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ESC-205/99
December 18, 1999

00-TC/12-18

Mr. Richard B. Provencher, Director
Miamisburg Environmental Management Project
U.S. Department of Energy
P.O. Box 66
Miamisburg, OH 45343-0066

ATTENTION: Rob Rothman (2)

SUBJECT: Contract No. DE-AC24-97OH20044
CERCLA Documents for Parcel 4

REFERENCE: Statement of Work Requirement C 7.1e -- Regulator Reports

Dear Mr. Provencher:

BWXT of Ohio has completed the following CERCLA products for public review in support of the transfer of Parcel 4: Residual Risk Evaluation, Screening Level Ecological Risk Assessment and the Proposed Plan for Parcel 4.

Pending approval from your office to release the documents to the public, copies will be placed in the CERCLA Public Reading Room for a thirty day public review period that starts December 18, 2000 through January 16, 2001. If you or members of your staff have any questions regarding the documents, or if additional support is needed, please contact Dave Rakel at extension 4203.

Sincerely,

JSStapleton

Jeffrey S. Stapleton
Manager, Environmental Safeguards & Compliance

JSS/nmg

Enclosures as stated

cc: Tim Fischer, USEPA, (2) w/attachments
Brian Nickel, OEPA, (2) w/attachments
Ruth Vandegrift, ODH, (1) w/attachments
Dewain Eckman, DOE/MEMP, (1) w/attachments
John Ebersole, DOE/OH, (1) w/attachments
Dave Rakel, BWXT of Ohio, (2) w/attachments
Dann Bird, MMCIC, (2) w/attachments
Public Reading Room, (5) w/attachments
DCC

Proposed Plan for Parcel 4, The Mound Plant, Miamisburg, Ohio

Prepared by BWXT of Ohio, Inc.

Contract # DE-AC24-979OH20044

PUBLIC REVIEW DRAFT (REV. 0)

December 2000

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ACRONYMS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
BDP	Building Data Package
BVA	Buried Valley Aquifer
BWXTO	BWXT of Ohio
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
DOE	Department of Energy
FFA	Federal Facilities Agreement
FOD	Frequency of Detection
GV	Guideline Value
HI	Hazard Index
HQ	Hazard Quotient
IDM	Investigative Derived Material
MEMP	Miamisburg Environmental Management Project
MMCIC	Miamisburg Mound Community Improvement Corporation
NCP	National Contingency Plan
NFA	No Further Assessment
NPL	National Priority List
OEPA	Ohio Environmental Protection Agency
OSC	On-Scene Coordinator
OU	Operable Unit
pCi	picocurie
PAH	Polynuclear aromatic hydrocarbon
PETREX	(trade name for a type of soil sampling)
PRS	Potential Release Site
RB	Release Block
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study

ACRONYMS (continued)

ROD	Record of Decision
RRE	Residual Risk Evaluation
RREM	Residual Risk Evaluation Methodology
SM/PP	Special Metallurgical/Plutonium Processing
TPR	Technical Position Report in Support of Release Block Residual Risk Evaluation
UCL	Upper Confidence Limit
US DOE	United States Department of Energy
US EPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit

PROPOSED PLAN
PARCEL 4
Mound Plant, OHIO

1. SITE NAME, LOCATION, AND DESCRIPTION

The U.S. Department of Energy (US DOE) Mound Plant (CERCLIS ID-04935) is located within the city limits of Miamisburg, in southern Montgomery County, Ohio (Figure 1.1). The Site is approximately ten (10) miles south-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 unused open spaces. The Mound Plant will remain in industrial use into the future. This future use has been determined based upon agreement among DOE, United States Environmental Protection Agency (US EPA), Ohio Environmental Protection Agency (OEPA), and interested stakeholders. This land use is reflected in the Mound Comprehensive Reuse Plan of the Miamisburg Mound Community Improvement Corporation (MMCIC) and is currently codified in the City of Miamisburg Zoning Ordinance for industrial use.

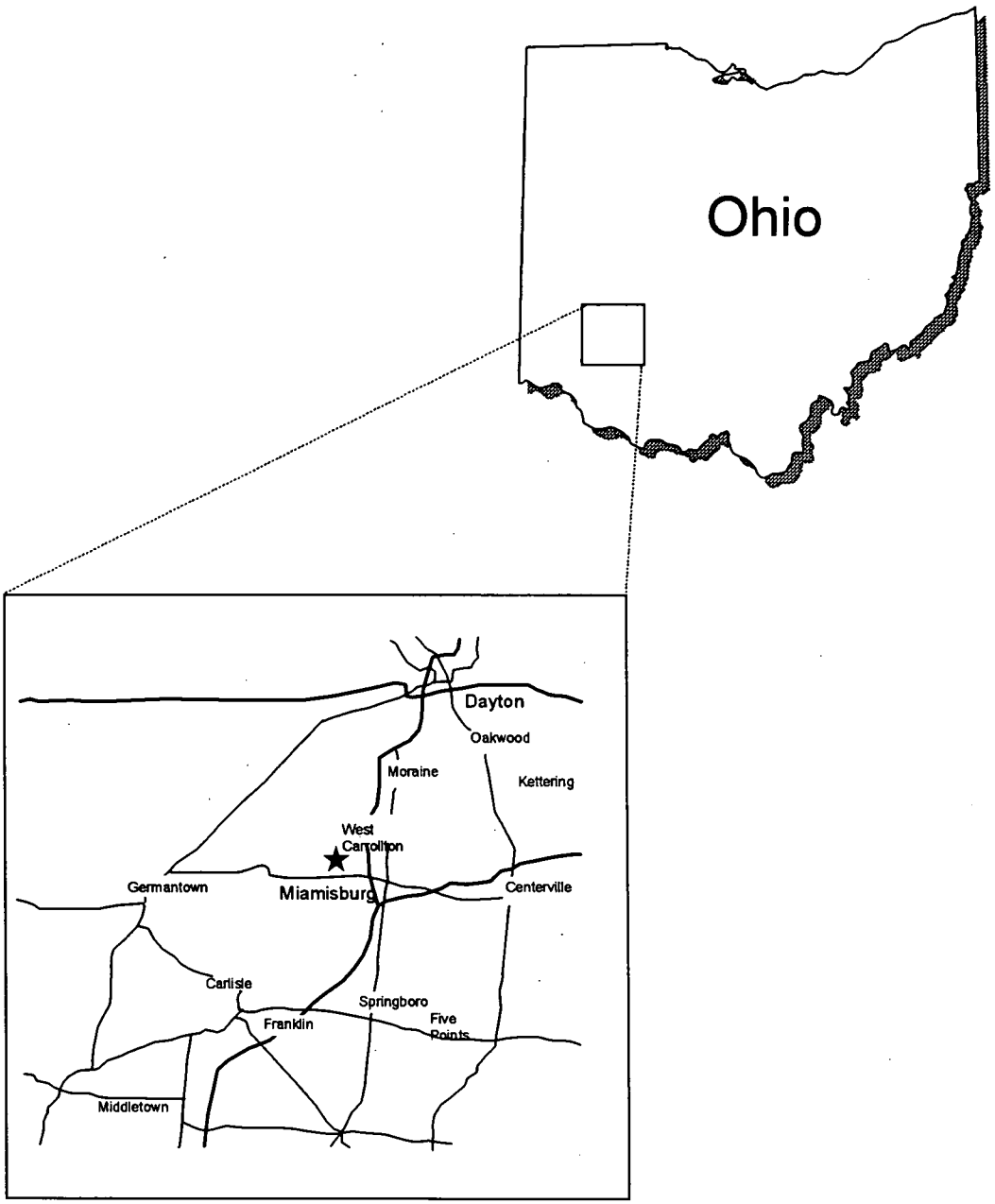
Mound Golf Course and Miamisburg Mound State Memorial Park, both directly east of the Mound facility across Mound Road, are frequented during favorable weather. The park is the site of a 68-foot high ancient Indian mound, located 380 feet east of the Mound Plant boundary. Other recreational areas within one (1) mile of the facility include the Miamisburg Municipal Park, Harmon Athletic Field, and Library Park. These areas are used extensively during the summer.

There are no large lakes within a 5-mile radius of the Site. Some vestiges of the old Miami-Erie Canal lie between the Norfolk Southern Railroad and Dayton-Cincinnati Pike west of the site. This remnant of the old Miami-Erie Canal is designated as Operable Unit (OU) 4. The major water body in the vicinity of the Mound Plant is the Great Miami River located approximately 2,000 feet to the west. The river is approximately 150 to 200 feet wide in this area.

Agricultural land within a 5-mile radial area around the Site is primarily used for corn and soybean production and for livestock grazing.

According to 1990 census figures, the population of Miamisburg is 17,834, Dayton is 182,044, and Montgomery County is 573,809.

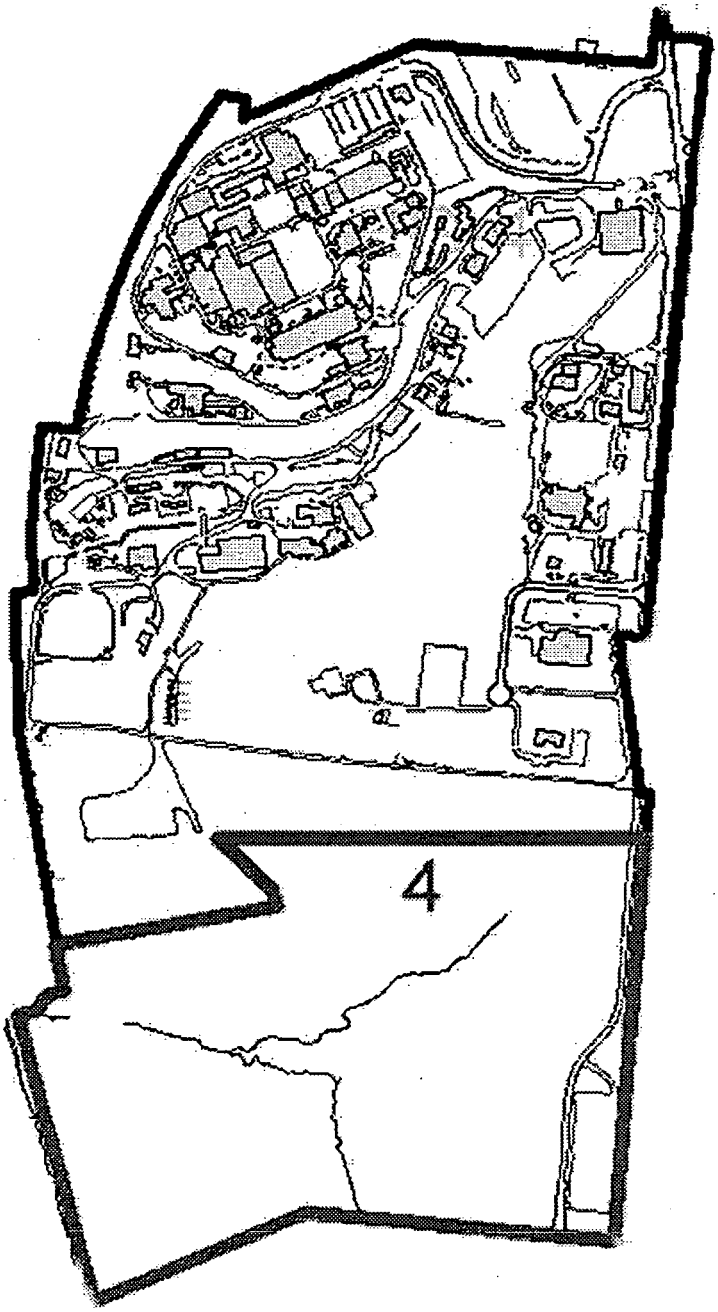
Figure 1.1 Regional Context of the Mound Plant



This Proposed Plan addresses Parcel 4 (Figure 1.2) which includes approximately 95 acres on the southern border of the plant site. Parcel 4 is generally bound to the north by the plant, to the east by off-site residences, to the south by Benner Road, and to the west by the Miami-Erie Canal.

Parcel 4 lies within what was once called Operable Unit 5 (OU5). There are no structures in Parcel 4. There are four Potential Release Sites (PRSs) in Parcel 4. 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 Parcel 4 is summarized in Table 2.1. Any residual risks associated with remaining contamination in Parcel 4 have been evaluated and are presented in the *Parcel 4 Residual Risk Evaluation* (RRE).

Figure 1.2 Location of Parcel 4



2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 History

The Mound facility was originally established by the DOE as an integrated research, development, and production facility that supported the nation's weapons and energy programs. To reconfigure and consolidate the nuclear complex, the DOE has decided to phase out the defense mission at Mound. As a result, the Mound Site has been designated an environmental management site and the plant is in the process of being remediated, transferred, and converted into a research and industrial site. Currently BWXT of Ohio, Inc. manages Mound for the DOE.

Early Mound Plant programs investigated the chemical and metallurgical properties of polonium-210 and its applications; particularly, the fabrication of neutron and alpha sources for weapon and non-weapon use. Investigations involving uranium, protactinium-231, and plutonium-239 were performed from 1950 to 1963 as part of the national civilian power reactor program. In 1954, Mound began the separation of stable isotopes.

In the mid-1950s, Mound initiated efforts to develop a large-scale process for the recovery of thorium from a variety of thorium-bearing ores. Even though this project was canceled prior to full-scale operation, approximately 1,650 tons of sludge containing thorium were received at Mound. Due to its corrosivity, the thorium sludge was continually repackaged and relocated. This resulted in a number of thorium-contaminated areas around the site.

Plutonium-238 research and development activity began at Mound in the mid-1950s. From the early 1960s to the late 1970s, Mound processed plutonium-238 for use in heat sources within Radioisotopic Thermal Generators (RTGs). The fabrication of heat sources from plutonium metal was terminated in the mid-1960s. Oxide processes continued into the late 1970s. Since early 1979, Mound has not handled unencapsulated plutonium-238.

As a result of historic disposal practices and contaminant releases to the environment, the Mound Plant was placed on the National Priorities List (NPL) on November 21, 1989. The DOE signed a *Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 120 Federal Facility Agreement* (FFA) with the US EPA, effective October 1990. In 1993, this agreement was modified and expanded to include the OEPA.

The PRSs at Mound were identified on the basis of potential radiological and

chemical (non-radioactive) contamination using knowledge of historical land use or on actual measurements of contaminants. The PRSs in Parcel 4 are listed in Table 2.1 along with the activity that caused concern and the evaluation results. There are no buildings in Parcel 4.

On August 26, 1981, DOE purchased 124 acres of land contiguous with and south of the original 182 acres at the Mound Plant. Parcel 4 was part of that purchase. The land, which was gently rolling until it approached the Mound Plant property line where it was steeply sloped, was used for agricultural purposes. DOE razed a two-story brick house, a barn, a frame tool shed and an outhouse and discarded appliances and some old implements and that were left by the former owner. A farm fence was put up around the perimeter. There are natural drainage channels and some groundwater seeps present year-round, but no surface water bodies such as streams or ponds on the land. Mound set up a flow activated water sampler to obtain runoff water during rain events. An archaeological survey was conducted in 1987. Although two sites were discovered, neither was regarded "as having eligibility for the National Register, and no further work is recommended at either location" (*An Archaeological Survey of Portions of the Mound Facility, Montgomery County, Ohio,* December 1987). Other than a construction gate, parking area, contractor storage area, road from Benner Road and an above ground power line running approximately north-south through the center of the property, the property remains undeveloped.

2.2 Enforcement and Agreements - Mound 2000

The DOE, the US EPA, and the OEPA had originally planned to address the Plant's environmental restoration issues under a set of OUs, each of which would include a number of PRSs. For each OU, the site would follow the traditional CERCLA process: a Remedial Investigation/Feasibility Study (RI/FS) followed by a Record of Decision (ROD), followed by Remedial Design/Remedial Action (RD/RA). After initiating remedial investigations for several OUs, the DOE and its regulators realized during a strategic review in 1995 that, for Mound, the OU approach was inefficient. The 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 documented in the Record of Decision. To evaluate any residual risk after all removals have been completed, a residual risk evaluation is conducted to ensure the conditions at the block or parcel do not pose an unacceptable risk to human health when the block or 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 US EPA 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 US EPA and OEPA rights to enforce the FFA.

Table 2.1 Parcel 4 PRSs and Core Team Conclusions

PRS	Reason for Identification	Core Team Decision	Close Out of PRS
306	SM/PP Hill Seep 0609	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 3/14/96.
314	Farm Trash Area	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 3/14/96.
406	Southern Portion of PRS 283	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 3/14/96.
419	Drainage Outflow Reroute	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 11/17/99.

The Mound 2000 process established a "Core Team" consisting of representatives of the Miamisburg Environmental Management Project (MEMP) of DOE, US EPA, and OEPA. The Core Team evaluates each of the potential contamination problems 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 the possible problem area. 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 potential problem area. The details of this process are explained in the *Workplan for Environmental Restoration at the Mound Plant, The Mound 2000 Approach* (December 1998).

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. Recently, the nineteen release blocks were reconfigured and renamed parcels. Currently, the Mound property is divided into ten parcels.

The Mound 2000 Residual Risk Evaluation Methodology (RREM), The Mound Plant, Final, Revision 0 (January 6, 1997) was developed as a framework for evaluating human health risks associated with residual levels of contamination. The RREM is applied to a release block once necessary remediation has been

completed, and the remaining PRSs or buildings in the release block have been designated as No Further Assessment (NFA). Once these environmental concerns have been adequately addressed by the Core Team, a residual risk evaluation is performed. The evaluation documents whether the release block is acceptable for industrial redevelopment. The results of the Residual Risk Evaluation for Parcel 4 are discussed in Section 4 through Section 6 of this Proposed Plan.

Overall total, background, and incremental carcinogenic and non-carcinogenic risks are presented in the Tables 6.1 through 6.3. The risk values in the table are broken out by media (i.e., groundwater, air, and soil) and are the sum of risks for all pathways for the construction worker and site employee scenarios. Overall carcinogenic and non-carcinogenic risks associated with exposure to soil and air fall within the acceptable risk range of 10^{-4} to 10^{-6} and an HI of less than one for both potential receptors. Total and incremental carcinogenic and non-carcinogenic risks exceed the acceptable risk range for the future construction worker and the future site employee due to potential exposure to groundwater. Incremental carcinogenic risk is within the acceptable risk range for the current construction worker and current site employee. Total carcinogenic risk is within the acceptable risk range for the current construction worker, but exceeds the acceptable risk range for the current site employee. Total and incremental non-carcinogenic risk for the current and future construction worker, and current and future site employee exceed an HI of one due to potential exposure to groundwater. The incremental non-carcinogenic risk exceeds the standard (HI=one) for the four scenarios listed in Tables 6.1 through 6.3. The incremental excess lifetime cancer risk exceeds the acceptable risk range (10^{-4} to 10^{-6}) for the Future Construction Worker Scenario (3.2×10^{-4}) and for the Future Site Employee Scenario (1.2×10^{-4}). Where overall risk exceeds acceptable levels, these risks are driven by exposure to groundwater. These exceedences result from the conservative nature of the groundwater analysis. The groundwater model does not take into account natural physical and chemical processes such as dilution, dispersion, adsorption, and soil properties that may reduce contaminant levels by the time it reaches the BVA. As a result, the future groundwater exposure point concentration is biased high and conservative. Specifically, using the maximum detection value (a single measurement) from a data set that spans approximately seventeen years as the concentration representing a contaminant of potential concern and assuming contaminants are present only in their most toxic form overestimate the risk. Details are provided in Section 6, Uncertainties. Given the conservative nature of the RRE and the associated uncertainties, the risks presented in this table represent the upper-bound plausible limit of risks (worst case scenario). Based on the protective measures presented in the Proposed Plan for Parcel 4 and the conservative

nature of the RRE, the future groundwater risks presented will be managed to be protective of human and environmental health.

A Record of Decision (ROD) will be generated for each piece of property to be transferred. The ROD will document the most appropriate remedy that meets statutory requirements and ensures protection of human health and the environment. The Core Team expects that institutional controls will be specified in the ROD for Parcel 4.

After the ROD for Parcel 4 is final, DOE will submit to US EPA and OEPA documentation that shows the property meets CERCLA 120 (h) (3) requirements. This documentation must be sent to the Administrator of US EPA for concurrence on the property transfer. After concurrence is obtained, the title of the property may be formally transferred. Prior to acceptance of the deed for any discrete parcel, the Buyer shall acknowledge that it has reviewed the existing environmental reports provided by DOE for the Mound Facility. Acceptance of the deed thereby acknowledges and commits the Buyer to abiding by institutional controls specified in the ROD.

3. HIGHLIGHTS OF PREVIOUS COMMUNITY PARTICIPATION

The community has been an active participant in this process to date. Comments from the public on the PRS recommendations 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. The Mound 2000 RREM has also gone through a public comment cycle and copies are in the CERCLA Public Reading Room. The RRE for Parcel 4 is in a public review cycle concurrent with this Proposed Plan.

Table 3.1 lists the Parcel 4 PRS Packages, along with the dates they were made available for public comment. This Proposed Plan will also have a thirty (30) day public comment period.

Table 3.1 Parcel 4 Documents and Public Comment Periods

DOCUMENT (PRS)	COMMENT PERIOD (BEGIN)	COMMENT PERIOD (END)
306	3/18/96	4/01/96
314	3/18/96	4/14/96
406	3/18/96	4/01/96
419	1/19/00	2/17/00
Parcel 4 Residual Risk Evaluation	Concurrent with this Proposed Plan	

4. SCOPE AND ROLE OF PARCEL 4

This Proposed Plan addresses one of ten separate parcels at Mound. These ten parcels may be reconfigured to accommodate transfer of Mound property for economic development.

A ROD will be generated for each piece of property to be transferred. The Proposed Plan and resulting ROD will document the most appropriate remedy that meets statutory requirements and ensures protection of human health and the environment. This Proposed Plan for Parcel 4 represents one of a number of Proposed Plans that will be generated for parts of the Mound site. As such, this Plan identifies the proposed final action for Parcel 4. Once the ROD for Parcel 4 is final and in effect, DOE could petition the US EPA to delist Parcel 4 from the NPL.

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

5. SITE CHARACTERISTICS

5.1 Geologic Setting

The bedrock section beneath the 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 the Mound Plant and underlies Parcel 4. The limestone beds range from 2 to 6 inches in thickness and the shale layers are commonly 5 to 8 feet thick.

Pleistocene age (less than about 2 million years old) glacial deposits at the Mound Plant include both till and outwash deposits. The till in the area of the 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 is horizontally layered, and commonly cross-bedded. The outwash in the vicinity of the 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 forms the Buried Valley Aquifer (BVA) and contiguous deposits. A general discussion of the geology is presented in the *Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan, Final* (May 1992).

5.2 Hydrogeologic Setting

There are two hydrogeologic regimes at the Mound Plant: flow through the bedrock beneath the Main Hill and the SM/PP Hill, and flow within the unconsolidated glacial deposits and alluvium associated with the Buried Valley Aquifer (BVA) in the Great Miami River Valley and the tributary valley between the Main Hill and SM/PP Hill. The BVA is a US EPA-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 the 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 OU9 Work Plan and the *Operable Unit 9; Hydrogeologic Investigation: Buried Valley Aquifer Report, Technical Memorandum, Revision 1* (September 1994) and *Operable Unit 9 Hydrogeologic Investigation: Bedrock Report,*

Technical Memorandum, Revision 0 (January 1994).

5.3 Available Data for Parcel 4

The PRSs in Parcel 4 have been evaluated by the Core Team. The following sections discuss the data relevant to Parcel 4 that are available from the general source documents and the Potential Release Site packages.

5.3.1 Background Data

Soils. Background concentrations measure the amount of a chemical that is naturally occurring (like metals) or anthropogenic (man-made but, for background purposes, 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 5.4 of this Proposed Plan. Regional background concentrations in soil were determined during investigations conducted in September 1994 and August 1995 and are documented in reports titled *Operable Unit 9 Background Soils Investigation Soil Chemistry Report* (September, 1994) and *Operable Unit 9,.Regional Soils Investigation Report* (August, 1995).

Groundwater. Background concentrations for groundwater were developed from two sources of data. For the Buried Valley Aquifer, background values were reported in the April 1995 *OU9 Hydrologic Investigation: Groundwater Sweeps Report*. Background concentrations for bedrock groundwater were reported in the February 1996 *OU5 New Property Remedial Investigation Report*.

5.3.2 Groundwater Contaminant Data

Groundwater data consist of water analyses of the Mound production wells screened within the Buried Valley Aquifer, 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. The RRE for Parcel 4 documents the specific groundwater data used to evaluate the current and future groundwater profile for Parcel 4.

5.3.3 PRS 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 Parcel 4.

Soil contaminant data for Parcel 4 are documented in a number of DOE reports. These references include:

- *OU-9 Regional Soils Investigation Report, Revision 2* (August, 1995) (Purpose was to give a regional soil description away from impacts of Mound operations.),

- *OU-3 Miscellaneous Sites Limited Field Investigation Report, Volumes 1, 2, and 3. Final, Revision 0* (July, 1993) (Purpose was to address areas noted in previous surveys; but, not thought to endanger human health or environment.),

- *OU-9 Site Scoping Report, Volume 3 - Radiological Site Survey, Final*, (June, 1993) (A compendium of existing data.),

- *OU-9 Surface Water and Sediment Report, Technical memo, Rev 2*, (September 1996) (Purpose was to sample surface water and sediment on the Mound Plant site, within the zone of influence of the Mound Plant air emissions, and outside the zone of influence of the Mound Plant air emissions.)

