(+D)	0.0370	4.520	X	319/ 356	1.700	1.700	1.500	YES:3
Thorium-228 long lived decay	14274-82-9L	0.0370	4.520	X	319/ 356	1.700	1.700	1.500	YES:3
Thorium-230 long lived decay	14269-63-7L	0.1000	7.510	X	317/ 499	2.700	2.700	1.900	YES:2

Table 4: Final Identification of Current and Future Soil COPCs for the Site Employee Scenario
(EPC vs. Background) - Table 5 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Detection Frequency	95% UCL of Mean	EPC	Background Concentration	COPC
Thorium-232	7440-29-1	0.0450	80.100	D	675/1518	0.873	0.873	1.400	NO
Thorium-232 long lived decay	7440-29-1L	0.0450	80.100	D	675/1518	0.868	0.868	1.400	YES:4
Uranium-238 long lived decay	7440-61-1L	0.4760	1.950	X	50/ 91	2.030	1.950	1.200	YES

"+D" : incorporates daughter products within the risk calculations
CAS: Chemical Abstract Service
UCL: upper confidence limit
EPC: Exposure Point Concentration
SVOCs: semivolatile organic compounds
Dist.: distribution where:
N = normal, L = lognormal, D = distribution not determined due to less than 20 or less than 50% detects, and
X = significantly different from lognormal or normal distribution
COPC: Constituent of Potential Concern, evaluation based on EPC vs. background
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). See Appendix H for details. For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation.

COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to RBGV, and/or
4 = analyte is an essential human nutrient

Table 5: Final Identification of Current Groundwater COPCs for the Construction Worker Scenario

(EPC vs. Background) - Table 7 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Detection Frequency	95% UCL	EPC	Background Concentration	COPC
Inorganics (mg/L)								
Antimony	7440-36-0	0.0028	0.014	3/ 20	0.044	0.014	0.001	YES
Cadmium	7440-43-9w	0.0046	0.008	5/ 25	0.007	0.007		YES
Copper	7440-50-8	0.0016	0.593	15/ 25	0.042	0.042	0.001	YES
Lead	7439-92-1	0.0034	0.040	5/ 25	0.013	0.013		YES
Volatile Organic Compounds (mg/L)								
Tert-butyl methyl ether	1634-04-4	0.0012	0.002	4/ 24	0.001	0.001		YES
Trichloroethylene (TCE)	79-01-6	0.0005	0.006	189/ 219	0.002	0.002		YES
Radionuclides (pCi/L)								
Thorium-230 long lived decay	14269-63-7L	0.0075	1.990	19/ 43	0.476	0.476		YES:2
Uranium-235 long lived decay	15117-96-1L	0.0063	2.300	30/ 53	0.466	0.466	0.814	NO
Uranium-238 long lived decay	7440-61-1L	0.1300	8.250	52/ 59	0.409	0.409	0.688	YES:5

EPC: exposure point concentration
UCL: upper confidence limit
CAS: Chemical Abstract Service

COPC: Constituent of Potential Concern
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was retained for risk evaluation.

COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to the lower of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 6: Final Identification of Current Groundwater COPCs for the Site Employee Scenario

(EPC vs. Background) - Table 9 of the RRE

Analyte (unit)	CAS Number	Minimum Detect	Maximum Detect	Detection Frequency	95% UCL	EPC	Background Concentration	COPC
Inorganics (mg/L)								
Antimony	7440-36-0	0.0028	0.014	3/ 20	0.0436	0.0144	0.0006	YES
Cadmium	7440-43-9w	0.0046	0.008	5/ 25	0.0066	0.0066		YES
Copper	7440-50-8	0.0016	0.593	15/ 25	0.0416	0.0416	0.0012	YES
Lead	7439-92-1	0.0034	0.040	5/ 25	0.0130	0.0130		YES
Volatile Organic Compounds (mg/L)								
Tert-butyl methyl ether	1634-04-4	0.0012	0.002	4/ 24	0.0006	0.0006		YES
Trichloroethylene (TCE)	79-01-6	0.0005	0.006	189/ 219	0.0023	0.0023		YES
Radionuclides (pCi/L)								
Plutonium-239/240	PU-239/240	0.0018	2.000	5/ 19	9.6400	2.0000	0.1250	YES
Thorium-228	14274-82-9	0.0085	2.170	17/ 46	25.6000	2.1700	0.7790	YES:3
Thorium-228+D	14274-82-9(+D)	0.0085	2.170	17/ 46	25.6000	2.1700	0.7790	YES:3
Thorium-228 long lived decay	14274-82-9L	0.0085	2.170	17/ 46	25.6000	2.1700	0.7790	YES:3
Thorium-230	14269-63-7	0.0075	1.990	19/ 43	0.4760	0.4760		YES:2
Thorium-230 long lived decay	14269-63-7L	0.0075	1.990	19/ 43	0.4760	0.4760		YES:2
Thorium-232 long lived decay	7440-29-1L	0.0025	0.100	8/ 44	0.3380	0.1000	0.3140	YES:4
Tritium	10028-17-8w	30.0000	7200.000	123/ 139	799.0000	799.0000	1485.4700	NO
Uranium-233/234	U-233/234	0.1670	0.361	36/ 36	0.2460	0.2460		YES
Uranium-234	13966-29-5	0.2000	8.140	19/ 24	2.0200	2.0200	0.7920	YES:2
Uranium-235	15117-96-1	0.0063	2.300	30/ 53	0.4660	0.4660	0.8140	NO
Uranium-235+D	15117-96-1(+D)	0.0063	2.300	30/ 53	0.4660	0.4660	0.8140	NO
Uranium-235 long lived decay	15117-96-1L	0.0063	2.300	30/ 53	0.4660	0.4660	0.8140	NO
Uranium-238	7440-61-1	0.1300	8.250	52/ 59	0.4090	0.4090	0.6880	NO
Uranium-238+D	7440-61-1(+D)	0.1300	8.250	52/ 59	0.4090	0.4090	0.6880	NO
Uranium-238 long lived decay	7440-61-1L	0.1300	8.250	52/ 59	0.4090	0.4090	0.6880	YES:5

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Table 6: Final Identification of Current Groundwater COPCs for the Site Employee Scenario

footnotes

"+D" - incorporates daughter products within the risk calculations
EPC: exposure point concentration
UCL: upper confidence limit
CAS: Chemical Abstract Service
COPC: Constituent of Potential Concern
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it is included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2), or Th-232 (reference 3). See Appendix H for details. For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained for risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was retained for risk evaluation.
COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to the lower of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 7: Final Identification of Future Groundwater COPCs for the Construction Worker Scenario

(Modeled Concentration vs. Background) - Table 11 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
Metals (mg/L)				
Aluminum	7429-90-5	2.0238	0.038	YES
Antimony	7440-36-0	0.0184	0.001	YES
Arsenic	7440-38-2	0.0184	0.033	NO
Barium	7440-39-3	0.1829	0.310	NO
Bismuth	7440-69-9	0.0241		YES
Cadmium	7440-43-9w	0.0080		YES
Chromium	7440-47-3	0.9642	0.006	YES
Copper	7440-50-8	0.0557	0.001	YES
Lead	7439-92-1	0.0194		YES
Lithium	7439-93-2	0.1510	0.056	YES
Manganese	7439-96-5w	0.2154	0.230	NO
Molybdenum	7439-98-7	0.0149	0.006	YES
Nickel	7440-02-0	0.2779	0.035	YES
Nitrate/Nitrite	14797-65-0nn	6.5098	5.3490	YES
Thallium	7440-28-0	0.0036		YES
Vanadium	7440-62-2	0.0257	0.017	YES
SVOCs (mg/L)				
Bis(2-ethylhexyl)phthalate	117-81-7	0.0176		YES
VOCs (mg/L)				
Bromochloromethane	74-97-5	0.0058		YES
Dichloromethane (Methylene Chloride)	75-09-2	0.0154		YES
Fluorobenzene	462-06-6	0.0087		YES
O-Chloroflurobenzene	348-51-6	0.0072		YES
Tetrachloroethene	127-18-4	0.0015		YES
Tert-butyl methyl ether	1634-04-4	0.0006		YES
Trichloroethylene (TCE)	79-01-6	0.0039		YES
Radionuclides (pCi/L)				
Plutonium-238	13981-16-3	0.2587	0.087	YES
Potassium-40	13966-00-2	48.3052		YES
Radium-226	13982-63-3	1.6849	0.996	YES:2
Radium-226 +D	13982-63-3(+D)	1.6849	0.996	YES:2
Radium-226 long lived decay	13982-63-3L	1.6849	0.996	YES:2
Radium-228	15262-20-1	0.4179		YES:3
Radium-228 +D	15262-20-1(+D)	0.4179		YES:3
Radium-228 long lived decay	15262-20-1L	0.4179		YES:3
Strontium-90	10098-97-2	1.4173	0.975	YES
Thorium-228	14274-82-9	77.5034	0.779	YES:3
Thorium-228+D	14274-82-9(+D)	77.5034	0.779	YES:3
Thorium-228 long lived decay	14274-82-9L	77.5034	0.779	YES:3
Thorium-230	14269-63-7	0.6202		YES:2
Thorium-230 long lived decay	14269-63-7L	0.6202		YES:2
Thorium-232	7440-29-1	0.1803	0.314	NO
Thorium-232 long lived decay	7440-29-1L	0.1803	0.314	YES:4

Table 7: Final Identification of Future Groundwater COPCs for the Construction Worker Scenario

(Modeled Concentration vs. Background) - Table 11 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
Tritium	10028-17-8w	66797.9574	1485.470	YES
Uranium-233	13968-55-3	1.3619		YES:6
Uranium-233 long lived decay	13968-55-3L	1.3619		YES
Uranium-234	13966-29-5	2.6013	0.792	YES:2
Uranium-235	15117-96-1	2.1485	0.814	YES:7
Uranium-235+D	15117-96-1(+D)	2.1485	0.814	YES:7
Uranium-235 long lived decay	15117-96-1L	2.1485	0.814	YES
Uranium-235/236	U-235/236	0.0184		YES:7
Uranium-238	7440-61-1	0.5524	0.688	NO
Uranium-238+D	7440-61-1(+D)	0.5524	0.688	NO
Uranium-238 long lived decay	7440-61-1L	0.5524	0.688	YES:5

·D' incorporates daughter products
:AS: Chemical Abstract Service
'OCs: volatile organic compounds
:VOCs: semivolatile organic compounds

:OPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it i ıcluded in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference 2) r Th-232 (reference 3). For reference 4, Th-232 screens out but the Th-232 long lived decay chain was retained ɔr risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was retained for risk valuation. Analyte is retained as a COPC; however, will not be evaluated individually because it is included in the sk assessment as part of the long lived decay chain of U-233 (reference 6) and U-235 (reference 7).

:OPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to the ɔwer of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 8: Final Identification of Future Groundwater COPCs for the Site Employee Scenario

(Future Modeled Concentration vs. Background) - Table 13 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
Inorganics (mg/L)				
Aluminum	7429-90-5	2.0238	0.0375	YES
Antimony	7440-36-0	0.0184	0.0006	YES
Arsenic	7440-38-2	0.0184	0.0330	NO
Barium	7440-39-3	0.1829	0.3102	NO
Bismuth	7440-69-9	0.0241		YES
Cadmium	7440-43-9w	0.0080		YES
Chromium	7440-47-3	0.9642	0.0061	YES
Copper	7440-50-8	0.0557	0.0012	YES
Lead	7439-92-1	0.0194		YES
Lithium	7439-93-2	0.1510	0.0557	YES
Manganese	7439-96-5w	0.2154	0.2296	NO
Molybdenum	7439-98-7	0.0149	0.0056	YES
Nickel	7440-02-0	0.2779	0.0350	YES
Nitrate/Nitrite	14797-65-0nn	6.510	5.3490	YES
Thallium	7440-28-0	0.0036		YES
Vanadium	7440-62-2	0.0257	0.0171	YES
SVOCs (mg/L)				
Bis(2-ethylhexyl)phthalate	117-81-7	0.0176		YES
VOCs (mg/L)				
Bromochloromethane	74-97-5	0.0058		YES
Dichloromethane (Methylene Chloride)	75-09-2	0.0154		YES
Fluorobenzene	462-06-6	0.0087		YES
O-Chloroflurobenzene	348-51-6	0.0072		YES
Tert-butyl methyl ether	1634-04-4	0.0006		YES
Tetrachloroethene	127-18-4	0.0015		YES
Trichloroethylene (TCE)	79-01-6	0.0039		YES
Radionuclides (pCi/L)				
Plutonium-238	13981-16-3	0.2587	0.0870	YES
Potassium-40	13966-00-2	48.3052		YES
Radium-226	13982-63-3	1.6849	0.9960	YES:2
Radium-226 +D	13982-63-3(+D)	1.6849	0.9960	YES:2
Radium-226 long lived decay	13982-63-3L	1.6849	0.9960	YES:2
Radium-228	15262-20-1	0.4179		YES:3
Radium-228 +D	15262-20-1(+D)	0.4179		YES:3
Radium-228 long lived decay	15262-20-1L	0.4179		YES:3
Strontium-90	10098-97-2	1.4173	0.9750	YES
Thorium-228	14274-82-9	77.5034	0.7790	YES:3
Thorium-228+D	14274-82-9(+D)	77.5034	0.7790	YES:3
Thorium-228 long lived decay	14274-82-9L	77.5034	0.7790	YES:3
Thorium-230	14269-63-7	0.6202		YES:2
Thorium-230 long lived decay	14269-63-7L	0.6202		YES:2
Thorium-232	7440-29-1	0.1803	0.3140	NO
Thorium-232 long lived decay	7440-29-1L	0.1803	0.3140	YES:4
Tritium	10028-17-8w	66797.9574	1485.4700	YES

Table 8: Final Identification of Future Groundwater COPCs for the Site Employee Scenario

(Future Modeled Concentration vs. Background) - Table 13 of the RRE

Analyte (unit)	CAS Number	Future Modeled Screening Concentration	Background Concentration	COPC
Uranium-233	13968-55-3	1.3619		YES:6
Uranium-233 long lived decay	13968-55-3L	1.3619		YES
Uranium-234	13966-29-5	2.6013	0.7920	YES:2
Uranium-235	15117-96-1	2.1485	0.8140	YES:7
Uranium-235+D	15117-96-1(+D)	2.1485	0.8140	YES:7
Uranium-235 long lived decay	15117-96-1L	2.1485	0.8140	YES
Uranium-238	7440-61-1	0.5524	0.6880	NO
Uranium-238+D	7440-61-1(+D)	0.5524	0.6880	NO
Uranium-238 long lived decay	7440-61-1L	0.5524	0.6880	YES:5

+D' incorporates daughter products
CAS: Chemical Abstract Service
/OCs: volatile organic compounds
SVOCs: semivolatile organic compounds
RBGV: Risk-Based Guideline Value, value is the lower of 10^{-6} cancer risk or 0.1 hazard index
ı - carcinogen value, b - noncarcinogen value, c - maximum contaminant level (MCL)
COPC: Constituent of Potential Concern
COPC = YES indicates the analyte is retained as a COPC; however, will not be evaluated individually because it s included in the risk assessment as part of the long lived decay chain of Ac-227 (reference 1), U-238 (reference !), or Th-232 (reference 3). For reference 4, Th-232 screens out but the Th-232 long lived decay chain was etained for risk evaluation. For reference 5, U-238 screens out but the U-238 long lived decay chain was etained for risk evaluation. Analyte is retained as a COPC; however, will not be evaluated individually because it s included in the risk assessment as part of the long lived decay chain of U-233 (reference 6) and U-235 reference 7).
COPC = NO indicates analyte was screened out based on: 2 = comparison to background, 3 = comparison to he lower of RBGV or MCL, and/or 4 = analyte is an essential human nutrient

Table 9: Incremental Residual Risk Summary

Table 36 of the RRE

Scenario and Receptor	Media	Constituents	Pathway	Total Non-Cancer Hazard or HI	Total Cancer Risk
Construction Worker Scenario	Current & Future Soil (all depths)	Chemical & Radiological	Oral	1.4E-01	**7.4E-06**
			Dermal Contact	1.6E-03	3.5E-07
			Inhalation of Dust	NA	2.0E-08
			Inhalation of VOCs	NA	NA
			External	NA	**9.5E-06**
			Soil Total Risk	1.4E-01	**1.7E-05**
	Current Groundwater	Chemical & Radiological	Oral	5.5E-01	**3.5E-06**
			Dermal Contact	3.1E-01	**1.3E-06**
			Inhalation While Showering	4.8E-07	NA
			Current Groundwater Total Risk	**8.6E-01**	**4.8E-06**
	Future Groundwater	Chemical & Radiological	Oral	**4.6E+00**	**2.0E-05**
			Dermal Contact	9.3E-01	**2.3E-06**
			Inhalation While Showering	1.4E-05	4.5E-08
			Future Groundwater Total Risk	**5.5E+00**	**2.2E-05**
	Air*	Radiological	Inhalation	NA	2.0E-07
			Air Total Risk	NA	2.0E-07
			Cumulative Incremental Current Risk	1.0E+00	**2.2E-05**
			Cumulative Incremental Future Risk	**5.7E+00**	**4.0E-05**
Site Employee Scenario	Current & Future Soil (0-2 feet bls)	Chemical & Radiological	Oral	4.6E-04	**4.0E-06**
			Inhalation of Dust	NA	9.7E-08
			Inhalation of VOCs	NA	NA
			External	NA	**1.2E-05**
			Soil Total Risk	4.6E-04	**1.6E-05**
	Current Groundwater	Chemical & Radiological	Oral	5.5E-01	**2.6E-05**
			Current Groundwater Total Risk	5.5E-01	**2.6E-05**
	Future Groundwater	Chemical & Radiological	Oral	**4.6E+00**	**9.3E-05**
			Future Groundwater Total Risk	**4.6E+00**	**9.3E-05**
	Air*	Radiological	Inhalation	NA	9.9E-07
			Air Total Risk	NA	9.9E-07
			Cumulative Incremental Current Risk	5.5E-01	**4.3E-05**
			Cumulative Incremental Future Risk	**4.6E+00**	**1.1E-04**

HI: Hazard Index
NA: not applicable
*RRE values for air were brought forward from the Technical Position Report for Release Blocks D and H. (Reference 20).
bolded values exceed cancer risk of 10^{-6} or non-cancer Hazard Index greater than 1.
bls: below land surface
VOCs: volatile organic compounds
numbers written as 1.0E-3 equal 1x10-3 and 0.001

Table 10: Summary of Other Factors Considered for Phase I

Factor Considered	Affects Phase I? **Yes**	Affects Phase I? **No**	Recommendation/Conclusion	Reference
Cultural Resources		✔	There are no historic or cultural resources within Phase I.	Correspondence from Mark J. Epstein, Department Head, Resource Protection and Review, Ohio Historic Preservation Office dated July 31, 1998.
Drinking Water Quality		✔	In accordance with OEPA requirements, the site's drinking water is routinely tested fior various compounds. These analyses must be performed by a state certified laboratory. In 2001, the following analyses were performed: total coliform, lead, copper, nitrate, and volatile organic compounds. No exceedances were observed in 2001.	Miamisburg Environmental Management Project, Annual Site Environmental Report for Calendar Year 2001, September 2002
Endangered Species		✔	Two state-protected species were found: the dark-eyed junco (*Junxo hyemalis*) and the inland rush (*Juncus interior*). Because only one individual inland rush was located, it is not considered a viable breeding population at the Mound facility. The dark-eyed junco is not known to breed in southwestern Ohio. It has also been determined that the plant site is in the habitat range of the federally endangered species of Indiana Bat (*Myotis sodalis*); however, the Mound Site does not provide a suitable habitat for the Indiana Bat. Neither the solitary sitings of the rush and the junco, nor the potential habitat for the Indiana Bat, are expected to affect ongoing or future activities at the site.	Operable Unit 9 Hydrogeologic Investigation: Wetlands Determination Report, Technical Memorandum, Revision 1, January 1994 Operable Unit 9 Ecological Characterization Report, Final, March 1994

Table 10: Summary of Other Factors Considered for Phase I

Factor Considered	Affects Phase I? **Yes**	Affects Phase I? **No**	Recommendation/Conclusion	Reference
Fragment Arcs		✔	No fragment arcs and clearances zones due to explosive hazards at onsite operations exist in Phase I.	Drawing FSD 970058, "Clearance Zones and Fragment Arcs"
Monitoring Equipment	✔		Both DOE and OEPA operate air monitoring stations within Phase I. There are several monitoring wells within Phase I.	Groundwater Monitoring Program and Groundwater Protection Management Program Plan, April 1997, Revision 1 Mound Plant Environmental Monitoring Plan, July 1997
National Environmental Policy Act (NEPA)	✔		A Finding of No Significant Impact (FONSI) was issued on October 10, 1994 for the commercialization of the Mound Plant.	The Mound Plant EA for Commercialization of the Mound Plant, DOE/EA-1001, October 1994, and FONSI for the Commercialization of the Mound Plant EA, October 27, 1994

Table 10: Summary of Other Factors Considered for Phase I

Factor Considered	Affects Phase I? **Yes**	Affects Phase I? **No**	Recommendation/Conclusion	Reference
Resource Conservation and Recovery Act	✔		DOE has found no RCRA regulated units within Phase I warranting a RCRA closure action.	RCRA Part B Permit Application, Volume I, Section A, September 1995 (as amended)
			It has been determined that the closest facility boundary from Buildings 23 and 72 will not change with the sale of Phase I. Therefore, the risk assessment information prepared in conjunction with the RCRA Part B Permit and submitted to the Ohio Hazardous Waste Facility Board (HWFB) will not change.	Responses to Information requested by the Ohio HWFB Technical Staff transmitted to Bob Brown of the State of the Hazardous Waste Facility Board dated March 12, 1996.
			The Burn area was closed in accordance with procedures in the approved Burn Area Closure Plan.	Burn Area Closure Report, March 1998
Underground Storage Tanks		✔	There are no USTs located within Phase I.	EG&G Mound Applied Technologies, Active Underground Storage Tank Plan, November 1994
Wetlands	✔		Three characteristics must be present to be classified as jurisdictional wetlands: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetlands hydrology. Absence of any one of these characteristics removes an area from consideration. One site (Site HH) examined within Phase I constitutes a jurisdictional wetland. In addition, Site EE	Operable Unit 9 Hydrogeologic Investigation: Wetlands Determination Report, Technical Memorandum, Revision 1, January 1994

Table 10: Summary of Other Factors Considered for Phase I

Factor Considered	Affects Phase I? **Yes**	Affects Phase I? **No**	Recommendation/Conclusion	Reference
			could become a jurisdictional wetland if its use changes from a sedimentation basin. Consistent with 10 CFR 1022, the applicability of wetland regulations to the property must be disclosed to the new owner.	Delineation of Federal Wetlands and Other Waters of the U.S., Final, August 1999 Notice of Wetlands Involvement for the Transfer of Land at the Miamisburg Closure Project, federal Register, Vol 67, No. 229, November 27, 2002
Floodplains		✔	No portion of Phase I lies within the 100-year floodplain. Consistent with 10 CFR 1022, the applicability of floodplain regulations to the property must be disclosed to the new owner.	South Property Floodplain Assessment and Notice of Floodplain Involvement, issued in Environmental Assessment of Mound Plant's South Property, June 1999
Clean Air Act	✔		OEPA placed the roads and parking lots on permanent registration status with air permit F001.	Air permit F001

Table 11: Phase I Documents and Public Comment Periods

Document	Comment Period (Begin)	Comment Period (End)
Phase I Proposed Plan*	26 March 2003	24 April 2003
Phase I Proposed Plan	2 October 2002	31 October 2002
Phase I RRE	25 September 2002	24 October 2002
PRS 16 Package	19 June 1996	17 July 1996
PRS 73 Package	27 March 2002	25 April 2002
PRS 74 Package	3 April 1997	8 May 1997
PRS 258-265 Package	12 June 2002	12 July 2002
PRS 276 CRA AM	2 October 2001	1 November 2001
PRS 280 Package	17 April 2002	17 May 2002
PRS 304 AM	21 December 1998	25 January 1999
PRS 304/313 Package	8 May 1997	16 June 1997
PRS 311/350 Package	18 March 1996	1 April 1996
PRS 346-8/355/370 Package	19 December 1996	23 January 1997
PRS 349 Package	3 April 1997	8 May 1997
PRS 351-3, 357, 359-62, 385-7 Package	19 December 1996	23 January 1997
PRS 365 Package	27 February 1997	3 April 1997
PRS 369 Package	19 December 1996	23 January 1997
PRS 371 Package	3 April 1997	8 May 1997
PRS 372 Package	15 May 1996	17 June 1996
PRS 383 Package	17 June 1997	18 July 1997
PRS 384 Package	19 December 1996	23 January 1997
PRS 406 Package	18 March 1996	1 April 1996
PRS 418 Package	9 August 2000	14 September 2000
PRS 419 Package	19 January 2000	17 February 2000
PRS 421 CRA AM	2 October 2001	1 November 2001
Building 3 BDP	27 March 2002	26 April 2002
Building 35 & 59 AM	20 April 1999	20 May 1999
Building 87 BDP	24 July 1997	23 August 1997

Mags 80-84 BDP	27 March 2002	26 April 2002
Building 95 BDP	4 September 2002	4 October 2002
Building 102 BDP	3 July 2002	2 August 2002
Building SST BDP	27 March 2002	26 April 2002

AM: Action Memo
BDP: Building Data Package
CRA: Contingent Removal Action
PRS: Potential Release Site

Note: Some PRSs are addressed in Building Data Packages or On-Scene Coordinator Reports.