- *OU-5 New Property Extended Phase I Field Investigation Report, Final, Rev 0* (July, 1995) (Purpose was to augment previous reconnaissance survey with surface and subsurface sampling, groundwater sampling, and sediment sampling in ephemeral streams.),

- *Characterization Report for Soils at the EG&G Mound Waste Disposal (WD) Building* (February, 1992) (Investigation of soils in

the vicinity of WD Building. Sample from Parcel 4 was used for comparison.), and

- *OU-5 Remedial Investigation Report, Final, Rev. 0* (February, 1996) (Identifies nature and extent of contamination in ground water, surface water, soils, and sediment in Operable Unit 5.).

- Data Report, Parcel 4/5 Boundary Sampling, Draft, Rev. 0, (November, 2000) (Assures radioactive materials are not migrating onto Parcel 4.)

In the Mound 2000 process, radionuclide and chemical contaminants were studied on a PRS basis. The results, as taken from the PRS packages, are described below.

There are two Potential Release Sites (PRS 306 and 314) located entirely within Parcel 4. There are two PRSs (PRS 406 and 419) partially located in Parcel 4. The 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 these PRSs are shown in Figure 5.1.

The rationale for designation of PRS 306, 314, 406, and 419 is outlined as follows:

PRS 306, is a groundwater seep (seep 0609/0610). This seep is not suspected as a source of contamination to the groundwater. The seep is a surface expression of groundwater and could be an exposure point to possible contaminated groundwater if contamination exists. At the time the PRS 306 was described it was the only documented seep on the new property and the water quality at the seep was unknown. For this reason it was retained as a PRS until the groundwater quality could be analyzed.

PRS 314, the Farm Trash Area, was identified as a potential release site as a result of historical information which suggests that waste oil from farm operations may have contaminated this area prior to DOE's purchase of the property.

PRS 406 (previously known as the southern portion of PRS 283) became a PRS due to potential thorium from the thorium sludge redrumming. PRS 406 is located on the southern end of the Mound Plant operational area and on the northern end of the New Property and Parcel 4. Radiological

surveys conducted in 1983 indicated potential radiological contamination.

PRS 306, 314, and 406 were evaluated by the Core Team using information from the *OU-5 New Property Remedial Investigation Report, Final, Rev. 0* (February, 1996). All radiological concentrations reported in the vicinity of these PRSs were below guideline criteria. Twenty groundwater samples were collected from four monitoring wells, two borings, and eight seeps in the vicinity of these PRSs. Sample results detected TCE from well 411 and seep 617 at the MCL (8 ppb). Infrequent and scattered occurrences of Arsenic (As), Manganese (Mn), Nickel (Ni) and Chromium (Cr) are above background criteria; these metals do not appear to originate in current or past activities on Parcel 4. No plumes of contaminated groundwater were identified. The Core Team decided that PRS 306, 314, and 406 require No Further Assessment (NFA).

More recently, monitoring wells have been sampled. Monitoring wells in Parcel 4 are shown in Figure 5.2. Monitoring wells 400 and 319 show elevated levels of nickel. Additional site-wide investigations of elevated nickel are underway and monitoring is continuing.

PRS 419 is the Mound Plant Drainage Outflow Reroute. It was constructed in 1996 as part of the Miami-Erie Canal Remediation Project. It conveys the Plant's non-process and storm water to the Great Miami River. The effluent is monitored for a variety of chemicals and properties to demonstrate compliance with the Plant's National Pollutant Discharge Elimination System Permit (NPDES). The effluent is monitored for a variety of radioactive constituents to demonstrate compliance with DOE Order 5400.1. In November, 1999, the Core Team decided that PRS 419 required No Further Assessment (NFA).

5.3.4 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 (HTO), plutonium-238, and plutonium-239/240 reported in the *Residual Risk Evaluation, Release Block D, Final* (December, 1996) 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.

Figure 5.1 PRSs In Parcel 4

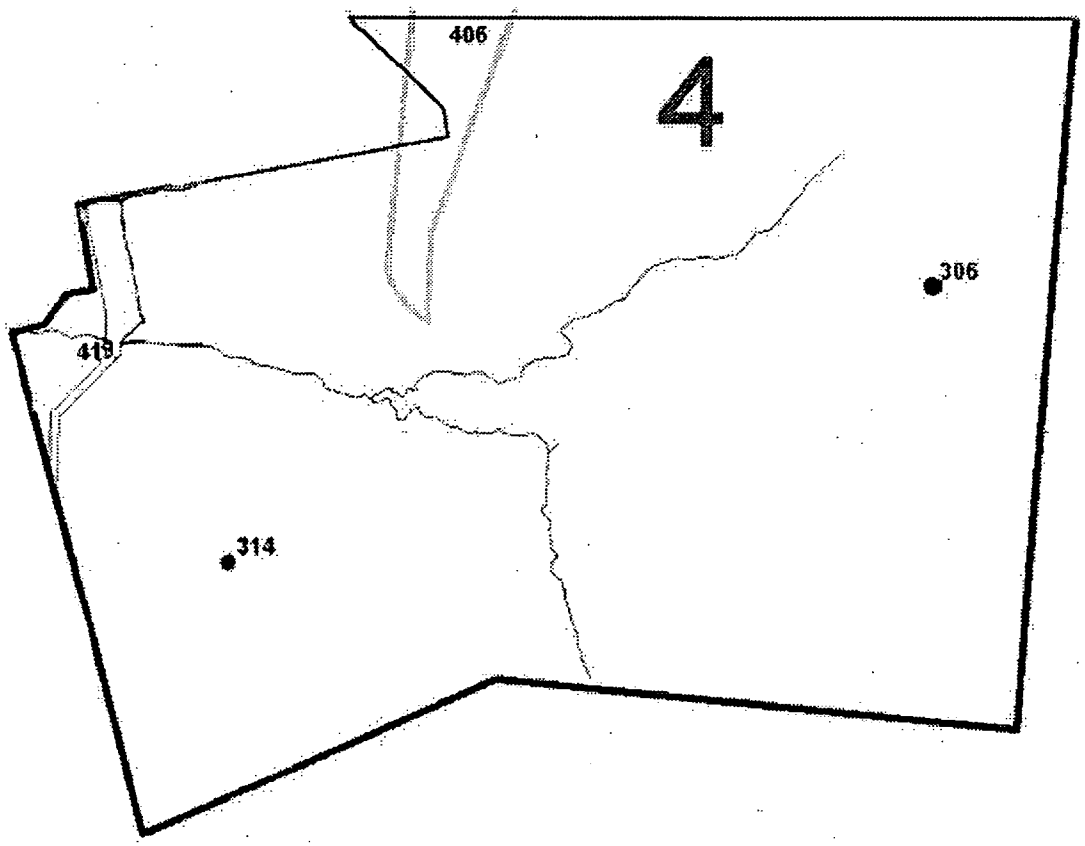
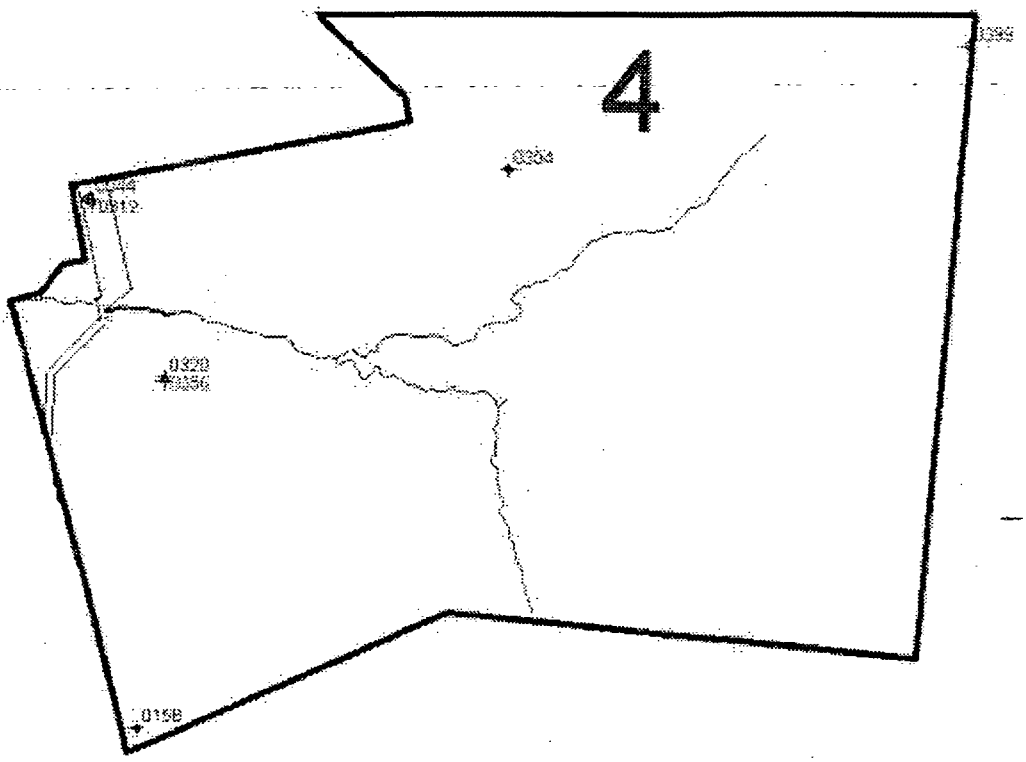


Figure 5.2 Monitoring Wells In Parcel 4



5.4 Summary of Contaminants Detected in Parcel 4

The complete list of all contaminants detected at least once within Parcel 4 is provided in the Parcel 4 RRE in Table 2.1 (Soil, Construction Worker Scenario), Table 2.3 (Soil, Site Employee Scenario), Table 2.5 (Current Groundwater, Construction Worker), Table 2.7 (Current Groundwater, Site Employee), Table 2.9 (Future Groundwater, Construction Worker), and Table 2.11 (Future Groundwater, Site Employee). These tables present the maximum concentration of each contaminant, and also present appropriate background concentrations, Guideline Values, and additional screening criteria for comparative purposes. These tables are reproduced in Appendix A of this Proposed Plan.

Only contaminants exceeding (1) background, (2) a base level of potential health concern, and (3) certain frequency of detection (FOD) criteria are carried through the RRE process. In general, whether or not a contaminant is present at or above background is determined by comparing the sample result to the 95% upper tolerance limit (UTL) for background data on that contaminant. Secondly, the levels of health concern used as screening criteria are the Guideline Values (GVs) established for Mound. GVs are media-specific concentrations of contaminants that correspond to certain risk levels for certain exposure scenarios. GVs for Mound were compiled in *Risk-Based Guideline Values, Mound Plant, Miamisburg, OH* (March 1997). Some of these values have been revised to reflect revised toxicity values and/or include the effect of additional decay products. Thirdly, FOD criteria are used to screen out contaminants when the compound is infrequently detected and there is no reason to believe the compound is present. Infrequently is defined, for RRE screening purposes, as a detection rate below 5% (one sample in 20). A more detailed discussion of the screening process is located in the *Mound 2000 Residual Risk Methodology*.

Contaminants carried forward in the RRE for Parcel 4 are identified in the Parcel 4 RRE in Table 2.2 (Soil, Construction Worker Scenario), Table 2.4 (Soil, Site Employee Scenario), Table 2.6 (Current Groundwater, Construction Worker), Table 2.8 (Current Groundwater, Site Employee), Table 2.10 (Future Groundwater, Construction Worker), and Table 2.12 (Future Groundwater, Site Employee). The tables document the results of the screening process by listing the reason that specific contaminants were screened out of the RRE. These tables are reproduced in Appendix A of this Proposed Plan.

5.4.1 Screening Results for Soil Contaminants

For the Construction Worker scenario, thirty-five organic (Volatile Organic Compounds and Semi-Volatile Organic Compounds), thirty inorganic

(metal), seventeen pesticides, three explosives, and twenty-one radiological compounds were considered as potential contaminants of concern for the soil component of the RRE. For the Site Employee scenario, eighteen organic (Volatile Organic Compounds and Semi-Volatile Organic Compounds), twenty-seven inorganic (metal), seventeen pesticides/PCBs, two explosives, and nineteen radiological compounds were considered as potential contaminants of concern for the soil component of the RRE. Soil concentrations of those compounds were compared to the screening criteria listed above to determine if a given compound should be included in the RRE.

Organic compounds. Because the organic contaminants found at Mound are generally not naturally-occurring substances, background concentrations were not available. The organic compounds were therefore screened against Guideline Values, and against the FOD factor (the contaminant must have been detected at least once in every 20 samples collected to be carried forward in the RRE). Using these screening criteria, the number of organic compounds was reduced to seven for the Construction Worker scenario and three for the Site Employee scenario. (See Tables 2.2 and 2.4 of the RRE, reproduced in Appendix A of this report.)

Inorganic compounds. Inorganic compounds were screened against background concentrations, Guideline Values, frequency of detection criteria, and whether they are common constituents of most soils, such as sodium and potassium. Compounds classified as human nutrients were eliminated from further consideration. Using these screening criteria, the number of inorganic compounds was reduced from thirty to five for the Construction Worker scenario and from twenty-seven to two for the Site Employee scenario.

Pesticides/PCBs. Pesticides/PCBs were screened against available background concentrations, Guideline values, and the FOD factor. Using these screening criteria, the number of pesticides was reduced to two for the Construction Worker scenario and four for the Site Employee scenario.

Explosives. Explosive concentrations were screened against available background concentrations, Guideline values, and the FOD factors. Using these criteria, the number of explosives was reduced to none for both the Construction Worker and Site Employee scenarios.

Radiological compounds. Radiological contaminants were screened against background and Guideline Values. Using these screening criteria, the number of radionuclides was reduced from twenty-one to five for the Construction Worker scenario and from nineteen to six for the Site Employee scenario.

5.4.2 Screening Results for the Current Groundwater Contaminants

"Current" groundwater contaminants are defined as those found in the Mound production wells (0076 and 0271). For screening purposes, eighteen organic, twenty-two inorganic, and seventeen radiological compounds were identified as potential contaminants of concern. Similar to the approach for soils data, current groundwater concentrations were screened against background, Guideline Values, and on the basis of whether they are common water quality parameters, such as alkalinity or dissolved solids that are not health-related parameters.

For both scenarios, the screening process reduced the number of organic contaminants from eighteen to none. For the Construction Worker scenario, the screening process reduced the number of inorganic contaminants from twenty-two to three. For the Site Employee scenario, the screening process reduced the number of inorganic contaminants from twenty-two to three. For the Construction Worker scenario, the screening process reduced the number of radiological contaminants from seventeen to one. For the Site Employee scenario, the screening process reduced the number of radiological contaminants from seventeen to five. (See Tables 2.6 and 2.8 of the RRE, reproduced in Appendix A of this report.)

5.4.3 Screening Results for the Future Groundwater Contaminants

Future groundwater contaminants are defined as those currently in the Mound production wells, combined with contaminants measured in Mound site bedrock monitoring wells. This definition assumes that all contaminants in the bedrock aquifer water (that exceed background) will migrate to the production wells within the BVA in the future. To create this combined list of contaminants, the bedrock contaminants were screened against BVA background concentrations. This list was combined with the current groundwater list. These contaminants were screened with respect to BVA background concentrations, Guideline Values, and whether they are common water quality parameters not associated with health impacts. The screening reduced the number of future organic contaminants for the Construction Worker scenario from twenty-three to

four, the inorganic contaminants from thirty-six to thirteen, and the radiological contaminants from eighteen to seven. The screening reduced the number of future organic contaminants for the Site Employee scenario from twenty-three to four, the inorganic contaminants from thirty-six to thirteen, and the radiological contaminants from eighteen to nine. (See Tables 2.10 and 2.12 of the RRE, reproduced in Appendix A of this report.)

6. SUMMARY OF SITE RISKS

For the Mound Plant, the human health risk associated with exposure to residual levels of contamination is evaluated pursuant to the Mound 2000 Residual Risk Evaluation Methodology (RREM) document described previously in this Proposed Plan. The RREM is applied to a limited area, such as a release block, after all necessary remediation has been completed and the remaining PRSs or buildings within that release block have been designated as NFA. Once the Core Team has determined that all environmental concerns have been adequately addressed, the residual risk evaluation is performed for confirmation and assess residual risk. The RRE consists of five steps:

Step 1: Identification of Contaminants to be Evaluated

Step 2: Exposure Assessment

Step 3: Toxicity Assessment

Step 4: Risk Characterization

Step 5: Evaluation of Potential Residual Risks

The information needed for Step 1 was presented in Section 5 of this Proposed Plan. Steps 2 through 5 are described below. After the Core Team reviews and approves an RRE, it is placed in the public reading room for a formal 30-day public review period.

6.1 Exposure Assessment

The two exposure scenarios examined in the Parcel 4 RRE involve an onsite construction worker, and a site employee engaged in non-construction activities. The construction worker and site employee are assumed to be exposed to soil contaminated at the levels described by currently available data. The workers are assumed to be exposed to the existing soil contamination both now and into the future. For the groundwater pathways, both current and future exposures are assumed. Current groundwater exposures are estimated based on the current

concentration levels in Mound production wells 0076 and 0271 (which are screened in the Buried Valley Aquifer) because they supply potable water to the Mound and represent a potential future potable water supply. The bedrock water under Parcel 4 is not a current source of drinking water.

Future groundwater contamination is assumed to be appropriately represented by combining current BVA contamination with additional contamination currently in the nearby bedrock aquifer. Bedrock aquifer groundwater from across the entire the Mound Plant is assumed to eventually mix with BVA water, and thereby contribute bedrock aquifer contamination to the BVA. It is this mix of BVA and bedrock contaminated water to which the future construction worker and site employee are assumed to be exposed.

6.1.1 Construction Worker Scenario

It is assumed that activities requiring earth-moving, such as construction of new buildings, will occur in Parcel 4. These construction activities could result in worker exposure to contaminants in soil, on dust particles, in air, and in groundwater. This scenario characterizes the potential exposure to a construction worker by assuming the worker is onsite eight hours per day, 250 days per year, for five years. The construction worker is assumed to be an adult weighing 70 kg. The amount of soil ingested is assumed to be 480 mg/day based on "heavy" construction work. All parameters needed to calculate intakes are listed in Table 3.1 of the Parcel 4 RRE.

6.1.2 Site Employee Scenario

It is assumed that normal activities associated with light industry, small business, and general office work will occur on the Parcel 4 property. These activities could result in worker exposure to contaminants in soil, on dust particles, in air, and in groundwater. This scenario characterizes the potential exposure of a site employee assumed to work on the property eight hours per day, 250 days per year, for 25 years. No exposure to potential interior building contamination is assumed or addressed here. The site employee is assumed to be an adult weighing 70 kg. The site employee is assumed to ingest 50 mg/day of contaminated soil, the amount incidentally ingested while working at the site. All parameters needed to calculate intakes are listed in Table 3.1 of the Parcel 4 RRE.

6.2 Identification of Exposure Pathways

An exposure pathway describes the course a chemical or radionuclide takes from

a source to an exposed individual. An exposure pathway generally consists of a source and mechanism of release, an environmental medium in which the contaminant is contained or transported, a human or environmental receptor, and an exposure route. As an example, a source of contamination could be shallow soil that received a spill, a release mechanism could be resuspension of the soil by wind action, the affected environmental medium would be the atmosphere into which the soil was suspended, and a construction worker would be the receptor. In this example, the exposure route would be inhalation. Other typical exposure routes include uptake by ingestion and/or dermal contact.

6.3 Residual Risk Evaluation

To estimate the residual risks associated with the use of Parcel 4, toxicity and exposure assessments were summarized and integrated into quantitative expressions of risk. Two types of risk characterization are performed. The first is the calculation of a Hazard Index (HI) for noncarcinogens. The second is the calculation of carcinogenic risk associated with cancer-causing compounds, including radionuclides. These calculations are performed for both the hypothetical construction worker and the hypothetical site employee. The results for Parcel 4 are summarized below.

6.3.1 Hazards and Risks for the Construction Worker

The RRE methodology established for Mound is intentionally conservative and tends to over-estimate hazards and risk. For the construction worker-related scenarios, a conservative assumption of daily exposure to Parcel 4 contamination throughout a five-year period was used.

6.3.1.1 Non-Cancer Risks

Overall hazards across all pathways, soil + air + current groundwater and soil + air + future groundwater, were summed to provide a Cumulative Hazard Index (HI). Cumulative Hazard Indices were developed for incremental, background, and total exposures. See Tables 6.1, 6.2, and 6.3, respectively. Background exposures and hazards are minimal. US EPA guidance sets a limit of 1.0 for the Cumulative Hazard Index. The current and future Cumulative Incremental Hazard Indices (1.5 and 5.5, respectively) exceed this limit.

The groundwater pathway makes the primary contribution (1.3) to the soil + air + current groundwater incremented cumulative HI (1.5).

Much of the non-carcinogenic risk for this scenario is attributable to daily ingestion of groundwater containing antimony. The uncertainties associated with the antimony concentration and the conclusion that it does not represent current conditions were presented in Section 6 of the RRE. Elimination of questionable May 6, 1991 antimony results would lower the estimated current total risk from an HI=1.3 for the construction worker down to an HI of 0.6 which is well below the acceptable risk threshold.

The larger value for the soil + air + future groundwater HI (5.5) is due to a predicted increase in hexavalent chromium and thallium concentrations in the BVA. The bedrock water is assumed to eventually mix with BVA groundwater, which is the potable water supply for the Mound Plant. Actual exposure to BVA groundwater is likely to be less than assumed here as the hazards were calculated assuming no dilution and using only the highest concentrations of chromium detected in groundwater. The uncertainties associated with this predictive model are discussed in greater detail in the RRE. It should be noted that the elevated levels of chromium and other metals in the bedrock and BVA groundwater are currently under investigation. No contaminant source areas are known to exist in Parcel 4.

6.3.1.2 Cancer Risks

Risks from carcinogenic, including radiological, contaminants across all pathways were summed to provide a cumulative risk based on incremental (i.e., above background) exposures. Cumulative risks were also developed based on background and total exposures. The results from the RRE are also shown in Tables 6.1, 6.2, and 6.3.

Currently, cumulative incremental cancer risks for the Parcel 4 construction worker (3.2×10^{-5}) are within the 10^{-4} to 10^{-6} (1 human in 10,000 to 1 human in 1,000,000 incremental cancer incidence) acceptable risk range established by CERCLA and the NCP. Much of the risk for this scenario (1.3×10^{-5}) is attributable to plutonium-238 observed in the soil.

Future cumulative incremental cancer risks for the Parcel 4 construction worker (3.2×10^{-4}) exceed the 10^{-4} to 10^{-6} (1 human in 10,000 to 1 human in 1,000,000 incremental cancer incidence) acceptable risk range established by CERCLA and the NCP. This

increase is due to potential presence of tritium in the future groundwater. The uncertainties associated with the future groundwater model results were presented in Section 6 of the RRE.

6.3.2 Hazards and Risks for the Site Employee

The RRE methodology established for Mound is intentionally conservative and tends to over-estimate hazards and risk. For the site employee-related scenarios, a conservative assumption of daily exposure to Parcel 4 contamination throughout a 25-year period was used.

6.3.2.1 Non-Cancer Risks

Overall hazards across all pathways for soil + air + current groundwater, and for soil+ air + future groundwater, were summed to provide a comprehensive Hazard Index. The HI is based on incremental exposures above background to a hypothetical site employee working at Parcel 4. Comprehensive Hazard Indices were also developed based on background and total exposures. See Tables 6.1, 6.2, and 6.3. Background exposure and hazards are minimal.

For current exposure conditions, the ingestion of antimony from groundwater dominates the incremental cumulative HI (1.1).

As seen previously, the primary difference between the calculated current and future groundwater incremental total HI (1.1 and 4.9, respectively) is due to the potential presence of hexavalent chromium, antimony, and thallium in modeled future groundwater.

6.3.2.2 Cancer Risks

Current cumulative incremental cancer risks for the Parcel 4 Site Employee (8.3×10^{-5}) is within, and future cumulative incremental cancer risk (1.2×10^{-4}) exceeds the 10^{-4} to 10^{-6} (1 human in 10,000 to 1 human in 1,000,000 incremental cancer incidence) acceptable risk range established by CERCLA and the NCP. Risks from carcinogenic, including radiological, contaminants across all pathways were summed to provide a cumulative risk based on incremental exposures (above background) background, and total exposures. See Tables 6.1, 6.2, and 6.3.

Table 6.1 Incremental Residual Risk for Parcel 4 Summary Table**

Scenario and Receptor	Media	Constituents	Pathway	Total Noncarcinogen Risk HI	Total Carcinogenic Risk ELCR
Construction Worker Scenario	Soil (all sample depths) Current and Future	Chemical and Radiological	Ingestion	1.6E-01	**1.7E-05**
			Dermal Contact	1.7E-03	4.0E-07
			Inhalation of Dust	NA	1.3E-08
			Inhalation of VOCs	NA	0.0E+00
			External	NA	**1.2E-05**
		Soil Total Risk		1.6E-01	**2.9E-05**
	Groundwater (Current)	Chemical and Radiological	Ingestion	**1.1E+00**	**2.1E-06**
			Dermal Contact	1.9E-01	NA
			Inhalation While Showering	NA	NA
		Current Groundwater Total Risk		**1.3E+00**	**2.1E-06**
	Groundwater (Future)	Chemical and Radiological	Ingestion	**4.9E+00**	**9.6E-06**
			Dermal Contact	4.6E-01	**2.8E-04**
			Inhalation While Showering	4.8E-04	7.6E-08
		Future Groundwater Total Risk		**5.4E+00**	**2.9E-04**
	Air*	Radiological	Inhalation	NA	2.0E-07
		Air Total Risk		NA	2.0E-07
	Cumulative Incremental Current Risk			**1.5E+00**	**3.2E-05**
	Cumulative Incremental Future Risk			**5.5E+00**	**3.2E-04**
Site Employee Scenario	Soil (0-2 ft bls) Current and Future	Chemical and Radiological	Ingestion	3.2E-05	**3.0E-06**
			Inhalation of Dust	NA	2.5E-08
			Inhalation of VOCs	NA	NA
			External	NA	**6.1E-05**
		Soil Total Risk		3.2E-05	**6.4E-05**
	Groundwater (Current)	Chemical and Radiological	Ingestion	**1.1E+00**	**1.8E-05**
		Current Groundwater Total Risk		**1.1E+00**	**1.8E-05**
	Groundwater (Future)	Chemical and Radiological	Ingestion	**4.9E+00**	**5.4E-05**
		Future Groundwater Total Risk		**4.9E+00**	**5.4E-05**
	Air*	Radiological	Inhalation	NA	9.9E-07
		Air Total Risk		NA	9.9E-07
	Cumulative Incremental Current Risk			**1.1E+00**	**8.3E-05**
	Cumulative Incremental Future Risk			**4.9E+00**	**1.2E-04**

bls - below land surface

NA - Not applicable

*RRE values for air were brought forward from the Technical Position Report for Release Blocks D and H. (DOE 1999).

Numbers written as 1.0E-03 equal $1x10^{-3}$

**Source: Parcel 4 RRE Table 5.21. (DOE 2000)

Note: Negative risk values were not added into the total incremental risk.

Table 6.2 Background Residual Risk for Parcel 4 Summary Table**

Scenario and Receptor	Media	Constituents	Pathway	Total Noncarcinogen Risk HI	Total Carcinogenic Risk ELCR
Construction Worker Scenario	Soil (all sample depths) Current and Future	Chemical and Radiological	Ingestion	2.7E-02	**1.6E-06**
			Dermal Contact	4.0E-05	NA
			Inhalation of Dust	NA	2.8E-10
			Inhalation of VOCs	NA	NA
			External	NA	**5.3E-06**
		Soil Total Risk		2.7E-02	**6.9E-06**
	Groundwater (Current)	Chemical and Radiological	Ingestion	1.4E-02	NA
			Dermal Contact	2.4E-03	NA
			Inhalation While Showering	NA	NA
		Current Groundwater Total Risk		1.7E-02	NA
	Groundwater (Future)	Chemical and Radiological	Ingestion	2.1E-01	**2.3E-06**
			Dermal Contact	1.5E-02	**6.5E-06**
			Inhalation While Showering	NA	1.7E-09
		Future Groundwater Total Risk		2.3E-01	**8.8E-06**
	Air*	Radiological	Inhalation	NA	7.7E-09
		Air Total Risk		NA	7.7E-09
	Cumulative Background Current Risk			1.7E-02	6.9E-06
	Cumulative Background Future Risk			2.5E-01	**1.6E-05**
Site Employee Scenario	Soil (0-2 ft bls) Current and Future	Chemical and Radiological	Ingestion	6.4E-04	**1.3E-06**
			Inhalation of Dust	NA	3.2E-09
			Inhalation of VOCs	NA	NA
			External	NA	**4.3E-05**
		Soil Total Risk		6.4E-04	**4.4E-05**
	Groundwater (Current)	Chemical and Radiological	Ingestion	1.4E-02	**3.3E-06**
		Current Groundwater Total Risk		1.4E-02	**3.3E-06**
	Groundwater (Future)	Chemical and Radiological	Ingestion	**1.2E+00**	**5.5E-06**
		Future Groundwater Total Risk		**1.2E+00**	**5.5E-06**
	Air*	Radiological	Inhalation	NA	3.9E-08
		Air Total Risk		NA	3.9E-08
	Cumulative Background Current Risk			1.5E-02	**4.8E-05**
	Cumulative Background Future Risk			**1.2E+00**	**5.0E-05**

bls - below land surface

NA - Not applicable

*RRE values for air were brought forward from the Technical Position Report for Release Blocks D and H. (DOE 1999).

Numbers written as 1.0E-03 equal $1x10^{-3}$

**Source: Parcel 4 RRE Table 5.20. (DOE 2000)

Table 6.3 Total Residual Risk for Parcel 4 Summary Table**

Scenario and Receptor	Media	Constituents	Pathway	Total Noncarcinogen Risk HI	Total Carcinogenic Risk ELCR
Construction Worker Scenario	Soil (all sample depths) Current and Future	Chemical and Radiological	Ingestion	1.9E-01	**1.5E-05**
			Dermal Contact	1.7E-03	4.0E-07
			Inhalation of Dust	NA	9.4E-09
			Inhalation of VOCs	NA	NA
			External	NA	**1.8E-05**
		Soil Total Risk		1.9E-01	**3.3E-05**
	Groundwater (Current)	Chemical and Radiological	Ingestion	**1.1E+00**	**2.1E-06**
			Dermal Contact	1.9E-01	NA
			Inhalation While Showering	NA	NA
		Current Groundwater Total Risk		**1.3E+00**	**2.1E-06**
	Groundwater (Future)	Chemical and Radiological	Ingestion	**5.1E+00**	**9.9E-06**
			Dermal Contact	4.8E-01	**2.9E-04**
			Inhalation While Showering	4.8E-04	7.7E-08
		Future Groundwater Total Risk		**5.5E+00**	**3.0E-04**
	Air*	Radiological	Inhalation	NA	2.1E-07
		Air Total Risk		NA	2.1E-07
	Cumulative Total Current Risk			**1.5E+00**	**3.6E-05**
	Cumulative Total Future Risk			**5.7E+00**	**3.3E-04**
Site Employee Scenario	Soil (0-2 ft bls) Current and Future	Chemical and Radiological	Ingestion	6.7E-04	**4.4E-06**
			Inhalation of Dust	NA	2.8E-08
			Inhalation of VOCs	NA	NA
			External	NA	**1.0E-04**
		Soil Total Risk		6.7E-04	**1.0E-04**
	Groundwater (Current)	Chemical and Radiological	Ingestion	**1.1E+00**	**2.2E-05**
		Current Groundwater Total Risk		**1.1E+00**	**2.2E-05**
	Groundwater (Future)	Chemical and Radiological	Ingestion	**5.1E+00**	**5.9E-05**
		Future Groundwater Total Risk		**5.1E+00**	**5.9E-05**
	Air*	Radiological	Inhalation	NA	1.0E-06
		Air Total Risk		NA	1.0E-06
	Cumulative Total Current Risk			**1.1E+00**	**1.3E-04**
	Cumulative Total Future Risk			**5.1E+00**	**1.6E-04**

bls - below land surface

NA - Not applicable

*RRE values for air were brought forward from the Technical Position Report for Release Blocks D and H. (DOE 1999).

Numbers written as 1.0E-03 equal $1x10^{-3}$

**Source: Parcel 4 RRE Table 5.19. (DOE 2000)

The soil and groundwater pathways make comparable contributions to the incremental risk (6.4×10^{-5} from soil, and 1.8×10^{-5} from current groundwater, and 5.4×10^{-5} from future groundwater). Much of the risk for this scenario is attributable to radium-228 in the soil; plutonium-239/240, thorium-228, thorium-230, actinium-227, and uranium-234 in current groundwater; and tritium in the modeled future groundwater.

6.4 Conclusions

Overall total, background, and incremental carcinogenic and non-carcinogenic risks are presented in Tables 6.1 through 6.3. The risk values in the table are broken out by media (i.e., groundwater, air, and soil) and are the sum of risks for all pathways for the construction worker and site employee scenarios. Overall carcinogenic and non-carcinogenic risks associated with exposure to soil and air fall within the acceptable risk range of 10^{-4} to 10^{-6} and an HI of less than one for both potential receptors. Total and incremental carcinogenic and non-carcinogenic risks exceed the acceptable risk range for the future construction worker and the future site employee due to potential exposure to groundwater. Incremental carcinogenic risk is within the acceptable risk range for the current construction worker and current site employee. Total carcinogenic risk is within the acceptable risk range for the current construction worker, but exceeds the acceptable risk range for the current site employee. Total and incremental non-carcinogenic risk for the current and future construction worker, and current and future site employee exceed an HI of one due to potential exposure to groundwater. The incremental non-carcinogenic risk exceeds the standard (HI=one) for the four scenarios listed in Tables 6.1 through 6.3. The incremental excess lifetime cancer risk exceeds the acceptable risk range (10^{-4} to 10^{-6}) for the Future Construction Worker Scenario (3.2×10^{-4}) and for the Future Site Employee Scenario (1.2×10^{-4}). Where overall risk exceeds acceptable levels, these risks are driven by exposure to groundwater. These exceedences result from the conservative nature of the groundwater analysis. The groundwater model does not take into account natural physical and chemical processes such as dilution, dispersion, adsorption, and soil properties that may reduce contaminant levels by the time it reaches the BVA. As a result, the future groundwater exposure point concentration is biased high and conservative. Specifically, using the maximum detection value (a single measurement) from a data set that spans approximately seventeen years as the concentration representing a contaminant of potential concern and assuming contaminants are present only in their most toxic form overestimate the risk. Details are provided in Section 6, Uncertainties. Given the conservative nature of the RRE and the associated uncertainties, the risks presented in this table represent the upper-bound plausible limit of risks (worst case scenario). Based on

the protective measures presented in the Proposed Plan for Parcel 4 and the conservative nature of the RRE, the future groundwater risks presented will be managed to be protective of human and environmental health.

Because the scope of the RRE was limited to industrial use, the soils within Parcel 4 have not been evaluated for unrestricted release (e.g. residential use). Disposition of Parcel 4 soils without proper handling, sampling and management could create an unacceptable risk to human health and the environment.

6.5 Ecological Risk

Based on the results of an ecological characterization of the Mound Plant (*OU-9 Ecological Characterization Report* (March, 1994)), there are no federal threatened or endangered species documented and none are expected to occur on Parcel 4. The OU9 Ecological Characterization also concluded there were no critical habitats of endangered species on Parcel 4.

The site lies within the range of the Indiana bat, a federally listed endangered species and the eastern massasauga, a docile rattlesnake that may soon receive status as a federal candidate species. The snake is currently listed as endangered by the State of Ohio. The Indiana bat and the eastern massasauga are not expected to occur on the parcel for the following reasons:

- During the 1994 OU9 Ecological Characterization, the United States Forest and Wildlife Service provided a letter to the Department of Energy indicating that although the Mound Plant lies within the range of the Indiana bat, no habitat for this species was present.

- Surveys for reptiles and amphibians during the ecological characterization revealed several species of snakes in and along the Miami Erie Canal and overflow creek and on Parcel 4, the eastern massasauga was not found. Potential habitat for the eastern massasauga was very limited and the species is considered not to occur on or in the vicinity of Parcel 4.

During the OU9 ecological characterization study field surveys, two state-protected species were found: the dark-eyed junco, a state-endangered bird, and the inland rush, a state endangered grass. The dark-eyed junco is a common winter visitor throughout most of the eastern US. At the Mound Plant, numerous individuals were found in the fall and winter in several areas on the north and south properties. The inland rush was found in a seasonal grassland seepage area on the south property and is apparently a casual waif. As such, it is not expected to be a permanent part of the Mound Plant flora.

An Ecological Baseline Risk Assessment was performed for OU-5; no ecological contaminants of concern were identified (*OU-5 New Property Remedial Investigation Report, Final Rev 0* (February 1996)). The conservative *Parcel 4 Screening Level Ecological Risk Evaluation* (December 2000) concluded that there is a potential for adverse effects on terrestrial organism from residual chemical contamination (i.e., metals). However, refinement of the preliminary COPCs found that the potential for adverse ecological affects due to site-related waste disposal activities is low. The refinement included a background evaluation, re-calculation of Hazard Quotients (HQ) using an average exposure point concentration (i.e., 95% UCL), evaluation of bioavailability of COPCs, adjustment of the area use factor, and re-evaluation of ecological screening levels.

7. DESCRIPTIONS 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 Parcel 4, a remedy must be implemented to protect human heath and the environment into the future. Two alternatives were considered for Parcel 4:

Alternative 1, No Action

Regulations governing the Superfund program require that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, DOE would take no action at Parcel 4 to prevent exposure to soil and groundwater contamination.

Alternative 2, Institutional Controls

Institutional controls in the form of deed restrictions on future land use would be placed on Parcel 4. The objective of these institutional controls is to prevent an unacceptable risk to human health and the environment by restricting the use of Parcel 4, including Parcel 4 soils, to that which is consistent with assumptions in the Parcel 4 RRE. DOE or its successors would retain the right and responsibility to monitor, maintain, and enforce these institutional controls. In order to maintain protection of human health and the environment at Parcel 4 in the future, institutional controls (in the form of deed restrictions) would be adopted.

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 the removal of Parcel 4 soils from the DOE Mound property (as owned in 1998) boundary without approval from the Ohio Department of Health and the Ohio Environmental Protection Agency.

8. EVALUATION OF ALTERNATIVES

The USEPA has developed threshold, balancing and modifying criteria to aid in the evaluation of alternatives. There are two (2) threshold criteria, five (5) balancing criteria and two (2) modifying criteria. An evaluation of the alternatives in terms of these criteria follows.

8.1 THRESHOLD CRITERIA - *must be met for an alternative to be eligible for selection:*

8.1.1 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, evaluation was made of the risks posed by unrestricted use of the property. Deed restrictions are therefore required as a mechanism to ensure the continued future use of Parcel 4 is limited to industrial/commercial purposes and to prohibit groundwater usage.

8.1.2 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 which 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 under specified conditions. For Parcel 4, "Maximum Contaminant Levels" or "MCLs" established under the Safe Drinking Water Act constitute chemical-specific ARARs and are listed in Appendix B. They apply to the groundwater beneath Parcel 4. There is evidence of contamination above MCLs in this ground water. Consequently, ARARs with respect to ground water are not met by Alternative 1, but are met by Alternative 2.

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., floodplains, wetlands, historic places, etc. For Parcel 4, Ohio has identified two statutory provisions that describe site conditions that would prompt certain response actions. (See Appendix B). These provisions are similar to location-specific ARARs. Alternative 2 meets both of 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. For Alternative 2, the remedy is an institutional control - deed restrictions. The ARARs are applicable State requirements concerning the recording of deeds. (See Appendix B). Alternative 2 will comply with these requirements.

It should be noted that any onsite management of Parcel 4 soils, not associated with a CERCLA response action, in a manner inconsistent with State law or any disposition of Parcel 4 soils away from the Mound Superfund Site would be subject to applicable Ohio regulations, which are enforceable independent of CERCLA.

8.2 BALANCING CRITERIA - *used to weigh major trade-offs among alternatives:*

8.2.1 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, provides some degree of 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 Parcel 4.

Because this remedy will result in hazardous substances remaining in Parcel 4 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.

8.2.2 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 Parcel 4 was accomplished previously on an individual PRS basis.

8.2.3 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. Alternative 2, Institutional Controls, provides this assurance.

8.2.4 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. Alternative 2, Institutional Controls, 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, USDOE dated February 17, 1999.

8.2.5 CRITERIA 7: Cost

The range of costs is zero dollars ($0) for Alternative 1, No Action, to approximately $5,000 annually for the maintenance of the deed restrictions for Alternative 2, Institutional Controls.

8.3 MODIFYING CRITERIA - *to be considered after public comment is received on the Proposed Plan and of equal importance to the balancing criteria*:

8.3.1 CRITERIA 8: State/Support Agency Acceptance

Both US EPA 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 Alternative 2, Institutional Controls.

8.3.2 CRITERIA 9: Community Acceptance

To evaluate community acceptance, this Proposed Plan will be the subject of a formal public comment and review period of 30 days.

9. THE PREFERRED ALTERNATIVE

The preferred alternative is Alternative 2, Institutional Controls, in the form of deed restrictions on future land use. DOE or its successors would retain the right and responsibility to monitor, maintain and enforce these institutional controls. The objective of these restrictions is:

- 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 Parcel 4 soils from the DOE Mound property (as owned in 1998) boundary without approval from the Ohio Department of Health and the Ohio Environmental Protection Agency.

The soils within Parcel 4 have not been evaluated for any use other than on-site industrial use. Any off-site disposition of Parcel 4 soil without proper handling, sampling and management could create an unacceptable risk to off-site receptors.

The initial costs associated with these deed restrictions are those associated with the writing and recording of the restrictions with the deed. DOE will ensure the deed restrictions are implemented prior or upon property transfer. The costs associated with monitoring and enforcing the land use and property deed restrictions are estimated to be $5,000 per year.

10. OPPORTUNITIES FOR COMMUNITY PARTICIPATION

This Proposed Plan will be available for public review and comment from December 18, 2000 to January 16, 2001. During this time, a public meeting will be held to discuss the Plan.

All of the supporting documentation for this Proposed Plan is located in the Administrative Record File, which is available for public review at the Mound CERCLA Public Reading Room located at the Miamisburg Senior Adult Center. Any questions or

comments related to this Proposed Plan should be forwarded to Ms. Jane Greenwalt, Public Affairs Officer, DOE/MEMP at (937) 865-3116 or via e-mail at jane.greenwalt@em.doe.gov. Should you have questions or comments you wish to present directly to the regulators, the points-of-contact are Mr. Tim Fischer and Mr. Brian Nickel of the US EPA and OEPA, respectively. Mr. Fischer can be reached at (312) 886-5787; Mr. Nickel can be reached at (937) 285-6468.

11. REFERENCES

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

Operable Unit 3 Miscellaneous Sites Limited Field Investigation Report, Volumes 1, 2, and 3, Final, Revision 0, July 1, 1993.

Operable Unit 9 Site Scoping Report, Volume 3 - Radiological Site Survey, Final, June 1, 1993.

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

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

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

Operable Unit 9 Ecological Characterization Report, Mound Plant, Montgomery County Ohio, March 1994.

Operable Unit 5 New Property Remedial Investigation Report, Final, Revision 0, February 1996.

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

Operable Unit 9 Regional Soils Investigation Report, Revision 2, August 1, 1995.

Residual Risk Evaluation, Release Block D, Final, Rev. 0, December 1996.

The Mound 2000 Residual Risk Evaluation Methodology (RREM), Mound Plant, Final, Revision 0, January 6, 1997.

Workplan for Environmental Restoration at the Mound Plant, The Mound 2000 Approach, December 1998.

Risk-Based Guideline Values, Mound Plant, Miamisburg, Ohio, Final, Rev. 4, March 1997.

Residual Risk Evaluation, Mound Plant, Parcel 4, Draft (Rev. 3), December 2000.

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

Screening Level Ecological Risk Assessment, Parcel 4, Public Review Draft, December 2000.

An Archaeological Survey of Portions of the Mound Facility, Montgomery County, Ohio, December 1987.

Operable Unit 9, Regional Soils Investigation Report, August 1995.

OU-9 Surface Water and Sediment Report, Technical memo, Rev. 2, September 1996.

Mound Laboratory Environmental Plutonium Study 1974 (MLM-02249), September 1975.

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

Characterization Report for Soils at the EG&G Mound Waste Disposal (WD) Building, February 1992.

OU-9 Ecological Characterization, March 1984.

PRSs 306/314/406 Data Package, April 1996.

PRS 419 Data Package, April 2000.

Parcel 4 Ecological Risk Evaluation, Draft, October 2000.

Appendix A

Contaminant of Potential Concern Screening Tables
From Parcel 4 RRE

Table 2.1 Initial Identification of Soil Constituents of Potential Concern for the Construction Worker in Parcel 4.
(Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guideline Value	Reference	Rationale for Contaminant Deletion or Selection
Metals												
7429-90-5	Aluminum	363	21400.00	mg/kg	B409	65-65	12700	21400.00	19000.00	21000.00	b, f	YES
7440-36-0	Antimony	0.27	42.20	mg/kg	MND33-0103	20-48	12.6	42.20		8.50	a	YES
7440-38-2	Arsenic	1.7	17.10	mg/kg		65-65	6.99	17.10	8.60	6.40	a	YES
7440-39-3	Barium	2	133.00	mg/kg	CH	65-65	86.5	133.00	180.00	1500.00	b	NO:2,3
13966-02-4	Beryllium	0.12	0.94	mg/kg	CH	50-65	0.66	0.94	1.30	0.70	c	NO:2
14733-03-0	Bismuth	0.76	70.40	mg/kg	CJ	48-51	73.3	70.40				YES
7440-43-9	Cadmium	0.31	7.70	mg/kg	MND33-0103	14-65	1.02	7.70	2.10	21.00	a	NO:3
7440-70-2	Calcium	812	175000.00	mg/kg	NPS1	65-65	108000	175000.00	310000.00			NO:2
	Cerium	23.60	50.90	mg/kg		8-8	NC	50.90				YES
7440-47-3	Chromium	1	30.50	mg/kg	MND33-0103	65-65	17.9	30.50	20.00	110.00	a	NO:3
10198-40-0	Cobalt	0.37	14.40	mg/kg	B409	65-65	12.0	14.40	19.00			NO:2
7440-50-8	Copper	1.4	27.50	mg/kg		65-65	17.5	27.50	26.00	790.00	a, f	NO:3
57-12-5	Cyanide	0.12	0.38	mg/kg	MND33-0103	8-65	0.31	0.38		430.00	a	NO:3
7439-89-6	Iron	1300	40500.00	mg/kg		65-65	22100	40500.00	35000.00			NO:4
15067-28-4	Lead	2	255.00	mg/kg		65-65	20.6	255.00	48.00			YES
7439-93-2	Lithium	2.7	41.40	mg/kg	B409	45-46	17.6	41.40	26.00			YES
7439-95-4	Magnesium	583	68800.00	mg/kg	MND33-0103	65-65	21700	68800.00	40000.00			YES
7439-96-5	Manganese	42.3	5240.00	mg/kg		65-65	1010	5240.00	1400.00	2700.00	b	YES
7439-97-6	Mercury	0.14	0.42	mg/kg	NPS6	4-65	0.07	0.42		6.40	b	NO:3
7439-98-7	Molybdenum	0.56	15.70	mg/kg		45-46	9.52	15 70	27.00			NO:2
	Neodymium	16.5	33.40	mg/kg		7-8	NC	33.40				YES
7440-02-0	Nickel	2.8	26.20	mg/kg	CJ	62-65	22.0	26.20	32.00	430.00	a	NO:2,3
13966-00-2	Potassium	157	4320.00	mg/kg	B409	60-65	2530	4320.00	1900.00			NO:4
7782-49-2	Selenium	0.29	2.20	mg/kg	CJ	10-65	0.54	2.20		110.00	a, f	NO:3
7440-22-4	Silver	0.35	17.00	mg/kg	MND33-0103	9-65	1.88	17.00	1.70	110.00	a	NO:3
13966-32-0	Sodium	26.7	865.00	mg/kg		50-65	410	865.00	240.00			NO:4
14913-50-9	Thallium	0.35	2.10	mg/kg		11-50	0.66	2.10	0.46	1.70	a, f	YES
7440-31-5	Tin	1.6	41.10	mg/kg		7-52	6.9	41.10	20.00	13000.00	a, f	NO:3
7440-62-2	Vanadium	0.45	37.00	mg/kg	B409	63-65	34.9	37.00	25.00	150.00	a	NO:3
7440-66-6	Zinc	4.1	1310.00	mg/kg		65-65	65.5	1310.00	140.00	6400.00	a	NO:3