* Proposed Plan reissued to enable public comment on the Monitored Natural Attenuation component of the remedy and the impact of the boundary change.

Table 12: Impact of Boundary Changes on Incremental Residual Soil Risk

Table 19 of the Proposed Plan

Scenario and Receptor	Media	Constituents	Pathway	Total Non-Cancer Hazard or HI	Total Non-Cancer Hazard or HI	Total Cancer Risk	Total Cancer Risk
				Boundary in October 2002	Current Boundary	Boundary in October 2002	Current Boundary
Construction Worker Scenario	Current & Future Soil (all depths)	Chemical & Radiological	Oral	1.4E-01	1.4E-01	**7.4E-06**	**7.4E-06**
			Dermal Contact	1.6E-03	2.2E-02	3.5E-07	3.5E-07
			Inhalation of Dust	NA	NA	2.0E-08	1.9E-08
			Inhalation of VOCs	NA	NA	NA	NA
			External	NA	NA	**9.5E-06**	**9.6E-06**
			Soil Total Risk	1.4E-01	1.6E-01	**1.7E-05**	**1.7E-05**
Site Employee Scenario	Current & Future Soil (0-2 feet bls)	Chemical & Radiological	Oral	4.6E-04	4.6E-04	**4.0E-06**	**4.0E-06**
			Inhalation of Dust	NA	NA	9.7E-08	9.7E-08
			Inhalation of VOCs	NA	NA	NA	NA
			External	NA	NA	**1.2E-05**	**1.2E-05**
			Soil Total Risk	4.6E-04	4.6E-04	**1.6E-05**	**1.6E-05**

HI: Hazard Index
NA: not applicable
bolded values exceed cancer risk of 10^{-6} or non-cancer Hazard Index greater than 1.
bls: below land surface
VOCs: volatile organic compounds
numbers written as 1.0E-3 equal 1x10-3 and 0.001

Table 13: Building Analysis Summary

	Asbestos	Lead	Radon	Radiological Surveys	PCBs
Building 3	Present, No remediation needed	Present, No remediation needed	No abatement required	Met surface contamination guidelines	May be present in flourescent lamp ballasts
Building 87	Asbestos bearing items removed	None identified	No abatement required	Met surface contamination guidelines	None identified
Building 95	None identified	None identified	No abatement required	Met surface contamination guidelines	None identified
Building 102	Unlikely	Unlikely	No abatement required	Met surface contamination guidelines	None identified
Magazine 80-84	None identified	None identified	No abatement required	Met surface contamination guidelines	None identified

APPENDIX D

Building Information

Phase I includes approximately 52 acres of land located in three distinct sections or parcels of the site property (Figure 1). The first parcel, the largest block of property in Phase I includes lands located on the south central part of the original 182 acres of the site that was purchased in 1947. This piece of property also contains a portion of the South Property (purchased in 1982). The second parcel of property included in Phase I is situated to the south of the Spoils Area and the site well pump houses, in the area designated as the South Property. The third parcel of property in Phase I lies to the south-southwest of Building 38.

Phase I includes 10 existing buildings and explosives magazines and 25 former production-era building sites including buildings, explosives storage magazines, and an electrical generator. Since the plant became operational, the properties in Phase I, with the exception of the South Property, have supported a number of plant related operations. Included in the activities that once took place in Phase I is explosives testing and production-related activities, administrative activities (i.e., offices and site security operations), utilities operations, waste processing operations (the Burn Area), and cleanup waste storage operations.

In addition to the production-era buildings noted above, Phase I also includes building sites dating from the construction era (a storage warehouse, a quonset-type hut building, and some temporary buildings).

Phase I lands have also been used for various waste and non-waste storage activities including waste container management, equipment management, and for other general plant uses.

BUILDINGS CURRENTLY LOCATED IN PHASE I

There are 10 existing buildings located within Phase I (as shown in Figure 3), including two buildings located in the Test Fire Area that have supported detonator and explosives testing operations (Buildings 3 and 87). In addition to the two Test Fire Area buildings, there are five explosives magazines located to the southwest of the Test Fire Area (Magazines 80, 81, 82, 83, and 84). Both of the buildings in the Test Fire Area and the explosives magazines are currently operated under users agreements that are being administered by MMCIC.

The remaining three buildings located in Phase I include Building 95, which is a chiller and steam plant that is located on the SM/PP Hill; Building 102, an office building located on the SM/PP Hill; and the Salt Storage (SST) Building.

Buildings currently located in Phase I are described below.

Building 3. Building 3 was constructed in 1963 and is an explosives material destructive test firing and environmental testing laboratory. With four additions to the building, including two attached corrugated fiberglass faced metal framed storage sheds, the square footage of Building 3 is currently 12,400 square feet.

When operated by DOE and the contractor, Building 3 included 17 environmental chambers for thermal testing, six systems for mechanical testing operations, two vibration testing systems, one centrifuge testing system, and three shock testing systems.

Building 3 was used as a facility for the destructive and environmental testing of explosives materials from the time of construction in 1963 until the building was turned over to EG&G Star City (now Perkin-Elmer) in 1994 under a lease agreement with the DOE. Building 3 has operated under that agreement since that time.

Building 87. Building 87 (or CTF-the Component Test Facility) is a two-story, 38,882 square foot, concrete structure, built slab-on-grade. The CTF offices and support facilities and other operational control/testing facilities that supported the testing cells were located on the first floor. The mechanical penthouse, on the second floor, contains HVAC heating and air conditioning, air handling units for the test cell areas, and a heat exchanger for hot water. The mechanical area occupies approximately 600 square feet. Building 87 was constructed in the 1980s and underwent shut down in about 1995.

Building 87 is currently being renovated by MMCIC for use by private industry.

Building 95. Building 95, the "SM/PP Chiller" consists of one larger building (Building 95) with 2,000 square feet of floor space, and two smaller ancillary buildings (Buildings 95-A and 95-B, each having 450 square feet of floor space. Buildings 95 (collectively) was constructed in the mid-1980s, in order to supplement P Building (Power Plant) operations, and in order to satisfy the demand for a chiller on the SM/PP Hill.

Building 102. Building 102 is a 10,982 square-foot two-story office building that was constructed in 1987 to support Mound's Decontamination and Decommissioning Program (D&D Program), and to provide an administrative area to house cleanup related staff. Through time, Building 102 has continued in its mission as an office, however, the building tenants have differed, including staff members from the PST Program, Soil Project team staff, as well as D&D Program staff members.

SST Building. SST Building was constructed in the early 1970s and is located in the vicinity of the former Burn Area, just to the southwest of where that area was located, and just to the east of the former Building 21 location. SST has been used for salt storage for snow control on site.

SST Building is a one-story, 590 square-foot, slab-on grade structure with wood framing for the walls and roof. The front of SST Building is open from wall to wall and from the ground to the roof. A 3-foot high concrete wall separates the wood structure from the slab and divides the area into two sections. Wood siding and the roof are covered with tar paper. SST Building was renovated in 2000.

Magazines 80, 81, 82, 83, and 84. Magazines 80, 81, 82, 83, and 84, are smaller explosives storage bunkers (explosives magazines) that were constructed in 1985.

Magazines 80, 81, 82, 83, and 84 each contain two-units or compartments. Each of the magazines is constructed of reinforced concrete as a box-shaped structure and considered non-standard earthen-covered magazines. The configuration of Magazines 80, 81, 82, 83, and 84 appears to be one unit. These magazines were used for the storage of energetic materials, and were used for that purpose, until they were transferred to EG&G Star City (now Perkin-Elmer) under a user agreement initiated with DOE.

The transition of Magazines 80, 81, 82, 83, and 84 to private industry took place in the mid-1990s, and these magazines have continued to operate under a user lease agreement since that time.

FORMER PRODUCTION ERA BUILDING SITES

There are numerous sites where production era buildings were once located within Phase I. Included in the former buildings that were located in Phase I are 4 buildings (Buildings 13, 14, 35, and 59) in the Test Fire Area that supported detonator and explosives testing operations. In addition to the Test Fire buildings, there were six explosives storage magazines to the southwest of the Test Fire Area (Magazines 4, 5, 8, 9, 10, and 20) that supported explosive operations.

Buildings 12 and 18 were located near the current Building 87 location into the 1980s. These buildings were apparently storage warehouses that were used to support explosives operations.

An additional four buildings or facilities were located in an area designated as the "Burn Area." This area was located to the northwest of SST Building, and included the Pyroshed Energetic Materials Waste Storage Unit, the Open Burn Energetic Materials Treatment Unit, Building 90 and the retort unit (an explosives treatment unit), and Magazine 53 (an explosives storage area).

Other building sites in Phase I also include the location for Building 39, a maintenance building, the location for an emergency electrical generator (Electric Generator Number 7), a process material storage building (Building 21), and four modular office buildings (Buildings 77, 78, 97, and 101).

The buildings once located on the former building sites within Phase I are described below.

Buildings 12 and 18. Building 12, titled the "Detonator Storage Building" was constructed in 1960, as a 57' x 32' long "Armco" steel building. Building 18, constructed in 1963, was similar in size and construction to Building 12. Both buildings were used to support explosives operations and were located about where Building 87 is currently located. Buildings 12 and Building 18 were demolished in the 1980s.

Building 13. Building 13 was a one-story, 44 square-foot wood-framed asbestos-coated steel structure on a concrete slab. Building 13 was located to the west of Building 21, and was used to support a program for remote monitoring of energetic materials

destructed in the Burn Area, located to the east. Building 13 contained a video monitor and electrical initiation equipment for firing explosive materials treatment devices. The building use, as described in 1990, was a "firing shed." Building 13 was demolished in 1997.

Building 14. Building 14 was a 42 square-foot, one-story, structure. This building was constructed with a wood and metal-frame and asbestos-coated sidewalls, with concrete deck roof on concrete footings. This building was used as an observation post in association with the former Burn Area to the east. The facility had no heating, cooling, or electrical services. The building use, as described in 1990, was metal melting. Building 14 was demolished in 1997.

Building 21. Building 21 was used for the storage of materials associated with two of Mound's processing missions, including thorium ores and protactinium ores (Cotter Concentrates). This structure was located along the south central border of the improved plant property; adjacent to the area designated as the Burn Area.

Building 21 was a 4,032 square-foot concrete structure with 10-inch thick floors and 14- to 16-inch thick walls. The roof was constructed of iron and steel. The facility was designed to ensure liquid tightness and was divided into two separate isolated bay areas. Building 21 became operational in 1964. Storage operations ended in 1987. Beginning in 1964, 1,338 drums of thorium oxalate were dumped in bulk form into the small bay area, while 3,576 drums of thorium hydroxide sludge were dumped in bulk form into the larger bay. The thorium sludge was ultimately sold to General Atomic Company for reclamation and was removed from Building 21 in 1975. Following removal of the thorium sludge, the building was cleaned and used as a staging area for Cotter Concentrates (high-level waste resulting from uranium milling). Approximately 1,258 drums of Cotter Concentrate were stored in Building 21. These drums were eventually shipped to the Nevada Test Site (NTS) in 1987 and use of Building 21 ceased. Since 1987, the building and surrounding area were maintained in a safe mode until the building was demolished in 1997.

Building 35. Building 35 was a 2,500 square-foot single-story structure built of concrete block. Building 35 was designed to provide x-ray and eddy current non-destructive testing of explosives. Building 35 was also used as the control room for the californium-252 multiplier (CFX) neutron radiography facility that was located in adjacent Building 59. Building 35 was demolished in the spring of 1998.

Building 39. Building 39, constructed in 1969, was a one-story structure constructed of prefabricated metal with a metal roof.

Initially, the eastern end of Building 39 was used by the Decontamination and Decommissioning project, which worked to produce fiberglass wooden boxes that were used for radioactive trash. The turntable used for this operation is still in place. Indications are that the facility was also used to perform gamma spectroscopy on these boxes.

From 1984 to 1988, the building was either inactive or used for storage.

In 1988, Building 39 was converted to a maintenance shop, and was divided into three sections: the east end was a machine shop; the middle was a break room; and the west end was used primarily for storage of building materials, parts, paints, and some solvents.

Building 39 was demolished in 1998.

Building 59. Building 59, the neutron radiography facility, was a 700 square-foot, two-story reinforced concrete structure with a rolled roof. Building 59 was constructed in 1970 to provide neutron radiography capability to the site.

Building 59 housed a neutron-radiation source (californium-252) that was used to supply neutrons to an assembly of uranium plates. The californium-252 source was stored remotely from the core when not in use; when radiography operations were to be conducted, the source would be transported via a hand-cranked source transfer system into its proper location within the core assembly. The californium-252 source was removed from the facility and transported to Oak Ridge National Lab in 1995. Building 59 was demolished in the spring of 1998.

Building 77 and 78. Building 77 and 78, both located to the north of Building 39 were modular office structures that were used in the early 1980s. Both Building 77 and Building 78 contained 12 rooms, each with overall dimensions of 23.5 feet by 60 feet, and a combined square footage of 2,995. Both of these buildings were removed from service or were dismantled by the 1990s.

Building 97. Building 97 was a 12-room, 7,410 square-foot, 23.5 foot by 60 foot modular office structure, located to the south of Building 39. Building 97 was constructed in the early to late 1980s and was removed from service and dismantled in the 1990s.

Building 101. Building 101 was a single-story modular building with wooden exterior and Hypalon roof. The square footage of Building 101 was 1,815. Building 101 was brought on site in 1986, and was used as offices for the area maintenance foreman and planner. It was sold and removed from the site in 1999.

Building 120. Building 120 was a 350 square-foot, one-story, wood-sided building with a metal roof. Building 120 was located just to the south of Building 102 and was used as an administrative office for the Decontamination and Decommissioning (D&D) Group. It was dismantled in 1998.

Burn Area Buildings. The Burn Area, excluding Magazine 53, described below, included three buildings and/or areas, as follows:

1. Pyroshed Energetic Materials Waste Storage Unit. This structure, known as the "Pyroshed" was used for the storage of pyrotechnic wastes and other energetic materials prior to their treatment at the Burn Area. The Pyroshed was located inside the fenced Burn Area and was constructed on a concrete pad measuring approximately 9 feet by 15 feet. The shed was approximately 7 feet high, with

chain-link fence walls. A locked entry gate was located in the front side of the structure.

2. Open Burn Energetic Materials Treatment Unit. The open burn unit was used for op en burning of non-liquid explosive waste, pyrotechnic waste, and thermal treatment of explosive-contaminated material.

   The open burn unit consisted of a 12.3-foot by 18-foot base encircled by a 10-foot high composite metal wall with a sand core. The treatment zone measured approximately 12 feet by 12 feet, and the remainder of the floor space was occupied by an access-way. The entrance consisted of a 4-foot wide aisle that turned at a right angle to enter the treatment zone. The unit was developed on an 18-inch wide by 30-inch deep continuous, concrete footing developed on native soil. The enclosure's sides consisted of 0.25-inch thick milled steel plates.

3. Building 90. Building 90, constructed in 1984 and demolished in 1997, was a pre-engineered sheet metal building constructed on a reinforced concrete slab. The retort unit part of this building was located within a rectangular enclosure attached to the east side of Building 90 that was approximately 30 feet long and 15 feet wide with 9-foot high walls. Building 90 was designed to house the unit controls and waste feed operations for the Retort Unit (rotary-kiln-thermal-treatment-unit). Operations in Building 90 were suspended in January 1996, and the building was demolished in 1996-1997.

The buildings and facilities within the Burn Area were used for the destruction of pyrotechnics and energetic materials, including regulated hazardous waste explosives. Consequently, these operations underwent a RCRA closure, and as a part of that process were demolished in 1997 and 1998.

Electrical Generator 7. EG-7 (emergency generator) was constructed in 1972 to provide emergency electrical power to the Test Fire Area. The generator was an internal combustion key-starting engine generator housed in an 80-foot square metal structure, which was located just to the north of Building 63. EG-7 remained available as an emergency generator until the 1990s, when it was taken out of use. EG-7 was sold in 1998.

Magazines 5, 8, 10, and 20. Magazines 5, 8, 10, and 20 were smaller explosive storage magazines or bunkers that were constructed in the mid-1950s and into the early 1960's. These magazines were located in the Test Fire Area, in a fenced area behind the former Building 85 site and behind Building 87. The purpose of these structures was for the storage of Mounds energetic materials. These buildings were demolished.

Magazine 53. Magazine 53 was a one-story, 239 square-foot reinforced concrete structure. The roof was made of reinforced steel, and the structure was covered with earth. Magazine 53 was constructed in 1970 and was used for the storage of pyrotechnics and energetic materials that were destroyed in the Burn Area. Magazine 53 was also used as a storage area for hazardous waste regulated explosives, and

consequently underwent a RCRA closure. Magazine 53, as part of this closure, was demolished in January 1998.

Magazines 4 and 9. Magazine 4, the bulk storage magazine, was constructed in 1962 as an earthen covered magazine. Magazine 53 was constructed in an area adjacent to Magazine 9. Magazine 4 contained 4 units, with the front of the structure measuring 53 feet across. Magazine 9 was constructed in 1956, also as an earthen covered magazine. Magazine 9 contained a single cell that measured 17-feet by 14-feet. Both magazines were in the vicinity of Building 87. Magazines 4 and 9 were demolished by the 1980s.

FORMER CONSTRUCTION-ERA BUILDING SITES LOCATED IN PHASE I

There are three locations within Phase I that were used during the time that the original 1948-era buildings were constructed on the Mound site. These locations are summarized below:

Warehouse 12. Warehouse 12 was located in the approximate vicinity of the Building 39 site and was constructed by Maxon Construction Company to provide an administrative area (i.e., storage warehouse) in 1947 during the construction era for Mound's original buildings. Later plant records do not indicate any mission-related uses for Warehouse 12. Based upon comparisons of site photographs and available information, Warehouse 12 was likely demolished in the late 1940s or the early 1950s.

Tropical Huts and other Temporary Buildings. A number of shacks and tents (tropical huts) were used in conjunction with the construction of the original plant buildings in the very early 1950s for the storage of debris and other polonium contaminated materials. Little information is available on these buildings. However, based upon early photographs, there were three of these structures located near the current location of Building 2.

Building 19 Quonset Hut. The Quonset Hut is a 40-foot by 60-foot Stransteel brand structure that was originally located at Dayton Unit III and was relocated to the Mound site. When Unit III was being cleaned up, this building was disassembled and was moved from Unit III. In 1949, it was relocated to the lower valley of the Mound Laboratory site where the existing Building 3 is now located.

The Quonset Hut was used for shipping, receiving, and storing of radioactive field materials in the 1950s.

The Quonset Hut was also used for storage of bismuth-chloride sludges from the polonium separations. At that time, 500 to 600 drums of sludge generated by the hydrolysis process were stored in the Quonset Hut awaiting a determination on potential reuse or shipment to the Oak Ridge site for burial.

The Quonset Hut was also used for the storage of thorium in 1952 and for the storage of Purex residues from 1949 to 1954.

In 1963, the Quonset Hut was again relocated when it was moved to its current location near the western property boundary.

OTHER LAND USE AREAS IN PHASE I

In addition to uses of the Test Fire Area (i.e., around Building 2) for the management of materials during the construction era and use of those same areas for early production era uses, the lands in Phase I have also been used for the following purposes:

SM/PP Pad. The SM/PP Pad is a concrete pad that was used by waste management for the management of low-level waste boxes containing soil and debris, as well as being used as a staging site for unused or empty low-level waste boxes. This pad is located to the east of the former Building 21 site and north of the SST Building.