Table 2.1 Initial Identification of Soil Constituents of Potential Concern for the Construction Worker in Parcel 4.
(Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guideline Value	Reference	Rationale for Contaminant Deletion or Selection
Semi-Volatile Organic Compounds												
120-82-1	1,2,4-Trichlorobenzene	33.0	33.00	ug/kg	MND33-0104	1-58	239	33.00				NO:1
95-57-8	2-Chlorophenol	38.0	38.00	ug/kg	MND33-0104	1-58	238	38.00				NO:1
91-57-6	2-Methylnaphthalene	63.0	110.00	ug/kg		2-58	238	110.00				NO:1
59-50-7	4-Chloro-3-methylphenol	7.0	7.00	ug/kg	MND33-0104	1-58	263	7.00				NO:1
	Acenaphthene	42.0	120.00	ug/kg		2-58	252	120.00				NO:1
	Acenaphthylene	44.0	290.00	ug/kg		4-58	243	290.00				YES
	Anthracene	50.0	690.00	ug/kg		7-58	243	690.00		6400000.00	a	NO:3
56-55-3	Benzo(a)anthracene	58.0	2800.00	ug/kg		10-58	325	2800.00		4100.00	d	NO:3
50-32-8	Benzo(a)pyrene	40.0	2500.00	ug/kg		11-58	330	2500.00		410.00	d	YES
205-99-2	Benzo(b)fluoranthene	35.0	4800.00	ug/kg		21-58	439	4800.00		4100.00	d	YES
191-24-2	Benzo(g,h,i)perylene	47.0	250.00	ug/kg		8-58	241	250.00				YES
207-08-9	Benzo(k)fluoranthene	58.0	8600.00	ug/kg		19-58	524	8600.00		41000.00	d	NO:3
65-85-0	Benzoic Acid	12.0	86.00	ug/kg		5-55	1710	86.00		85000000.00	a	NO:3
117-81-7	Bis(2-ethylhexyl)phthalate	34.0	340.00	ug/kg	B401	11-58	241	340.00		215000.00	d	NO:3
	Carbazole	41.0	420.00	ug/kg		4-50	219	420.00				YES
218-01-9	Chrysene	43.0	2400.00	ug/kg		12-58	321	2400.00		410000.00	d	NO:3
84-74-2	Di-n-butyl Phthalate	25.0	420.00	ug/kg	NPS5	8-58	252	420.00		2100000.00	a	NO:3
117-84-0	Di-n-octyl Phthalate	47.0	130.00	ug/kg	B408	3-58	240	130.00		430000.00	a	NO:3
	Dibenz(a,h)anthracene	46.0	130.00	ug/kg		4-58	240	130.00		410.00	c, f	NO:3
	Dibenzofuran	42.0	250.00	ug/kg		2-58	243	250.00				NO:1
206-44-0	Fluoranthene	39.0	5000.00	ug/kg		21-58	433	5000.00		850000.00	a	NO:3
	Fluorene	50.0	460.00	ug/kg		5-58	246	460.00		850000.00	a, f	NO:3
	Indeno(1,2,3-cd)pyrene	67.0	850.00	ug/kg		8-58	253	850.00		410.00	c, f	YES
	Naphthalene	200.0	200.00	ug/kg		1-58	237	200.00				NO:1
85-01-8	Phenanthrene	78.0	3700.00	ug/kg		10-58	338	3700.00				YES
108-95-2	Phenol	23.0	23.00	ug/kg	MND33-0104	1-58	243	23.00		13000000.00	a	NO:1
129-00-0	Pyrene	25.0	3300.00	ug/kg		21-58	371	3300.00		640000.00	a	NO:3
Volatile Organic Compounds												
78-93-3	2-Butanone	8.5	8.50	ug/kg	NPS3	1-65	6.11	8.50		930000.00	b	NO:1
67-64-1	Acetone	12.0	55.00	ug/kg		9-65	10.3	55.00		2100000.00	a	NO:3
56-23-5	Carbon Tetrachloride	9.6	9.60	ug/kg	NPS3	1-65	3.74	9.60		12000.00	c	NO:1
100-41-4	Ethylbenzene	2.1	2.10	ug/kg	NPS3	1-65	3.61	2.10		50.00	b	NO:1
	Hexane	4.0	10.00	ug/kg		2-53	6.24	10.00		9100.00	b	NO:1
75-09-2	Methylene Chloride	6.0	97.00	ug/kg	NPS3	10-65	10.9	97.00		100000.00	b	NO:3
108-88-3	Toluene	1.0	4.70	ug/kg	NPS3	3-65	3.66	4.70		25000.00	b	NO:1
	Xylenes, Total	2.1	2.10	ug/kg		1-65	3.61	2.10		43000000.00	a	NO:1

Table 2.1 Initial Identification of Soil Constituents of Potential Concern for the Construction Worker in Parcel 4. (Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guideline Value	Reference	Rationale for Contaminant Deletion or Selection
Pesticides/PCBs												
72-54-8	4,4'-DDD	0.4	6.60	ug/kg	B409	2-64	2.6	6.60	4.20			NO:1
72-55-9	4,4'-DDE	0.25	3.50	ug/kg	MND22-4101	6-64	2.07	3.50	4.30	9000.00	d	NO:2,3
50-29-3	4,4'-DDT	0.19	0.48	ug/kg		4-65	2.69	0.48	13.00	9000.00	c	NO:2,3
309-00-2	Aldrin	0.074	0.35	ug/kg	B401	6-64	1.26	0.35		180.00	c, f	NO:3
5103-71-9	Alpha Chlordane	0.044	3.50	ug/kg		6-65	1.97	3.50		8500.00	c, f	NO:3
319-86-8	Delta-BHC	0.08	5.30	ug/kg	MND22-4101	3-65	1.64	5.30				NO:1
60-57-1	Dieldrin	0.31	1.20	ug/kg		4-65	2.17	1.20		185.00	c	NO:3
33213-65-9	Endosulfan I	0.051	0.27	ug/kg	B407	3-63	1.81	0.27		130000.00	a, f	NO:1
33213-65-9	Endosulfan II	0.053	7.10	ug/kg	MND22-4001	5-65	2.41	7.10		130000.00	a, f	NO:3
1031-07-8	Endosulfan Sulfate	0.13	0.56	ug/kg	MND22-4101	2-65	3.35	0.56				NO:1
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	4-60	3.34	0.93				YES
53494-70-5	Endrin Ketone	0.24	0.86	ug/kg		4-65	3.43	0.86				YES
5103-74-2	Gamma Chlordane	0.058	0.93	ug/kg	MND22-4003	2-65	1.85	0.93		8500.00	c, f	NO:1
58-89-9	Gamma-BHC (Lindane)	0.065	0.095	ug/kg	MND22-4101	2-65	1.26	0.10		2300.00	d, f	NO:1
1024-57-3	Heptachlor	0.056	1.20	ug/kg		7-65	1.17	1.20		660.00	d, f	NO:3
1024-57-3	Heptachlor Epoxide	0.072	0.94	ug/kg	MND22-4102	6-65	1.79	0.94		280.00	a, f	NO:3
72-43-5	Methoxychlor	0.13	0.95	ug/kg	MND22-4101	4-63	23.2	0.95	30.00			NO:2
Explosives												
99-65-0	1,3-Dinitrobenzene	0.098	0.098	mg/kg	B405	1-41	0.89	0.10				NO:1
118-96-7	2,4,6-Trinitrotoluene	0.20	0.20	mg/kg	B405	1-41	0.86	0.20				NO:1
	Tetryl	0.29	0.29	mg/kg		1-41	1.34	0.29				NO:1

Table 2.1 Initial Identification of Soil Constituents of Potential Concern for the Construction Worker in Parcel 4.
(Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guideline Value	Reference	Rationale for Contaminant Deletion or Selection
Radionuclides												
AC-227DA	Actinium-227	0.13	2.01	pCi/g		14-130	0.23	2.01		1.00	e	YES
14596-10-2	Americium-241	0.05	0.21	pCi/g		5-188	0.13	0.21		4.95	e	NO:1
10045-97-3	Cesium-137	0.06	0.90	pCi/g		130-188	0.36	0.90	0.42	0.46	e	YES
10198-40-0	Cobalt-60	0.04	0.90	pCi/g		3-188	0.05	0.90				NO:1
14255-04-0	Lead-210	0.38	3.35	pCi/g		94-117	1.76	3.35		1.65	e, f	YES
13994-20-2	Neptunium-237	0.023	0.067	pCi/g	#6B	6-8	NC	0.07		1.50	e, f	NO:3
13981-16-3	Plutonium-238	0.013	55.40	pCi/g		142-480	87	55.40	0.13	5.50	e	YES
PU-239/240	Plutonium-239	0.01	0.011	pCi/g		3-10	NC	0.01	0.18	5.50	e	NO:2,3
PU-239/240	Plutonium-239/240	0.0039	0.21	pCi/g		18-63	0.02	0.21	0.18	5.50	e	NO:3
13982-10-0	Plutonium-242	0.0102	0.01	pCi/g	GJ	1-31	0.02	0.01				NO:1
13966-00-2	Potassium-40	10.5	34.46	pCi/g	B405	56-67	22.6	34.46	37.00			NO:2
13982-63-3	Radium-226	0.39	3.26	pCi/g		137-180	1.34	3.26	2.00	0.14	e	YES
	Radium-228	0.636	2.57	pCi/g		10-10	NC	2.57		0.10	e, f	YES
10098-97-2	Strontium-90	0.158	2.77	pCi/g	B405	4-37	1.07	2.77	0.72	3.00	e	NO:3
14274-82-9	Thorium-228	0.195	1.79	pCi/g		66-80	1.07	1.79	1.50	0.16	e	YES
14269-63-7	Thorium-230	0.15	2.69	pCi/g		79-178	3.57	2.69	1.90		g	YES
7440-29-1	Thorium-232	0.037	5.60	pCi/g	S1049	184-491	0.83	5.60	1.40	0.10	e, f	YES
10028-17-8	Tritium	0.066	3.00	pCi/g		7-64	0.88	3.00	1.60	23500.00	e	NO:3
13966-29-5	Uranium-234	0.33	1.17	pCi/g	B406	56-65	0.77	1.17	1.10	37.50	e	NO:3
15117-96-1	Uranium-235	0.019	0.20	pCi/g	B406	46-51	0.09	0.20	0.11	3.35	e	NO:3
24678-82-8	Uranium-238	0.32	1.95	pCi/g		110-115	1.08	1.95	1.20	0.12	e	YES

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion + inhalation
c= 10^{-6} cancer risk for ingestion + inhalation
d= 10^{-6} cancer risk for ingestion
e= 10^{-6} cancer risk for ingestion + inhalation + external
f= Calculated values based on procedures in Mound's approved Risk-Based Guidance Values, Final Rev. 4, March 1997 and updated toxicity criteria
g= Guideline Value was removed(under Core Team review)

NO:1 - <5% Detects
NO:2 - <Background
NO:3 - < Screening Toxicity Value
NO:2,3 - <Background,Screening Toxicity
NO:4 - Essential Human Nutrient

Table 2.2 Final Identification of Soil Constituents of Potential Concern for the Construction Worker in Parcel 4. (Exposure Point Concentration (EPC) Compared to Background)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening (EPC)	Background Value	Rationale for Contaminant Deletion or Selection
Metals										
7429-90-5	Aluminum	363	21400.00	mg/kg	B409	65-65	12700	12700.00	19000.00	NO
7440-36-0	Antimony	0.27	42.20	mg/kg	MND33-0103	20-48	12.6	12.60		YES
7440-38-2	Arsenic	1.7	17.10	mg/kg		65-65	6.99	6.99	8.60	NO
14733-03-0	Bismuth	0.76	70.40	mg/kg	CJ	46-51	73.3	70.40		YES
	Cerium	23.60	50.90	mg/kg		8-8	NC	50.90		YES
15067-28-4	Lead	2	255.00	mg/kg		65-65	20.6	20.60	48.00	NO
7439-93-2	Lithium	2.7	41.40	mg/kg	B409	45-46	17.6	17.60	26.00	NO
7439-95-4	Magnesium	583	68800.00	mg/kg	MND33-0103	65-65	21700	21700.00	40000.00	NO
7439-96-5	Manganese	42.3	5240.00	mg/kg		65-65	1010	1010.00	1400.00	NO
	Neodymium	16.5	33.40	mg/kg		7-8	NC	33.40		YES
14913-50-0	Thallium	0.35	2.10	mg/kg		11-50	0.66	0.66	0.48	YES
Semi-Volatile Organic Compounds										
	Acenaphthylene	44.0	290.00	ug/kg		4-58	243	243.00		YES
50-32-8	Benzo(a)pyrene	40.0	2500.00	ug/kg		11-58	330	330.00		YES
205-99-2	Benzo(b)fluoranthene	35.0	4800.00	ug/kg		21-58	439	439.00		YES
191-24-2	Benzo(g,h,i)perylene	47.0	250.00	ug/kg		8-58	241	241.00		YES
	Carbazole	41.0	420.00	ug/kg		4-50	219	219.00		YES
	Indeno(1,2,3-cd)pyrene	67.0	850.00	ug/kg		8-58	253	253.00		YES
85-01-8	Phenanthrene	78.0	3700.00	ug/kg		10-58	338	338.00		YES
Pesticides/PCBs										
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	4-60	3.34	0.93		YES
53494-70-5	Endrin Ketone	0.24	0.86	ug/kg		4-65	3.43	0.86		YES
Radionuclides										
AC-227DA	Actinium-227	0.13	2.01	pCi/g		14-130	0.23	0.23		YES
10045-97-3	Cesium-137	0.06	0.90	pCi/g		130-188	0.36	0.36	0.42	NO
14255-04-0	Lead-210	0.34	3.35	pCi/g		94-117	1.76	1.76		YES
13981-16-3	Plutonium-238	0.013	55.40	pCi/g		142-480	87	55.40	0.13	YES
13982-63-3	Radium-226	0.39	3.26	pCi/g		137-180	1.34	1.34	2.00	NO
	Radium-228	0.636	2.57	pCi/g		10-10	NC	2.57		YES
14274-82-9	Thorium-228	0.195	1.79	pCi/g		66-80	1.07	1.07	1.50	NO
14269-63-7	Thorium-230	0.15	2.69	pCi/g		79-178	3.57	2.69	1.90	YES
7440-29-1	Thorium-232	0.037	5.60	pCi/g	S1049	184-491	0.83	0.83	1.40	NO
24678-82-8	Uranium-238	0.32	1.95	pCi/g		110-115	1.08	1.08	1.20	NO

UCL - Upper Confidence Limit
EPC Exposure Point Concentration= minimum of either 95% UCL or maximum detected concentration

Table 2.3 Initial Identification of Surface Soil Constituents of Potential Concern for the Site Employee in Parcel 4. (Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guidance Values	Reference	Rationale for Contaminant Deletion or Selection
Metals												
7429-90-5	Aluminum	1680	21400	mg/kg	B409	22-22	8570.00	21400	19000.00	190000.00	b, f	YES
7440-36-0	Antimony	26.1	42.2	mg/kg	MND33-0103	8-21	367.00	42.20		82.00	a	NO:3
7440-38-2	Arsenic	3.90	11.80	mg/kg	B406	22-22	7.00	11.80	8.60	61.00	a	NO:3
7440-39-3	Barium	12.4	111.00	mg/kg		22-22	58.30	111.00	180.00	14000.00	b	NO:2,3
13966-02-4	Beryllium	0.12	0.85	mg/kg		21-22	0.70	0.85	1.30	1.30	c	NO:2,3
14733-03-0	Bismuth	0.76	28.50	mg/kg	CJ	12-14	NC	28.50				YES
7440-43-9	Cadmium	0.31	7.70	mg/kg	MND33-0103	11-22	40.10	7.70	2.10	200.00	a	NO:3
7440-70-2	Calcium	812	150000.00	mg/kg		22-22	662000.00	150000.00	310000.00			NO:2
7440-47-3	Chromium	1.7	30.50	mg/kg	MND33-0103	22-22	26.70	30.50	20.00	1000.00	a	NO:3
10198-40-0	Cobalt	1.4	14.40	mg/kg	B409	22-22	10.80	14.40	19.00			NO:2
7440-50-8	Copper	3.4	21.70	mg/kg		22-22	18.10	21.70	26.00	7600.00	a, f	NO:2,3
57-12-5	Cyanide	0.12	0.38	mg/kg	MND33-0103	8-22	0.35	0.38		4100.00	a	NO:3
7439-89-6	Iron	2790	28800.00	mg/kg		22-22	17600.00	28800.00	35000.00			NO:2
15067-28-4	Lead	5.4	32.00	mg/kg	B401	22-22	19.20	32.00	48.00			NO:2
7439-93-2	Lithium	2.7	27.30	mg/kg	B409	12-13	NC	27.30	26.00			YES
7439-95-4	Magnesium	583	68800.00	mg/kg	MND33-0103	22-22	110000.00	68800.00	40000.00			NO:4
7439-96-5	Manganese	116	1250.00	mg/kg	MND22-4101	22-22	722.00	1250.00	1400.00	15000.00	b	NO:2,3
7439-97-6	Mercury	0.14	0.14	mg/kg		1-22	0.07	0.14		61.00	b	NO:1
7439-98-7	Molybdenum	0.56	6.20	mg/kg	B409	13-13	NC	6.20	27.00			NO:2
7440-02-0	Nickel	2.8	25.80	mg/kg		21-22	30.10	25.80	32.00	4100.00	a	NO:2,3
13966-00-2	Potassium	270	3550.00	mg/kg	B409	22-22	1650.00	3550.00	1900.00			NO:4
7440-22-4	Silver	12	17.00	mg/kg	MND33-0103	8-22	149.00	17.00	1.70	1000.00	a	NO:3
13966-32-0	Sodium	26.7	530.00	mg/kg	MND22-4101	21-22	407.00	530.00	240.00			NO:4
14913-50-9	Thallium	0.43	0.44	mg/kg		8-22	0.89	0.44	0.46	16.00	a, f	NO:2,3
7440-31-5	Tin	2.6	4.80	mg/kg	MND22-4102	3-14	NC	4.80	20.00			NO:2
7440-62-2	Vanadium	0.75	37.00	mg/kg	B409	22-22	33.20	37.00	25.00	1400.00	a	NO:3
7440-66-6	Zinc	6.7	74.10	mg/kg		22-22	45.50	74.10	140.00	61000.00	a	NO:2,3
Semi-Volatile Organic Compounds												
120-82-1	1,2,4-Trichlorobenzene	33	33	ug/kg	MND33-0104	1-15	NC	33.00		2040000.00	b, f	NO:3
95-57-8	2-Chlorophenol	38	38	ug/kg	MND33-0104	1-15	NC	38.00		10200000.00	a, f	NO:3
91-57-6	2-Methylnaphthalene	63	63	ug/kg	B401	1-15	NC	63.00				YES
59-50-7	4-Chloro-3-methylphenol	7	7	ug/kg	MND33-0104	1-15	NC	7.00				YES
56-55-3	Benzo(a)anthracene	58	58	ug/kg	B401	1-15	NC	58.00		7800.00	d	NO:3
50-32-8	Benzo(a)pyrene	51	51	ug/kg	B401	1-15	NC	51.00		780.00	d	NO:3
205-99-2	Benzo(b)fluoranthene	37	98	ug/kg	B401	4-15	NC	98.00		7800.00	d	NO:3
207-08-9	Benzo(k)fluoranthene	65	170	ug/kg	B401	4-15	NC	170.00		78000.00	d	NO:3
65-85-0	Benzoic Acid	12	12	ug/kg	MND33-0104	1-15	NC	12.00		820000000.00	a	NO:3
218-01-9	Chrysene	78	78	ug/kg	B401	1-15	NC	78.00		780000.00	a	NO:3
84-74-2	Di-n-butyl Phthalate	25	68	ug/kg		3-15	NC	68.00		20000000.00	a	NO:3
206-44-0	Fluoranthene	39	110	ug/kg	B401	4-15	NC	110.00		8200000.00	a	NO:3
85-01-8	Phenanthrene	78	78	ug/kg	B401	1-15	NC	78.00				YES
108-95-2	Phenol	23	23	ug/kg	MND33-0104	1-15	NC	23.00		120000000.00	a	NO:3
129-00-0	Pyrene	25	120	ug/kg	MND33-0103	7-15	NC	120.00		6100000.00	a	NO:3
Volatile Organic Compounds												
67-64-1	Acetone	13	17	ug/kg	MND22-4101	2-22	7.16	17.00		20000000.00	a	NO:3
75-09-2	Methylene Chloride	6	14	ug/kg		7-22	9.54	14.00		100000.00	d	NO:3
108-88-3	Toluene	2	2	ug/kg		1-22	3.12	2.00		25000.00	b	NO:1

Table 2.3 Initial Identification of Surface Soil Constituents of Potential Concern for the Site Employee in Parcel 4. (Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guidance Values	Reference	Rationale for Contaminant Deletion or Selection
Pesticides/PCBs												
72-54-8	4,4'-DDD	0.4	6.60	ug/kg	B409	2-21	4.04	6.60	4.20			YES
72-55-9	4,4'-DDE	0.25	3.50	ug/kg	MND22-4101	3-22	2.36	3.50	4.30	17000.00	d	NO:2,3
50-29-3	4,4'-DDT	0.19	0.25	ug/kg	B406	3-22	5.46	0.25	13.00	17000.00	c	NO:2,3
309-00-2	Aldrin	0.074	0.35	ug/kg	B401	6-22	2.38	0.35		340.00	c, f	NO:3
5103-71-9	Alpha Chlordane	0.04	1.10	ug/kg	MND22-4003	3-22	6.87	1.10		16000.00	c, f	NO:3
319-86-8	Delta-BHC	0.08	5.3	ug/kg	MND22-4101	3-22	4.67	5.3				YES
60-57-1	Dieldrin	0.96	0.96	ug/kg	MND22-4003	1-22	1.95	0.96		360.00	c	NO:1
33213-65-9	Endosulfan I	0.05	0.27	ug/kg	B407	3-22	6.11	0.27		1200000.00	a, f	NO:3
33213-65-9	Endosulfan II	0.05	7.10	ug/kg	MND22-4001	4-22	4.45	7.10		1200000.00	a, f	NO:3
1031-07-8	Endosulfan Sulfate	0.13	0.56	ug/kg	MND22-4101	2-22	10.20	0.56				YES
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	3-22	9.30	0.93				YES
53494-70-5	Endrin Ketone	0.24	0.25	ug/kg	B407	2-22	10.10	0.25				YES
5103-74-2	Gamma Chlordane	0.058	0.93	ug/kg	MND22-4003	2-22	5.92	0.93		16000.00	c, f	NO:3
58-89-9	Gamma-BHC (Lindane)	0.065	0.095	ug/kg	MND22-4101	2-22	2.05	0.10		4400.00	d, f	NO:3
1024-57-3	Heptachlor	0.056	0.32	ug/kg	MND22-4102	3-22	1.62	0.32		1300.00	c, f	NO:3
1024-57-3	Heptachlor Epoxide	0.072	0.94	ug/kg	MND22-4102	4-22	7.05	0.94		630.00	c, f	NO:3
72-43-5	Methoxychlor	0.13	0.95	ug/kg	MND22-4101	4-22	204.00	0.95	30.00			NO:2
Explosives												
99-65-0	1,3-Dinitrobenzene	0.10	0.10	mg/kg	B405	1-7	NC	0.10		20.00	a, f	NO:3
118-96-7	2,4,6-Trinitrotoluene	0.2	0.20	mg/kg	B405	1-7	NC	0.20		100.00	a, f	NO:3
Radionuclides												
AC-227	Actinium-227	0.13	2.01	pCi/g		14-124	0.24	2.01		1.10	e	YES
14596-10-2	Americium-241	0.05	0.21	pCi/g		5-137	0.09	0.21		9.20	e	NO:1
10045-97-3	Cesium-137	0.055	0.895	pCi/g		119-137	0.37	0.90	0.42	0.42	e	YES
10198-40-0	Cobalt-60	0.04	0.09	pCi/g		3-137	0.04	0.09		0.09	e	NO:1
14255-04-0	Lead-210	0.38	3.35	pCi/g		94-117	1.76	3.35		3.20	e, f	YES
13994-20-2	Neptunium-237	0.023	0.067	pCi/g	#6B	4-6	NC	0.07		1.60	e, f	NO:3
13981-16-3	Plutonium-238	0.013	55.40	pCi/g		88-358	20.40	55.40	0.13	11.00	e	YES
PU-239/240	Plutonium-239	0.01	0.011	pCi/g	CANAL NW	3-5	NC	0.011	0.18	10.00	e	NO:2,3
PU-239/240	Plutonium-239/240	0.004	0.192	pCi/g		14-37	0.02	0.19	0.18	10.00	e	NO:3
13966-00-2	Potassium-40	12.5	34.46	pCi/g	B405	24-24	23.80	34.46	37.00			NO:2
13982-63-3	Radium-226	0.64	3.26	pCi/g		95-131	1.41	3.26	2.00	0.13	e	YES
	Radium-228	0.636	2.57	pCi/g		10-10	NC	2.57		0.09	e, f	YES
10098-97-2	Strontium-90	0.158	2.10	pCi/g	#4B	2-14	NC	2.10	0.72	57.00	e	NO:3
14274-82-9	Thorium-228	0.21	1.66	pCi/g	B405	38-40	1.03	1.66	1.50	0.16	e, f	YES
14269-63-7	Thorium-230	0.316	2.69	pCi/g		41-138	4.21	2.69	1.90			YES
7440-29-1	Thorium-232	0.037	5.60	pCi/g	S1049	141-369	0.73	5.60	1.40	0.09	e, f	YES
13966-29-5	Uranium-234	0.57	1.17	pCi/g	B406	20-25	0.86	1.17	1.10	70.00	e	NO:3
15117-96-1	Uranium-235	0.025	0.20	pCi/g	B406	24-27	0.09	0.20	0.11	3.10	e	NO:3
24678-82-8	Uranium-238	0.32	1.95	pCi/g		72-75	1.23	1.95	1.20	0.12	e, f	YES