Fenced Location for Storage of Equipment and Drums near Building 21. A fenced area to the east-southeast of Building 21 was used for the management of low-level waste drums and potentially contaminated equipment. This area was addressed as part of the Building 21 cleanup activities.

Building 21 soils management area, east of SST Building. This area was used for the management of soils excavated after the Building 21 operations ceased and was addressed as part of the Building 21 cleanup activities.

South Property Portions of Phase I. The portions of the south property included in Phase I are part of two property parcels containing 124 acres of rolling hills to the south of the main processing related areas. DOE had purchased the South Property (also called the "New Property") in 1981 in part as a buffer and in part for possible future expansions. Despite its purchase for possible future expansion, it has for the most part remained unused since the date of purchase. The only plant uses that have taken place in the areas to be transferred in Phase I are the installation of boundary fences, the grading of the surface and the associated filling in of low-lying areas, and road installation and mobile laboratory operations in support of the Canal Removal Action.

An older unimproved road. The road running from the vicinity of Building 105 to the area behind Buildings 2, 3, and 87 was improved and the curves banked to utilize the area as a haul road in support of clean up activities in the Building 21 area and in the Burn Area.

Unidentified trailers near Building 21 and the SST Building. A grouping of office-type trailers existed in the vicinity of Building 21 and the SST Building were removed from this location by the 1990s.

Concrete Pad West of Building 35. The Building 35 concrete pad area was used by waste management for the management of low-level waste boxes of soil and debris.

P Building Soils Management Area-"Petro Piles". In the early 1990s, soil that was removed in conjunction with the removal of the P Building fuel oil tank removal were staged in the vicinity of Building 87 and Building 85 for treatment in a biodegradation facility for petroleum contaminated soils.

Management Area for Equipment. In 1996 and 1997, along the current property line for (previously transferred) Release Block D and Phase I (west of Building 100), an area was used to store portable office trailers, modular guard shacks, portable utility buildings, and various types of equipment that had been removed from an equipment management area in the Spoils Area.

Storage of Bird-Cage Drums. In the mid-1990s, empty blue transport drums that had been used for the transportation of fissile (product) material were located along the current property line for Release Block D and Phase I (west of Building 100). These drums were constructed with an internal framework that suspended the material contained in the drum in the drums' center, allowing the placement of the drums in a manner that was consistent with the criticality requirements for the contained material.

APPENDIX E

PRS Information

PRS 16. Area C (Old Building 72) was a former Hazardous Waste Storage Area dismantled in accordance with an Ohio Environmental Protection Agency approved RCRA closure plan. Core Team decided that PRS 16 requires No Further Assessment.

PRS 73. PRS 73, the Evaporator Storage Area, was an equipment storage area located in the Test Fire Valley. Further Assessment sampling in July 2001 identified no levels of concern. Core Team decided that PRS 73 requires No Further Assessment.

PRS 74. Quonset Hut (former), placed on a potentially contaminated concrete floor shows no indication that its shell was ever contaminated. The concrete floor was removed in 1963. Core Team decided that PRS 74 requires No Further Assessment.

PRS 258-265. PRSs 258-265 refer to the waste storage and treatment facilities formerly located in the "Burn Area" where a variety of wastes such as explosive powders, pyrotechnic materials, solid wastes contaminated with energetic materials, and non-radiological weapons components were thermally treated. Beryllium was the only COC identified as exceeding its Guideline Value during sampling events. There are no reported recent historical events to indicate other reasons for concern. Core Team decided that PRSs 258-265 require No Further Assessment.

PRS 276. Area 22, Orphan Soil from Other Areas, was a potentially contaminated site due to its use as a temporary storage area for contaminated soils. The soils were removed in accordance with the Core Team recommendation. Core Team decided that PRS 276 requires No Further Assessment.

PRS 280. Further Assessment sampling in the Waste Oil Drum Field yielded only low-level and isolated exceedances were noted above 10^{-6} RBGVs/screening levels; however, none were above cleanup objectives (10^{-5} RBGV + background). Core Team decided that PRS 280 requires No Further Assessment.

PRS 281. Area E, identified as a historical, isolated waste oil spill, produced levels of radiological contamination over Mound soils guidelines for radium-226. The area was subject to the removal action associated with the Building 21 demolition. Core Team decided that PRS 281 requires No Further Assessment.

PRS 284. The Building 21 Thorium Sludge Storage Facility held 4,914 drums of thorium oxalate from 1966-1975 and 1,258 drums of Cotter Concentrate (high-level nuclear waste) until 1987. Cleanup and removal of Building 21 was completed 31 March 1997. Core Team decided that PRS 284 requires No Further Assessment.

PRS 304. This Excavated Material Disposal Area was created due to the dumping of low-level thorium soils. Sampling in 1984 found plutonium and thorium levels below the risk-based guideline values. Core Team decided that PRS 304 requires No Further Assessment.

PRS 311. Potential Hot Spot Location S0706 was identified during a 1983 site survey project, which discovered an isolated plutonium-238 reading of 29 pCi/g. This level is below all associated cleanup levels and guideline values. Core Team decided that PRS 311 requires No Further Assessment.

PRS 313. Potential Hot Spot Location S0982 was identified as a thorium hot spot during

the Radiological Site Survey Project. Results from sampling in 1995 indicated no radioactive contamination in excess of guideline criteria. Core Team decided that PRS 313 requires No Further Assessment.

PRS 333. PRS 333 is an explosive surge tank (Tank 263) located along the southern border of Building 87,a previous explosives testing area that has since undergone Safe Shutdown. Core Team decided that PRS 333 requires No Further Assessment.

PRS 334. PRS 334 is an explosive surge tank (Tank 264) located along the southern border of Building 87,a previous explosives testing area that has since undergone Safe Shutdown. Core Team decided that PRS 334 requires No Further Assessment.

PRS 335. PRS 335 is an explosive surge tank (Tank 265) located along the southern border of Building 87,a previous explosives testing area that has since undergone Safe Shutdown. Core Team decided that PRS 335 requires No Further Assessment.

PRS 347. PRS 347 was identified according to qualitative hydrocarbon detections found during the PETREX soil gas portion of OU5, Non Area of Concern investigation. The 1996 Soil Gas confirmation sampling effort discovered no contamination above the 10^{-6} risk range. Core Team decided that PRS 347 requires No Further Assessment.

PRS 348. PRS 348 was identified according to qualitative hydrocarbon detections found during the PETREX soil gas portion of OU5, Non Area of Concern investigation. The 1996 Soil Gas confirmation sampling effort discovered no contamination above the 10^{-6} risk range. Core Team decided that PRS 348 requires No Further Assessment.

PRS 349. PRS 349 was identified due to plutonium detections found during the Mound Soil Screening Analysis performed as part of the June 1994 OU5, Operational Area Phase I Investigation. All concentrations are below the 10^{-5} Risk Based Guideline Value. Core Team decided that PRS 349 requires No Further Assessment.

PRS 350. Soil Contamination, Area West of Building 21, consists of detectable plutonium concentrations; however, concentrations were below all associated cleanup levels and guideline values. Core Team decided that PRS 350 requires No Further Assessment.

PRS 352. PRS 352 was identified as an elevated soil gas location due to an elevated PETREX passive soil gas portion of the OU5, Non Area of Concern investigation. Soil gas confirmation sampling indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 352 requires No Further Assessment.

PRS 353. PRS 353 was identified as an elevated soil gas location due to an elevated PETREX passive soil gas portion of the OU5, Non Area of Concern investigation. Soil gas confirmation sampling indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 353 requires No Further Assessment.

PRS 362. PRS 362 was identified as an elevated soil gas location due to an elevated

PETREX passive soil gas portion of the OU5, Non Area of Concern investigation. Soil gas confirmation sampling indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 362 requires No Further Assessment.

PRS 365. PRS 365 was identified as an elevated soil gas location due to an elevated PETREX passive soil gas survey result in 1994. A soil gas confirmation sample collected within 50 feet of this PRS indicated that all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 365 requires No Further Assessment.

PRS 369. PRS 369 was identified as an elevated soil gas location due to elevation qualitative PETREX hydrocarbon levels. During the 1996 soil gas confirmation sampling, all concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 369 requires No Further Assessment.

PRS 370. PRS 370 was identified according to qualitative hydrocarbon detections found during the PETREX soil gas portion of OU5, Non Area of Concern investigation. The 1996 Soil Gas confirmation sampling effort discovered no contamination above the 10^{-6} risk range. Core Team decided that PRS 370 requires No Further Assessment.

PRS 371. PRS 371 was identified due to a single, elevated plutonium-238 detection during the OU5, Operational Area Phase I Investigation in 1994. In 1996, a sample was collected within approximately 25 feet of PRS 371 during the Soil Gas Confirmation Investigation. All concentrations of volatile, semivolatile, PCBs, pesticides, metals, radionuclides, and explosives within the soil were below applicable guideline criteria. Core Team decided that PRS 371 requires No Further Assessment.

PRS 372. PRS 372 was identified due to elevated soil gas measurements. Subsequent quantitative sampling showed that all soil samples taken in the area were at or below their respective 10^{-6} Risk Based Guideline Value. Core Team decided that PRS 372 requires No Further Assessment.

PRS 383. PRS 383 was identified as an area of possible organic contamination during the 1992 PETREX Survey. However, additional sampling in 1995 quantitatively determined that no volatile, semivolatile, PCBs, pesticides, metals, radionuclides, or explosives exceeded applicable guideline values. Core Team decided that PRS 383 requires No Further Assessment.

PRS 384. PRS 384 was identified due to elevated qualitative PETREX hydrocarbon levels. However, the soil gas confirmation investigation in 1996 determined that no volatile, semivolatile, PCBs, pesticides, metals, radionuclides, or explosives exceeded applicable guideline values. Core Team decided that PRS 384 requires No Further Assessment.

PRS 406. The southern portion of PRS 283 became a PRS due to potential thorium dust from the thorium sludge redrumming. However, radionuclides in the soils were

scattered and infrequent, and all occurrences were below the 10^{-5} risk-based guideline values. Core Team decided that PRS 406 requires No Further Assessment.

PRS 407. Soil Contamination West of Building 21 resulted in a removal action in which one to two feet of soil was excavated and disposed of via railcar shipments to Envirocare. PRS 407 was later binned No Further Action in 2000. Core Team decided that PRS 407 requires No Further Assessment.

PRS 418. PRS 418, the Overflow Pond South Inlet, was created to address potential plutonium-238, thorium-228, thorium-232, and Radium-226 contamination from PRS 407. Since the PRS 407 removal action, there are no known PRSs draining into the inlet. Although sample results for benzo(a)pyrene exceed the 10^{-6} guideline value, they are below the 10^{-5} risk-based guideline value. All other constituents are below guideline criteria. Core Team decided that PRS 418 requires No Further Assessment.

PRS 419. The Mound Plant Drainage Outflow Reroute, constructed during the Miami-Erie Canal Remediation Project, is monitored for radiological parameters under DOE Order 5400.1 and the DOE Regulatory Guide. It is also monitored for non-radiological parameters in accordance with the site's NPDES permit. To address potential radiological releases, the Outflow Reroute is also monitored daily for gross alpha and tritium, and bi-weekly from flow-proportional 24-hour composite samples for multiple radionuclides. Core Team decided that PRS 419 requires No Further Assessment.

PRS 421. PRS 421 is "The Ridge" across the road south of the location of the former Building 21. It was identified as a PRS when historical sampling data indicated the presence of contaminated soil. Contamination was confirmed during the verification sampling for PRS 407. The source of the contamination was surface runoff from the PRS 407 cleanup that followed preferential and intermediate drainage pathways south to the PRS 421 area. The removal action resulted in the excavation and containerization for disposal of approximately 105,133 cubic feet of soil, concrete, and asphalt. The cleanup objectives were 55 pCi/g for plutonium-238, 2.1 pCi/g for thorium-232, and 2.6 pCi/g for thorium-228. The OSC report documented that all verification sample results were below cleanup objectives.

APPENDIX F

Listing of All Detected Analytes

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
BTEX Compounds										
Benzene (UG/KG)	71-43-2	0			O	0/ 15	0.0			NO
Ethylbenzene (UG/KG)	100-41-4	0			O	0/ 15	0.0			NO
Toluene (UG/KG)	108-88-3	0			O	0/ 15	0.0			NO
Xylenes, Total (UG/KG)	1330-20-7	0			O	0/ 15	0.0			NO
Explosives										
1,3,5-Trinitrobenzene (UG/KG)	99-35-4	0			O	0/ 81	0.0			NO
1,3-Dinitrobenzene (UG/KG)	99-65-0	0			O	0/ 81	0.0			NO
2,4,6-Trinitrotoluene (UG/KG)	118-96-7	1	1.1E+02	1.1E+02	D	1/ 91	1.1	6.3E+02	1.1E+02	NO
2,4-Dinitrotoluene (UG/KG)	121-14-2	0			O	0/ 75	0.0			NO
2,6-Dinitrotoluene (UG/KG)	606-20-2	0			O	0/ 32	0.0			NO
2-Amino-4,6-Dinitrotoluene (UG/KG)	35572-78-2	0			O	0/ 61	0.0			NO
4-Amino-2,6-Dinitrotoluene (UG/KG)	1946-51-0	0			O	0/ 19	0.0			NO
HMX (UG/KG)	2691-41-0	0			O	0/ 98	0.0			NO
Nitrobenzene (UG/KG)	98-95-3	1	3.8E+02	3.8E+02	D	1/ 32	3.1	4.7E+02	3.8E+02	NO
Nitroglycerin (UG/KG)	55-63-0	0			O	0/ 76	0.0			NO
PETN (UG/KG)	78-11-5	0			O	0/ 99	0.0			NO
RDX (UG/KG)	121-82-4	0			O	0/ 99	0.0			NO
Tetryl (UG/KG)	479-45-8	0			O	0/ 71	0.0			NO
Metals										
Aluminum (UG/KG)	7429-90-5	145	5.9E+05	2.3E+07	N	145/ 146	99.3	1.5E+07	1.5E+07	YES
Antimony (UG/KG)	7440-36-0	64	2.1E+02	4.5E+04	D	64/ 209	30.6	8.5E+03	8.5E+03	YES
Arsenic (UG/KG)	7440-38-2	137	4.9E+02	2.0E+04	X	137/ 143	95.8	8.2E+03	8.2E+03	YES
Barium (UG/KG)	7440-39-3	226	4.4E+03	6.0E+05	X	226/ 227	99.6	1.0E+05	1.0E+05	YES
Beryllium (UG/KG)	7440-41-7	220	5.0E+01	3.6E+03	X	220/ 226	97.3	1.1E+03	1.1E+03	YES
Bismuth (UG/KG)	7440-69-9	33	8.2E+02	7.3E+04	X	33/ 59	55.9	1.3E+05	7.3E+04	YES
Cadmium (UG/KG)	7440-43-9	69	2.5E+02	1.2E+04	D	69/ 227	30.4	1.5E+03	1.5E+03	YES
Calcium (UG/KG)	7440-70-2	145	1.4E+06	3.4E+08	X	145/ 146	99.3	1.5E+08	1.5E+08	YES
Chromium (UG/KG)	7440-47-3	226	1.1E+03	3.7E+04	X	226/ 227	99.6	1.7E+04	1.7E+04	YES
Cobalt (UG/KG)	7440-48-4	145	7.9E+02	2.5E+04	X	145/ 146	99.3	1.3E+04	1.3E+04	YES
Copper (UG/KG)	7440-50-8	143	1.8E+03	1.1E+06	X	143/ 146	97.9	2.2E+04	2.2E+04	YES
Cyanide (UG/KG)	57-12-5	35	1.0E+02	8.9E+03	D	35/ 162	21.6	5.8E+02	5.8E+02	YES
Iron (UG/KG)	7439-89-6	145	2.3E+04	4.3E+07	N	145/ 146	99.3	3.1E+07	3.1E+07	YES
Lead (UG/KG)	7439-92-1	242	1.6E+03	2.2E+05	X	242/ 256	94.5	1.5E+04	1.5E+04	YES
Lithium (UG/KG)	7439-93-2	53	2.3E+03	3.4E+04	N	53/ 55	96.4	1.8E+04	1.8E+04	YES

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Magnesium (UG/KG)	7439-95-4	145	1.2E+04	1.2E+08	X	145/ 146	99.3	2.9E+07	2.9E+07	YES
Manganese (UG/KG)	7439-96-5	137	6.5E+04	8.2E+06	X	137/ 138	99.3	6.8E+05	6.8E+05	YES
Mercury (UG/KG)	7439-97-6	61	3.0E+01	1.4E+03	D	61/ 139	43.9	1.2E+02	1.2E+02	YES
Molybdenum (UG/KG)	7439-98-7	49	2.2E+02	9.7E+03	L	49/ 54	90.7	4.0E+03	4.0E+03	YES
Nickel (UG/KG)	7440-02-0	224	2.3E+03	2.5E+05	X	224/ 227	98.7	2.2E+04	2.2E+04	YES
Potassium (UG/KG)	7440-09-7	142	3.1E+05	3.3E+08	X	142/ 147	96.6	1.9E+06	1.9E+06	YES
Selenium (UG/KG)	7782-49-2	19	4.6E+02	2.3E+03	D	19/ 131	14.5	9.6E+02	9.6E+02	YES
Silver (UG/KG)	7440-22-4	65	1.1E+02	2.1E+04	D	65/ 227	28.6	2.4E+03	2.4E+03	YES
Sodium (UG/KG)	7440-23-5	136	4.2E+04	3.5E+06	X	136/ 146	93.2	1.1E+06	1.1E+06	YES
Thallium (UG/KG)	7440-28-0	29	2.0E+02	3.5E+03	D	29/ 142	20.4	1.1E+03	1.1E+03	YES
Tin (UG/KG)	7440-31-5	22	6.7E+02	3.3E+03	D	22/ 54	40.7	1.2E+04	3.3E+03	YES
Vanadium (UG/KG)	7440-62-2	145	1.7E+03	4.3E+04	X	145/ 146	99.3	2.5E+04	2.5E+04	YES
Zinc (UG/KG)	7440-66-6	145	5.5E+03	4.6E+05	X	145/ 146	99.3	9.3E+04	9.3E+04	YES
Pesticides and/or PCBs										
4,4'-DDD (UG/KG)	72-54-8	0			O	0/ 122	0.0			NO
4,4'-DDE (UG/KG)	72-55-9	7	2.8E-01	1.8E+00	D	7/ 121	5.8	3.3E+00	1.8E+00	YES
4,4'-DDT (UG/KG)	50-29-3	0			O	0/ 122	0.0			NO
Aldrin (UG/KG)	309-00-2	1	5.4E-02	5.4E-02	D	1/ 122	0.8	2.2E+00	5.4E-02	NO
Alpha Chlordane (UG/KG)	5103-71-9	0			O	0/ 99	0.0			NO
Alpha-BHC (UG/KG)	319-84-6	0			O	0/ 122	0.0			NO
Aroclor-1016 (UG/KG)	12674-11-2	0			O	0/ 151	0.0			NO
Aroclor-1221 (UG/KG)	11104-28-2	0			O	0/ 151	0.0			NO
Aroclor-1232 (UG/KG)	11141-16-5	1	1.2E+02	1.2E+02	D	1/ 151	0.7	3.3E+01	3.3E+01	NO
Aroclor-1242 (UG/KG)	53469-21-9	1	1.2E+02	1.2E+02	D	1/ 151	0.7	3.3E+01	3.3E+01	NO
Aroclor-1248 (UG/KG)	12672-29-6	3	7.4E+01	9.1E+02	D	3/ 150	2.0	3.7E+01	3.7E+01	NO
Aroclor-1254 (UG/KG)	11097-69-1	1	2.2E+02	2.2E+02	D	1/ 151	0.7	5.8E+01	5.8E+01	NO
Aroclor-1260 (UG/KG)	11096-82-5	0			O	0/ 150	0.0			NO
Beta-BHC (UG/KG)	319-85-7	3	1.8E-01	1.2E+02	D	3/ 120	2.5	3.1E+00	3.1E+00	NO
Chlordane (UG/KG)	57-74-9	2	1.9E+01	9.8E+01	D	2/ 23	8.7	1.6E+01	1.6E+01	YES
Delta-BHC (UG/KG)	319-86-8	1	1.7E-01	1.7E-01	D	1/ 122	0.8	3.4E+00	1.7E-01	NO
Dieldrin (UG/KG)	60-57-1	3	5.2E-01	4.4E+00	D	3/ 122	2.5	3.1E+00	3.1E+00	NO
Endosulfan I (UG/KG)	959-98-8	0			O	0/ 122	0.0			NO
Endosulfan II (UG/KG)	33213-65-9	0			O	0/ 122	0.0			NO
Endosulfan Sulfate (UG/KG)	1031-07-8	0			O	0/ 122	0.0			NO
Endrin (UG/KG)	72-20-8	2	1.5E-01	2.3E+01	D	2/ 121	1.7	4.6E+00	4.6E+00	NO

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Endrin Aldehyde (UG/KG)	7421-93-4	0			O	0/ 108	0.0			NO
Endrin Ketone (UG/KG)	53494-70-5	2	5.2E-01	7.6E-01	D	2/ 122	1.6	1.3E+01	7.6E-01	NO
Gamma Chlordane (UG/KG)	5103-74-2	1	5.7E-02	5.7E-02	D	1/ 99	1.0	1.7E+01	5.7E-02	NO
Gamma-BHC (Lindane) (UG/KG)	58-89-9	0			O	0/ 122	0.0			NO
Heptachlor (UG/KG)	76-44-8	2	1.1E-01	1.3E-01	D	2/ 122	1.6	2.0E+00	1.3E-01	NO
Heptachlor Epoxide (UG/KG)	1024-57-3	2	1.1E-01	3.5E-01	D	2/ 122	1.6	1.3E+01	3.5E-01	NO
Methoxychlor (UG/KG)	72-43-5	0			O	0/ 122	0.0			NO
Toxaphene (UG/KG)	8001-35-2	0			O	0/ 122	0.0			NO
Phenols										
Phenolics (UG/KG)	64743-03-9	0			O	0/ 24	0.0			NO
Radiological										
Actinium-227 (PCI/G)	14952-40-0	37	5.0E-02	2.1E+00	D	37/ 282	13.1	3.0E-01	3.0E-01	YES
Actinium-228 (PCI/G)	14331-83-0	7	7.6E-01	1.4E+00	D	7/ 7	100.0	1.2E+00	1.4E+00	YES
Americium-241 (PCI/G)	14596-10-2	12	5.0E-02	3.8E+01	D	12/ 558	2.2	1.1E-01	1.1E-01	NO
Bismuth-207 (PCI/G)	13982-38-2	0			O	0/ 126	0.0			
Bismuth-210 (PCI/G)	14331-79-4	1	6.8E-02	6.8E-02	D	1/ 222	0.5	2.9E-02	2.9E-02	NO
Bismuth-210M (PCI/G)	BI-210M	3	1.4E-01	2.7E-01	D	3/ 84	3.6	5.5E-02	5.5E-02	NO
Bismuth-214 (PCI/G)	14733-03-0	10	7.0E-01	9.3E-01	N	10/ 10	100.0	8.6E-01	9.3E-01	YES
Cesium-137 (PCI/G)	10045-97-3	276	2.1E-02	1.6E+00	D	276/ 564	48.9	1.6E-01	1.6E-01	YES
Cobalt-60 (PCI/G)	10198-40-0	14	2.0E-02	5.0E-01	D	14/ 575	2.4	3.6E-02	3.6E-02	NO
Europium-152 (PCI/G)	14683-23-9	1	8.7E-02	8.7E-02	D	1/ 191	0.5	4.7E-02	4.7E-02	NO
Europium-154 (PCI/G)	15585-10-1	0			O	0/ 180	0.0			NO
Lead-210 (PCI/G)	14255-04-0	180	4.9E-01	3.7E+00	X	180/ 344	52.3	1.2E+00	1.2E+00	YES
Lead-212 (PCI/G)	15092-94-1	10	8.4E-01	1.2E+00	L	10/ 10	100.0	1.1E+00	1.2E+00	YES
Lead-214 (PCI/G)	15067-28-4	20	5.7E-01	1.1E+00	N	20/ 20	100.0	9.2E-01	9.2E-01	YES
Plutonium-238 (PCI/G)	13981-16-3	665	1.2E-02	4.0E+02	D	665/1545	43.0	2.6E+01	2.6E+01	YES
Plutonium-239 (PCI/G)	15117-48-3	83	3.5E-03	1.3E+00	X	83/ 90	92.2	6.9E-02	6.9E-02	YES
Plutonium-239/240 (PCI/G)	PU-239/240	79	3.7E-03	1.0E+00	D	79/ 254	31.1	4.4E-02	4.4E-02	YES
Plutonium-242 (PCI/G)	13982-10-0	0			O	0/ 5	0.0			NO
Potassium-40 (PCI/G)	13966-00-2	122	7.2E+00	3.7E+01	X	122/ 126	96.8	2.1E+01	2.1E+01	YES
Protactinium-231 (PCI/G)	14331-85-2	0			O	0/ 36	0.0			NO
Radium-224 (PCI/G)	13233-32-4	190	7.3E-02	6.3E+00	X	190/ 190	100.0	1.3E+00	1.3E+00	YES
Radium-226 (PCI/G)	13982-63-3	494	1.8E-01	3.7E+00	X	494/ 567	87.1	1.2E+00	1.2E+00	YES
Radium-228 (PCI/G)	15262-20-1	80	3.1E-01	2.0E+00	N	80/ 81	98.8	1.2E+00	1.2E+00	YES
Strontium-90 (PCI/G)	10098-97-2	0			O	0/ 21	0.0			NO

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Thallium-208 (PCI/G)	14913-50-9	10	1.6E-01	4.0E-01	N	10/ 10	100.0	3.8E-01	4.0E-01	YES
Thorium-227 (PCI/G)	15623-47-9	17	6.0E-02	4.4E-01	L	17/ 33	51.5	1.4E-01	1.4E-01	YES
Thorium-228 (PCI/G)	14274-82-9	342	3.7E-02	4.5E+00	X	342/ 384	89.1	1.6E+00	1.6E+00	YES
Thorium-229 (PCI/G)	15594-54-4	0			O	0/ 36	0.0			NO
Thorium-230 (PCI/G)	14269-63-7	340	1.0E-01	7.5E+00	X	340/ 595	57.1	2.8E+00	2.8E+00	YES
Thorium-232 (PCI/G)	7440-29-1	789	4.5E-02	8.0E+01	D	789/1805	43.7	8.3E-01	8.3E-01	YES
Tritium (PCI/G)	10028-17-8	1	1.4E+00	1.4E+00	D	1/ 21	4.8	2.0E+00	1.4E+00	NO
Uranium-234 (PCI/G)	13966-29-5	46	3.8E-01	1.6E+00	N	46/ 54	85.2	1.0E+00	1.0E+00	YES
Uranium-235 (PCI/G)	15117-96-1	28	2.7E-02	2.1E-01	D	28/ 77	36.4	1.9E-01	1.9E-01	YES
Uranium-235/236 (PCI/G)	U-235/236	0			O	0/ 2	0.0			NO
Uranium-238 (PCI/G)	7440-61-1	72	4.1E-01	2.0E+00	X	72/ 119	60.5	1.9E+00	1.9E+00	YES
Semi-Volatile Organics										
1,2,4-Trichlorobenzene (UG/KG)	120-82-1	0			O	0/ 159	0.0			NO
1,2-Dichlorobenzene (UG/KG)	95-50-1	0			O	0/ 159	0.0			NO
1,3-Dichlorobenzene (UG/KG)	541-73-1	0			O	0/ 159	0.0			NO
1,4-Dichlorobenzene (UG/KG)	106-46-7	0			O	0/ 159	0.0			NO
1-chloro-4-phenoxybenzene (UG/KG)	7005-72-3	0			O	0/ 159	0.0			NO
2,2'-oxybis(1-chloropropane) (UG/KG)	108-60-1	0			O	0/ 159	0.0			NO
2,4,5-Trichlorophenol (UG/KG)	95-95-4	0			O	0/ 159	0.0			NO
2,4,6-Trichlorophenol (UG/KG)	88-06-2	0			O	0/ 159	0.0			NO
2,4-Dichlorophenol (UG/KG)	120-83-2	0			O	0/ 159	0.0			NO
2,4-Dimethylphenol (UG/KG)	105-67-9	0			O	0/ 159	0.0			NO
2,4-Dinitrophenol (UG/KG)	51-28-5	0			O	0/ 159	0.0			NO
2,4-Dinitrotoluene (UG/KG)	121-14-2	0			O	0/ 91	0.0			NO
2,6-Dinitrotoluene (UG/KG)	606-20-2	0			O	0/ 134	0.0			NO
2-Benzyl-4-Chlorophenol (UG/KG)	120-32-1	0			O	0/ 30	0.0			NO
2-Chloronaphthalene (UG/KG)	91-58-7	0			O	0/ 174	0.0			NO
2-Chlorophenol (UG/KG)	95-57-8	0			O	0/ 159	0.0			NO
2-Methylnaphthalene (UG/KG)	91-57-6	3	5.4E+01	9.9E+01	D	3/ 174	1.7	2.8E+02	9.9E+01	NO
2-Methylphenol (UG/KG)	95-48-7	0			O	0/ 159	0.0			NO
2-Nitroaniline (UG/KG)	88-74-4	0			O	0/ 159	0.0			NO
2-Nitrophenol (UG/KG)	88-75-5	0			O	0/ 159	0.0			NO
3,3'-Dichlorobenzidine (UG/KG)	91-94-1	0			O	0/ 159	0.0			NO
3-Nitroaniline (UG/KG)	99-09-2	0			O	0/ 157	0.0			NO
4,6-Dinitro-o-Cresol (UG/KG)	534-52-1	0			O	0/ 159	0.0			NO

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
4-Bromophenyl-phenyl Ether (UG/KG)	101-55-3	0			O	0/ 159	0.0			NO
4-Chloro-3-methylphenol (UG/KG)	59-50-7	0			O	0/ 159	0.0			NO
4-Chloroaniline (UG/KG)	106-47-8	0			O	0/ 159	0.0			NO
4-Methylphenol (UG/KG)	106-44-5	1	4.1E+02	4.1E+02	D	1/ 159	0.6	2.8E+02	2.8E+02	NO
4-Nitroaniline (UG/KG)	100-01-6	0			O	0/ 159	0.0			NO
4-Nitrophenol (UG/KG)	100-02-7	1	1.8E+02	1.8E+02	D	1/ 159	0.6	1.2E+03	1.8E+02	NO
Acenaphthene (UG/KG)	83-32-9	6	2.7E+01	4.3E+02	D	6/ 174	3.4	2.9E+02	2.9E+02	NO
Acenaphthylene (UG/KG)	208-96-8	0			O	0/ 174	0.0			NO
Anthracene (UG/KG)	120-12-7	13	2.2E+01	2.8E+03	D	13/ 174	7.5	3.1E+02	3.1E+02	YES
Benzidine (UG/KG)	92-87-5	0			O	0/ 21	0.0			NO
Benzo(a)anthracene (UG/KG)	56-55-3	31	2.3E+01	4.2E+03	D	31/ 174	17.8	3.2E+02	3.2E+02	YES
Benzo(a)pyrene (UG/KG)	50-32-8	29	2.3E+01	3.6E+03	D	29/ 174	16.7	3.2E+02	3.2E+02	YES
Benzo(b)fluoranthene (UG/KG)	205-99-2	35	2.5E+01	2.8E+03	D	35/ 174	20.1	3.2E+02	3.2E+02	YES
Benzo(g,h,i)perylene (UG/KG)	191-24-2	16	2.7E+01	2.1E+03	D	16/ 174	9.2	3.0E+02	3.0E+02	YES
Benzo(k)fluoranthene (UG/KG)	207-08-9	27	2.1E+01	3.4E+03	D	27/ 174	15.5	3.2E+02	3.2E+02	YES
Benzoic Acid (UG/KG)	65-85-0	5	7.8E+01	9.5E+01	D	5/ 139	3.6	1.5E+03	9.5E+01	NO
Benzyl Alcohol (UG/KG)	100-51-6	0			O	0/ 139	0.0			NO
Bis(2-chloroethoxy)methane (UG/KG)	111-91-1	0			O	0/ 159	0.0			NO
Bis(2-chloroethyl)ether (UG/KG)	111-44-4	0			O	0/ 159	0.0			NO
Bis(2-ethylhexyl)phthalate (UG/KG)	117-81-7	59	1.9E+01	6.5E+03	D	59/ 159	37.1	3.3E+02	3.3E+02	YES
Butyl Benzyl Phthalate (UG/KG)	85-68-7	3	4.8E+01	6.4E+01	D	3/ 159	1.9	2.8E+02	6.4E+01	NO
Carbazole (UG/KG)	86-74-8	2	1.5E+02	1.7E+02	D	2/ 89	2.2	2.0E+02	1.7E+02	NO
Chrysene (UG/KG)	218-01-9	30	2.0E+01	1.7E+03	D	30/ 159	18.9	3.0E+02	3.0E+02	YES
Di-n-butyl Phthalate (UG/KG)	84-74-2	61	2.1E+01	2.0E+03	D	61/ 240	25.4	3.1E+02	3.1E+02	YES
Di-n-octyl Phthalate (UG/KG)	117-84-0	1	4.0E+02	4.0E+02	D	1/ 159	0.6	2.8E+02	2.8E+02	NO
Dibenz(a,h)anthracene (UG/KG)	53-70-3	6	7.1E+01	8.0E+02	D	6/ 174	3.4	2.8E+02	2.8E+02	NO
Dibenzofuran (UG/KG)	132-64-9	6	3.2E+01	5.8E+02	D	6/ 159	3.8	2.7E+02	2.7E+02	NO
Diethyl Phthalate (UG/KG)	84-66-2	6	3.9E+01	1.1E+02	D	6/ 159	3.8	2.8E+02	1.1E+02	NO
Dimethyl Phthalate (UG/KG)	131-11-3	0			O	0/ 159	0.0			NO
Diphenylamine (UG/KG)	122-39-4	0			O	0/ 81	0.0			NO
Fluoranthene (UG/KG)	206-44-0	48	2.3E+01	1.1E+04	D	48/ 174	27.6	3.7E+02	3.7E+02	YES
Fluorene (UG/KG)	86-73-7	7	3.8E+01	1.1E+03	D	7/ 174	4.0	2.9E+02	2.9E+02	NO
Hexachlorobenzene (UG/KG)	118-74-1	0			O	0/ 159	0.0			NO
Hexachlorobutadiene (UG/KG)	87-68-3	0			O	0/ 159	0.0			NO
Hexachlorocyclopentadiene (UG/KG)	77-47-4	0			O	0/ 159	0.0			NO

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection In Greater than 5%
Hexachloroethane (UG/KG)	67-72-1	0			O	0/ 159	0.0			NO
Indeno(1,2,3-cd)pyrene (UG/KG)	193-39-5	18	2.5E+01	1.9E+03	D	18/ 174	10.3	3.0E+02	3.0E+02	YES
Isophorone (UG/KG)	78-59-1	0			O	0/ 159	0.0			NO
N-Nitroso-di-n-propylamine (UG/KG)	621-64-7	0			O	0/ 159	0.0			NO
N-Nitrosodiphenylamine (UG/KG)	86-30-6	8	5.7E+01	2.1E+02	D	8/ 159	5.0	2.7E+02	2.1E+02	YES
Naphthalene (UG/KG)	91-20-3	5	2.6E+01	4.1E+02	D	5/ 171	2.9	2.9E+02	2.9E+02	NO
Nitrobenzene (UG/KG)	98-95-3	0			O	0/ 134	0.0			NO
Pentachlorophenol (UG/KG)	87-86-5	0			O	0/ 159	0.0			NO
Phenanthrene (UG/KG)	85-01-8	32	2.7E+01	1.1E+04	D	32/ 174	18.4	3.5E+02	3.5E+02	YES
Phenol (UG/KG)	108-95-2	2	8.5E+01	3.2E+02	D	2/ 159	1.3	2.8E+02	2.8E+02	NO
Pyrene (UG/KG)	129-00-0	45	2.6E+01	9.7E+03	D	45/ 174	25.9	3.6E+02	3.6E+02	YES
Volatile Organics										
1,1,1,2-Tetrachloroethane (UG/KG)	630-20-6	0			O	0/ 23	0.0			NO
1,1,1-Trichloroethane (UG/KG)	71-55-6	4	1.0E+00	8.0E+00	D	4/ 200	2.0	3.4E+00	3.4E+00	NO
1,1,2,2-Tetrachloroethane (UG/KG)	79-34-5	0			O	0/ 200	0.0			NO
1,1,2-Trichloroethane (UG/KG)	79-00-5	0			O	0/ 200	0.0			NO
1,1-Dichloroethane (UG/KG)	75-34-3	1	3.0E+00	3.0E+00	D	1/ 200	0.5	3.4E+00	3.0E+00	NO
1,1-Dichloroethene (UG/KG)	75-35-4	0			O	0/ 200	0.0			NO
1,1-Dichloropropene (UG/KG)	563-58-6	0			O	0/ 23	0.0			NO
1,2,3-Trichlorobenzene (UG/KG)	87-61-6	0			O	0/ 23	0.0			NO
1,2,3-Trichloropropane (UG/KG)	96-18-4	0			O	0/ 23	0.0			NO
1,2,4-Trichlorobenzene (UG/KG)	120-82-1	0			O	0/ 3	0.0			NO
1,2,4-Trimethylbenzene (UG/KG)	95-63-6	0			O	0/ 23	0.0			NO
1,2-Dibromo-3-Chloropropane (UG/KG)	96-12-8	0			O	0/ 23	0.0			NO
1,2-Dichlorobenzene (UG/KG)	95-50-1	0			O	0/ 3	0.0			NO
1,2-Dichloroethane (UG/KG)	107-06-2	0			O	0/ 200	0.0			NO
1,2-Dichloroethene (UG/KG)	540-59-0	5	2.0E+00	2.1E+02	D	5/ 177	2.8	4.1E+00	4.1E+00	NO
1,2-Dichloropropane (UG/KG)	78-87-5	0			O	0/ 200	0.0			NO
1,2-Diethylbenzene (UG/KG)	135-01-3	0			O	0/ 31	0.0			NO
1,2-cis-Dichloroethene (UG/KG)	156-59-2	0			O	0/ 34	0.0			NO
1,2-trans-Dichloroethene (UG/KG)	156-60-5	0			O	0/ 34	0.0			NO
1,3,5-Trimethylbenzene (UG/KG)	108-67-8	0			O	0/ 23	0.0			NO
1,3-Dichlorobenzene (UG/KG)	541-73-1	0			O	0/ 3	0.0			NO
1,3-Dichloropropane (UG/KG)	142-28-9	0			O	0/ 23	0.0			NO
1,3-cis-Dichloropropene (UG/KG)	10061-01-5	0			O	0/ 200	0.0			NO

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
1,3-trans-Dichloropropene (UG/KG)	10061-02-6	0			O	0/ 200	0.0			NO
1,4-Dichlorobenzene (UG/KG)	106-46-7	0			O	0/ 3	0.0			NO
2,2-Dichloropropane (UG/KG)	594-20-7	0			O	0/ 23	0.0			NO
2-Butanone (UG/KG)	78-93-3	18	1.0E+00	3.1E+01	D	18/ 177	10.2	6.8E+00	6.8E+00	YES
2-Chlorotoluene (UG/KG)	95-49-8	0			O	0/ 23	0.0			NO
2-Hexanone (UG/KG)	591-78-6	0			O	0/ 177	0.0			NO
4-Chlorotoluene (UG/KG)	106-43-4	0			O	0/ 23	0.0			NO
4-Methyl-2-pentanone (UG/KG)	108-10-1	9	1.0E+00	7.0E+00	D	9/ 177	5.1	6.0E+00	6.0E+00	YES
Acetone (UG/KG)	67-64-1	48	4.0E+00	1.7E+02	D	48/ 177	27.1	1.4E+01	1.4E+01	YES
Acetonitrile (UG/KG)	75-05-8	0			O	0/ 31	0.0			NO
Acrylonitrile (UG/KG)	107-13-1	0			O	0/ 31	0.0			NO
Benzene (UG/KG)	71-43-2	2	2.0E+00	5.0E+00	D	2/ 200	1.0	3.4E+00	3.4E+00	NO
Bromochloromethane (UG/KG)	74-97-5	0			O	0/ 23	0.0			NO
Bromodichloromethane (UG/KG)	75-27-4	1	5.0E+00	5.0E+00	D	1/ 200	0.5	3.4E+00	3.4E+00	NO
Bromoform (UG/KG)	75-25-2	0			O	0/ 200	0.0			NO
Bromomethane (UG/KG)	74-83-9	0			O	0/ 200	0.0			NO
Carbon Disulfide (UG/KG)	75-15-0	4	1.0E+00	3.0E+00	D	4/ 177	2.3	3.4E+00	3.0E+00	NO
Carbon Tetrachloride (UG/KG)	56-23-5	0			O	0/ 200	0.0			NO
Chlorobenzene (UG/KG)	108-90-7	0			O	0/ 200	0.0			NO
Chloroethane (UG/KG)	75-00-3	0			O	0/ 200	0.0			NO
Chloroform (Trichloromethane) (UG/KG	67-66-3	1	2.4E+01	2.4E+01	D	1/ 200	0.5	3.4E+00	3.4E+00	NO
Chloromethane (UG/KG)	74-87-3	2	1.0E+00	4.0E+00	D	2/ 200	1.0	5.7E+00	4.0E+00	NO
Dibromochloromethane (UG/KG)	124-48-1	1	1.0E+00	1.0E+00	D	1/ 200	0.5	3.4E+00	1.0E+00	NO
Dibromomethane (UG/KG)	74-95-3	0			O	0/ 23	0.0			NO
Dichlorodifluoromethane (UG/KG)	75-71-8	0			O	0/ 23	0.0			NO
Dichloromethane (Methylene Chloride) (UG/KG)	75-09-2	96	3.0E+00	6.8E+01	D	96/ 200	48.0	1.0E+01	1.0E+01	YES
Ethylbenzene (UG/KG)	100-41-4	9	1.0E+00	1.1E+01	D	9/ 200	4.5	3.4E+00	3.4E+00	NO
Ethylene Dibromide (1,2-Dibromoethane) (UG/KG	106-93-4	0			O	0/ 23	0.0			NO
FREON-113 (UG/KG)	76-13-1	0			O	0/ 39	0.0			NO
Hexachlorobutadiene (UG/KG)	87-68-3	0			O	0/ 3	0.0			NO
Hexane (UG/KG)	110-54-3	0			O	0/ 39	0.0			NO
Iodomethane (UG/KG)	74-88-4	0			O	0/ 31	0.0			NO
Isopropyl Benzene (UG/KG)	98-82-8	0			O	0/ 23	0.0			NO

Analytes Detected in Surface and Subsurface Soil for the Construction Worker Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Distribution	Results Greater than Detection Limit	% Results Greater than Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Monobromobenzene (Phenyl bromide) (UG/KG)	108-86-1	0			O	0/ 23	0.0			NO
Naphthalene (UG/KG)	91-20-3	3	1.0E+00	6.0E+00	D	3/ 6	50.0	1.0E+01	6.0E+00	YES
Styrene (UG/KG)	100-42-5	0			O	0/ 200	0.0			NO
Tetrachloroethene (UG/KG)	127-18-4	13	2.0E+00	4.1E+01	D	13/ 200	6.5	3.9E+00	3.9E+00	YES
Toluene (UG/KG)	108-88-3	35	1.0E+00	5.1E+01	D	35/ 200	17.5	3.8E+00	3.8E+00	YES
Trichloroethylene (TCE) (UG/KG)	79-01-6	7	3.0E+00	7.4E+01	D	7/ 200	3.5	3.8E+00	3.8E+00	NO
Trichlorofluoromethane (UG/KG)	75-69-4	0			O	0/ 23	0.0			NO
Vinyl Acetate (UG/KG)	108-05-4	0			O	0/ 149	0.0			NO
Vinyl Chloride (UG/KG)	75-01-4	0			O	0/ 200	0.0			NO
Xylenes, Total (UG/KG)	1330-20-7	16	1.0E+00	3.9E+01	D	16/ 177	9.0	3.7E+00	3.7E+00	YES
m-Xylene (UG/KG)	108-38-3	0			O	0/ 11	0.0			NO
mp-Xylene (UG/KG)	mp-Xylene	23	5.0E+00	6.0E+00	X	23/ 23	100.0	6.0E+00	6.0E+00	YES
n-Butylbenzene (UG/KG)	104-51-8	0			O	0/ 23	0.0			NO
n-propylbenzene (UG/KG)	103-65-1	0			O	0/ 23	0.0			NO
o-Xylene (UG/KG)	95-47-6	0			O	0/ 34	0.0			NO
p-Isopropyltoluene (UG/KG)	99-87-6	0			O	0/ 23	0.0			NO
sec-Butylbenzene (UG/KG)	135-98-8	0			O	0/ 23	0.0			NO
tert-Butylbenzene (UG/KG)	98-06-6	0			O	0/ 23	0.0			NO