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion + inhalation
c= 10^{-6} cancer risk for ingestion + inhalation
d= 10^{-6} cancer risk for ingestion
e= 10^{-6} cancer risk for ingestion + inhalation + external
f= Calculated values based on procedures in Mound's approved Risk-Based Guidance Values, Final Rev. 4, March 1997 and updated toxicity criteria
g= Guideline Value was removed (under Core Team review)

NO:1 - <5% Detects
NO:2 - <Background
NO:3 - < Screening Toxicity Value
NO:2,3 - <Background,Screening Toxicity
NO:4 - Essential Human Nutrient

Table 2.4 Final Identification of Surface Soil Constituents of Potential Concern for the Site Employee in Parcel 4. (Exposure Point Concentration Compared to Background Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening (EPC)	Background Value	Rationale for Contaminant Deletion or Selection
Metals										
7429-90-5	Aluminum	1680	21400	mg/kg	B409	22-22	8570.00	8570.00	19000.00	NO
14733-03-0	Bismuth	0.76	28.50	mg/kg	C5	12-14	NC	28.50		YES
7439-93-2	Lithium	2.7	27.30	mg/kg	B409	12-13	NC	27.30	26.00	YES
Semi-Volatile Organic Compounds										
91-57-6	2-Methylnaphthalene	63	63	ug/kg	B401	1-15	NC	63.00		YES
59-50-7	4-Chloro-3-methylphenol	7	7	ug/kg	MND33-0104	1-15	NC	7.00		YES
85-01-8	Phenanthrene	78	78	ug/kg	B401	1-15	NC	78.00		YES
Pesticides/PCBs										
72-54-8	4,4'-DDD	0.4	6.60	ug/kg	B409	2-21	4.04	4.04	4.20	NO
319-86-8	Delta-BHC	0.08	5.3	ug/kg	MND22-4101	3-22	4.67	4.67		YES
1031-07-8	Endosulfan Sulfate	0.13	0.56	ug/kg	MND22-4101	2-22	10.20	0.56		YES
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	3-22	9.30	0.93		YES
53494-70-5	Endrin Ketone	0.24	0.25	ug/kg	B407	2-22	10.10	0.25		YES
Radionuclides										
AC-227	Actinium-227	0.13	2.01	pCi/g		14-124	0.24	0.24		YES
10045-97-3	Cesium-137	0.055	0.895	pCi/g		119-137	0.37	0.37	0.42	NO
14255-04-0	Lead-210	0.38	2.35	pCi/g		94-117	1.76	1.76		YES
13981-16-3	Plutonium-238	0.013	35.40	pCi/g		88-358	20.40	20.40	0.13	YES
13982-63-3	Radium-226	0.64	3.26	pCi/g		95-131	1.41	1.41	2.00	NO
	Radium-228	0.636	2.57	pCi/g		10-10	NC	2.57		YES
14274-82-9	Thorium-228	0.21	1.66	pCi/g	B405	38-40	1.03	1.03	1.50	NO
14269-63-7	Thorium-230	0.316	2.69	pCi/g		41-139	4.21	2.69	1.90	YES
7440-29-1	Thorium-232	0.037	5.60	pCi/g	S1049	141-369	0.73	0.73	1.40	NO
24678-82-8	Uranium-238	0.32	1.95	pCi/g		72-75	1.23	1.23	1.20	YES

UCL - Upper Confidence Limit
EPC Exposure Point Concentration= minimum of either 95% UCL or maximum detected concentration

Table 2.5 Initial Identification of Current Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Maximum Detected Values Compared to Background and Screening Guidance Values

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	Concentration Used for Screening and Risk	Background Value	Construction Worker Risk-Based GV	Reference Risk-Based GV	Initial COPC
Inorganics									
Aluminum	67.91	148.00	ug/L	7-29	148.00	37.523	10200	a, f	NO:3
Antimony	2.8	40.20	ug/L	5-29	40.20	0.578	4.1	a	YES
Barium	75	115.00	ug/L	27-29	115.00	310.209	710	a	NO:2,3
Cadmium	4.6	7.70	ug/L	6-32	7.70		5.1	a	YES
Calcium	94300	126000.00	ug/L	33-33	126000.00	111110.664			NO:4
Chromium (assume all VI)	18.3	24.91	ug/L	6-32	24.91	6.076	30	a,f	NO:3
Copper	1.6	593.00	ug/L	22-32	593.00	1.167	409	a,f	YES
Iron	18.8	1890.00	ug/L	14-31	1890.00	4064.888			NO:2
Lead	3.4	40.00	ug/L	5-32	40.00	10.05			YES
Lithium	2.9	2.90	ug/L	4-10	2.90	55.7			NO:2
Magnesium	29100	39600.00	ug/L	32-32	39600.00	40428.111			NO:2
Manganese	2.8	224.00	ug/L	30-32	224.00	229.568	51	a	NO:2
Molybdenum	1.6	2.70	ug/L	5-10	2.70	5.597			NO:2
Nickel	2.1	27.10	ug/L	5-32	27.10	34.957	200	a	NO:2,3
Potassium	2390	3761.00	ug/L	27-33	3761.00	4461.063			NO:2
Selenium	1.5	1.50	ug/L	1-32	1.50				NO:1
Silver	16.9	24.20	ug/L	6-29	24.20		51	a	NO:3
Sodium	46600	84200.00	ug/L	32-32	84200.00	62425.563			NO:4
Thallium	2.4	2.40	ug/L	1-29	2.40				NO:1
Tin	8.7	8.70	ug/L	1-10	8.70	34.382			NO:2
Vanadium	3.9	14.60	ug/L	12-29	14.60	17.1	71	a	NO:2,3
Zinc	4.5	57.70	ug/L	10-32	57.70	119.6	3100	a	NO:2,3
Volatile Organic Compounds									
1,1,1-trichloroethane	0.30	3.30	ug/L	79-193	3.30	0.668	180.00	a,f	NO:3
1,1,2 trichloro-1,2,2-trifluoroethane	2.00	34.00	ug/L	13-18	34.00		250000.00	a,f	NO:3
1,1-Dichloroethane	2.50	3.50	ug/L	2-191	3.50		950.00	a	NO:1
1,1-Dichloroethene	1.70	1.70	ug/L	1-193	1.70				NO:1
1,2-cis-Dichloroethene	0.47	4.00	ug/L	103-159	4.00	0.999	102.00	b, f	NO:3
1,2-trans-Dichloroethene	0.50	3.00	ug/L	8-195	3.00		200.00	b	NO:1
1,3-cis-Dichloropropene	0.50	1.20	ug/L	2-195	1.20				NO:1
2-Butanone	7.00	41.00	ug/L	3-12	41.00		5300.00	a	NO:3
Acetone	1.00	12.00	ug/L	6-12	12.00		1000.00	a	NO:3
Bromodichloromethane	2.20	3.70	ug/L	2-193	3.70		4.50	d	NO:1
Chloroform	0.50	5.40	ug/L	9-197	5.40	0.516			NO:1
Dichloromethane	3.00	13.00	ug/L	8-195	13.00		38.00	d	NO:1
Ethylbenzene	0.50	0.60	ug/L	2-197	0.60		69.00	a	NO:1
Tetrachloroethene	0.15	2.20	ug/L	109-196	2.20		12.00	a	NO:3
Toluene	0.60	1.50	ug/L	4-197	1.50		150.00	a	NO:1
Trichloroethene	0.47	5.90	ug/L	176-197	5.90		15.00	d	NO:3
Trichlorofluoromethane	2.20	2.50	ug/L	2-188	2.50		2200.00	a	NO:1
Xylenes, Total	0.60	3.60	ug/L	8-190	3.60		20000.00	b	NO:1

Table 2.5 Initial Identification of Current Groundwater Constituents of Potential Concern for the Construction Worker Scenario
(Maximum Detected Values Compared to Background and Screening Guidance Values

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	Concentration Used for Screening and Risk	Background Value	Construction Worker Risk-Based GV	Reference Risk-Based GV	Initial COPC
Radionuclides									
Actinium-227	0.50	0.50	pCi/L	1-10	0.50		1.30	c	NO:3
Americium-241	0.03	0.03	pCi/L	1-9	0.03	0.139	2.40	c	NO:2,3
Bismuth-210	0.11	0.39	pCi/L	2-19	0.39		110.00	c, f	NO:3
Plutonium-238	0.01	0.25	pCi/L	8-48	0.25	0.087	2.70	c	NO:3
Plutonium-239/240	0.002	2.00	pCi/L	6-20	2.00	0.125	2.50	c	NO:3
Radium-226	0.10	0.52	pCi/L	6-19	0.52	0.996	2.70	c	NO:2,3
Strontium-85	25.00	25.00	pCi/L	1-2	25.00		570.00	c, f	NO:3
Strontium-90	0.50	0.50	pCi/L	3-19	0.50	0.975	14.00	c	NO:2,3
Thorium-227	0.01	0.10	pCi/L	8-14	0.10		19.80	c, f	NO:3
Thorium-228	0.01	2.17	pCi/L	14-35	2.17	0.779	3.50	c, f	NO:3
Thorium-230	0.01	1.99	pCi/L	11-32	1.99		0.60	c, f	YES
Thorium-232	0.0025	0.10	pCi/L	8-33	0.10	0.314	1.60	c, f	NO:2,3
Tritium	110.00	7200.00	pCi/L	112-128	7200.00	1485.47	11000.00	e	NO:3
Uranium-233/234	0.17	0.36	pCi/L	30-30	0.36		18.00	c	NO:3
Uranium-234	0.20	8.14	pCi/L	14-19	8.14	0.792	18.00	c	NO:3
Uranium-235	0.10	2.30	pCi/L	23-43	2.30	0.814	17.00	c	NO:3
Uranium-238	0.13	8.25	pCi/L	41-48	8.25	0.688	0.56	c, f	YES

NC= 95% UCL not calculated, less than 20 samples in the data set.

a= 1/10th HI for ingestion + inhalation + dermal
b= 1/10th HI for ingestion
c= 10^{-6} cancer risk for ingestion
d= 10^{-6} cancer risk for ingestion + dermal + inhalation
e= 10^{-6} cancer risk for ingestion + inhalation + external
f= New Risk-Based Guideline Values calculated according to Mound GV 3/97 methodology
The calculations for updated GVs are presented in Appendix C.

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient

Table 2.6 Final Identification of Current Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Exposure Point Concentration Compared to Background Values)

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	95 Percent UCL	Concentration Used for Screening EPC	Background Value	COPC for RRE
Inorganics								
Antimony	2.8	40.20	ug/L	5-29	80.30	40.20	0.578	YES
Cadmium	4.6	7.70	ug/L	6-32	5.25	5.25		YES
Copper	1.6	593.00	ug/L	22-32	22.70	22.70	1.169	YES
Lead	3.4	40.00	ug/L	5-32	7.28	7.28	10.05	NO
Radionuclides								
Thorium-230	0.01	1.99	pCi/L	11-32	1.25	1.25		YES
Uranium-238	0.13	8.25	pCi/L	41-48	0.47	0.47	0.688	NO:3

UCL= Upper Confidence Limit
EPC= Exposure point concentration minimum of 95% UCL or maximum detected concentration
NO <Background Value
NC= 95% UCL not calculated, less than 20 samples in the data set.

Table 2.7 Initial Identification of Current Groundwater Constituents of Potential Concern for the Site Employee Scenario
(Maximum Detected Values Compared to Background and Screening Guidance Values

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	Concentration Used for Screening and Risk	Background Value	Site Employee Risk-Based GV	Reference Risk-Based GV	Initial COPC
Inorganics									
Aluminum	67.91	148.00	ug/L	7-29	148.00	37.523	10200.00	a,d	NO:3
Antimony	2.8	40.20	ug/L	5-29	40.20	0.578	4.10	a	YES
Barium	75	115.00	ug/L	27-29	115.00	310.209	720.00	a	NO:2,3
Cadmium	4.6	7.70	ug/L	6-32	7.70		5.10	a	YES
Calcium	94300	126000.00	ug/L	33-33	126000.00	111110.664			NO:4
Chromium (assume all is VI)	18.3	24.91	ug/L	6-32	24.91	6.076	31.00	b,d	NO:3
Copper	1.6	593.00	ug/L	22-32	593.00	1.167	409.00	a, d	YES
Iron	18.8	1890.00	ug/L	14-31	1890.00	4064.888			NO:2
Lead	3.4	40.00	ug/L	5-32	40.00	10.05			YES
Lithium	2.9	2.90	ug/L	4-10	2.90	55.7			NO:2
Magnesium	29100	39600.00	ug/L	32-32	39600.00	40428.111			NO:2
Manganese	2.8	224.00	ug/L	30-32	224.00	229.568	51.00	a	NO:2
Molybdenum	1.6	2.70	ug/L	5-10	2.70	5.597			NO:2
Nickel	2.1	27.10	ug/L	5-32	27.10	34.957	200.00	a	NO:2,3
Potassium	2390	3761.00	ug/L	27-33	3761.00	4461.063			NO:2
Selenium	1.5	1.50	ug/L	1-32	1.50				NO:1
Silver	16.9	24.20	ug/L	6-29	24.20		51.00	a	NO:3
Sodium	46600	84200.00	ug/L	32-32	84200.00	62425.563			NO:4
Thallium	2.4	2.40	ug/L	1-29	2.40				NO:1
Tin	8.7	8.70	ug/L	1-10	8.70	34.382			NO:2
Vanadium	3.9	14.60	ug/L	12-29	14.60	17.1	72.00	a	NO:2,3
Zinc	4.5	57.70	ug/L	10-32	57.70	119.6	3100.00	a	NO:2,3
Volatile Organic Compounds									
1,1,1-trichloroethane	0.30	3.30	ug/L	79-193	3.30	0.668	360.00	a, d	NO:3
1,1,2 trichloro-1,2,2-trifluoroethane	2.00	34.00	ug/L	13-18	34.00		310000.00	a, d	NO:3
1,1-Dichloroethane	2.50	3.50	ug/L	2-191	3.50		1000.00	a	NO:1
1,1-Dichloroethene	1.70	1.70	ug/L	1-193	1.70				NO:1
1,2-cis-Dichloroethene	0.47	4.00	ug/L	103-159	4.00	0.999	100.00	a, d	NO:3
1,2-trans-Dichloroethene	0.50	3.00	ug/L	8-195	3.00		200.00	a	NO:1
1,3-cis-Dichloropropene	0.50	1.20	ug/L	2-195	1.20				NO:1
2-Butanone	7.00	41.00	ug/L	3-12	41.00		6100.00	a	NO:3
Acetone	1.00	12.00	ug/L	6-12	12.00		1000.00	a	NO:3
Bromodichloromethane	2.20	3.70	ug/L	2-193	3.70		4.60	c	NO:1
Chloroform	0.50	5.40	ug/L	9-197	5.40	0.516			NO:1
Dichloromethane	3.00	13.00	ug/L	8-195	13.00		38.00	c	NO:1
Ethylbenzene	0.50	0.60	ug/L	2-197	0.60		1000.00	a	NO:1
Tetrachloroethene	0.15	2.20	ug/L	109-196	2.20		100.00	a	NO:3
Toluene	0.60	1.50	ug/L	4-197	1.50		2000.00	a	NO:1
Trichloroethene	0.47	5.90	ug/L	176-197	5.90		26.00	c	NO:3
Trichlorofluoromethane	2.20	2.50	ug/L	2-188	2.50		3100.00	a	NO:1
Xylenes, Total	0.60	3.60	ug/L	8-190	3.60		20000.00	a	NO:1

Table 2.7 Initial Identification of Current Groundwater Constituents of Potential Concern for the Site Employee Scenario
(Maximum Detected Values Compared to Background and Screening Guidance Values

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	Concentration Used for Screening and Risk	Background Value	Site Employee Risk-Based GV	Reference Risk-Based GV	Initial COPC
Radionuclides									
Actinium-227	0.50	0.50	pCi/L	1-10	0.50		0.26	c	YES
Americium-241	0.03	0.03	pCi/L	1-9	0.03	0.139	0.49	c	NO:2,3
Bismuth-210	0.11	0.39	pCi/L	2-19	0.39		22.00	c,d	NO:3
Plutonium-238	0.01	0.25	pCi/L	8-48	0.25	0.087	0.54	c	NO:3
Plutonium-239/240	0.00	2.00	pCi/L	6-20	2.00	0.125	0.51	c	YES
Radium-226	0.10	0.52	pCi/L	6-19	0.52	0.996	0.54	c	NO:2,3
Strontium-85	25.00	25.00	pCi/L	1-2	25.00		110.00	c,d	NO:3
Strontium-90	0.50	0.50	pCi/L	3-19	0.50	0.975	2.90	c	NO:2,3
Thorium-227	0.01	0.10	pCi/L	8-14	0.10		4.00	c,d	NO:3
Thorium-228	0.01	2.17	pCi/L	14-35	2.17	0.779	0.69	c,d	YES
Thorium-230	0.01	1.99	pCi/L	11-32	1.99			e	YES
Thorium-232	0.00	0.10	pCi/L	8-33	0.10	0.314	0.31	c,d	NO:2,3
Tritium	110.00	7200.00	pCi/L	112-128	7200.00	1485.47	2200.00	c	YES
Uranium-233/234	0.17	0.36	pCi/L	30-30	0.36		3.60	c	NO:3
Uranium-234	0.20	8.14	pCi/L	14-19	8.14	0.792	3.60	c	YES
Uranium-235	0.10	2.30	pCi/L	23-43	2.30	0.814	3.40	c	NO:3
Uranium-238	0.13	8.25	pCi/L	41-48	8.25	0.688	0.11	c,d	YES

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion of Cr VI
c= 10^{-6} cancer risk for ingestion
d= New Risk-Based Guideline Values calculated according to Mound GV 3/97 methodology
e= Guideline Value is under review
The calculations for new or revised GVs are presented in Appendix C.
NC= 95% UCL not calculated, less than 20 samples in the data set.

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value

NO:4 - Essential Nutrient
NO:5 - short half life, one detect

Table 2.8 Final Identification of Current Groundwater Constituents of Potential Concern for the Site Employee Scenario (Exposure Point Concentration Compared to Background Values)

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	95 Percent UCL	Concentration Used for Screening and EPC	Background Value	COPC for RRE
Inorganics								
Antimony	2.8	40.20	ug/L	5-29	80.39	40.20	0.578	YES
Cadmium	4.6	7.70	ug/L	6-32	5.25	5.25		YES
Copper	1.6	593.00	ug/L	22-32	22.70	22.70	1.167	YES
Lead	3.4	40.00	ug/L	5-32	7.28	7.28	10.05	NO
Radionuclides								
Actinium-227	0.50	0.50	pCi/L	1-10	NC	0.50		YES
Plutonium-239/240	0.00	2.00	pCi/L	6-20	8.87	2.00	0.125	YES
Thorium-228	0.01	2.17	pCi/L	14-35	105.00	2.17	0.779	YES
Thorium-230	0.01	1.99	pCi/L	11-12	1.25	1.25		YES
Tritium	110.00	7200.00	pCi/L	112-128	861.00	861.00	1485.47	NO
Uranium-234	0.20	8.14	pCi/L	14-19	NC	8.14	0.792	YES
Uranium-238	0.13	8.25	pCi/L	41-48	0.47	0.47	0.688	NO

UCL= Upper Confidence Limit
EPC= minimum of 95% UCL or maximum detected concentration
NO <Background Value
NC= 95% UCL not calculated, less than 20 samples in the data set.

Table 2.9 Initial Identification of Future Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Construction Worker Risk-Based GV	Reference	COPC?
Inorganics										
Aluminum	20.1	31500.00	ug/L	107/ 115	6840.00	31500.00	37.523	10025.51	a, d	YES
Ammonia**	110	37500.00	ug/L	34/ 61	403.00	37500.00	162			NO:5
Antimony	0.35	41.60	ug/L	21/ 122	2.82	41.60	0.578	4.10	a	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	933.00	32.997	3.10	a	YES
Barium	17.5	329.00	ug/L	112/ 114	130.00	329.00	310.209	710.00	a	NO:3
Beryllium**	0.03	2.30	ug/L	41/ 115	0.47	2.30		0.07	c	YES
Bismuth**	0.9	264.00	ug/L	23/ 103	23.20	264.00				YES
Boron**	110	110.00	ug/L	1/ 2	NC	110.00		900.00	a, d	NO:3
Cadmium	0.14	13.10	ug/L	11/ 124	0.75	13.10		5.10	a	YES
Calcium	116	1510000.00	ug/L	164/ 164	199000.00	1510000.00	111110.664			NO:4
Chloride**	8100	17700000.00	ug/L	74/ 74	908000.00	17700000.00	105821			NO:5
Chromium	0.27	44800.00	ug/L	78/ 120	5010.00	44800.00	6.076	30.00	a*, d	YES
Cobalt**	0.31	295.00	ug/L	46/ 115	18.50	295.00	1.032	600.00	a, d	NO:3
Copper	0.38	514.00	ug/L	81/ 117	26.80	514.00	1.167	400.00	a, d	YES
Cyanide**	5.5	14.20	ug/L	3/ 45	4790.00	14.20		200.00	a	NO:3
Dissolved Solids	499000	32500000.00	ug/L	47/ 47	2480.00	32500000.00				NO:4
Fluoride**	150	2400.00	ug/L	57/ 58	678.00	2400.00	419			NO:5
Iron	0.154	192000.00	ug/L	151/ 165	45400.00	192000.00	4064.888			NO:5
Lead**	0.4	32.00	ug/L	55/ 125	4.90	32.00	10.05			YES
Lithium	8.8	4280.00	ug/L	87/ 102	123.00	4280.00	55.7			YES
Magnesium	26.9	719000.00	ug/L	165/ 165	77500.00	719000.00	40428.111			NO:4
Manganese	0.037	3030.00	ug/L	155/ 165	737.00	3030.00	229.568	51.00	a	YES
Mercury**	0.1	1.40	ug/L	3/ 115	0.06	1.40		3.10	a	NO:1
Molybdenum	0.79	474.00	ug/L	51/ 98	32.50	474.00	5.597	50.00	a, d	YES
Nickel	1.2	11600.00	ug/L	82/ 120	749.00	11600.00	34.957	200.00	a	YES
Phosphate**	60	10100.00	ug/L	31/ 41	792.00	10100.00	231			NO:5
Potassium	2.12	214000.00	ug/L	150/ 164	15200.00	214000.00	4461.063			NO:4
Selenium	1.3	7.00	ug/L	10/ 112	1.78	7.00		50.00	a, d	NO:3
Silicon**	2230	12300.00	ug/L	6/ 6	NC	12300.00				NO:4
Silver	0.72	29.40	ug/L	7/ 115	1.24	29.40		51.00	a	NO:3
Sodium	68.2	7270000.00	ug/L	162/ 162	346000.00	7270000.00	62425.563			NO:4
Sulfate	5000	456000.00	ug/L	73/ 76	205.00	456000.00				NO:4
Thallium	3.1	6.90	ug/L	6/ 107	4.44	6.90		0.80	a,d	YES
Tin	1.4	357.20	ug/L	27/ 100	14.90	357.20	34.382	6000.00	a, d	NO:3
Vanadium	0.15	277.00	ug/L	65/ 115	33.00	277.00	17.1	71.00	a	YES
Zinc	1.4	399.00	ug/L	78/ 117	47.10	399.00	119.6	3100.00	a	NO:3

Table 2.9 Initial Identification of Future Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Construction Worker Risk-Based GV	Reference	COPC?
Volatiles & Organic Compounds										
1,1,1-trichloroethane	0.40	7.00	ug/L	20/ 238	0.67	7.00	0.668	180.00	a,d	NO:3
1,1,2 trichloro-1,2,2-trifluoroethane	2.20	2.20	ug/L	1/ 118	1.08	2.20		250000.00	a,d	NO:1
1,1-Dichloroethane^^	2.00	2.00	ug/L	1/ 238	0.75	2.00		950.00	a	YES
1,2-cis-Dichloroethene	0.06	17.00	ug/L	48/ 148	1.61	17.00	0.999	100.00	a,d	NO:3
1,2-Dichloroethene**	1.00	35.00	ug/L	13/ 38	6.61	35.00				YES
1,2-trans-Dichloroethene	0.43	10.00	ug/L	13/ 217	0.76	10.00		200.00	b	NO:3
1,3-Dichlorobenzene**	1.50	1.50	ug/L	1/ 147	3.92	1.50				NO:1
2-Butanone	3.00	65.00	ug/L	14/ 106	6.48	65.00		5300.00	a	NO:3
4-Methylphenol	12.00	61.00	ug/L	2/ 71	6.05	61.00		48.00	a	NO:1
Acetone	1.00	17.00	ug/L	25/ 81	9.19	17.00		1000.00	a	NO:3
Alpha Chlordane**	0.01	0.069	ug/L	3/ 62	0.11	0.07				NO:1
Benzene**	2.50	2.50	ug/L	1/ 241	1.26	2.50		7.50	c	NO:1
Benzoic Acid**	1.00	890.00	ug/L	2/ 68	35.70	890.00		40000.00	a	NO:1
Bis(2-ethylhexyl)phthalate**	0.50	950.00	ug/L	16/ 72	17.20	950.00	8.41	12.00	c	NO:6
Carbon Tetrachloride**	1.50	1.50	ug/L	1/ 238	0.94	1.50		2.00	c	NO:1
Chloroform	0.50	0.70	ug/L	2/ 239	0.65	0.70	0.516			NO:1
Chloromethane**	3.40	3.40	ug/L	1/ 85	4.12	3.40				NO:1
Dibromomethane**	2.80	2.80	ug/L	1/ 182	1.01	2.80				NO:1
Dichloromethane	1.00	610.00	ug/L	41/ 239	3.28	610.00		38.00	c	YES
Di-n-butyl Phthalate**	0.50	3.00	ug/L	5/ 71	5.80	3.00		410.00	a	NO:6
Tetrachloroethene**	0.30	25.00	ug/L	55/ 247	3.37	25.00		12.00	a	YES
Toluene	0.50	8.00	ug/L	13/ 243	1.27	8.00		150.00	a	NO:3
Trichloroethene	0.44	46.00	ug/L	152/ 273	5.12	46.00		15.00	c	YES