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
BTEX Compounds										
Benzene (UG/KG)	71-43-2	0			O	0/ 15	0.0			NO
Ethylbenzene (UG/KG)	100-41-4	0			O	0/ 15	0.0			NO
Toluene (UG/KG)	108-88-3	0			O	0/ 15	0.0			NO
Xylenes, Total (UG/KG)	1330-20-7	0			O	0/ 15	0.0			NO
Explosives										
1,3,5-Trinitrobenzene (UG/KG)	99-35-4	0			O	0/ 53	0.0			NO
1,3-Dinitrobenzene (UG/KG)	99-65-0	0			O	0/ 53	0.0			NO
2,4,6-Trinitrotoluene (UG/KG)	118-96-7	1	1.1E+02	1.1E+02	D	1/ 59	1.7	7.4E+02	1.1E+02	NO
2,4-Dinitrotoluene (UG/KG)	121-14-2	0			O	0/ 50	0.0			NO
2,6-Dinitrotoluene (UG/KG)	606-20-2	0			O	0/ 12	0.0			NO
2-Amino-4,6-Dinitrotoluene (UG/KG)	35572-78-2	0			O	0/ 52	0.0			NO
4-Amino-2,6-Dinitrotoluene (UG/KG)	1946-51-0	0			O	0/ 1	0.0			NO
HMX (UG/KG)	2691-41-0	0			O	0/ 66	0.0			NO
Nitrobenzene (UG/KG)	98-95-3	1	3.8E+02	3.8E+02	D	1/ 12	8.3	1.3E+03	3.8E+02	YES
Nitroglycerin (UG/KG)	55-63-0	0			O	0/ 50	0.0			NO
PETN (UG/KG)	78-11-5	0			O	0/ 53	0.0			NO
RDX (UG/KG)	121-82-4	0			O	0/ 67	0.0			NO
Tetryl (UG/KG)	479-45-8	0			O	0/ 46	0.0			NO
Metals										
Aluminum (UG/KG)	7429-90-5	105	5.9E+05	2.3E+07	N	105/ 105	100.0	1.2E+07	1.2E+07	YES
Antimony (UG/KG)	7440-36-0	42	2.1E+02	4.5E+04	D	42/ 146	28.8	1.3E+04	1.3E+04	YES
Arsenic (UG/KG)	7440-38-2	104	4.9E+02	2.0E+04	X	104/ 105	99.0	8.9E+03	8.9E+03	YES
Barium (UG/KG)	7440-39-3	158	4.4E+03	4.5E+05	X	158/ 158	100.0	1.0E+05	1.0E+05	YES
Beryllium (UG/KG)	7440-41-7	155	1.2E+02	3.6E+03	X	155/ 158	98.1	1.2E+03	1.2E+03	YES
Bismuth (UG/KG)	7440-69-9	26	1.3E+04	7.3E+04	X	26/ 36	72.2	1.0E+05	7.3E+04	YES
Cadmium (UG/KG)	7440-43-9	43	2.5E+02	1.2E+04	D	43/ 158	27.2	1.2E+03	1.2E+03	YES
Calcium (UG/KG)	7440-70-2	105	1.4E+06	3.1E+08	X	105/ 105	100.0	1.3E+08	1.3E+08	YES
Chromium (UG/KG)	7440-47-3	158	1.1E+03	3.7E+04	X	158/ 158	100.0	1.8E+04	1.8E+04	YES
Cobalt (UG/KG)	7440-48-4	105	7.9E+02	2.5E+04	X	105/ 105	100.0	1.3E+04	1.3E+04	YES
Copper (UG/KG)	7440-50-8	103	2.6E+03	1.1E+06	X	103/ 105	98.1	2.3E+04	2.3E+04	YES
Cyanide (UG/KG)	57-12-5	31	1.0E+02	8.9E+03	D	31/ 126	24.6	6.7E+02	6.7E+02	YES
Iron (UG/KG)	7439-89-6	105	2.3E+04	4.3E+07	N	105/ 105	100.0	2.8E+07	2.8E+07	YES
Lead (UG/KG)	7439-92-1	179	1.6E+03	2.2E+05	X	179/ 186	96.2	1.7E+04	1.7E+04	YES
Lithium (UG/KG)	7439-93-2	31	2.3E+03	2.7E+04	N	31/ 31	100.0	1.7E+04	1.7E+04	YES
Magnesium (UG/KG)	7439-95-4	105	1.2E+04	1.2E+08	X	105/ 105	100.0	3.3E+07	3.3E+07	YES
Manganese (UG/KG)	7439-96-5	104	6.5E+04	1.3E+06	X	104/ 104	100.0	5.7E+05	5.7E+05	YES

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Mercury (UG/KG)	7439-97-6	43	3.0E+01	6.5E+02	D	43/ 97	44.3	1.0E+02	1.0E+02	YES
Molybdenum (UG/KG)	7439-98-7	29	4.7E+02	9.7E+03	L	29/ 31	93.5	5.9E+03	5.9E+03	YES
Nickel (UG/KG)	7440-02-0	157	2.3E+03	2.5E+05	X	157/ 158	99.4	2.3E+04	2.3E+04	YES
Potassium (UG/KG)	7440-09-7	103	3.1E+05	5.2E+06	X	103/ 105	98.1	1.7E+06	1.7E+06	YES
Selenium (UG/KG)	7782-49-2	18	4.9E+02	2.3E+03	D	18/ 96	18.8	1.1E+03	1.1E+03	YES
Silver (UG/KG)	7440-22-4	47	1.1E+02	2.1E+04	D	47/ 158	29.7	2.7E+03	2.7E+03	YES
Sodium (UG/KG)	7440-23-5	100	4.2E+04	3.5E+06	X	100/ 105	95.2	1.3E+06	1.3E+06	YES
Thallium (UG/KG)	7440-28-0	27	2.2E+02	3.5E+03	D	27/ 100	27.0	1.8E+03	1.8E+03	YES
Tin (UG/KG)	7440-31-5	7	1.1E+03	2.2E+03	D	7/ 31	22.6	2.2E+04	2.2E+03	YES
Vanadium (UG/KG)	7440-62-2	105	1.7E+03	4.0E+04	X	105/ 105	100.0	2.6E+04	2.6E+04	YES
Zinc (UG/KG)	7440-66-6	105	5.5E+03	4.6E+05	X	105/ 105	100.0	8.4E+04	8.4E+04	YES
Pesticides and/or PCBs										
4,4'-DDD (UG/KG)	72-54-8	0			O	0/ 86	0.0			NO
4,4'-DDE (UG/KG)	72-55-9	7	2.8E-01	1.8E+00	D	7/ 85	8.2	3.1E+00	1.8E+00	YES
4,4'-DDT (UG/KG)	50-29-3	0			O	0/ 86	0.0			NO
Aldrin (UG/KG)	309-00-2	1	5.4E-02	5.4E-02	D	1/ 86	1.2	2.3E+00	5.4E-02	NO
Alpha Chlordane (UG/KG)	5103-71-9	0			O	0/ 63	0.0			NO
Alpha-BHC (UG/KG)	319-84-6	0			O	0/ 86	0.0			NO
Aroclor-1016 (UG/KG)	12674-11-2	0			O	0/ 115	0.0			NO
Aroclor-1221 (UG/KG)	11104-28-2	0			O	0/ 115	0.0			NO
Aroclor-1232 (UG/KG)	11141-16-5	1	1.2E+02	1.2E+02	D	1/ 115	0.9	3.4E+01	3.4E+01	NO
Aroclor-1242 (UG/KG)	53469-21-9	1	1.2E+02	1.2E+02	D	1/ 115	0.9	3.4E+01	3.4E+01	NO
Aroclor-1248 (UG/KG)	12672-29-6	3	7.4E+01	9.1E+02	D	3/ 114	2.6	3.8E+01	3.8E+01	NO
Aroclor-1254 (UG/KG)	11097-69-1	1	2.2E+02	2.2E+02	D	1/ 115	0.9	5.9E+01	5.9E+01	NO
Aroclor-1260 (UG/KG)	11096-82-5	0			O	0/ 114	0.0			NO
Beta-BHC (UG/KG)	319-85-7	3	1.8E-01	1.2E+02	D	3/ 86	3.5	3.9E+00	3.9E+00	NO
Chlordane (UG/KG)	57-74-9	2	1.9E+01	9.8E+01	D	2/ 23	8.7	1.6E+01	1.6E+01	YES
Delta-BHC (UG/KG)	319-86-8	1	1.7E-01	1.7E-01	D	1/ 86	1.2	4.0E+00	1.7E-01	NO
Dieldrin (UG/KG)	60-57-1	3	5.2E-01	4.4E+00	D	3/ 86	3.5	2.8E+00	2.8E+00	NO
Endosulfan I (UG/KG)	959-98-8	0			O	0/ 86	0.0			NO
Endosulfan II (UG/KG)	33213-65-9	0			O	0/ 86	0.0			NO
Endosulfan Sulfate (UG/KG)	1031-07-8	0			O	0/ 86	0.0			NO
Endrin (UG/KG)	72-20-8	2	1.5E-01	2.3E+01	D	2/ 85	2.4	5.2E+00	5.2E+00	NO
Endrin Aldehyde (UG/KG)	7421-93-4	0			O	0/ 79	0.0			NO
Endrin Ketone (UG/KG)	53494-70-5	2	5.2E-01	7.6E-01	D	2/ 86	2.3	1.9E+01	7.6E-01	NO
Gamma Chlordane (UG/KG)	5103-74-2	1	5.7E-02	5.7E-02	D	1/ 63	1.6	2.0E+01	5.7E-02	NO
Gamma-BHC (Lindane) (UG/KG)	58-89-9	0			O	0/ 86	0.0			NO

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Heptachlor (UG/KG)	76-44-8	2	1.1E-01	1.3E-01	D	2/ 86	2.3	2.0E+00	1.3E-01	NO
Heptachlor Epoxide (UG/KG)	1024-57-3	2	1.1E-01	3.5E-01	D	2/ 86	2.3	2.6E+01	3.5E-01	NO
Methoxychlor (UG/KG)	72-43-5	0			O	0/ 86	0.0			NO
Toxaphene (UG/KG)	8001-35-2	0			O	0/ 86	0.0			NO
Phenols										
Phenolics (UG/KG)	64743-03-9	0			O	0/ 24	0.0			NO
Radiological										
Actinium-227 (PCI/G)	14952-40-0	36	5.0E-02	2.1E+00	D	36/ 219	16.4	3.5E-01	3.5E-01	YES
Actinium-228 (PCI/G)	14331-83-0	7	7.6E-01	1.4E+00	D	7/ 7	100.0	1.2E+00	1.4E+00	YES
Americium-241 (PCI/G)	14596-10-2	11	5.0E-02	3.8E+01	D	11/ 458	2.4	1.1E-01	1.1E-01	NO
Bismuth-207 (PCI/G)	13982-38-2	0			O	0/ 96	0.0			NO
Bismuth-210 (PCI/G)	14331-79-4	1	6.8E-02	6.8E-02	D	1/ 194	0.5	2.3E-02	2.3E-02	NO
Bismuth-210M (PCI/G)	BI-210M	3	1.4E-01	2.7E-01	D	3/ 78	3.8	5.7E-02	5.7E-02	NO
Bismuth-214 (PCI/G)	14733-03-0	10	7.0E-01	9.3E-01	N	10/ 10	100.0	8.6E-01	9.3E-01	YES
Cesium-137 (PCI/G)	10045-97-3	258	2.1E-02	1.6E+00	X	258/ 461	56.0	1.8E-01	1.8E-01	YES
Cobalt-60 (PCI/G)	10198-40-0	11	2.0E-02	5.0E-01	D	11/ 461	2.4	3.4E-02	3.4E-02	NO
Europium-152 (PCI/G)	14683-23-9	1	8.7E-02	8.7E-02	D	1/ 176	0.6	4.3E-02	4.3E-02	NO
Europium-154 (PCI/G)	15585-10-1	0			O	0/ 176	0.0			NO
Lead-210 (PCI/G)	14255-04-0	146	6.3E-01	3.7E+00	X	146/ 262	55.7	1.3E+00	1.3E+00	YES
Lead-212 (PCI/G)	15092-94-1	10	8.4E-01	1.2E+00	L	10/ 10	100.0	1.1E+00	1.2E+00	YES
Lead-214 (PCI/G)	15067-28-4	10	8.3E-01	1.1E+00	N	10/ 10	100.0	1.0E+00	1.1E+00	YES
Plutonium-238 (PCI/G)	13981-16-3	592	1.2E-02	4.0E+02	D	592/1308	45.3	2.5E+01	2.5E+01	YES
Plutonium-239 (PCI/G)	15117-48-3	83	3.5E-03	1.3E+00	X	83/ 90	92.2	6.9E-02	6.9E-02	YES
Plutonium-239/240 (PCI/G)	PU-239/240	64	3.9E-03	1.0E+00	D	64/ 230	27.8	4.4E-02	4.4E-02	YES
Plutonium-242 (PCI/G)	13982-10-0	0			O	0/ 5	0.0			NO
Potassium-40 (PCI/G)	13966-00-2	96	7.5E+00	3.6E+01	X	96/ 96	100.0	1.9E+01	1.9E+01	YES
Protactinium-231 (PCI/G)	14331-85-2	0			O	0/ 36	0.0			NO
Radium-224 (PCI/G)	13233-32-4	186	7.3E-02	6.3E+00	X	186/ 186	100.0	1.3E+00	1.3E+00	YES
Radium-226 (PCI/G)	13982-63-3	411	1.8E-01	3.7E+00	X	411/ 466	88.2	1.3E+00	1.3E+00	YES
Radium-228 (PCI/G)	15262-20-1	74	5.5E-01	2.0E+00	N	74/ 75	98.7	1.3E+00	1.3E+00	YES
Strontium-90 (PCI/G)	10098-97-2	0			O	0/ 16	0.0			NO
Thallium-208 (PCI/G)	14913-50-9	10	1.6E-01	4.0E-01	N	10/ 10	100.0	3.8E-01	4.0E-01	YES
Thorium-227 (PCI/G)	15623-47-9	17	6.0E-02	4.4E-01	L	17/ 33	51.5	1.4E-01	1.4E-01	YES
Thorium-228 (PCI/G)	14274-82-9	319	3.7E-02	4.5E+00	X	319/ 356	89.6	1.7E+00	1.7E+00	YES
Thorium-229 (PCI/G)	15594-54-4	0			O	0/ 36	0.0			NO
Thorium-230 (PCI/G)	14269-63-7	317	1.0E-01	7.5E+00	X	317/ 499	63.5	2.7E+00	2.7E+00	YES
Thorium-232 (PCI/G)	7440-29-1	675	4.5E-02	8.0E+01	D	675/1518	44.5	8.7E-01	8.7E-01	YES

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Tritium (PCI/G)	10028-17-8	1	1.4E+00	1.4E+00	D	1/ 16	6.3	2.2E+00	1.4E+00	YES
Uranium-234 (PCI/G)	13966-29-5	25	3.9E-01	1.6E+00	N	25/ 29	86.2	9.8E-01	9.8E-01	YES
Uranium-235 (PCI/G)	15117-96-1	13	3.3E-02	2.1E-01	D	13/ 55	23.6	2.5E-01	2.1E-01	YES
Uranium-238 (PCI/G)	7440-61-1	50	4.8E-01	2.0E+00	X	50/ 91	54.9	2.0E+00	2.0E+00	YES
Semi-Volatile Organics										
1,2,4-Trichlorobenzene (UG/KG)	120-82-1	0			O	0/ 119	0.0			NO
1,2-Dichlorobenzene (UG/KG)	95-50-1	0			O	0/ 119	0.0			NO
1,3-Dichlorobenzene (UG/KG)	541-73-1	0			O	0/ 119	0.0			NO
1,4-Dichlorobenzene (UG/KG)	106-46-7	0			O	0/ 119	0.0			NO
1-chloro-4-phenoxybenzene (UG/KG)	7005-72-3	0			O	0/ 119	0.0			NO
2,2'-oxybis(1-chloropropane) (UG/KG)	108-60-1	0			O	0/ 119	0.0			NO
2,4,5-Trichlorophenol (UG/KG)	95-95-4	0			O	0/ 119	0.0			NO
2,4,6-Trichlorophenol (UG/KG)	88-06-2	0			O	0/ 119	0.0			NO
2,4-Dichlorophenol (UG/KG)	120-83-2	0			O	0/ 119	0.0			NO
2,4-Dimethylphenol (UG/KG)	105-67-9	0			O	0/ 119	0.0			NO
2,4-Dinitrophenol (UG/KG)	51-28-5	0			O	0/ 119	0.0			NO
2,4-Dinitrotoluene (UG/KG)	121-14-2	0			O	0/ 75	0.0			NO
2,6-Dinitrotoluene (UG/KG)	606-20-2	0			O	0/ 113	0.0			NO
2-Benzyl-4-Chlorophenol (UG/KG)	120-32-1	0			O	0/ 27	0.0			NO
2-Chloronaphthalene (UG/KG)	91-58-7	0			O	0/ 134	0.0			NO
2-Chlorophenol (UG/KG)	95-57-8	0			O	0/ 119	0.0			NO
2-Methylnaphthalene (UG/KG)	91-57-6	3	5.4E+01	9.9E+01	D	3/ 134	2.2	3.0E+02	9.9E+01	NO
2-Methylphenol (UG/KG)	95-48-7	0			O	0/ 119	0.0			NO
2-Nitroaniline (UG/KG)	88-74-4	0			O	0/ 119	0.0			NO
2-Nitrophenol (UG/KG)	88-75-5	0			O	0/ 119	0.0			NO
3,3'-Dichlorobenzidine (UG/KG)	91-94-1	0			O	0/ 119	0.0			NO
3-Nitroaniline (UG/KG)	99-09-2	0			O	0/ 117	0.0			NO
4,6-Dinitro-o-Cresol (UG/KG)	534-52-1	0			O	0/ 119	0.0			NO
4-Bromophenyl-phenyl Ether (UG/KG)	101-55-3	0			O	0/ 119	0.0			NO
4-Chloro-3-methylphenol (UG/KG)	59-50-7	0			O	0/ 119	0.0			NO
4-Chloroaniline (UG/KG)	106-47-8	0			O	0/ 119	0.0			NO
4-Methylphenol (UG/KG)	106-44-5	1	4.1E+02	4.1E+02	D	1/ 119	0.8	2.9E+02	2.9E+02	NO
4-Nitroaniline (UG/KG)	100-01-6	0			O	0/ 119	0.0			NO
4-Nitrophenol (UG/KG)	100-02-7	1	1.8E+02	1.8E+02	D	1/ 119	0.8	1.3E+03	1.8E+02	NO
Acenaphthene (UG/KG)	83-32-9	5	6.5E+01	4.3E+02	D	5/ 134	3.7	3.0E+02	3.0E+02	NO
Acenaphthylene (UG/KG)	208-96-8	0			O	0/ 134	0.0			NO
Anthracene (UG/KG)	120-12-7	11	2.2E+01	2.8E+03	D	11/ 134	8.2	3.4E+02	3.4E+02	YES

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Benzidine (UG/KG)	92-87-5	0			O	0/ 21	0.0			NO
Benzo(a)anthracene (UG/KG)	56-55-3	24	2.8E+01	4.2E+03	D	24/ 134	17.9	3.5E+02	3.5E+02	YES
Benzo(a)pyrene (UG/KG)	50-32-8	22	2.4E+01	3.6E+03	D	22/ 134	16.4	3.5E+02	3.5E+02	YES
Benzo(b)fluoranthene (UG/KG)	205-99-2	28	2.5E+01	2.8E+03	D	28/ 134	20.9	3.5E+02	3.5E+02	YES
Benzo(g,h,i)perylene (UG/KG)	191-24-2	12	2.7E+01	2.1E+03	D	12/ 134	9.0	3.3E+02	3.3E+02	YES
Benzo(k)fluoranthene (UG/KG)	207-08-9	24	2.5E+01	3.4E+03	D	24/ 134	17.9	3.4E+02	3.4E+02	YES
Benzoic Acid (UG/KG)	65-85-0	5	7.8E+01	9.5E+01	D	5/ 118	4.2	1.6E+03	9.5E+01	NO
Benzyl Alcohol (UG/KG)	100-51-6	0			O	0/ 118	0.0			NO
Bis(2-chloroethoxy)methane (UG/KG)	111-91-1	0			O	0/ 119	0.0			NO
Bis(2-chloroethyl)ether (UG/KG)	111-44-4	0			O	0/ 119	0.0			NO
Bis(2-ethylhexyl)phthalate (UG/KG)	117-81-7	44	2.0E+01	6.5E+03	D	44/ 119	37.0	3.8E+02	3.8E+02	YES
Butyl Benzyl Phthalate (UG/KG)	85-68-7	3	4.8E+01	6.4E+01	D	3/ 119	2.5	2.9E+02	6.4E+01	NO
Carbazole (UG/KG)	86-74-8	2	1.5E+02	1.7E+02	D	2/ 67	3.0	2.0E+02	1.7E+02	NO
Chrysene (UG/KG)	218-01-9	23	2.0E+01	1.7E+03	D	23/ 119	19.3	3.3E+02	3.3E+02	YES
Di-n-butyl Phthalate (UG/KG)	84-74-2	48	2.1E+01	2.0E+03	D	48/ 172	27.9	3.5E+02	3.5E+02	YES
Di-n-octyl Phthalate (UG/KG)	117-84-0	1	4.0E+02	4.0E+02	D	1/ 119	0.8	2.9E+02	2.9E+02	NO
Dibenz(a,h)anthracene (UG/KG)	53-70-3	6	7.1E+01	8.0E+02	D	6/ 134	4.5	3.0E+02	3.0E+02	NO
Dibenzofuran (UG/KG)	132-64-9	6	3.2E+01	5.8E+02	D	6/ 119	5.0	2.8E+02	2.8E+02	YES
Diethyl Phthalate (UG/KG)	84-66-2	6	3.9E+01	1.1E+02	D	6/ 119	5.0	2.9E+02	1.1E+02	YES
Dimethyl Phthalate (UG/KG)	131-11-3	0			O	0/ 119	0.0			NO
Diphenylamine (UG/KG)	122-39-4	0			O	0/ 53	0.0			NO
Fluoranthene (UG/KG)	206-44-0	40	2.3E+01	1.1E+04	D	40/ 134	29.9	4.3E+02	4.3E+02	YES
Fluorene (UG/KG)	86-73-7	7	3.8E+01	1.1E+03	D	7/ 134	5.2	3.0E+02	3.0E+02	YES
Hexachlorobenzene (UG/KG)	118-74-1	0			O	0/ 119	0.0			NO
Hexachlorobutadiene (UG/KG)	87-68-3	0			O	0/ 119	0.0			NO
Hexachlorocyclopentadiene (UG/KG)	77-47-4	0			O	0/ 119	0.0			NO
Hexachloroethane (UG/KG)	67-72-1	0			O	0/ 119	0.0			NO
Indeno(1,2,3-cd)pyrene (UG/KG)	193-39-5	14	2.5E+01	1.9E+03	D	14/ 134	10.4	3.3E+02	3.3E+02	YES
Isophorone (UG/KG)	78-59-1	0			O	0/ 119	0.0			NO
N-Nitroso-di-n-propylamine (UG/KG)	621-64-7	0			O	0/ 119	0.0			NO
N-Nitrosodiphenylamine (UG/KG)	86-30-6	5	7.8E+01	2.1E+02	D	5/ 119	4.2	2.8E+02	2.1E+02	NO
Naphthalene (UG/KG)	91-20-3	4	2.6E+01	4.1E+02	D	4/ 131	3.1	3.0E+02	3.0E+02	NO
Nitrobenzene (UG/KG)	98-95-3	0			O	0/ 113	0.0			NO
Pentachlorophenol (UG/KG)	87-86-5	0			O	0/ 119	0.0			NO
Phenanthrene (UG/KG)	85-01-8	25	2.7E+01	1.1E+04	D	25/ 134	18.7	4.0E+02	4.0E+02	YES
Phenol (UG/KG)	108-95-2	1	3.2E+02	3.2E+02	D	1/ 119	0.8	2.9E+02	2.9E+02	NO
Pyrene (UG/KG)	129-00-0	37	2.8E+01	9.7E+03	D	37/ 134	27.6	4.2E+02	4.2E+02	YES

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Volatile Organics										
1,1,1,2-Tetrachloroethane (UG/KG)	630-20-6	0			O	0/ 23	0.0			NO
1,1,1-Trichloroethane (UG/KG)	71-55-6	4	1.0E+00	8.0E+00	D	4/ 109	3.7	3.1E+00	3.1E+00	NO
1,1,2,2-Tetrachloroethane (UG/KG)	79-34-5	0			O	0/ 109	0.0			NO
1,1,2-Trichloroethane (UG/KG)	79-00-5	0			O	0/ 109	0.0			NO
1,1-Dichloroethane (UG/KG)	75-34-3	1	3.0E+00	3.0E+00	D	1/ 109	0.9	3.1E+00	3.0E+00	NO
1,1-Dichloroethene (UG/KG)	75-35-4	0			O	0/ 109	0.0			NO
1,1-Dichloropropene (UG/KG)	563-58-6	0			O	0/ 23	0.0			NO
1,2,3-Trichlorobenzene (UG/KG)	87-61-6	0			O	0/ 23	0.0			NO
1,2,3-Trichloropropane (UG/KG)	96-18-4	0			O	0/ 23	0.0			NO
1,2,4-Trichlorobenzene (UG/KG)	120-82-1	0			O	0/ 3	0.0			NO
1,2,4-Trimethylbenzene (UG/KG)	95-63-6	0			O	0/ 23	0.0			NO
1,2-Dibromo-3-Chloropropane (UG/KG)	96-12-8	0			O	0/ 23	0.0			NO
1,2-Dichlorobenzene (UG/KG)	95-50-1	0			O	0/ 3	0.0			NO
1,2-Dichloroethane (UG/KG)	107-06-2	0			O	0/ 109	0.0			NO
1,2-Dichloroethene (UG/KG)	540-59-0	2	2.0E+00	6.0E+00	D	2/ 86	2.3	3.1E+00	3.1E+00	NO
1,2-Dichloropropane (UG/KG)	78-87-5	0			O	0/ 109	0.0			NO
1,2-Diethylbenzene (UG/KG)	135-01-3	0			O	0/ 28	0.0			NO
1,2-cis-Dichloroethene (UG/KG)	156-59-2	0			O	0/ 34	0.0			NO
1,2-trans-Dichloroethene (UG/KG)	156-60-5	0			O	0/ 34	0.0			NO
1,3,5-Trimethylbenzene (UG/KG)	108-67-8	0			O	0/ 23	0.0			NO
1,3-Dichlorobenzene (UG/KG)	541-73-1	0			O	0/ 3	0.0			NO
1,3-Dichloropropane (UG/KG)	142-28-9	0			O	0/ 23	0.0			NO
1,3-cis-Dichloropropene (UG/KG)	10061-01-5	0			O	0/ 109	0.0			NO
1,3-trans-Dichloropropene (UG/KG)	10061-02-6	0			O	0/ 109	0.0			NO
1,4-Dichlorobenzene (UG/KG)	106-46-7	0			O	0/ 3	0.0			NO
2,2-Dichloropropane (UG/KG)	594-20-7	0			O	0/ 23	0.0			NO
2-Butanone (UG/KG)	78-93-3	7	1.0E+00	1.7E+01	D	7/ 86	8.1	6.2E+00	6.2E+00	YES
2-Chlorotoluene (UG/KG)	95-49-8	0			O	0/ 23	0.0			NO
2-Hexanone (UG/KG)	591-78-6	0			O	0/ 86	0.0			NO
4-Chlorotoluene (UG/KG)	106-43-4	0			O	0/ 23	0.0			NO
4-Methyl-2-pentanone (UG/KG)	108-10-1	5	1.0E+00	6.0E+00	D	5/ 86	5.8	6.1E+00	6.0E+00	YES
Acetone (UG/KG)	67-64-1	14	4.0E+00	1.5E+02	D	14/ 86	16.3	9.0E+00	9.0E+00	YES
Acetonitrile (UG/KG)	75-05-8	0			O	0/ 28	0.0			NO
Acrylonitrile (UG/KG)	107-13-1	0			O	0/ 28	0.0			NO
Benzene (UG/KG)	71-43-2	0			O	0/ 109	0.0			NO
Bromochloromethane (UG/KG)	74-97-5	0			O	0/ 23	0.0			NO

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Bromodichloromethane (UG/KG)	75-27-4	0			O	0/ 109	0.0			NO
Bromoform (UG/KG)	75-25-2	0			O	0/ 109	0.0			NO
Bromomethane (UG/KG)	74-83-9	0			O	0/ 109	0.0			NO
Carbon Disulfide (UG/KG)	75-15-0	2	1.0E+00	2.0E+00	D	2/ 86	2.3	3.1E+00	2.0E+00	NO
Carbon Tetrachloride (UG/KG)	56-23-5	0			O	0/ 109	0.0			NO
Chlorobenzene (UG/KG)	108-90-7	0			O	0/ 109	0.0			NO
Chloroethane (UG/KG)	75-00-3	0			O	0/ 109	0.0			NO
Chloroform (Trichloromethane) (UG/KG)	67-66-3	0			O	0/ 109	0.0			NO
Chloromethane (UG/KG)	74-87-3	1	4.0E+00	4.0E+00	D	1/ 109	0.9	5.6E+00	4.0E+00	NO
Dibromochloromethane (UG/KG)	124-48-1	0			O	0/ 109	0.0			NO
Dibromomethane (UG/KG)	74-95-3	0			O	0/ 23	0.0			NO
Dichlorodifluoromethane (UG/KG)	75-71-8	0			O	0/ 23	0.0			NO
Dichloromethane (Methylene Chloride) (UG/KG)	75-09-2	49	3.0E+00	6.8E+01	D	49/ 109	45.0	1.0E+01	1.0E+01	YES
Ethylbenzene (UG/KG)	100-41-4	3	1.0E+00	3.0E+00	D	3/ 109	2.8	3.1E+00	3.0E+00	NO
Ethylene Dibromide (1,2-Dibromoethane) (UG/KG	106-93-4	0			O	0/ 23	0.0			NO
FREON-113 (UG/KG)	76-13-1	0			O	0/ 28	0.0			NO
Hexachlorobutadiene (UG/KG)	87-68-3	0			O	0/ 3	0.0			NO
Hexane (UG/KG)	110-54-3	0			O	0/ 28	0.0			NO
Iodomethane (UG/KG)	74-88-4	0			O	0/ 28	0.0			NO
Isopropyl Benzene (UG/KG)	98-82-8	0			O	0/ 23	0.0			NO
Monobromobenzene (Phenyl bromide) (UG/KG)	108-86-1	0			O	0/ 23	0.0			NO
Naphthalene (UG/KG)	91-20-3	3	1.0E+00	6.0E+00	D	3/ 6	50.0	1.0E+01	6.0E+00	YES
Styrene (UG/KG)	100-42-5	0			O	0/ 109	0.0			NO
Tetrachloroethene (UG/KG)	127-18-4	7	2.0E+00	2.8E+01	D	7/ 109	6.4	3.7E+00	3.7E+00	YES
Toluene (UG/KG)	108-88-3	18	1.0E+00	5.1E+01	D	18/ 109	16.5	3.4E+00	3.4E+00	YES
Trichloroethylene (TCE) (UG/KG)	79-01-6	2	1.8E+01	2.0E+01	D	2/ 109	1.8	3.4E+00	3.4E+00	NO
Trichlorofluoromethane (UG/KG)	75-69-4	0			O	0/ 23	0.0			NO
Vinyl Acetate (UG/KG)	108-05-4	0			O	0/ 86	0.0			NO
Vinyl Chloride (UG/KG)	75-01-4	0			O	0/ 109	0.0			NO
Xylenes, Total (UG/KG)	1330-20-7	7	1.0E+00	3.9E+01	D	7/ 86	8.1	3.5E+00	3.5E+00	YES
m-Xylene (UG/KG)	108-38-3	0			O	0/ 11	0.0			NO
mp-Xylene (UG/KG)	mp-Xylene	23	5.0E+00	6.0E+00	X	23/ 23	100.0	6.0E+00	6.0E+00	YES
n-Butylbenzene (UG/KG)	104-51-8	0			O	0/ 23	0.0			NO
n-propylbenzene (UG/KG)	103-65-1	0			O	0/ 23	0.0			NO

Analytes Detected in Surface Soil for the Site Employee Scenario

Analyte (units)	CAS Number	Number of Detections	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
o-Xylene (UG/KG)	95-47-6	0			O	0/ 34	0.0			NO
p-Isopropyltoluene (UG/KG)	99-87-6	0			O	0/ 23	0.0			NO
sec-Butylbenzene (UG/KG)	135-98-8	0			O	0/ 23	0.0			NO
tert-Butylbenzene (UG/KG)	98-06-6	0			O	0/ 23	0.0			NO

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Common Anions									
Nitrate (UG/L)	7697-37-2	738.00	2550.00	D	2/ 2	100.0		2550.00	YES
Nitrate/Nitrite (UG/L)	1497-55-8	680.00	4900.00	L	11/ 11	100.0	3510.00	4900.00	YES
Nitrite (UG/L)	14797-65-0			O	0/ 2	0.0			NO
Explosives									
1,3,5-Trinitrobenzene (UG/L)	99-35-4			O	0/ 2	0.0			NO
1,3-Dinitrobenzene (UG/L)	99-65-0			O	0/ 4	0.0			NO
2,4,6-Trinitrotoluene (UG/L)	118-96-7			O	0/ 2	0.0			NO
2,4-Dinitrotoluene (UG/L)	121-14-2			O	0/ 2	0.0			NO
2,6-Dinitrotoluene (UG/L)	606-20-2			O	0/ 2	0.0			NO
2-Amino-4,6-Dinitrotoluene (UG/L)	35572-78-2			O	0/ 4	0.0			NO
HMX (UG/L)	2691-41-0			O	0/ 4	0.0			NO
Nitrobenzene (UG/L)	98-95-3			O	0/ 4	0.0			NO
PETN (UG/L)	78-11-5			O	0/ 3	0.0			NO
RDX (UG/L)	121-82-4			O	0/ 4	0.0			NO
Tetryl (UG/L)	479-45-8			O	0/ 4	0.0			NO
Metals									
Aluminum (UG/L)	7429-90-5	68.80	148.00	D	6/ 22	27.3	163.00	148.00	YES
Antimony (UG/L)	7440-36-0	2.80	14.40	D	3/ 20	15.0	43.60	14.40	YES
Arsenic (UG/L)	7440-38-2			O	0/ 25	0.0			NO
Barium (UG/L)	7440-39-3	75.00	115.00	L	20/ 22	90.9	93.60	93.60	YES
Beryllium (UG/L)	7440-41-7			O	0/ 25	0.0			NO
Bismuth (UG/L)	7440-69-9			O	0/ 4	0.0			NO
Cadmium (UG/L)	7440-43-9	4.60	7.70	D	5/ 25	20.0	6.56	6.56	YES
Calcium (UG/L)	7440-70-2	94300.00	126000.00	L	24/ 24	100.0	110000.00	110000.00	YES
Chromium (UG/L)	7440-47-3	18.30	23.80	D	5/ 25	20.0	20.20	20.20	YES
Cobalt (UG/L)	7440-48-4			O	0/ 22	0.0			NO
Copper (UG/L)	7440-50-8	1.60	593.00	X	15/ 25	60.0	41.60	41.60	YES
Cyanide (UG/L)	57-12-5			O	0/ 4	0.0			NO
Iron (UG/L)	7439-89-6	19.00	1890.00	L	13/ 24	54.2	437.00	437.00	YES
Lead (UG/L)	7439-92-1	3.40	40.00	D	5/ 25	20.0	13.00	13.00	YES
Lithium (UG/L)	7439-93-2	2.90	2.90	D	2/ 4	50.0	604.00	2.90	YES
Magnesium (UG/L)	7439-95-4	29100.00	39600.00	L	24/ 24	100.0	34500.00	34500.00	YES
Manganese (UG/L)	7439-96-5	2.80	224.00	X	22/ 24	91.7	26.90	26.90	YES
Mercury (UG/L)	7439-97-6			O	0/ 22	0.0			NO
Molybdenum (UG/L)	7439-98-7	2.00	2.70	D	2/ 4	50.0	3980000.00	2.70	YES
Nickel (UG/L)	7440-02-0	2.10	27.10	D	5/ 25	20.0	16.30	16.30	YES

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Potassium (UG/L)	7440-09-7	2390.00	3650.00	X	20/ 26	76.9	4540.00	3650.00	YES
Selenium (UG/L)	7782-49-2	1.50	1.50	D	1/ 25	4.0	1.63	1.50	NO
Silver (UG/L)	7440-22-4	16.90	24.20	D	5/ 22	22.7	18.00	18.00	YES
Sodium (UG/L)	7440-23-5	46600.00	84200.00	L	24/ 24	100.0	66400.00	66400.00	YES
Thallium (UG/L)	7440-28-0	2.40	2.40	D	1/ 22	4.5	2.00	2.00	NO
Tin (UG/L)	7440-31-5	8.70	8.70	D	1/ 4	25.0	134.00	8.70	YES
Vanadium (UG/L)	7440-62-2	7.80	14.60	D	7/ 22	31.8	21.90	14.60	YES
Zinc (UG/L)	7440-66-6	4.50	57.70	D	9/ 25	36.0	73.70	57.70	YES
Pesticides and/or PCBs									
4,4'-DDD (UG/L)	72-54-8			O	0/ 18	0.0			NO
4,4'-DDE (UG/L)	72-55-9			O	0/ 18	0.0			NO
4,4'-DDT (UG/L)	50-29-3			O	0/ 18	0.0			NO
Aldrin (UG/L)	309-00-2			O	0/ 18	0.0			NO
Alpha Chlordane (UG/L)	5103-71-9			O	0/ 18	0.0			NO
Alpha-BHC (UG/L)	319-84-6			O	0/ 18	0.0			NO
Aroclor-1016 (UG/L)	12674-11-2			O	0/ 18	0.0			NO
Aroclor-1221 (UG/L)	11104-28-2			O	0/ 18	0.0			NO
Aroclor-1232 (UG/L)	11141-16-5			O	0/ 18	0.0			NO
Aroclor-1242 (UG/L)	53469-21-9			O	0/ 18	0.0			NO
Aroclor-1248 (UG/L)	12672-29-6			O	0/ 18	0.0			NO
Aroclor-1254 (UG/L)	11097-69-1			O	0/ 18	0.0			NO
Aroclor-1260 (UG/L)	11096-82-5			O	0/ 18	0.0			NO
Beta-BHC (UG/L)	319-85-7			O	0/ 18	0.0			NO
Delta-BHC (UG/L)	319-86-8			O	0/ 18	0.0			NO
Dieldrin (UG/L)	60-57-1			O	0/ 18	0.0			NO
Endosulfan I (UG/L)	959-98-8			O	0/ 18	0.0			NO
Endosulfan II (UG/L)	33213-65-9			O	0/ 18	0.0			NO
Endosulfan Sulfate (UG/L)	1031-07-8			O	0/ 18	0.0			NO
Endrin (UG/L)	72-20-8			O	0/ 18	0.0			NO
Endrin Aldehyde (UG/L)	7421-93-4			O	0/ 10	0.0			NO
Endrin Ketone (UG/L)	53494-70-5			O	0/ 18	0.0			NO
Gamma Chlordane (UG/L)	5103-74-2			O	0/ 18	0.0			NO
Gamma-BHC (Lindane) (UG/L)	58-89-9			O	0/ 18	0.0			NO
Heptachlor (UG/L)	76-44-8			O	0/ 18	0.0			NO
Heptachlor Epoxide (UG/L)	1024-57-3			O	0/ 18	0.0			NO
Methoxychlor (UG/L)	72-43-5			O	0/ 18	0.0			NO
Toxaphene (UG/L)	8001-35-2			O	0/ 18	0.0			NO

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Radiological									
Americium-241 (PCI/L)	14596-10-2			O	0/ 8	0.0			NO
Antimony-124 (PCI/L)	14683-10-4			O	0/ 2	0.0			NO
Antimony-125 (PCI/L)	14234-35-6			O	0/ 2	0.0			NO
Barium-133 (PCI/L)	13981-41-4			O	0/ 2	0.0			NO
Barium-140 (PCI/L)	14798-08-4			O	0/ 2	0.0			NO
Beryllium-7 (PCI/L)	13966-02-4			O	0/ 2	0.0			NO
Bismuth-207 (PCI/L)	13982-38-2			O	0/ 6	0.0			NO
Bismuth-210 (PCI/L)	14331-79-4	0.11	0.39	D	2/ 18	11.1	21.60	0.39	YES
Bismuth-211 (PCI/L)	15229-37-5			O	0/ 2	0.0			NO
Bismuth-212 (PCI/L)	14913-49-6			O	0/ 2	0.0			NO
Bismuth-214 (PCI/L)	14733-03-0			O	0/ 2	0.0			NO
Cerium-139 (PCI/L)	CE-139			O	0/ 2	0.0			NO
Cerium-141 (PCI/L)	13967-74-3			O	0/ 2	0.0			NO
Cerium-144 (PCI/L)	14762-78-8			O	0/ 2	0.0			NO
Cesium-134 (PCI/L)	13967-70-9			O	0/ 4	0.0			NO
Cesium-137 (PCI/L)	10045-97-3			O	0/ 14	0.0			NO
Cobalt-57 (PCI/L)	13981-50-5			O	0/ 2	0.0			NO
Cobalt-58 (PCI/L)	13981-38-9			O	0/ 2	0.0			NO
Cobalt-60 (PCI/L)	10198-40-0			O	0/ 11	0.0			NO
Europium-152 (PCI/L)	14683-23-9			O	0/ 4	0.0			NO
Europium-154 (PCI/L)	15585-10-1			O	0/ 4	0.0			NO
Europium-155 (PCI/L)	14391-16-3			O	0/ 4	0.0			NO
Iodine-131 (PCI/L)	24267-56-9			O	0/ 2	0.0			NO
Iridium-192 (PCI/L)	12154-84-6			O	0/ 2	0.0			NO
Iron-59 (PCI/L)	14596-12-4			O	0/ 2	0.0			NO
Lanthanum-140 (PCI/L)	13981-28-7			O	0/ 2	0.0			NO
Lead-212 (PCI/L)	15092-94-1			O	0/ 2	0.0			NO
Lead-214 (PCI/L)	15067-28-4			O	0/ 2	0.0			NO
Manganese-54 (PCI/L)	13966-31-9			O	0/ 2	0.0			NO
Mercury-203 (PCI/L)	13982-78-0			O	0/ 2	0.0			NO
Neptunium-237 (PCI/L)	13994-20-2			O	0/ 2	0.0			NO
Niobium-95 (PCI/L)	13967-76-5			O	0/ 2	0.0			NO
Plutonium-238 (PCI/L)	13981-16-3	0.01	0.25	D	8/ 57	14.0	0.18	0.18	YES
Plutonium-238/239 (PCI/L)	PU-238/239	0.01	0.01	D	1/ 6	16.7	0.01	0.01	YES
Plutonium-239 (PCI/L)	15117-48-3			O	0/ 38	0.0			NO
Plutonium-239/240 (PCI/L)	PU-239/240	0.00	2.00	D	5/ 19	26.3	9.64	2.00	YES