Table 2.9 Initial Identification of Future Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Construction Worker Risk-Based GV	Reference	COPC?
Radionuclides										
Americium-241	0.6750	0.17	pCi/L	6/ 43	2.87	0.17	0.139	2.40	d	NO:3
Bismuth-210	0.12	0.26	pCi/L	2/ 55	7.99	0.26		110.00	d,e	NO:1
Gross Alpha**	1.03	1930.00	pCi/L	8/ 12	NC	1930.00				NO:4
Plutonium-238	0.012	1.870	pCi/L	8/ 60	0.15	1.87	0.087	2.70	d	NO:3
Plutonium-239/240	0.003	0.18	pCi/L	12/ 51	0.42	0.18	0.125	2.50	d	NO:3
Potassium-40**	129.000	258.00	pCi/L	3/ 61	133.00	258.00				NO:1
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	39.47	0.996	2.70	d	YES
Radium-228**	1.50	1.50	pCi/L	1/ 1	NC	1.50		1.70	d,e	NO:3
Strontium-90	0.74	42.40	pCi/L	7/ 57	2.22	42.40	0.975	14.00	d	YES
Thorium-228	0.02	8.50	pCi/L	39/ 54	90.70	8.50	0.779	3.50	d	YES
Thorium-230	0.0044	4.07	pCi/L	43/ 56	0.57	4.07				YES
Thorium-232	0.0005	2.11	pCi/L	31/ 63	0.78	2.11	0.314	1.60	d,e	YES
Tritium	2.95	2816310.00	pCi/L	4440/4455	206000.00	2816310.00	1485.47	11000.00	c	YES
Uranium-233/234	0.154	0.928	pCi/L	4/ 4	NC	0.93		18.00	d	NO:3
Uranium-234	0.03	59.10	pCi/L	60/ 69	2.12	59.10	0.792	18.00	d	YES
Uranium-235	0.01	0.36	pCi/L	18/ 45	5.71	0.36	0.814	17.00	d	NO:2,3
Uranium-235/236**	0.04	0.05	pCi/L	2/ 26	0.10	0.05		17.00	d	NO:3
Uranium-238	0.03	1.34	pCi/L	57/ 75	0.51	1.34	0.688	0.60	d,e	YES

a= 1/10th HI for ingestion + inhalation + dermal
b= 1/10th HI for ingestion
c= cancer risk for ingestion+ inhalation+dermal
d= cancer risk for ingestion
e= Risk-Based Guideline Values calculated using the methodology, equations, and parameters presented in Mound Screening GV 3/97
NC= 95% UCL not calculated, less than 20 samples in the data set.
**RED = Constituent detected in bedrock well, but not in production well
^^Green = Constituent detected in production well, not in bedrock wells; reported frequency of detection based on production wells analyses

NO:1 - <5 % Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient or General Quality Parameter

NO:5 - Water Quality Parameter
NO:6 - Common laboratory contaminant (EPA, 1998)

Table 2.10 Final Identification of Future Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Bedrock 95% UCL or Maximum Detected Concentration Compared to Background Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	COPC?
Inorganics								
Aluminum	26.1	31500.00	ug/L	107/ 115	6840.00	6840.00	37.923	YES
Antimony	0.35	41.60	ug/L	21/ 122	2.82	2.82	0.578	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	11.80	32.997	NO
Beryllium**	0.03	2.30	ug/L	41/ 115	0.47	0.47		YES
Bismuth**	0.9	264.00	ug/L	23/ 103	23.20	23.20		YES
Cadmium	0.14	13.10	ug/L	11/ 124	0.75	0.75		YES
Chromium	0.27	44800.00	ug/L	78/ 120	5010.00	5010.00	6.076	YES
Copper	0.38	514.00	ug/L	81/ 117	26.80	26.80	1.167	YES
Lead**	0.4	32.00	ug/L	55/ 125	4.90	4.90	10.05	NO
Lithium	8.8	4280.00	ug/L	87/ 102	123.00	123.00	35.7	YES
Manganese	0.037	3030.00	ug/L	159/ 165	737.00	737.00	229.568	YES
Molybdenum	0.79	474.00	ug/L	51/ 98	32.50	32.50	5.597	YES
Nickel	1.2	11600.00	ug/L	82/ 120	749.00	749.00	34.957	YES
Thallium	3.1	6.90	ug/L	6/ 107	4.44	4.44		YES
Vanadium	0.15	277.00	ug/L	65/ 115	33.00	33.00	17.1	YES

Table 2.10 Final Identification of Future Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Bedrock 95% UCL or Maximum Detected Concentration Compared to Background Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	COPC?
Organic Compounds								
1,1-Dichloroethane^^	2.00	2.00	ug/L	1/ 238	0.75	0.75		NO:1
1,2-Dichloroethene**	1.00	35.00	ug/L	13/ 38	6.61	6.61		YES
Dichloromethane	1.00	610.00	ug/L	41/ 239	3.28	3.28		YES
Tetrachloroethene**	0.30	25.00	ug/L	55/ 247	3.37	3.37		YES
Trichloroethene	0.44	46.00	ug/L	152/ 273	5.12	5.12		YES
Radionuclides								
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	2.34	0.906	YES
Strontium-90	0.74	42.40	pCi/L	7/ 57	2.22	2.22	0.935	YES
Thorium-228	0.02	8.50	pCi/L	39/ 54	90.70	8.50	0.779	YES
Thorium-230	0.0044	4.07	pCi/L	43/ 56	0.57	0.57		YES
Thorium-232	0.0005	2.11	pCi/L	31/ 63	0.78	0.78	0.314	YES
Tritium	2.95	2816310.00	pCi/L	4440/4455	206000.00	206000.00	1485.47	YES
Uranium-234	0.03	59.10	pCi/L	60/ 69	2.12	2.12	0.792	YES
Uranium-238	0.03	1.34	pCi/L	57/ 75	0.51	0.51	0.688	NO

UCL= Upper Confidence Limit
NC= 95% UCL not calculated, less than 20 samples in the data set.
** = Constituent detected in bedrock well, but not in production well
^^ = Constituent detected in production well, not in bedrock wells; reported frequency of detection based on production wells analyses

Table 2.11 Initial Identification of Future Groundwater Constituents of Potential Concern for the Site Employee Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Site Employee Risk-Based GV	Reference Risk-Based GV	COPC?
Inorganics										
Aluminum	20.1	31500.00	ug/L	107/ 115	6840.00	31500.00	37.523	10000.00	a,d	YES
Ammonia**	110	37500.00	ug/L	34/ 61	4030.00	37500.00	162			NO:5
Antimony	0.35	41.60	ug/L	21/ 122	2.82	41.60	0.578	4.10	a	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	933.00	37.295	3.10	a	YES
Barium	17.5	329.00	ug/L	112/ 114	130.00	329.00	310.209	720.00	a	NO:3
Beryllium**	0.03	2.30	ug/L	41/ 115	0.47	2.30		0.07	c	YES
Bismuth**	0.9	264.00	ug/L	23/ 103	23.20	264.00				YES
Boron**	110	110.00	ug/L	1/ 2	NC	110.00		920.00	a,d	NO:3
Cadmium	0.14	13.10	ug/L	11/ 124	0.75	13.10		5.10	a	YES
Calcium	116	1510000.00	ug/L	164/ 164	199000.00	1510000.00	111110.664			NO:4
Chloride**	8100	17700000.00	ug/L	74/ 74	908000.00	17700000.00	105821			NO:5
Chromium	0.27	44800.00	ug/L	78/ 120	5010.00	44800.00	6.076	31.00	a,d	YES
Cobalt**	0.31	295.00	ug/L	46/ 115	18.50	295.00	1.032	610.00	a,d	NO:3
Copper	0.38	514.00	ug/L	81/ 117	26.80	514.00	1.167	410.00	a,d	YES
Cyanide**	5.5	14.20	ug/L	3/ 45	4.79	14.20		200.00	a	NO:3
Dissolved Solids	499000	32500000.00	ug/L	47/ 47	2480.00	32500000.00				NO:5
Fluoride**	150	2400.00	ug/L	57/ 58	678.00	2400.00	419			NO:5
Iron	0.154	192000.00	ug/L	151/ 165	45400.00	192000.00	4064.888			NO:4
Lead**	0.4	32.00	ug/L	55/ 125	4.90	32.00	10.05			YES
Lithium	8.8	4280.00	ug/L	87/ 102	123.00	4280.00	55.7			YES
Magnesium	26.9	719000.00	ug/L	165/ 165	77500.00	719000.00	40428.111			NO:4
Manganese	0.037	3030.00	ug/L	155/ 165	737.00	3030.00	229.568	51.00	a	YES
Mercury**	0.1	1.40	ug/L	3/ 115	0.06	1.40	na	3.10	a	NO:1
Molybdenum	0.79	474.00	ug/L	51/ 98	32.50	474.00	5.597	51.00	a,d	YES
Nickel	1.2	11600.00	ug/L	82/ 120	749.00	11600.00	34.957	200.00	a	YES
Phosphate**	60	10100.00	ug/L	31/ 41	792.00	10100.00	231			NO:5
Potassium	2.12	214000.00	ug/L	150/ 164	15200.00	214000.00	4461.063			NO:4
Selenium	1.3	7.00	ug/L	10/ 112	1.78	7.00		51.00	a,d	NO:3
Silicon**	2230	12300.00	ug/L	6/ 6	NC	12300.00				NO:4
Silver	0.72	29.40	ug/L	7/ 115	1.24	29.40		51.00	a	NO:3
Sodium	68.2	7270000.00	ug/L	162/ 162	346000.00	7270000.00	62425.563			NO:4
Sulfate	5000	456000.00	ug/L	73/ 76	205.00	456000.00		0.82	a,d	NO:4
Thallium	3.1	6.90	ug/L	6/ 107	4.44	6.90				YES
Tin	1.4	357.20	ug/L	27/ 100	14.90	357.20	34.382	6100.00	a,d	NO:3
Vanadium	0.15	277.00	ug/L	65/ 115	33.00	277.00	17.1	72.00	a	YES
Zinc	1.4	399.00	ug/L	78/ 117	47.10	399.00	119.6	3100.00	a	NO:3

Table 2.11 Initial Identification of Future Groundwater Constituents of Potential Concern for the Site Employee Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Site Employee Risk-Based GV	Reference Risk-Based GV	COPC?
Volatiles & Organic Compounds										
1,1,1-trichloroethane	0.40	7.00	ug/L	20/ 238	0.67	7.00	0.668	360.00	a,d	NO:3
1,1,2 trichloro-1,2,2-trifluoroethane	2.20	2.20	ug/L	1/ 118	1.08	2.20				NO:1
1,1-Dichloroethane^^	2.00	2.00	ug/L	1/ 238	0.75	2.00		1000.00	a	NO:1
1,2-cis-Dichloroethene	0.06	17.00	ug/L	48/ 148	1.61	17.00	0.999			YES
1,2-Dichloroethene**	1.00	35.00	ug/L	13/ 38	6.61	35.00				YES
1,2-trans-Dichloroethene	0.43	10.00	ug/L	13/ 217	0.76	10.00		200.00	a	NO:3
1,3-Dichlorobenzene**	1.50	1.50	ug/L	1/ 147	3.92	1.50				NO:1
2-Butanone	3.00	65.00	ug/L	14/ 106	6.48	65.00		6100.00	a	NO:3
4-Methylphenol	12.00	61.00	ug/L	2/ 71	6.05	61.00		1000000	a	NO:1
Acetone	1.00	17.00	ug/L	25/ 81	9.19	17.00		1000.00	a	NO:3
Alpha Chlordane**	0.01	0.069	ug/L	3/ 62	0.11	0.07				NO:1
Benzene**	2.50	2.50	ug/L	1/ 241	1.26	2.50		9.90	c	NO:1
Benzoic Acid**	1.00	890.00	ug/L	2/ 68	35.70	890.00		8.20E+08	a	NO:1
Bis(2-ethylhexyl)phthalate**	0.50	950.00	ug/L	16/ 72	17.20	950.00	8.41	20.00	c	NO:6
Carbon Tetrachloride**	1.50	1.50	ug/L	1/ 238	0.94	1.50		2.20	c	NO:1
Chloroform	0.50	0.70	ug/L	2/ 239	0.65	0.70	0.516			NO:1
Chloromethane**	3.40	3.40	ug/L	1/ 85	4.12	3.40				NO:1
Dibromomethane**	2.80	2.80	ug/L	1/ 182	1.01	2.80				NO:1
Dichloromethane	1.00	610.00	ug/L	41/ 239	3.28	610.00		38.00	c	YES
Di-n-butyl Phthalate**	0.50	3.00	ug/L	5/ 71	5.80	3.00		1000.00	a	NO:3
Tetrachloroethene**	0.30	25.00	ug/L	55/ 247	3.37	25.00		100.00	a	NO:3
Toluene	0.50	8.00	ug/L	13/ 243	1.27	8.00		2000.00	a	NO:3
Trichloroethene	0.44	46.00	ug/L	152/ 273	5.12	46.00		26.00	c	YES

Table 2.11 Initial Identification of Future Groundwater Constituents of Potential Concern for the Site Employee Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Site Employee Risk-Based GV	Reference Risk-Based GV	COPC?
Radionuclides										
Americium-241	0.6750	0.17	pCi/L	6/ 43	2.87	0.17	0.139	0.49	c	NO:3
Bismuth-210	0.12	0.26	pCi/L	2/ 55	7.99	0.26				NO:1
Gross Alpha**	1.03	1930.00	pCi/L	8/ 12	NC	1930.00				NO:5
Plutonium-238	0.012	1.870	pCi/L	8/ 60	0.15	1.87	0.087	0.54	c	YES
Plutonium-239/240	0.003	0.18	pCi/L	12/ 51	0.42	0.18	0.125	0.51	c	NO:3
Potassium-40**	129.000	258.00	pCi/L	3/ 61	133.00	258.00				NO:1
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	39.47	0.996	0.54	c	YES
Radium-228**	1.50	1.50	pCi/L	1/ 1	NC	1.50		0.33	c,d	YES
Strontium-90	0.74	42.40	pCi/L	7/ 57	2.22	42.40	0.975	2.90	c	YES
Thorium-228	0.02	8.50	pCi/L	39/ 54	90.70	8.50	0.779	0.69	c	YES
Thorium-230	0.0044	4.07	pCi/L	43/ 56	0.57	4.07				YES
Thorium-232	0.0005	2.11	pCi/L	31/ 63	0.78	2.11	0.314	0.31	c,d	YES
Tritium	2.95	2816310.00	pCi/L	4440/4455	206000.00	2816310.00	1485.47	2200.00	c	YES
Uranium-233/234	0.154	0.928	pCi/L	4/ 4	NC	0.93		3.60	c	NO:3
Uranium-234	0.03	59.10	pCi/L	60/ 69	2.12	59.10	0.792	3.60	c	YES
Uranium-235	0.01	0.36	pCi/L	18/ 45	5.71	0.36	0.814	3.40	c	NO:2,3
Uranium-235/236**	0.04	0.05	pCi/L	2/ 26	0.10	0.05		3.40	c	NO:3
Uranium-238	0.03	1.34	pCi/L	57/ 75	0.51	1.34	0.688	0.11	c,d	YES

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion of Cr VI
c= 10^{-6} cancer risk for ingestion
d= Risk-Based Guideline Values calculated using the methodology, equations, and parameters in Mound Screening GV 3/97
NC= 95% UCL not calculated, less than 20 samples in the data set.
** = Constituent detected in bedrock well, but not in production well
^^ = Constituent detected in production well, not in bedrock wells; reported frequency of detection based on production wells analyses

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient
NO:5 - General Water Quality Parameter

Table 2.12 Final Identification of Future Groundwater Constituents of Potential Concern for the Site Employee Scenario (Bedrock 95% UCL or Maximum Detected Concentration Compared to Background Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	COPC?
Inorganics								
Aluminum	20.1	31500.00	ug/L	107/ 115	6840.00	6840.00	37.523	YES
Antimony	0.35	41.60	ug/L	21/ 122	2.82	2.82	0.578	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	11.80	32.997	NO
Beryllium**	0.03	2.30	ug/L	41/ 115	0.47	0.47		YES
Bismuth**	0.9	264.00	ug/L	25/ 103	23.20	23.20		YES
Cadmium	0.14	13.10	ug/L	11/ 124	0.75	0.75		YES
Chromium	0.27	44800.00	ug/L	78/ 120	5010.00	5010.00	6.076	YES
Copper	0.38	514.00	ug/L	81/ 117	26.80	26.80	1.157	YES
Lead**	0.4	32.00	ug/L	55/ 125	4.90	4.90	10.05	NO
Lithium	8.8	4280.00	ug/L	87/ 102	123.00	123.00	35.7	YES
Manganese	0.037	3030.00	ug/L	155/ 169	737.00	737.00	229.368	YES
Molybdenum	0.79	474.00	ug/L	51/ 98	32.30	32.30	5.591	YES
Nickel	1.2	11600.00	ug/L	82/ 120	749.00	749.00	34.957	YES
Thallium	3.1	6.90	ug/L	6/ 107	4.44	4.44		YES
Vanadium	0.15	277.00	ug/L	65/ 115	33.00	33.00	17.1	YES

Table 2.12 Final Identification of Future Groundwater Constituents of Potential Concern for the Site Employee Scenario (Bedrock 95% UCL or Maximum Detected Concentration Compared to Background Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	COPC?
Organic Compounds								
1,2-cis-Dichloroethene	0.06	17.00	ug/L	48/ 148	1.61	1.61	0.999	YES
1,2-Dichloroethene**	1.00	35.00	ug/L	13/ 38	6.61	6.61		YES
Dichloromethane	1.00	610.00	ug/L	41/ 239	3.28	3.28		YES
Trichloroethene	0.44	46.00	ug/L	132/ 273	5.12	5.12		YES
Radionuclides								
Plutonium-238	0.012	1.879	pCi/L	8/ 60	0.15	0.15	0.087	YES
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	2.34	0.996	YES
Radium-228**	1.50	1.50	pCi/L	1/ 1	NE	1.50		YES
Strontium-90	0.74	42.40	pCi/L	7/ 57	2.22	2.22	0.975	YES
Thorium-228	0.02	8.50	pCi/L	39/ 54	90.70	8.50	0.779	YES
Thorium-230	0.0043	4.07	pCi/L	43/ 56	0.57	0.57		YES
Thorium-232	0.0005	2.11	pCi/L	31/ 63	0.78	0.78	0.314	YES
Tritium	2.95	2816310.00	pCi/L	4440/4455	206000.00	206000.00	1485.47	YES
Uranium-234	0.03	59.10	pCi/L	60/ 69	2.12	2.12	0.792	YES
Uranium-238	0.03	1.34	pCi/L	57/ 75	0.51	0.51	0.688	NO

UCL= Upper confidence Limit
NC= 95% UCL not calculated, less than 20 samples in the data set.
** = Constituent detected in bedrock well, but not in production well
^^ = Constituent detected in production well, not in bedrock wells; reported frequency of detection based on production wells analyses

Appendix B

Listing of Applicable or Relevant and Appropriate Requirements (ARARs)

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 Ohio EPA Director's power for Protection of Public Health and the Environment

Action Specific ARARs

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

PROPOSED PLAN FOR PARCEL 4,
MOUND PLANT, MIAMISBURG, OHIO
OCTOBER 2000 DRAFT (REV.0)
OHIO ENVIRONMENTAL PROTECTION AGENCY
COMMENTS

General Comments

1. Replace all use of the term "Site Worker" with "Site Employee" to maintain consistency with the RRE.

2. In some areas of the document, the reports says "the Mound Plant" and in other places it refers to "Mound Plant". Please be consistent.

Specific Comments

1. Table of Contents -

   Please check the page numbering in the next version to ensure sections can be found on the pages listed.

   In the title of Section 5.4.2 Screening Results for the Current Ground Water Scenario, change the word "Scenario" to "Contaminants".

   In the title of Section 5.4.3 Screening Results for the Future Ground Water Scenario, change the word "Scenario" to "Contaminants".

2. List of Figures and Tables - Please identify the scenario with the titles of Tables 6.1 through 6.6.

3. Page 2, Figure 1.1 Regional Context of the Mound Plant - The Mound Plant is missing from this figure.

4. Page 5, Section 2.1 History - Fifth paragraph, second sentence, remove the word "Resource" and replace it with "Response".

5. Page 6, Section 2.1 History -

   First full paragraph, Replace the sentence beginning with "There were natural drainage channels..." with "There are natural drainage channels and some continuously flowing ground water seeps, but no surface water bodies such as streams or ponds".

PROPOSED PLAN FOR PARCEL 4,
MOUND PLANT, MIAMISBURG, OHIO
OCTOBER 2000 DRAFT (REV.0)
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COMMENTS

5. Page 6, Section 2.1 History continued -

   First full paragraph, sentence starting with "Mound set up a flow activated water sampler...". Please provide a reference for this statement and the reference for the sample results .

   First full paragraph, last sentence, remove the word "gravel".

6. Page 6, Section 2.2 Enforcements and Agreements - Mound 2000 - Replace the fifth sentence beginning with "To evaluate any residual risk..." with "To evaluate any residual risk after all removals have been completed, a residual risk evaluation is conducted to ensure the conditions at the parcel do not pose an unacceptable risk to human health when the parcel is used for industrial/commercial purposes.

7. Page 8, Section 2.2 Enforcements and Agreements - Mound 2000 - Replace the second full sentence on the page with "The risk exceeds the acceptable risk range and is primarily driven by the conservative ground water analysis. Risk due to soil and air contaminants is within acceptable risk range for industrial/commercial reuse".

8. Page 12, Section 5.3.3 PRS Contaminant Data - Remove the fifth bullet on the page dealing with the 1974 plutonium study. Add the Parcel 4/5 boundary sampling event.

9. Page 13, Section 5.3.3 PRS Contaminant Data - Last full paragraph on the page, first sentence, remove the word "dust".

10. Page 14, Section 5.3.3 PRS Contaminant Data -

    Remove the first full sentence beginning with "Contamination in soils and sediment ..." on this page.

    Fifth full sentence on the page, remove the first word "Only".

PROPOSED PLAN FOR PARCEL 4,
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10. Page 14, Section 5.3.3 PRS Contaminant Data continued-

    Add a paragraph to describe the more recent ground water sampling results from BVA wells within Parcel 4. Most notably, the elevated nickel concentrations need to be discussed . Provide well locations on a separate map or use Figure 5.1 to indicate well locations. Indicate that these wells and related elevated concentrations will be monitored and included in the ongoing site wide investigation.

11. Page 16, Section 5.4 Summary of Contaminants Detected in Parcel 4 - In the third paragraph, remove the second sentence beginning with "The tables document the...." The tables actually document the reason a contaminant was screened out of the risk.

12. Page 16, Section 5.4.1. Screening Results for Soil Contaminants - There are numerous counting errors within this section and the ground water result sections. The errors occurred when the number of rads, inorganics, etc. were summarized from the tables.

13. Page 18, Section 5.4.1 Screening Results for Soil Contaminants - In the first partial sentence on the page, a reference to Tables 5.1 and 5.2 is given. Where are these tables?

14. Page 18, Section 5.4.2 Screening Results for Current Ground Water Scenario - Change the word "Scenario" within the title of this section to "Contaminants".

15. Page 18, Section 5.4.3 Screening Results for Future Ground Water Scenario - Change the word "Scenario" within the title of this section to "Contaminants".

16. Page 19, Section 6. Summary of Site Risks - In the first paragraph, second sentence from the bottom, add the following to the sentence "...for confirmation and to assess residual risk.

17. Page 19, Section 6.1 Exposure Assessment - Add the following to the second to the last sentence on the page "...and represent a potential future potable water supply".

18. Page 20, Section 6.1 Exposure Assessment - A comment was made in the Nov. 28, 2000, session to remove the word "aquifer" from the term "bedrock aquifer" as it appears in the first paragraph on this page. Disregard the Nov. 28 comment and continue using the term "bedrock aquifer".

PROPOSED PLAN FOR PARCEL 4,
MOUND PLANT, MIAMISBURG, OHIO
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19. Page 21, Section 6.3.1.1 Non-Cancer Risks -

In the first paragraph, last sentence, change the Hazard Indices from "1.3 and 1.5" to "1.5 and 14".

In the second paragraph, last sentence, change the word "is" to "it". Add a sentence to reflect that the risk had been recalculated without the questionable antimony results and provide the recalculated HI value.

20. Page 22, Section 6.3.1.1 Non-Cancer Risks - Add the following sentence to the end of first partial paragraph. "No contaminant source areas are known to exist in Parcel 4".

21. Page 23, Tables 6.1 - 6.3 - Identify the scenario within the title of the tables and change "Release Block H" to "Parcel 4".

22. Page 24, Section 6.3.2.2 Cancer Risks - In the first sentence in this section, change the future risk number from "7.7×10^{-5}" to "7.2×10^{-5}".

23. Page 25, Section 6.3.2.2 Cancer Risks - In the second paragraph, second sentence, add "uranium-234" to the list of current ground water risk drivers.

24. Page 25, Tables 6.4 - 6.6 Summary Tables - Identify the scenario within the title of the tables and change "Release Block H" to "Parcel 4".

25. Page 27, Section 6.4 Conclusions - Remove the first paragraph. For consistency purposes, use the recommended conclusion wording from the Parcel 4 RRE. The recommended wording is as follows: The risk exceeds the acceptable risk range and is primarily driven by the conservative ground water analysis. Risk due to soil and air contaminants is within the acceptable risk range for industrial/commercial reuse.

26. Page 27, 6.5 Ecological Risk -

Section 6.5 states in the last sentence: " . . . Parcel 4 Ecological Risk Evaluation (To Be Published) concluded there is no threat to the Parcel 4 ecology from residual contamination." This statement is premature and the document in question, correctly titled *Screening Level Ecological Risk Assessment Parcel 4*, dated September 2000, was reviewed and found deficient by Ohio EPA. The *Operable Unit 9, Ecological*

PROPOSED PLAN FOR PARCEL 4,
MOUND PLANT, MIAMISBURG, OHIO
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27. Page 27, 6.5 Ecological Risk - continued

Characterization Report, dated March 1994 (correct date – not 1984), states that no federally threatened or endangered species occur on the Mound Plant; ;however, that is as of 1994 and current status has yet to be finalized.

The Mound Plant does lie within the range of both the Indiana bat and the eastern massasauga. It appears to Ohio EPA's reviewers that little effort has been made over the years to ascertain whether suitable habitat does or does not exist at the site for the Indiana bat. In addition, Section 6.5 fails to mention that two species listed by the State of Ohio as endangered have been found at Mound: the dark-eyed junco (bird) and the inland rush (grass). Current status of these two species is also questionable.

This section should give correct publication dates, correct titles, and state that the Parcel 4 area lies within the range of both the Indiana bat and eastern massasauga. It should also state that the two State of Ohio listed species have been found at the site. Additional language, i.e., current status of these species, will depend upon the results of the Ohio EPA comment review resolution on the *Screening Level Ecological Risk Assessment Parcel 4*.

28. Page 27, Section 7. Description of Alternatives - Replace the first sentence in this section with the following: The risk exceeds the acceptable risk range and is primarily driven by the conservative ground water analysis. Risk due to soil and air contaminants is within the acceptable risk range for industrial/commercial reuse.

29. Page 28, Section 7. Description of Alternatives - Replace the bullets describing the institutional controls with the following bullets:

- Maintenance of industrial/commercial land use;
- Prohibition against residential use;
- Prohibition against the use of ground water;
- Site access for federal and state agencies for the purpose of sampling and monitoring; and
- Prohibition against the removal of Parcel 4 soils from the DOE Mound property (as owned in 1998) boundary without approval from the Ohio Department of Health and the Ohio Environmental Protection Agency

PROPOSED PLAN FOR PARCEL 4,
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COMMENTS

30. Page 28, Section 8.1.1 Criteria 1: - Change the second sentence to read as follows: 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 ground water exposure. Add "In addition" to the beginning of the next sentence. Add "and to prohibit ground water usage" to the end of the last sentence.

31. Page 29, Section 8.1.2 Criteria 2: -

    In the second full paragraph, third sentence from the bottom, remove the word "bedrock".

    In the third paragraph, the appendix reference should be "B" instead of "A".

32. Page 32, Section 9, The Preferred Alternative - Replace the bullets describing the institutional controls with the following bullets:

    - Maintenance of industrial/commercial land use;
    - Prohibition against residential use;
    - Prohibition against the use of ground water;
    - Site access for federal and state agencies for the purpose of sampling and monitoring; and
    - Prohibition against the removal of Parcel 4 soils from the DOE Mound property (as owned in 1998) boundary without approval from the Ohio Department of Health and the Ohio Environmental Protection Agency.

Dave, pls show me the revisions per this note from Brian.
thx

rob

Forward Header

Subject: Re: Core Team Action Item Request
Author: "Brian Nickel" <Brian.Nickel@epa.state.oh.us> at Internet Date: 12/1/2000 11:27 AM

Rob and Dave,
Not entirely, but we can work with it. (Our original intent of the action item was to have someone with expertise check on the status of the inland rush during the growing season.) To cover and bring it to closure so we can transfer Parcel 4, we need to add paragraphs similar to those below to the Parcel 4 Proposed Plan (Section 6.5) and ROD in the Eco Risk section. We would also like to pull the section from Table 3.6 in the Environmental Summary on the Endangered Species as a note into the text under Section D stating that there may be state protected species on Parcel 4.

Kathy and Laurie's comments will cover it with regards to the Parcel Eco Risk.
The purpose of all this is to notify the public and future owner(s) that state protected species may be on the Parcel 4.

After all this is done, we can close the action item.

Let me know if you have any questions. Thanks

Brian
OFFO

>>> Robert Rothman <Robert.Rothman@ohio.doe.gov> 12/01/00 12:18PM >>>
Brian and Tim,

I believe this info closes action item #14. Pls call me with any questions
rob

Forward Header

Subject: Core Team Action Item Request
Author: Paul Lucas at MOUND
Date: 12/1/2000 7:15 AM

Core Team Action #14 followup:

Forward Header

Subject: Core Team Action Item Request
Author: David Rakel at MNDGW
Date: 11/30/2000 6:29 PM

Date: 11/30/2000 06:29 pm (Thursday)
From: David Rakel
To: DOE_OH.MOUND.Lucas Paul
Subject: Core Team Action Item Request

Paul,

Just a follow-up note to our exchange of voice mail messages yesterday concerning the following core team action item:
(14) Locating site of inland rush and checking for specimens, endangered species

I have two references on this subject:

OU9 Ecological Characterization Report, Tech Memo, Rev 0, March 1994 "Finally, in spite of an extensive effort, no federal threatened or endangered species were documented and none are expected to occur. Two state protected species were found, the dark eyed junco (bird) and the inland rush (grass). The dark-eyed junco is a common winter visitor throughout most of the eastern US. At the Mound Plant, numerous individuals were found in the fall and the winter in several areas on the North and South Properties. the inland rush was found in a seasonal grassland seepage area on the South Property and is apparently a casual waif. As such, it is not expected to be a permanent part of the Mound Plant flora." p4-9

Environmental Assessment - Disposition of Mound Plant's South Property DOE/EA-1239, June 1999
"During a 1993 ecological assessment of the site (Thorsen 1993), a single specimen of an Inland rush, Juncas interior, was discovered growing on the South Property. The identification of the specimen was independently confirmed by a botanist from the University of Tennessee. This species of rush has been designated a state endangered species by the Ohio Division of Natural Areas and Preserves. Despite intensive efforts to find other specimens, only the single plant was located. Therefore the assessment concluded that a viable breeding population for the Inland rush did not exist on the site." p 21

The Thorsen reference mentions a map that was not included in the EA.
At this time, the Ecological Risk Evaluation for Parcel 4 doesn't add any more or different information.

From: Robert Rothman at MOUND
To: MNDCONT.MNDPO(RAKEDA)
Date: 12/1/00 1:14pm
Subject: Re: Core Team Action Item Request

Dave, pls show me the revisions per this note from Brian.
thx

rob

---Forward Header---

Author: "Brian Nickel" <Brian.Nickel@epa.state.oh.us> at Internet Date: 12/

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The Thorsen reference mentions a map that was not included in the EA.
At this time, the Ecological Risk Evaluation for Parcel 4 doesn't add any more

Dave

BWX Technologies, Inc.
a McDermott company

BWXT of Ohio, Inc.
1 Mound Road
P.O. Box 3030
Miamisburg, Ohio 45343-3030
(937) 865-4020

ESC-165/00
October 26, 2000

00-TC/10-26

Mr. Richard B. Provencher, Director
Miamisburg Environmental Management Project
U.S. Department of Energy
P.O. Box 66
Miamisburg, OH 45343-0066

ATTENTION: Dewain Eckman

SUBJECT: Contract No. DE-AC24-97OH20044
PARCEL 4 PROPOSED PLAN - DRAFT

REFERENCE: Statement of Work Requirement C 7.1d -- Regulator Data Requests

Dear Mr. Provencher:

Attached is the Draft (Revision 0) Proposed Plan for Parcel 4. The release of this document to USEPA, OEPA, ODH for review concurrent with DOE has been authorized by Rob Rothman of MEMP.

If you or members of your staff have any questions regarding the document, or if additional support is needed, please contact Dave Rakel at extension 4203.

Sincerely,

JSStapleton

Jeffrey S. Stapleton
Manager, Environmental Safeguards & Compliance

JSS/nmg

Enclosures as stated

cc: Tim Fischer, USEPA, (2) w/attachments
Dave Meredith, TechLaw, (1) w/attachments
Brian Nickel, OEPA, (2) w/attachments
Ruth Vandegrift, ODH, (1) w/attachments
Rob Rothman, MEMP, (2) w/attachments
John Krueger, BWXT of Ohio, (1) w/attachments
Monte Williams, BWXT of Ohio, (1) w/attachments
DCC

Proposed Plan for Parcel 4, Mound Plant, Miamisburg, Ohio

Prepared by BWXT of Ohio, Inc.

Contract # DE-AC24-979OH20044

DRAFT (REV. 0)

October 2000

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ACRONYMS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
BDP	Building Data Package
BVA	Buried Valley Aquifer
BWXTO	BWXT of Ohio
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
DOE	Department of Energy
FFA	Federal Facilities Agreement
FOD	Frequency of Detection
GV	Guideline Value
HI	Hazard Index
IDM	Investigative Derived Material
MEMP	Miamisburg Environmental Management Project
MMCIC	Miamisburg Mound Community Improvement Corporation
NCP	National Contingency Plan
NFA	No Further Assessment
NPL	National Priority List
OEPA	Ohio Environmental Protection Agency
OSC	On-Scene Coordinator
OU	Operable Unit
pCi	picocurie
PAH	Polynuclear aromatic hydrocarbon
PETREX	(trade name for a type of soil sampling)
PRS	Potential Release Site
RB	Release Block
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
SM/PP	Special Metallurgical/Plutonium Processing
TPR	Technical Position Report in Support of Release Block Residual Risk Evaluation
US DOE	United States Department of Energy
US EPA	United States Environmental Protection Agency
UTL	Upper Tolerance Limit

PROPOSED PLAN
PARCEL 4
MOUND PLANT, OHIO

1. SITE NAME, LOCATION, AND DESCRIPTION

The U.S. Department of Energy (US DOE) Mound Plant (CERCLIS ID-04935) is located within the city limits of Miamisburg, in southern Montgomery County, Ohio (Figure 1.1). The Site is approximately ten (10) miles south-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 unused open spaces. The Mound Plant will remain in industrial use into the future. This future use has been determined based upon agreement among DOE, United States Environmental Protection Agency (US EPA), Ohio Environmental Protection Agency (OEPA), and interested stakeholders. This land use is reflected in the Mound Comprehensive Reuse Plan of the Miamisburg Mound Community Improvement Corporation (MMCIC) and is currently codified in the City of Miamisburg Zoning Ordinance for industrial use.

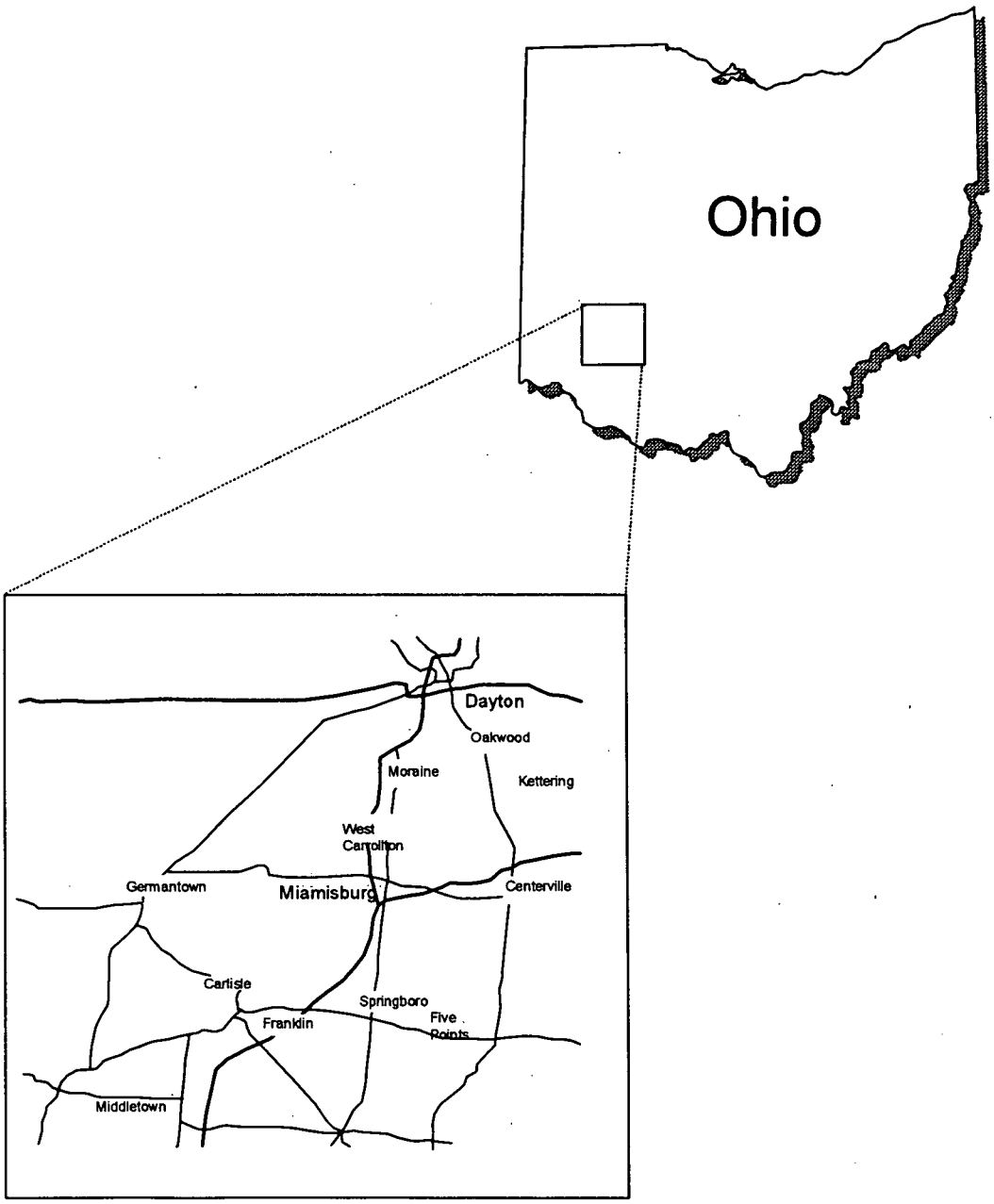
Mound Golf Course and Miamisburg Mound State Memorial Park, both directly east of the Mound facility across Mound Road, are frequented during favorable weather. The park is the site of a 68-foot high ancient Indian mound, located 380 feet east of the Mound Plant boundary. Other recreational areas within one (1) mile of the facility include the Miamisburg Municipal Park, Harmon Athletic Field, and Library Park. These areas are used extensively during the summer.

There are no large lakes within a 5-mile radius of the Site. Some vestiges of the old Miami-Erie Canal lie between the Norfolk Southern Railroad and Dayton-Cincinnati Pike west of the site. This remnant of the old Miami-Erie Canal is designated as Operable Unit (OU) 4. The major water body in the vicinity of the Mound Plant is the Great Miami River located approximately 2,000 feet to the west. The river is approximately 150 to 200 feet wide in this area.

Agricultural land within a 5-mile radial area around the Site is primarily used for corn and soybean production and for livestock grazing.

According to 1990 census figures, the population of Miamisburg is 17,834, Dayton is 182,044, and Montgomery County is 573,809.

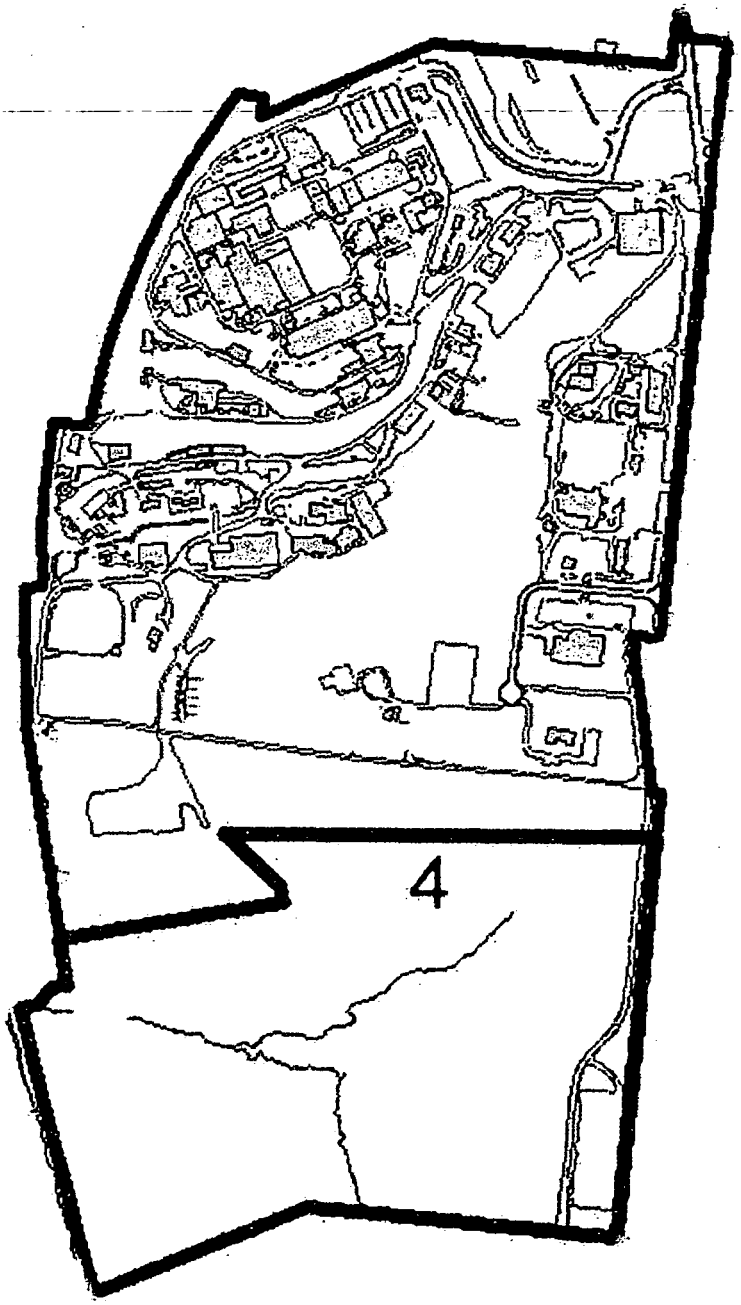
Figure 1.1 Regional Context of the Mound Plant



This Proposed Plan addresses Parcel 4 (Figure 1.2) which includes approximately 95 acres on the southern border of the plant site. Parcel 4 is generally bound to the north by the plant, to the east by off-site residences, to the south by Benner Road, and to the west by the Miami-Erie Canal.

Parcel 4 lies within what was once called Operable Unit 5 (OU5). There are no structures in Parcel 4. There are four Potential Release Sites (PRSs) in Parcel 4. 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 Parcel 4 is summarized in Table 2.1. Any residual risks associated with remaining contamination in Parcel 4 have been evaluated and are presented in the *Parcel 4 Residual Risk Evaluation* (RRE).

Figure 1.2 Location of Parcel 4



2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 History

The Mound facility was originally established by the DOE as an integrated research, development, and production facility that supported the nation's weapons and energy programs. To reconfigure and consolidate the nuclear complex, the DOE has decided to phase out the defense mission at Mound. As a result, the Mound Site has been designated an environmental management site and the plant is in the process of being remediated, transferred, and converted into a research and industrial site. Currently BWXT of Ohio, Inc. manages Mound for the DOE.

Early Mound Plant programs investigated the chemical and metallurgical properties of polonium-210 and its applications; particularly, the fabrication of neutron and alpha sources for weapon and non-weapon use. Investigations involving uranium, protactinium-231, and plutonium-239 were performed from 1950 to 1963 as part of the national civilian power reactor program. In 1954, Mound began the separation of stable isotopes.

In the mid-1950s, Mound initiated efforts to develop a large-scale process for the recovery of thorium from a variety of thorium-bearing ores. Even though this project was canceled prior to full-scale operation, approximately 1,650 tons of sludge containing thorium were received at Mound. Due to its corrositivity, the thorium sludge was continually repackaged and relocated. This resulted in a number of thorium-contaminated areas around the site.

Plutonium-238 research and development activity began at Mound in the mid-1950s. From the early 1960s to the late 1970s, Mound processed plutonium-238 for use in heat sources within Radioisotopic Thermal Generators (RTGs). The fabrication of heat sources from plutonium metal was terminated in the mid-1960s. Oxide processes continued into the late 1970s. Since early 1979, Mound has not handled unencapsulated plutonium-238.

As a result of historic disposal practices and contaminant releases to the environment, the Mound Plant was placed on the National Priorities List (NPL) on November 21, 1989. The DOE signed a *Comprehensive Environmental Resource Compensation and Liability Act (CERCLA) Section 120 Federal Facility Agreement* (FFA) with the US EPA, effective October 1990. In 1993, this agreement was modified and expanded to include the OEPA.

The PRSs at Mound were identified on the basis of potential radiological and chemical (non-radioactive) contamination using knowledge of historical land use

or on actual measurements of contaminants. The PRSs in Parcel 4 are listed in Table 2.1 along with the activity that caused concern and the evaluation results. There are no buildings in Parcel 4.

On August 26, 1981, DOE purchased 124 acres of land contiguous with and south of the original 182 acres at Mound Plant. Parcel 4 was part of that purchase. The land, which was gently rolling until it approached the Mound Plant property line where it was steeply sloped, was used for agricultural purposes. DOE razed a two-story brick house, a barn, a frame tool shed and an outhouse and discarded appliances and some old implements and that were left by the former owner. A farm fence was put up around the perimeter. There were natural drainage channels but no continuous running water on the land. Mound set up a flow activated water sampler to obtain runoff water during rain events. No radioactive contamination was found in this runoff. An archaeological survey was conducted in 1987. Although two sites were discovered, neither was regarded "as having eligibility for the National Register, and no further work is recommended at either location" (*An Archaeological Survey of Portions of the Mound Facility, Montgomery County, Ohio,* December 1987). Other than a construction gate, gravel surface parking area, contractor storage area, gravel road from Benner Road and an above ground power line running approximately north-south through the center of the property, the property remains undeveloped.

2.2 Enforcement and Agreements - Mound 2000

The DOE, the US EPA, and the OEPA had originally planned to address the Plant's environmental restoration issues under a set of OUs, each of which would include a number of PRSs. For each OU, the site would follow the traditional CERCLA process: a Remedial Investigation/Feasibility Study (RI/FS) followed by a Record of Decision (ROD), followed by Remedial Design/Remedial Action (RD/RA). After initiating remedial investigations for several OUs, the DOE and its regulators realized during a strategic review in 1995 that, for Mound, the OU approach was inefficient. The 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 documented in the Record of Decision. To evaluate any residual risk after all removals have been completed, a residual risk evaluation is conducted to ensure the block or parcel is protective of human health for industrial reuse. This process was named the Mound 2000 process. DOE and its regulators pursued this approach with the understanding that US EPA 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 US EPA and OEPA rights to

enforce the FFA.

Table 2.1 Parcel 4 PRSs and Core Team Conclusions

PRS	Reason for Identification	Core Team Decision	Close Out of PRS
306	SM/PP Hill Seep 0609	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 3/14/96.
314	Farm Trash Area	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 3/14/96.
406	Southern Portion of PRS 283	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 3/14/96.
419	Drainage Outflow Reroute	Binned for No Further Assessment	Recommendation for NFA signed by Core Team on 11/17/99.