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Potassium-40 (PCI/L)	13966-00-2			O	0/ 10	0.0			NO
Protactinium-233 (PCI/L)	13981-14-1			O	0/ 2	0.0			NO
Protactinium-234 (PCI/L)	15100-28-4			O	0/ 2	0.0			NO
Radium-223 (PCI/L)	15623-45-7			O	0/ 2	0.0			NO
Radium-225 (PCI/L)	13981-53-8			O	0/ 2	0.0			NO
Radium-226 (PCI/L)	13982-63-3	0.10	0.52	D	6/ 18	33.3	0.54	0.52	YES
Ruthenium-103 (PCI/L)	13968-53-1			O	0/ 2	0.0			NO
Ruthenium-106 (PCI/L)	13967-48-1			O	0/ 2	0.0			NO
Scandium-46 (PCI/L)	13967-63-0			O	0/ 2	0.0			NO
Sodium-22 (PCI/L)	13966-32-0			O	0/ 2	0.0			NO
Strontium-85 (PCI/L)	13967-73-2	25.00	25.00	D	1/ 2	50.0		25.00	YES
Strontium-89 (PCI/L)	14158-27-1			O	0/ 2	0.0			NO
Strontium-90 (PCI/L)	10098-97-2	0.50	0.50	D	3/ 18	16.7	2.13	0.50	YES
Thallium-208 (PCI/L)	14913-50-9			O	0/ 2	0.0			NO
Thorium-227 (PCI/L)	15623-47-9	0.01	0.23	X	16/ 22	72.7	84.00	0.23	YES
Thorium-228 (PCI/L)	14274-82-9	0.01	2.17	D	17/ 46	37.0	25.60	2.17	YES
Thorium-230 (PCI/L)	14269-63-7	0.01	1.99	D	19/ 43	44.2	0.48	0.48	YES
Thorium-232 (PCI/L)	7440-29-1	0.00	0.10	D	8/ 44	18.2	0.34	0.10	YES
Thorium-234 (PCI/L)	15065-10-8			O	0/ 2	0.0			NO
Tin-126 (PCI/L)	15832-50-5			O	0/ 2	0.0			NO
Tritium (PCI/L)	10028-17-8	30.00	7200.00	X	123/ 139	88.5	799.00	799.00	YES
Uranium-233/234 (PCI/L)	U-233/234	0.17	0.36	L	36/ 36	100.0	0.25	0.25	YES
Uranium-234 (PCI/L)	13966-29-5	0.20	8.14	X	19/ 24	79.2	2.02	2.02	YES
Uranium-235 (PCI/L)	15117-96-1	0.01	2.30	X	30/ 53	56.6	0.47	0.47	YES
Uranium-235/236 (PCI/L)	U-235/236			O	0/ 7	0.0			NO
Uranium-238 (PCI/L)	7440-61-1	0.13	8.25	X	52/ 59	88.1	0.41	0.41	YES
Yttrium-88 (PCI/L)	7440-65-5			O	0/ 2	0.0			NO
Zirconium-95 (PCI/L)	13967-71-0			O	0/ 2	0.0			NO
Semi-Volatile Organics									
1,2,4-Trichlorobenzene (UG/L)	120-82-1			O	0/ 18	0.0			NO
1,2-Dichlorobenzene (UG/L)	95-50-1			O	0/ 32	0.0			NO
1,3-Dichlorobenzene (UG/L)	541-73-1			O	0/ 30	0.0			NO
1,4-Dichlorobenzene (UG/L)	106-46-7			O	0/ 32	0.0			NO
1-chloro-4-phenoxybenzene (UG/L)	7005-72-3			O	0/ 18	0.0			NO
2,2'-oxybis(1-chloropropane) (UG/L)	108-60-1			O	0/ 29	0.0			NO
2,4,5-Trichlorophenol (UG/L)	95-95-4			O	0/ 18	0.0			NO
2,4,6-Trichlorophenol (UG/L)	88-06-2			O	0/ 18	0.0			NO

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
2,4-Dichlorophenol (UG/L)	120-83-2			O	0/ 18	0.0			NO
2,4-Dimethylphenol (UG/L)	105-67-9			O	0/ 18	0.0			NO
2,4-Dinitrophenol (UG/L)	51-28-5			O	0/ 18	0.0			NO
2,4-Dinitrotoluene (UG/L)	121-14-2			O	0/ 16	0.0			NO
2,6-Dinitrotoluene (UG/L)	606-20-2			O	0/ 16	0.0			NO
2-Benzyl-4-Chlorophenol (UG/L)	120-32-1			O	0/ 4	0.0			NO
2-Chloronaphthalene (UG/L)	91-58-7			O	0/ 18	0.0			NO
2-Chlorophenol (UG/L)	95-57-8			O	0/ 18	0.0			NO
2-Methylnaphthalene (UG/L)	91-57-6			O	0/ 18	0.0			NO
2-Methylphenol (UG/L)	95-48-7			O	0/ 18	0.0			NO
2-Nitroaniline (UG/L)	88-74-4			O	0/ 18	0.0			NO
2-Nitrophenol (UG/L)	88-75-5			O	0/ 18	0.0			NO
3,3'-Dichlorobenzidine (UG/L)	91-94-1			O	0/ 18	0.0			NO
3-Nitroaniline (UG/L)	99-09-2			O	0/ 18	0.0			NO
4,6-Dinitro-o-Cresol (UG/L)	534-52-1			O	0/ 18	0.0			NO
4-Bromophenyl-phenyl Ether (UG/L)	101-55-3			O	0/ 18	0.0			NO
4-Chloro-3-methylphenol (UG/L)	59-50-7			O	0/ 18	0.0			NO
4-Chloroaniline (UG/L)	106-47-8			O	0/ 18	0.0			NO
4-Methylphenol (UG/L)	106-44-5			O	0/ 18	0.0			NO
4-Nitroaniline (UG/L)	100-01-6			O	0/ 18	0.0			NO
4-Nitrophenol (UG/L)	100-02-7			O	0/ 18	0.0			NO
Acenaphthene (UG/L)	83-32-9			O	0/ 18	0.0			NO
Acenaphthylene (UG/L)	208-96-8			O	0/ 18	0.0			NO
Anthracene (UG/L)	120-12-7			O	0/ 18	0.0			NO
Benzo(a)anthracene (UG/L)	56-55-3			O	0/ 18	0.0			NO
Benzo(a)pyrene (UG/L)	50-32-8			O	0/ 18	0.0			NO
Benzo(b)fluoranthene (UG/L)	205-99-2			O	0/ 18	0.0			NO
Benzo(g,h,i)perylene (UG/L)	191-24-2			O	0/ 18	0.0			NO
Benzo(k)fluoranthene (UG/L)	207-08-9			O	0/ 18	0.0			NO
Benzoic Acid (UG/L)	65-85-0			O	0/ 13	0.0			NO
Benzyl Alcohol (UG/L)	100-51-6			O	0/ 13	0.0			NO
Bis(2-chloroethoxy)methane (UG/L)	111-91-1			O	0/ 18	0.0			NO
Bis(2-chloroethyl)ether (UG/L)	111-44-4			O	0/ 18	0.0			NO
Bis(2-ethylhexyl)phthalate (UG/L)	117-81-7			O	0/ 21	0.0			NO
Butyl Benzyl Phthalate (UG/L)	85-68-7			O	0/ 18	0.0			NO
Carbazole (UG/L)	86-74-8			O	0/ 9	0.0			NO
Chrysene (UG/L)	218-01-9			O	0/ 18	0.0			NO

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Di-n-butyl Phthalate (UG/L)	84-74-2			O	0/ 21	0.0			NO
Di-n-octyl Phthalate (UG/L)	117-84-0			O	0/ 18	0.0			NO
Dibenz(a,h)anthracene (UG/L)	53-70-3			O	0/ 18	0.0			NO
Dibenzofuran (UG/L)	132-64-9			O	0/ 18	0.0			NO
Diethyl Phthalate (UG/L)	84-66-2			O	0/ 18	0.0			NO
Dimethyl Phthalate (UG/L)	131-11-3			O	0/ 18	0.0			NO
Fluoranthene (UG/L)	206-44-0			O	0/ 18	0.0			NO
Fluorene (UG/L)	86-73-7			O	0/ 18	0.0			NO
Hexachlorobenzene (UG/L)	118-74-1			O	0/ 18	0.0			NO
Hexachlorobutadiene (UG/L)	87-68-3			O	0/ 18	0.0			NO
Hexachlorocyclopentadiene (UG/L)	77-47-4			O	0/ 18	0.0			NO
Hexachloroethane (UG/L)	67-72-1			O	0/ 18	0.0			NO
Indeno(1,2,3-cd)pyrene (UG/L)	193-39-5			O	0/ 18	0.0			NO
Isophorone (UG/L)	78-59-1			O	0/ 18	0.0			NO
N-Nitroso-di-n-propylamine (UG/L)	621-64-7			O	0/ 18	0.0			NO
N-Nitrosodiphenylamine (UG/L)	86-30-6			O	0/ 18	0.0			NO
Naphthalene (UG/L)	91-20-3			O	0/ 18	0.0			NO
Nitrobenzene (UG/L)	98-95-3			O	0/ 14	0.0			NO
Pentachlorophenol (UG/L)	87-86-5			O	0/ 21	0.0			NO
Phenanthrene (UG/L)	85-01-8			O	0/ 18	0.0			NO
Phenol (UG/L)	108-95-2			O	0/ 21	0.0			NO
Pyrene (UG/L)	129-00-0			O	0/ 18	0.0			NO
Volatile Organics									
1,1,1,2-Tetrachloroethane (UG/L)	630-20-6			O	0/ 202	0.0			NO
1,1,1-Trichloroethane (UG/L)	71-55-6	0.30	3.30	D	91/ 215	42.3	0.90	0.90	YES
1,1,2,2-Tetrachloroethane (UG/L)	79-34-5			O	0/ 213	0.0			NO
1,1,2-Trichloroethane (UG/L)	79-00-5			O	0/ 217	0.0			NO
1,1-Dichloroethane (UG/L)	75-34-3	3.50	3.50	D	1/ 213	0.5	0.34	0.34	NO
1,1-Dichloroethene (UG/L)	75-35-4	1.70	1.70	D	1/ 215	0.5	0.39	0.39	NO
1,1-Dichloropropene (UG/L)	563-58-6			O	0/ 167	0.0			NO
1,2,3-Trichlorobenzene (UG/L)	87-61-6			O	0/ 167	0.0			NO
1,2,3-Trichloropropane (UG/L)	96-18-4			O	0/ 192	0.0			NO
1,2,4-Trichlorobenzene (UG/L)	120-82-1			O	0/ 167	0.0			NO
1,2,4-Trimethylbenzene (UG/L)	95-63-6			O	0/ 167	0.0			NO
1,2-Dibromo-3-Chloropropane (UG/L)	96-12-8			O	0/ 2	0.0			NO
1,2-Dichlorobenzene (UG/L)	95-50-1			O	0/ 177	0.0			NO
1,2-Dichloroethane (UG/L)	107-06-2			O	0/ 219	0.0			NO

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
1,2-Dichloroethene (UG/L)	540-59-0	1.30	7.20	L	10/ 13	76.9	5.57	7.20	YES
1,2-Dichloropropane (UG/L)	78-87-5			O	0/ 213	0.0			NO
1,2-Diethylbenzene (UG/L)	135-01-3			O	0/ 4	0.0			NO
1,2-cis-Dichloroethene (UG/L)	156-59-2	0.50	4.00	X	102/ 182	56.0	1.08	1.08	YES
1,2-trans-Dichloroethene (UG/L)	156-60-5	1.00	3.00	D	7/ 217	3.2	0.39	0.39	NO
1,3,5-Trimethylbenzene (UG/L)	108-67-8			O	0/ 167	0.0			NO
1,3-Dichlorobenzene (UG/L)	541-73-1			O	0/ 177	0.0			NO
1,3-Dichloropropane (UG/L)	142-28-9			O	0/ 167	0.0			NO
1,3-Dichloropropene (UG/L)	542-75-6			O	0/ 167	0.0			NO
1,3-Diethylbenzene (UG/L)	141-93-5			O	0/ 4	0.0			NO
1,3-cis-Dichloropropene (UG/L)	10061-01-5	0.50	1.20	D	2/ 215	0.9	0.55	0.55	NO
1,3-trans-Dichloropropene (UG/L)	10061-02-6			O	0/ 215	0.0			NO
1,4-Dichlorobenzene (UG/L)	106-46-7			O	0/ 177	0.0			NO
1,4-Diethylbenzene (UG/L)	105-05-5			O	0/ 4	0.0			NO
1-Chlorohexane (UG/L)	544-10-5			O	0/ 33	0.0			NO
2,2-Dichloropropane (UG/L)	594-20-7			O	0/ 167	0.0			NO
2-Butanone (UG/L)	78-93-3	7.00	41.00	D	3/ 13	23.1	16.80	41.00	YES
2-Chloroethylvinylether (UG/L)	110-75-8			O	0/ 40	0.0			NO
2-Chlorotoluene (UG/L)	95-49-8			O	0/ 183	0.0			NO
2-Hexanone (UG/L)	591-78-6			O	0/ 7	0.0			NO
4-Chlorotoluene (UG/L)	106-43-4			O	0/ 173	0.0			NO
4-Methyl-2-pentanone (UG/L)	108-10-1			O	0/ 11	0.0			NO
Acetone (UG/L)	67-64-1	2.00	12.00	D	6/ 11	54.5	11.90	12.00	YES
Acetonitrile (UG/L)	75-05-8			O	0/ 4	0.0			NO
Acrolein (UG/L)	107-02-8			O	0/ 3	0.0			NO
Acrylonitrile (UG/L)	107-13-1			O	0/ 7	0.0			NO
Benzene (UG/L)	71-43-2			O	0/ 215	0.0			NO
Benzyl Chloride (UG/L)	100-44-7			O	0/ 4	0.0			NO
Bromochloromethane (UG/L)	74-97-5			O	0/ 167	0.0			NO
Bromodichloromethane (UG/L)	75-27-4	0.50	3.70	D	3/ 215	1.4	0.38	0.38	NO
Bromoform (UG/L)	75-25-2			O	0/ 214	0.0			NO
Bromomethane (UG/L)	74-83-9			O	0/ 185	0.0			NO
Carbon Disulfide (UG/L)	75-15-0			O	0/ 11	0.0			NO
Carbon Tetrachloride (UG/L)	56-23-5			O	0/ 215	0.0			NO
Chlorobenzene (UG/L)	108-90-7			O	0/ 213	0.0			NO
Chloroethane (UG/L)	75-00-3			O	0/ 185	0.0			NO
Chloroform (Trichloromethane) (UG/L)	67-66-3	0.50	7.00	D	13/ 219	5.9	0.42	0.42	YES

Analytes Detected in Groundwater in the Mound Production Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Chloromethane (UG/L)	74-87-3			O	0/ 187	0.0			NO
Chlorotoluene (UG/L)	25168-05-2			O	0/ 19	0.0			NO
Dibromochloromethane (UG/L)	124-48-1			O	0/ 215	0.0			NO
Dibromomethane (UG/L)	74-95-3			O	0/ 204	0.0			NO
Dichlorodifluoromethane (UG/L)	75-71-8			O	0/ 175	0.0			NO
Dichloromethane (Methylene Chloride) (U	75-09-2	3.00	13.00	D	8/ 217	3.7	0.70	0.70	NO
Ethylbenzene (UG/L)	100-41-4	0.50	0.60	D	2/ 219	0.9	0.48	0.48	NO
Ethylene Dibromide (1,2-Dibromoethane)	106-93-4			O	0/ 2	0.0			NO
FREON-113 (UG/L)	76-13-1	2.00	34.00	X	12/ 19	63.2	29.60	34.00	YES
Hexachlorobutadiene (UG/L)	87-68-3			O	0/ 167	0.0			NO
Isopropyl Benzene (UG/L)	98-82-8			O	0/ 167	0.0			NO
Monobromobenzene (Phenyl bromide) (U	108-86-1			O	0/ 202	0.0			NO
Naphthalene (UG/L)	91-20-3			O	0/ 167	0.0			NO
Styrene (UG/L)	100-42-5			O	0/ 174	0.0			NO
Tert-butyl methyl ether (UG/L)	1634-04-4	1.20	2.40	D	4/ 24	16.7	0.61	0.61	YES
Tetrachloroethene (UG/L)	127-18-4	0.29	2.20	X	114/ 218	52.3	0.96	0.96	YES
Toluene (UG/L)	108-88-3	0.60	3.00	D	4/ 219	1.8	0.50	0.50	NO
Trichloroethylene (TCE) (UG/L)	79-01-6	0.50	5.90	X	189/ 219	86.3	2.31	2.31	YES
Trichlorofluoromethane (UG/L)	75-69-4	2.20	2.20	D	1/ 210	0.5	0.43	0.43	NO
Vinyl Acetate (UG/L)	108-05-4			O	0/ 11	0.0			NO
Vinyl Chloride (UG/L)	75-01-4			O	0/ 219	0.0			NO
Xylenes, Total (UG/L)	1330-20-7	0.50	3.60	D	9/ 212	4.2	0.56	0.56	NO
mp-Xylene (UG/L)	mp-Xylene	0.60	2.40	D	8/ 167	4.8	0.31	0.31	NO
n-Butylbenzene (UG/L)	104-51-8			O	0/ 167	0.0			NO
n-propylbenzene (UG/L)	103-65-1			O	0/ 167	0.0			NO
o-Xylene (UG/L)	95-47-6	0.40	1.30	D	5/ 167	3.0	0.27	0.27	NO
p-Isopropyltoluene (UG/L)	99-87-6			O	0/ 167	0.0			NO
sec-Butylbenzene (UG/L)	135-98-8			O	0/ 167	0.0			NO
tert-Butylbenzene (UG/L)	98-06-6			O	0/ 167	0.0			NO

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Common Anions									
Nitrate (UG/L)	7697-37-2	1.7E+02	9.4E+03	D	5/ 10	50.0	1.1E+16	9.4E+03	YES
Nitrate/Nitrite (UG/L)	1497-55-8	6.3E+00	2.0E+04	X	76/ 113	67.3	3.1E+04	2.0E+04	YES
Nitrite (UG/L)	14797-65-0	1.0E+01	7.0E+01	D	2/ 21	9.5	1.4E+01	1.4E+01	YES
Explosives									
1,3,5-Trinitrobenzene (UG/L)	99-35-4	1.1E+00	1.1E+00	D	1/ 23	4.3	1.2E+00	1.1E+00	NO
1,3-Dinitrobenzene (UG/L)	99-65-0			O	0/ 43	0.0			NO
2,4,6-Trinitrotoluene (UG/L)	118-96-7	2.6E-01	2.6E-01	D	1/ 24	4.2	9.2E-01	2.6E-01	NO
2,4-Dinitrotoluene (UG/L)	121-14-2			O	0/ 23	0.0			NO
2,6-Dinitrotoluene (UG/L)	606-20-2			O	0/ 34	0.0			NO
2-Amino-4,6-Dinitrotoluene (UG/L)	35572-78-2			O	0/ 43	0.0			NO
HMX (UG/L)	2691-41-0			O	0/ 43	0.0			NO
Nitrobenzene (UG/L)	98-95-3			O	0/ 42	0.0			NO
PETN (UG/L)	78-11-5			O	0/ 40	0.0			NO
RDX (UG/L)	121-82-4			O	0/ 41	0.0			NO
Tetryl (UG/L)	479-45-8			O	0/ 43	0.0			NO
Metals									
Aluminum (UG/L)	7429-90-5	1.2E+01	3.2E+04	X	141/ 151	93.4	4.7E+03	4.7E+03	YES
Antimony (UG/L)	7440-36-0	3.5E-01	4.2E+01	D	47/ 158	29.7	3.2E+00	3.2E+00	YES
Arsenic (UG/L)	7440-38-2	3.0E-01	9.3E+02	D	35/ 150	23.3	7.3E+00	7.3E+00	YES
Barium (UG/L)	7440-39-3	1.8E+01	3.1E+03	X	148/ 150	98.7	1.4E+02	1.4E+02	YES
Beryllium (UG/L)	7440-41-7	3.0E-02	2.3E+00	D	56/ 151	37.1	3.8E-01	3.8E-01	YES
Bismuth (UG/L)	7440-69-9	8.2E-01	2.6E+02	D	29/ 139	20.9	2.1E+01	2.1E+01	YES
Boron (UG/L)	7440-42-8	5.7E+01	1.3E+02	D	7/ 8	87.5	1.1E+02	1.3E+02	YES
Cadmium (UG/L)	7440-43-9	1.4E-01	1.3E+01	D	17/ 161	10.6	7.0E-01	7.0E-01	YES
Calcium (UG/L)	7440-70-2	1.2E+02	1.5E+06	X	198/ 198	100.0	2.0E+05	2.0E+05	YES
Chromium (UG/L)	7440-47-3	2.0E-01	4.5E+04	X	106/ 155	68.4	1.6E+03	1.6E+03	YES
Cobalt (UG/L)	7440-48-4	3.1E-01	3.0E+02	D	63/ 151	41.7	1.7E+01	1.7E+01	YES
Copper (UG/L)	7440-50-8	3.8E-01	5.1E+02	X	118/ 153	77.1	1.8E+01	1.8E+01	YES
Cyanide (UG/L)	57-12-5	5.5E+00	1.4E+01	D	3/ 46	6.5	4.7E+00	4.7E+00	YES
Iron (UG/L)	7439-89-6	1.5E-01	1.9E+05	X	186/ 199	93.5	3.2E+04	3.2E+04	YES
Lead (UG/L)	7439-92-1	4.0E-01	4.0E+01	D	62/ 162	38.3	3.9E+00	3.9E+00	YES
Lithium (UG/L)	7439-93-2	1.2E+01	4.6E+03	X	123/ 138	89.1	1.4E+02	1.4E+02	YES
Magnesium (UG/L)	7439-95-4	2.7E+01	7.2E+05	X	199/ 199	100.0	7.7E+04	7.7E+04	YES
Manganese (UG/L)	7439-96-5	3.7E-02	3.0E+03	X	190/ 199	95.5	6.2E+02	6.2E+02	YES
Mercury (UG/L)	7439-97-6	1.0E-01	1.4E+00	D	3/ 151	2.0	6.1E-02	6.1E-02	NO
Molybdenum (UG/L)	7439-98-7	4.3E-01	4.7E+02	X	82/ 134	61.2	2.0E+01	2.0E+01	YES

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Nickel (UG/L)	7440-02-0	4.4E-01	1.2E+04	X	114/ 154	74.0	4.8E+02	4.8E+02	YES
Potassium (UG/L)	7440-09-7	2.1E+00	2.1E+05	X	186/ 200	93.0	1.6E+04	1.6E+04	YES
Selenium (UG/L)	7782-49-2	1.3E+00	9.1E+00	D	11/ 149	7.4	1.7E+00	1.7E+00	YES
Silicon (UG/L)	7440-21-3	2.2E+03	1.2E+04	D	6/ 6	100.0	1.7E+04	1.2E+04	YES
Silver (UG/L)	7440-22-4	1.8E-01	2.9E+01	D	13/ 153	8.5	1.1E+00	1.1E+00	YES
Sodium (UG/L)	7440-23-5	6.8E+01	7.3E+06	X	197/ 197	100.0	3.4E+05	3.4E+05	YES
Thallium (UG/L)	7440-28-0	1.1E+00	6.9E+00	D	10/ 147	6.8	3.4E+00	3.4E+00	YES
Tin (UG/L)	7440-31-5	1.4E+00	3.6E+02	D	29/ 136	21.3	7.5E+00	7.5E+00	YES
Vanadium (UG/L)	7440-62-2	1.5E-01	2.8E+02	D	72/ 151	47.7	2.3E+01	2.3E+01	YES
Zinc (UG/L)	7440-66-6	6.1E-01	4.0E+02	X	114/ 153	74.5	4.9E+01	4.9E+01	YES
Pesticides and/or PCBs									
4,4'-DDD (UG/L)	72-54-8			O	0/ 62	0.0			NO
4,4'-DDE (UG/L)	72-55-9			O	0/ 62	0.0			NO
4,4'-DDT (UG/L)	50-29-3			O	0/ 62	0.0			NO
Aldrin (UG/L)	309-00-2			O	0/ 62	0.0			NO
Alpha Chlordane (UG/L)	5103-71-9	3.2E-02	6.9E-02	D	3/ 62	4.8	1.1E-01	6.9E-02	NO
Alpha-BHC (UG/L)	319-84-6			O	0/ 62	0.0			NO
Aroclor-1016 (UG/L)	12674-11-2			O	0/ 62	0.0			NO
Aroclor-1221 (UG/L)	11104-28-2			O	0/ 62	0.0			NO
Aroclor-1232 (UG/L)	11141-16-5			O	0/ 62	0.0			NO
Aroclor-1242 (UG/L)	53469-21-9			O	0/ 62	0.0			NO
Aroclor-1248 (UG/L)	12672-29-6			O	0/ 62	0.0			NO
Aroclor-1254 (UG/L)	11097-69-1			O	0/ 62	0.0			NO
Aroclor-1260 (UG/L)	11096-82-5			O	0/ 62	0.0			NO
Beta-BHC (UG/L)	319-85-7			O	0/ 62	0.0			NO
Delta-BHC (UG/L)	319-86-8			O	0/ 62	0.0			NO
Dieldrin (UG/L)	60-57-1			O	0/ 62	0.0			NO
Endosulfan I (UG/L)	959-98-8			O	0/ 62	0.0			NO
Endosulfan II (UG/L)	33213-65-9			O	0/ 62	0.0			NO
Endosulfan Sulfate (UG/L)	1031-07-8			O	0/ 59	0.0			NO
Endrin (UG/L)	72-20-8			O	0/ 62	0.0			NO
Endrin Aldehyde (UG/L)	7421-93-4			O	0/ 48	0.0			NO
Endrin Ketone (UG/L)	53494-70-5			O	0/ 62	0.0			NO
Gamma Chlordane (UG/L)	5103-74-2			O	0/ 62	0.0			NO
Gamma-BHC (Lindane) (UG/L)	58-89-9			O	0/ 62	0.0			NO
Heptachlor (UG/L)	76-44-8			O	0/ 62	0.0			NO
Heptachlor Epoxide (UG/L)	1024-57-3			O	0/ 62	0.0			NO

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Methoxychlor (UG/L)	72-43-5			O	0/ 62	0.0			NO
Toxaphene (UG/L)	8001-35-2			O	0/ 62	0.0			NO
Radiological									
Americium-241 (PCI/L)	14596-10-2	6.8E-02	1.7E-01	D	6/ 43	14.0	2.9E+00	1.7E-01	YES
Bismuth-207 (PCI/L)	13982-38-2			O	0/ 50	0.0			NO
Bismuth-210 (PCI/L)	14331-79-4	1.2E-01	2.6E-01	D	2/ 55	3.6	8.0E+00	2.6E-01	NO
Bismuth-211 (PCI/L)	15229-37-5			O	0/ 4	0.0			NO
Bismuth-212 (PCI/L)	14913-49-6			O	0/ 4	0.0			NO
Bismuth-214 (PCI/L)	14733-03-0			O	0/ 4	0.0			NO
Cesium-134 (PCI/L)	13967-70-9			O	0/ 4	0.0			NO
Cesium-137 (PCI/L)	10045-97-3			O	0/ 56	0.0			NO
Cobalt-60 (PCI/L)	10198-40-0			O	0/ 56	0.0			NO
Europium-152 (PCI/L)	14683-23-9			O	0/ 4	0.0			NO
Europium-154 (PCI/L)	15585-10-1			O	0/ 4	0.0			NO
Europium-155 (PCI/L)	14391-16-3			O	0/ 4	0.0			NO
Lead-212 (PCI/L)	15092-94-1			O	0/ 4	0.0			NO
Lead-214 (PCI/L)	15067-28-4			O	0/ 4	0.0			NO
Neptunium-237 (PCI/L)	13994-20-2			O	0/ 4	0.0			NO
Plutonium-238 (PCI/L)	13981-16-3	9.0E-03	1.9E+00	D	8/ 62	12.9	2.4E-01	2.4E-01	YES
Plutonium-238/239 (PCI/L)	PU-238/239			O	0/ 2	0.0			NO
Plutonium-239 (PCI/L)	15117-48-3			O	0/ 5	0.0			NO
Plutonium-239/240 (PCI/L)	PU-239/240	3.0E-03	1.8E-01	D	12/ 52	23.1	5.4E-01	1.8E-01	YES
Plutonium-242 (PCI/L)	13982-10-0	1.1E-01	1.1E-01	D	1/ 2	50.0		1.1E-01	YES
Potassium-40 (PCI/L)	13966-00-2	1.3E+02	2.6E+02	D	5/ 54	9.3	1.4E+02	1.4E+02	YES
Protactinium-233 (PCI/L)	13981-14-1			O	0/ 4	0.0			NO
Protactinium-234 (PCI/L)	15100-28-4			O	0/ 4	0.0			NO
Radium-223 (PCI/L)	15623-45-7			O	0/ 4	0.0			NO
Radium-225 (PCI/L)	13981-53-8			O	0/ 4	0.0			NO
Radium-226 (PCI/L)	13982-63-3	1.3E-01	3.9E+01	X	50/ 66	75.8	2.4E+00	2.4E+00	YES
Radium-228 (PCI/L)	15262-20-1	5.7E-01	1.7E+01	L	8/ 8	100.0	4.5E+01	1.7E+01	YES
Strontium-89 (PCI/L)	14158-27-1			O	0/ 4	0.0			NO
Strontium-90 (PCI/L)	10098-97-2	7.5E-01	4.2E+01	D	8/ 57	14.0	2.2E+00	2.2E+00	YES
Thallium-208 (PCI/L)	14913-50-9			O	0/ 4	0.0			NO
Thorium-227 (PCI/L)	15623-47-9	5.8E-02	5.8E-02	D	1/ 5	20.0	2.4E+18	5.8E-02	YES
Thorium-228 (PCI/L)	14274-82-9	2.0E-02	8.5E+00	X	42/ 57	73.7	6.9E+01	8.5E+00	YES
Thorium-230 (PCI/L)	14269-63-7	4.4E-03	4.1E+00	L	45/ 59	76.3	5.4E-01	5.4E-01	YES
Thorium-232 (PCI/L)	7440-29-1	5.0E-04	2.1E+00	L	33/ 66	50.0	7.2E-01	7.2E-01	YES

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Thorium-234 (PCI/L)	15065-10-8			O	0/ 4	0.0			NO
Tritium (PCI/L)	10028-17-8	3.0E+00	2.8E+06	X	4473/4488	99.7	2.1E+05	2.1E+05	YES
Uranium-233 (PCI/L)	13968-55-3	2.7E-02	1.6E+01	D	3/ 3	100.0	1.6E+62	1.6E+01	YES
Uranium-233/234 (PCI/L)	U-233/234	1.5E-01	9.3E-01	D	5/ 5	100.0	2.7E+00	9.3E-01	YES
Uranium-234 (PCI/L)	13966-29-5	3.3E-02	6.7E+01	X	61/ 70	87.1	2.1E+00	2.1E+00	YES
Uranium-235 (PCI/L)	15117-96-1	7.8E-03	8.3E+00	D	20/ 43	46.5	6.9E+00	6.9E+00	YES
Uranium-235/236 (PCI/L)	U-235/236	3.7E-02	4.7E-02	D	2/ 26	7.7	9.6E-02	4.7E-02	YES
Uranium-238 (PCI/L)	7440-61-1	2.9E-02	6.6E+00	L	59/ 77	76.6	5.9E-01	5.9E-01	YES
Semi-Volatile Organics									
1,2,4-Trichlorobenzene (UG/L)	120-82-1			O	0/ 65	0.0			NO
1,2-Dichlorobenzene (UG/L)	95-50-1			O	0/ 99	0.0			NO
1,3-Dichlorobenzene (UG/L)	541-73-1	3.0E+00	3.0E+00	D	1/ 98	1.0	2.7E+00	2.7E+00	NO
1,4-Dichlorobenzene (UG/L)	106-46-7			O	0/ 99	0.0			NO
1-chloro-4-phenoxybenzene (UG/L)	7005-72-3			O	0/ 65	0.0			NO
2,2'-oxybis(1-chloropropane) (UG/L)	108-60-1			O	0/ 119	0.0			NO
2,4,5-Trichlorophenol (UG/L)	95-95-4			O	0/ 65	0.0			NO
2,4,6-Trichlorophenol (UG/L)	88-06-2			O	0/ 65	0.0			NO
2,4-Dichlorophenol (UG/L)	120-83-2			O	0/ 65	0.0			NO
2,4-Dimethylphenol (UG/L)	105-67-9			O	0/ 65	0.0			NO
2,4-Dinitrophenol (UG/L)	51-28-5			O	0/ 65	0.0			NO
2,4-Dinitrotoluene (UG/L)	121-14-2			O	0/ 42	0.0			NO
2,6-Dinitrotoluene (UG/L)	606-20-2			O	0/ 31	0.0			NO
2-Benzyl-4-Chlorophenol (UG/L)	120-32-1			O	0/ 44	0.0			NO
2-Chloronaphthalene (UG/L)	91-58-7			O	0/ 65	0.0			NO
2-Chlorophenol (UG/L)	95-57-8			O	0/ 65	0.0			NO
2-Methylnaphthalene (UG/L)	91-57-6	6.0E+00	6.0E+00	D	1/ 69	1.4	5.2E+00	5.2E+00	NO
2-Methylphenol (UG/L)	95-48-7			O	0/ 65	0.0			NO
2-Nitroaniline (UG/L)	88-74-4			O	0/ 65	0.0			NO
2-Nitrophenol (UG/L)	88-75-5			O	0/ 65	0.0			NO
3,3'-Dichlorobenzidine (UG/L)	91-94-1			O	0/ 66	0.0			NO
3-Nitroaniline (UG/L)	99-09-2			O	0/ 65	0.0			NO
4,6-Dinitro-o-Cresol (UG/L)	534-52-1			O	0/ 65	0.0			NO
4-Bromophenyl-phenyl Ether (UG/L)	101-55-3			O	0/ 65	0.0			NO
4-Chloro-3-methylphenol (UG/L)	59-50-7			O	0/ 65	0.0			NO
4-Chloroaniline (UG/L)	106-47-8			O	0/ 65	0.0			NO
4-Methylphenol (UG/L)	106-44-5	1.2E+01	6.1E+01	D	2/ 65	3.1	6.2E+00	6.2E+00	NO
4-Nitroaniline (UG/L)	100-01-6			O	0/ 64	0.0			NO

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4-Nitrophenol (UG/L)	100-02-7			O	0/ 65	0.0			NO
Acenaphthene (UG/L)	83-32-9	1.0E+00	1.0E+00	D	1/ 72	1.4	5.6E+00	1.0E+00	NO
Acenaphthylene (UG/L)	208-96-8			O	0/ 72	0.0			NO
Anthracene (UG/L)	120-12-7			O	0/ 72	0.0			NO
Benzo(a)anthracene (UG/L)	56-55-3			O	0/ 73	0.0			NO
Benzo(a)pyrene (UG/L)	50-32-8			O	0/ 73	0.0			NO
Benzo(b)fluoranthene (UG/L)	205-99-2			O	0/ 73	0.0			NO
Benzo(g,h,i)perylene (UG/L)	191-24-2			O	0/ 73	0.0			NO
Benzo(k)fluoranthene (UG/L)	207-08-9			O	0/ 73	0.0			NO
Benzoic Acid (UG/L)	65-85-0	1.0E+00	8.9E+02	D	2/ 62	3.2	3.7E+01	3.7E+01	NO
Benzyl Alcohol (UG/L)	100-51-6			O	0/ 62	0.0			NO
Bis(2-chloroethoxy)methane (UG/L)	111-91-1			O	0/ 65	0.0			NO
Bis(2-chloroethyl)ether (UG/L)	111-44-4			O	0/ 65	0.0			NO
Bis(2-ethylhexyl)phthalate (UG/L)	117-81-7	1.0E+00	9.5E+02	D	12/ 66	18.2	1.8E+01	1.8E+01	YES
Butyl Benzyl Phthalate (UG/L)	85-68-7			O	0/ 66	0.0			NO
Carbazole (UG/L)	86-74-8			O	0/ 50	0.0			NO
Chrysene (UG/L)	218-01-9			O	0/ 73	0.0			NO
Di-n-butyl Phthalate (UG/L)	84-74-2	6.0E-01	3.0E+00	D	5/ 65	7.7	5.6E+00	3.0E+00	YES
Di-n-octyl Phthalate (UG/L)	117-84-0			O	0/ 66	0.0			NO
Dibenz(a,h)anthracene (UG/L)	53-70-3			O	0/ 73	0.0			NO
Dibenzofuran (UG/L)	132-64-9			O	0/ 69	0.0			NO
Diethyl Phthalate (UG/L)	84-66-2	5.0E-01	5.0E-01	D	1/ 65	1.5	5.6E+00	5.0E-01	NO
Dimethyl Phthalate (UG/L)	131-11-3			O	0/ 65	0.0			NO
Fluoranthene (UG/L)	206-44-0	9.0E-01	9.0E-01	D	1/ 72	1.4	5.5E+00	9.0E-01	NO
Fluorene (UG/L)	86-73-7	2.0E+00	2.0E+00	D	1/ 72	1.4	5.4E+00	2.0E+00	NO
Hexachlorobenzene (UG/L)	118-74-1			O	0/ 65	0.0			NO
Hexachlorobutadiene (UG/L)	87-68-3			O	0/ 65	0.0			NO
Hexachlorocyclopentadiene (UG/L)	77-47-4			O	0/ 65	0.0			NO
Hexachloroethane (UG/L)	67-72-1			O	0/ 65	0.0			NO
Indeno(1,2,3-cd)pyrene (UG/L)	193-39-5			O	0/ 73	0.0			NO
Isophorone (UG/L)	78-59-1			O	0/ 65	0.0			NO
N-Nitroso-di-n-propylamine (UG/L)	621-64-7			O	0/ 65	0.0			NO
N-Nitrosodiphenylamine (UG/L)	86-30-6			O	0/ 65	0.0			NO
Naphthalene (UG/L)	91-20-3	5.0E+00	5.0E+00	D	1/ 72	1.4	5.5E+00	5.0E+00	NO
Nitrobenzene (UG/L)	98-95-3			O	0/ 23	0.0			NO
Pentachlorophenol (UG/L)	87-86-5			O	0/ 65	0.0			NO
Phenanthrene (UG/L)	85-01-8	3.0E+00	3.0E+00	D	1/ 72	1.4	5.2E+00	3.0E+00	NO

Analytes Detected in Groundwater in the Bedrock Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Phenol (UG/L)	108-95-2	1.0E+00	2.0E+00	D	2/ 65	3.1	5.4E+00	2.0E+00	NO
Pyrene (UG/L)	129-00-0	6.0E-01	6.0E-01	D	1/ 72	1.4	5.5E+00	6.0E-01	NO
Volatile Organics									
1,1,1,2-Tetrachloroethane (UG/L)	630-20-6			O	0/ 211	0.0			NO
1,1,1-Trichloroethane (UG/L)	71-55-6	4.0E-01	7.0E+00	D	20/ 264	7.6	5.3E-01	5.3E-01	YES
1,1,2,2-Tetrachloroethane (UG/L)	79-34-5			O	0/ 261	0.0			NO
1,1,2-Trichloroethane (UG/L)	79-00-5			O	0/ 264	0.0			NO
1,1-Dichloroethane (UG/L)	75-34-3	2.0E+00	2.0E+00	D	1/ 263	0.4	6.5E-01	6.5E-01	NO
1,1-Dichloroethene (UG/L)	75-35-4			O	0/ 264	0.0			NO
1,2,3-Trichloropropane (UG/L)	96-18-4			O	0/ 185	0.0			NO
1,2-Dichlorobenzene (UG/L)	95-50-1			O	0/ 154	0.0			NO
1,2-Dichloroethane (UG/L)	107-06-2			O	0/ 265	0.0			NO
1,2-Dichloroethene (UG/L)	540-59-0	1.8E+00	3.5E+01	D	10/ 33	30.3	7.4E+00	7.4E+00	YES
1,2-Dichloropropane (UG/L)	78-87-5			O	0/ 263	0.0			NO
1,2-Diethylbenzene (UG/L)	135-01-3			O	0/ 47	0.0			NO
1,2-cis-Dichloroethene (UG/L)	156-59-2	9.1E-01	1.7E+01	D	46/ 166	27.7	1.3E+00	1.3E+00	YES
1,2-trans-Dichloroethene (UG/L)	156-60-5	8.5E-01	1.0E+01	D	13/ 248	5.2	7.3E-01	7.3E-01	YES
1,3-Dichlorobenzene (UG/L)	541-73-1			O	0/ 154	0.0			NO
1,3-Diethylbenzene (UG/L)	141-93-5			O	0/ 43	0.0			NO
1,3-cis-Dichloropropene (UG/L)	10061-01-5			O	0/ 254	0.0			NO
1,3-trans-Dichloropropene (UG/L)	10061-02-6			O	0/ 264	0.0			NO
1,4-Dichlorobenzene (UG/L)	106-46-7			O	0/ 154	0.0			NO
1,4-Diethylbenzene (UG/L)	105-05-5			O	0/ 43	0.0			NO
1-Chlorohexane (UG/L)	544-10-5			O	0/ 160	0.0			NO
2,2'-oxybis(1-chloropropane) (UG/L)	108-60-1			O	0/ 4	0.0			NO
2-Butanone (UG/L)	78-93-3	6.0E+00	6.5E+01	D	12/ 130	9.2	5.1E+00	5.1E+00	YES
2-Chloroethylvinylether (UG/L)	110-75-8			O	0/ 187	0.0			NO
2-Chlorotoluene (UG/L)	95-49-8			O	0/ 161	0.0			NO
2-Hexanone (UG/L)	591-78-6	1.0E+00	1.0E+00	D	1/ 33	3.0	5.4E+00	1.0E+00	NO
4-Chlorotoluene (UG/L)	106-43-4			O	0/ 139	0.0			NO
4-Methyl-2-pentanone (UG/L)	108-10-1			O	0/ 76	0.0			NO
Acetone (UG/L)	67-64-1	1.0E+00	1.7E+01	D	23/ 75	30.7	9.2E+00	9.2E+00	YES
Acetonitrile (UG/L)	75-05-8			O	0/ 48	0.0			NO
Acrylonitrile (UG/L)	107-13-1			O	0/ 48	0.0			NO
Benzene (UG/L)	71-43-2	2.5E+00	2.5E+00	D	1/ 275	0.4	1.2E+00	1.2E+00	NO
Benzyl Chloride (UG/L)	100-44-7			O	0/ 11	0.0			NO
Bromochloromethane (UG/L)	74-97-5	2.6E+01	2.6E+01	D	1/ 1	100.0		2.6E+01	YES

Analytes Detected in Groundwater in the Bedrock Wells

Analyte (units)	CAS Number	Minimum Detect	Maximum Detect	Dist.	Results >Detection Limit	% Results >Detection Limit	95% UCL of Mean	Exposure Concentration	Detection in Greater than 5%
Bromodichloromethane (UG/L)	75-27-4			O	0/ 264	0.0			NO
Bromoform (UG/L)	75-25-2			O	0/ 264	0.0			NO
Bromomethane (UG/L)	74-83-9			O	0/ 65	0.0			NO
Carbon Disulfide (UG/L)	75-15-0			O	0/ 76	0.0			NO
Carbon Tetrachloride (UG/L)	56-23-5	1.5E+00	1.5E+00	D	1/ 264	0.4	8.6E-01	8.6E-01	NO
Chlorobenzene (UG/L)	108-90-7	1.0E+00	1.0E+00	D	1/ 266	0.4	1.2E+00	1.0E+00	NO
Chloroethane (UG/L)	75-00-3			O	0/ 81	0.0			NO
Chloroform (Trichloromethane) (UG/L)	67-66-3	5.8E-01	1.1E+00	D	4/ 265	1.5	5.5E-01	5.5E-01	NO
Chloromethane (UG/L)	74-87-3	3.4E+00	3.4E+00	D	1/ 80	1.3	3.7E+00	3.4E+00	NO
Chlorotoluene (UG/L)	25168-05-2			O	0/ 50	0.0			NO
Dibromochloromethane (UG/L)	124-48-1			O	0/ 259	0.0			NO
Dibromomethane (UG/L)	74-95-3	2.8E+00	2.8E+00	D	1/ 213	0.5	1.0E+00	1.0E+00	NO
Dichlorodifluoromethane (UG/L)	75-71-8			O	0/ 34	0.0			NO
Dichloromethane (Methylene Chloride)	75-09-2	1.0E+00	6.1E+02	D	46/ 264	17.4	3.3E+00	3.3E+00	YES
Ethylbenzene (UG/L)	100-41-4			O	0/ 276	0.0			NO
FREON-113 (UG/L)	76-13-1	2.2E+00	2.2E+00	D	1/ 149	0.7	1.1E+00	1.1E+00	NO
Fluorobenzene (UG/L)	462-06-6	3.9E+01	3.9E+01	D	1/ 1	100.0		3.9E+01	YES
Hexane (UG/L)	110-54-3			O	0/ 4	0.0			NO
Iodomethane (UG/L)	74-88-4			O	0/ 4	0.0			NO
Monobromobenzene (Phenyl bromide)	108-86-1			O	0/ 210	0.0			NO
O-Chloroflurobenzene (UG/L)	348-51-6	3.2E+01	3.2E+01	D	1/ 1	100.0		3.2E+01	YES
Styrene (UG/L)	100-42-5			O	0/ 33	0.0			NO
Tetrachloroethene (UG/L)	127-18-4	3.0E-01	2.5E+01	D	50/ 264	18.9	2.4E+00	2.4E+00	YES
Toluene (UG/L)	108-88-3	1.0E+00	8.0E+00	D	8/ 276	2.9	1.2E+00	1.2E+00	NO
Trichloroethylene (TCE) (UG/L)	79-01-6	6.0E-01	4.6E+01	X	139/ 273	50.9	4.7E+00	4.7E+00	YES
Trichlorofluoromethane (UG/L)	75-69-4			O	0/ 221	0.0			NO
Vinyl Acetate (UG/L)	108-05-4			O	0/ 76	0.0			NO
Vinyl Chloride (UG/L)	75-01-4			O	0/ 265	0.0			NO
Xylenes, Total (UG/L)	1330-20-7			O	0/ 270	0.0			NO