The Mound 2000 process established a "Core Team" consisting of representatives of the Miamisburg Environmental Management Project (MEMP) of DOE, US EPA, and OEPA. The Core Team evaluates each of the potential contamination problems 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 the possible problem area. 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 potential problem area. The details of this process are explained in the *Workplan for Environmental Restoration at the Mound Plant, The Mound 2000 Approach* (December 1998).

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. Recently, the nineteen release blocks were reconfigured and renamed parcels. Currently, the Mound property is divided into eight parcels.

The Mound 2000 Residual Risk Evaluation Methodology (RREM), Mound Plant, Final, Revision 0 (January 6, 1997) was developed as a framework for evaluating human health risks associated with residual levels of contamination. The RREM is applied to a release block once necessary remediation has been completed, and the remaining PRSs or buildings in the release block have been designated as No Further Assessment (NFA). Once these environmental concerns have been adequately addressed by the Core Team, a residual risk evaluation is

performed. The evaluation documents whether the release block is acceptable for industrial redevelopment. The results of the Residual Risk Evaluation for Parcel 4 are discussed in Section 4 through Section 6 of this Proposed Plan. These results indicate that Parcel 4 is protective of human health for industrial re-use (as defined by construction worker and site employee in the RREM).

A Record of Decision (ROD) will be generated for each piece of property to be transferred. The ROD will document the most appropriate remedy that meets statutory requirements and ensures protection of human health and the environment. The Core Team expects that institutional controls will be specified in the ROD for Parcel 4.

After the ROD for Parcel 4 is final, DOE will submit to US EPA and OEPA documentation that shows the property meets CERCLA 120 (h) (3) requirements. This documentation must be sent to the Administrator of US EPA for concurrence on the property transfer. After concurrence is obtained, the title of the property may be formally transferred. Prior to acceptance of the deed for any discrete parcel, the Buyer shall acknowledge that it has reviewed the existing environmental reports provided by DOE for the Mound Facility. Acceptance of the deed thereby acknowledges and commits the Buyer to abiding by institutional controls specified in the ROD.

3. HIGHLIGHTS OF PREVIOUS COMMUNITY PARTICIPATION

The community has been an active participant in this process to date. Comments from the public on the PRS recommendations 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. The Mound 2000 RREM has also gone through a public comment cycle and copies are in the CERCLA Public Reading Room. The RRE for Parcel 4 is in a public review cycle concurrent with this Proposed Plan.

Table 3.1 lists the Parcel 4 PRS Packages, along with the dates they were made available for public comment. This Proposed Plan will have a thirty (30) day public comment period ending on TBD, 2000.

Table 3.1 Parcel 4 Documents and Public Comment Periods

DOCUMENT (PRS)	COMMENT PERIOD (BEGIN)	COMMENT PERIOD (END)
306	3/18/96	4/01/96
314	3/18/96	4/14/96
406	3/18/96	4/01/96
419	1/19/00	2/17/00
Parcel 4 Residual Risk Evaluation	Concurrent with this Proposed Plan	

4. SCOPE AND ROLE OF PARCEL 4

This Proposed Plan addresses one of eight separate parcels at Mound. These eight parcels may be reconfigured to accommodate transfer of Mound property for economic development.

A ROD will be generated for each piece of property to be transferred. The Proposed Plan and resulting ROD will document the most appropriate remedy that meets statutory requirements and ensures protection of human health and the environment. This Proposed Plan for Parcel 4 represents one of a number of Proposed Plans that will be generated for parts of the Mound site. As such, this Plan identifies the proposed final action for Parcel 4. Once the ROD for Parcel 4 is final and in effect, DOE could petition the US EPA to delist Parcel 4 from the NPL.

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

5. SITE CHARACTERISTICS

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 Parcel 4. The limestone beds range from 2 to 6 inches in thickness and the shale layers are commonly 5 to 8 feet thick.

Pleistocene age (less than about 2 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 is 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 forms the Buried Valley Aquifer (BVA) and contiguous deposits. A general discussion of the geology is presented in the *Remedial Investigation/Feasibility Study, Operable Unit 9, Site-Wide Work Plan, Final* (May 1992).

5.2 Hydrogeologic Setting

There are two hydrogeologic regimes at the Mound Plant: flow through the bedrock beneath the Main Hill and the SM/PP Hill, and flow within the unconsolidated glacial deposits and alluvium associated with the Buried Valley Aquifer (BVA) in the Great Miami River Valley and the tributary valley between the Main Hill and SM/PP Hill. The BVA is a US EPA-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 OU9 Work Plan and the *Operable Unit 9; Hydrogeologic Investigation: Buried Valley Aquifer Report, Technical Memorandum, Revision 1* (September 1994) and *Operable Unit 9 Hydrogeologic Investigation: Bedrock Report, Technical Memorandum, Revision 0* (January 1994).

5.3 Available Data for Parcel 4

The PRSs in Parcel 4 have been evaluated by the Core Team. The following sections discuss the data relevant to Parcel 4 that are available from the general source documents and the Potential Release Site package.

5.3.1 Background Data

Soils. Background concentrations measure the amount of a chemical that is naturally occurring (like metals) or anthropogenic (man-made but, for background purposes, 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 5.4 of this Proposed Plan. Regional background concentrations in soil were determined during investigations conducted in September 1994 and August 1995 and are documented in reports titled *Operable Unit 9 Background Soils Investigation Soil Chemistry Report* (September, 1994) and *Operable Unit 9, Regional Soils Investigation Report* (August, 1995).

Groundwater. Background concentrations for groundwater were developed from two sources of data. For the Buried Valley Aquifer, background values were reported in the April 1995 *OU9 Hydrologic Investigation: Groundwater Sweeps Report*. Background concentrations for bedrock groundwater were reported in the February 1996 *OU5 New Property Remedial Investigation Report*.

5.3.2 Groundwater Contaminant Data

Groundwater data consist of water analyses of the Mound production wells screened within the Buried Valley Aquifer, 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. The RRE for Parcel 4 documents the specific groundwater data used to evaluate the current and future groundwater profile for Parcel 4.

5.3.3 PRS 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 Parcel 4.

Soil contaminant data for Parcel 4 collected prior to the Mound 2000 process are documented in a number of DOE reports. These references include:

- *OU-9 Regional Soils Investigation Report, Revision 2* (August, 1995) (Purpose was to give a regional soil description away from impacts of Mound operations.),

- *OU-3 Miscellaneous Sites Limited Field Investigation Report, Volumes 1, 2, and 3. Final, Revision 0* (July, 1993) (Purpose was to address areas noted in previous surveys; but, not thought to endanger human health or environment.),

- *OU-9 Site Scoping Report, Volume 3 - Radiological Site Survey, Final*, (June, 1993) (A compendium of existing data.),

- *OU-9 Surface Water and Sediment Report, Technical memo, Rev 2*, (September 1996) (Purpose was to sample surface water and sediment on the Mound Plant site, within the zone of influence of Mound Plant air emissions, and outside the zone of influence of Mound Plant air emissions.)

- *Mound Laboratory Environmental Plutonium Study 1974 (MLM-02249)*, (September, 1975) (Study of plutonium-238 in the Miami-Erie Canal. Sample from Parcel 4 was used comparison.),

- *OU-5 New Property Extended Phase I Field Investigation Report, Final, Rev 0* (July, 1995) (Purpose was to augment previous reconnaissance survey with surface and subsurface sampling, groundwater sampling, and sediment sampling in ephemeral streams.),

- *Characterization Report for Soils at the EG&G Mound Waste*

Disposal (WD) Building (February, 1992) (Investigation of soils in the vicinity of WD Building. Sample from Parcel 4 was used for comparison.), and

- *OU-5 Remedial Investigation Report, Final, Rev. 0* (February, 1996) (Identifies nature and extent of contamination in ground water, surface water, soils, and sediment in Operable Unit 5.).

In the Mound 2000 process, radionuclide and chemical contaminants were studied on a PRS basis. The results, as taken from the PRS packages, are described below.

There are two Potential Release Sites (PRS 306 and 314) located entirely within Parcel 4. There are two PRSs (PRS 406 and 419) partially located in Parcel 4. The 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 these PRSs are shown in Figure 5.1.

The rationale for designation of PRS 306, 314, 406, and 419 is outlined as follows:

PRS 306, is a groundwater seep (seep 0609/0610). This seep is not suspected as a source of contamination to the groundwater. The seep is a surface expression of groundwater and could be an exposure point to possible contaminated groundwater if contamination exists. At the time the PRS 306 was described it was the only documented seep on the new property and the water quality at the seep was unknown. For this reason it was retained as a PRS until the groundwater quality could be analyzed.

PRS 314, the Farm Trash Area, was identified as a potential release site as a result of historical information which suggests that waste oil from farm operations may have contaminated this area prior to DOE's purchase of the property.

PRS 406 (previously known as the southern portion of PRS 283) became a PRS due to potential thorium dust from the thorium sludge redrumming. PRS 406 is located on the southern end of the Mound Plant operational area and on the northern end of the New Property and Parcel 4. Radiological surveys conducted in 1983 indicated potential radiological contamination.

PRS 306, 314, and 406 were evaluated by the Core Team using

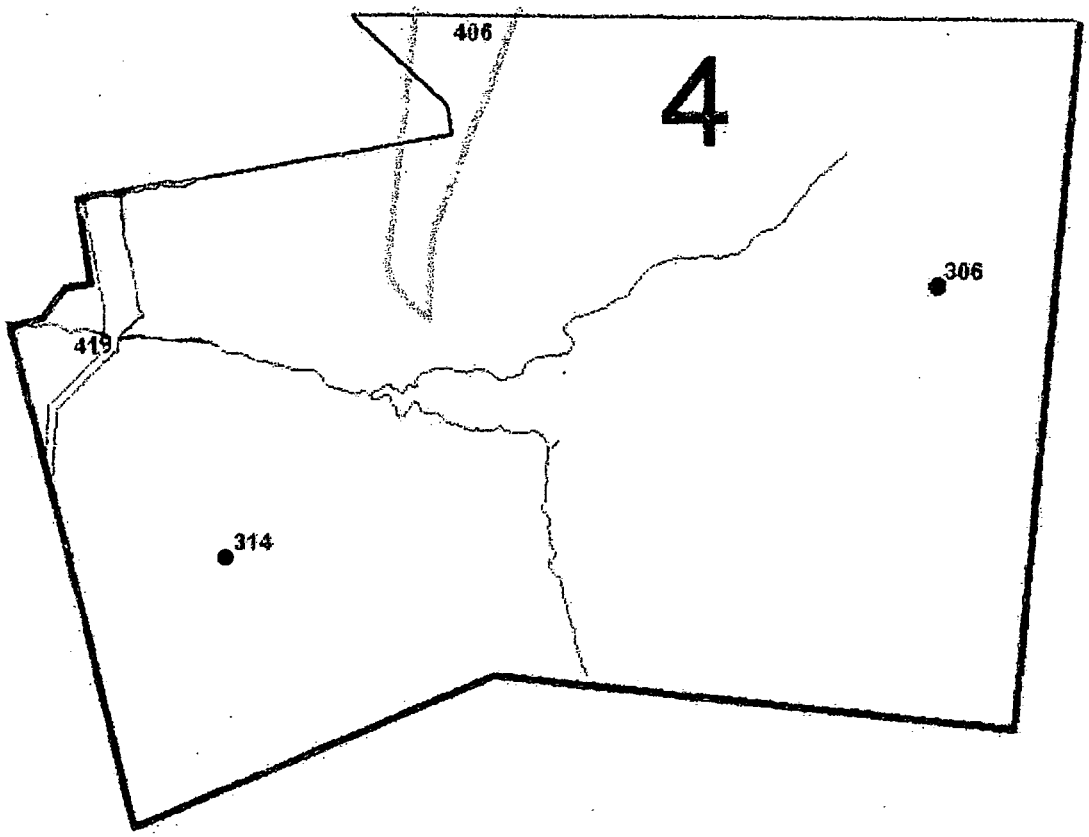
information from the *OU-5 New Proprty Remedial Investigation Report, Final, Rev. 0* (February, 1996). Contamination in soils and sediment was observed generally at levels indistinguishable from background. All radiological concentrations reported in the vicinity of these PRSs were below guideline criteria. Twenty groundwater samples were collected from four monitoring wells, two borings, and eight seeps in the vicinity of these PRSs. Sample results detected TCE from well 411 and seep 617 at the MCL (8 ppb). Only infrequent and scattered occurrences of Arsenic (As), Manganese (Mn), Nickel (Ni) and Chromium (Cr) are above background criteria; these metals do not appear to originate in current or past activities on Parcel 4. No plumes of contaminated groundwater were identified. The Core Team decided that PRS 306, 314, and 406 require No Further Assessment (NFA).

PRS 419 is the Mound Plant Drainage Outflow Reroute. It was constructed in 1996 as part of the Miami-Erie Canal Remediation Project. It conveys the Plant's non-process and storm water to the Great Miami River. The effluent is monitored for a variety of chemicals and properties to demonstrate compliance with the Plant's National Pollutant Discharge Elimination System Permit (NPDES). The effluent is monitored for a variety of radioactive constituents to demonstrate compliance with DOE Order 5400.1. In November, 1999, the Core Team decided that PRS 419 required No Further Assessment (NFA).

5.3.4 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 (HTO), plutonium-238, and plutonium-239/240 reported in the *Residual Risk Evaluation, Release Block D, Final* (December, 1996) 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.

Figure 5.1 PRSs In Parcel 4



5.4 Summary of Contaminants Detected in Parcel 4

The complete list of all contaminants detected at least once within Parcel 4 is provided in the Parcel 4 RRE in Table 2.1 (Soil, Construction Worker Scenario), Table 2.3 (Soil, Site Worker Scenario), Table 2.5 (Current Groundwater, Construction Worker), Table 2.7 (Current Groundwater, Site Worker), Table 2.9 (Future Groundwater, Construction Worker), and Table 2.11 (Future Groundwater, Site Worker). These tables present the maximum concentration of each contaminant, and also present appropriate background concentrations, Guideline Values, and additional screening criteria for comparative purposes. These tables are reproduced in Appendix A of this Proposed Plan.

Only contaminants exceeding (1) background, (2) a base level of potential health concern, and (3) certain frequency of detection (FOD) criteria are carried through the RRE process. In general, whether or not a contaminant is present at or above background is determined by comparing the sample result to the 95% upper tolerance limit (UTL) for background data on that contaminant. Secondly, the levels of health concern used as screening criteria are the Guideline Values (GVs) established for Mound. GVs are media-specific concentrations of contaminants that correspond to certain risk levels for certain exposure scenarios. GVs for Mound were compiled in *Risk-Based Guideline Values, Mound Plant, Miamisburg, OH* (March 1997). Some of these values have been revised to reflect revised toxicity values and/or include the effect of additional decay products. Thirdly, FOD criteria are used to screen out contaminants when the compound is infrequently detected and there is no reason to believe the compound is present. Infrequently is defined, for RRE screening purposes, as a detection rate below 5% (one sample in 20). A more detailed discussion of the screening process is located in the *Mound 2000 Residual Risk Methodology*.

Contaminants carried forward in the RRE for Parcel 4 are identified in the Parcel 4 RRE in Table 2.2 (Soil, Construction Worker Scenario), Table 2.4 (Soil, Site Worker Scenario), Table 2.6 (Current Groundwater, Construction Worker), Table 2.8 (Current Groundwater, Site Worker), Table 2.10 (Future Groundwater, Construction Worker), and Table 2.12 (Future Groundwater, Site Worker). The tables document the results of the screening process by listing the reason specific contaminants were carried through the RRE. These tables are reproduced in Appendix A of this Proposed Plan.

5.4.1 Screening Results for Soil Contaminants

For the Construction Worker scenario, thirty-five organic (Volatile Organic Compounds and Semi-Volatile Organic Compounds), thirty inorganic

(metal), seventeen pesticides, three explosives, and twenty-two radiological compounds were considered as potential contaminants of concern for the soil component of the RRE. For the Site Worker scenario, eighteen organic (Volatile Organic Compounds and Semi-Volatile Organic Compounds), twenty-seven inorganic (metal), seventeen pesticides, two explosives, and nineteen radiological compounds were considered as potential contaminants of concern for the soil component of the RRE. Soil concentrations of those compounds were compared to the screening criteria listed above to determine if a given compound should be included in the RRE.

Organic compounds. Because the organic contaminants found at Mound are generally not naturally-occurring substances, background concentrations were not available. The organic compounds were therefore screened against Guideline Values, and against the FOD factor (the contaminant must have been detected at least once in every 20 samples collected to be carried forward in the RRE). Using these screening criteria, the number of organic compounds was reduced to seven for the Construction Worker scenario and three for the Site Worker scenario. (See Tables 2.2 and 2.4 of the RRE, reproduced in Appendix A of this report.)

Inorganic compounds. Inorganic compounds were screened against background concentrations, Guideline Values, frequency of detection criteria, and whether they are common constituents of most soils, such as sodium and potassium. Compounds classified as human nutrients were eliminated from further consideration. Using these screening criteria, the number of inorganic compounds was reduced from thirty to five for the Construction Worker scenario and from twenty-seven to two for the Site Worker scenario.

Pesticides. Pesticides were screened against available background concentrations, Guideline values, and the FOD factor. Using these screening criteria, the number of pesticides was reduced to two for the Construction Worker scenario and four for the Site Worker scenario.

Explosives. Explosive concentrations were screened against available background concentrations, Guideline values, and the FOD factors. Using these criteria, the number of explosives was reduced to none for both the Construction Worker and Site Worker scenarios.

Radiological compounds. Radiological contaminants were screened against background (95% UTL) and Guideline Values. Using these

screening criteria, the number of radionuclides was reduced from twenty-two to four for the Construction Worker scenario and from nineteen to ten for the Site Worker scenario. (See Tables 5.1 and 5.2.)

5.4.2 Screening Results for the Current Groundwater Scenario

"Current" groundwater contaminants are defined as those found in the Mound production wells (0076 and 0271). For screening purposes, eighteen organic, twenty-one inorganic, and nineteen radiological compounds were identified as potential contaminants of concern. Similar to the approach for soils data, current groundwater concentrations were screened against background, Guideline Values, and on the basis of whether they are common water quality parameters, such as alkalinity or dissolved solids that are not health-related parameters.

For both scenarios, the screening process reduced the number of organic contaminants from eighteen to three. For the Construction Worker scenario, the screening process reduced the number of inorganic contaminants from twenty-one to one. For the Site Worker scenario, the screening process reduced the number of organic contaminants from twenty-one to three. For the Construction Worker scenario, the screening process reduced the number of radiological contaminants from nineteen to none. For the Site Worker Scenario, the screening process reduced the number of radiological contaminants from nineteen to five. (See Tables 2.6 and 2.8 of the RRE, reproduced in Appendix A of this report.)

5.4.3 Screening Results for the Future Groundwater Scenario

Future groundwater contaminants are defined as those currently in the Mound production wells, combined with contaminants measured in Mound site bedrock monitoring wells. This definition assumes that all contaminants in the bedrock aquifer water (that exceed background) will migrate to the production wells within the BVA in the future. To create this combined list of contaminants, the bedrock contaminants were screened against bedrock background concentrations. This list was combined with the current groundwater list. These contaminants were screened with respect to BVA background concentrations, Guideline Values, and whether they are common water quality parameters not associated with health impacts. The screening reduced the number of future organic contaminants for the Construction Worker scenario from twenty-nine to four, the inorganic contaminants from thirty-six to fourteen, and the radiological contaminants from twenty-two to seven. The screening reduced the number of future organic contaminants for the Site

Worker scenario from twenty-nine to three, the inorganic contaminants from thirty-six to ten, and the radiological contaminants from twenty-two to eight. (See Tables 2.10 and 2.12 of the RRE, reproduced in Appendix A of this report.)

6. SUMMARY OF SITE RISKS

For the Mound Plant, the human health risk associated with exposure to residual levels of contamination is evaluated pursuant to the Mound 2000 Residual Risk Evaluation Methodology (RREM) document described previously in this Proposed Plan. The RREM is applied to a limited area, such as a release block, after all necessary remediation has been completed and the remaining PRSs or buildings within that release block have been designated as NFA. Once the Core Team has determined that all environmental concerns have been adequately addressed, the residual risk evaluation is performed. The RRE consists of five steps:

Step 1: Identification of Contaminants to be Evaluated

Step 2: Exposure Assessment

Step 3: Toxicity Assessment

Step 4: Risk Characterization

Step 5: Evaluation of Potential Residual Risks

The information needed for Step 1 was presented in Section 5 of this Proposed Plan. Steps 2 through 5 are described below. After the Core Team reviews and approves an RRE, it is placed in the public reading room for a formal 30-day public review period.

6.1 Exposure Assessment

The two exposure scenarios examined in the Parcel 4 RRE involve an onsite construction worker, and a site employee engaged in non-construction activities. The construction worker and site employee are assumed to be exposed to soil contaminated at the levels described by currently available data. The workers are assumed to be exposed to the existing soil contamination both now and into the future. For the groundwater pathways, both current and future exposures are assumed. Current groundwater exposures are estimated based on the current concentration levels in Mound production wells 0076 and 0271 (which are screened in the Buried Valley Aquifer) because they supply potable water to Mound. The bedrock water under Parcel 4 is not a current source of drinking water.

Future groundwater contamination is assumed to be appropriately represented by combining current BVA contamination with additional contamination currently in the nearby bedrock aquifer. Bedrock aquifer groundwater from across the entire Mound Plant is assumed to eventually mix with BVA water, and thereby contribute bedrock aquifer contamination to the BVA. It is this mix of BVA and bedrock contaminated water to which the future construction worker and site employee are assumed to be exposed.

6.1.1 Construction Worker Scenario

It is assumed that activities requiring earth-moving, such as construction of new buildings, will occur in Parcel 4. These construction activities could result in worker exposure to contaminants in soil, on dust particles, in air, and in groundwater. This scenario characterizes the potential exposure to a construction worker by assuming the worker is onsite eight hours per day, 250 days per year, for five years. The construction worker is assumed to be an adult weighing 70 kg. The amount of soil ingested is assumed to be 480 mg/day based on "heavy" construction work. All parameters needed to calculate intakes are listed in Table 3.1 of the Parcel 4 RRE.

6.1.2 Site Employee Scenario

It is assumed that normal activities associated with light industry, small business, and general office work will occur on the Parcel 4 property. These activities could result in worker exposure to contaminants in soil, on dust particles, in air, and in groundwater. This scenario characterizes the potential exposure of a site employee assumed to work on the property eight hours per day, 250 days per year, for 25 years. No exposure to potential interior building contamination is assumed or addressed here. The site employee is assumed to be an adult weighing 70 kg. The site employee is assumed to ingest 50 mg/day of contaminated soil, the amount incidentally ingested while working at the site. All parameters needed to calculate intakes are listed in Table 3.1 of the Parcel 4 RRE.

6.2 Identification of Exposure Pathways

An exposure pathway describes the course a chemical or radionuclide takes from a source to an exposed individual. An exposure pathway generally consists of a source and mechanism of release, an environmental medium in which the contaminant is contained or transported, a human or environmental receptor, and an exposure route. As an example, a source of contamination could be shallow soil that received a spill, a release mechanism could be resuspension of the soil by wind action, the affected environmental medium would be the atmosphere into

which the soil was suspended, and a construction worker would be the receptor. In this example, the exposure route would be inhalation. Other typical exposure routes include uptake by ingestion and/or dermal contact.

6.3 Residual Risk Evaluation

To estimate the residual risks associated with the use of Parcel 4, toxicity and exposure assessments were summarized and integrated into quantitative expressions of risk. Two types of risk characterization are performed. The first is the calculation of a Hazard Index (HI) for noncarcinogens. The second is the calculation of carcinogenic risk associated with cancer-causing compounds, including radionuclides. These calculations are performed for both the hypothetical construction worker and the hypothetical site employee. The results for Parcel 4 are summarized below.

6.3.1 Hazards and Risks for the Construction Worker

The RRE methodology established for Mound is intentionally conservative and tends to over-estimate hazards and risk. For the construction worker-related scenarios, a conservative assumption of daily exposure to Parcel 4 contamination throughout a five-year period was used.

6.3.1.1 Non-Cancer Risks

Overall hazards across all pathways, soil + air + current groundwater and soil + air + future groundwater, were summed to provide a comprehensive Hazard Index (HI). Comprehensive Hazard Indices were developed for incremental, background, and total exposures. See Tables 6.1, 6.2, and 6.3. Background exposures and hazards are minimal. US EPA guidance sets a limit of 1.0 for the Comprehensive Hazard Index. The current and future Comprehensive Incremental Hazard Indices (1.3 and 1.5, respectively) exceed this limit.

The groundwater pathway makes the primary contribution (1.3) to the soil + air + current groundwater incremented comprehensive HI (1.5). Much of the non-carcinogenic risk for this scenario is attributable to daily ingestion of groundwater containing antimony. The uncertainties associated with the antimony concentration and the conclusion that is does not represent current conditions were presented in Section 6 of the RRE.

The larger value for the soil + air + future groundwater HI (14) is due

to a predicted increase in manganese, hexavalent chromium, and thallium concentrations in the BVA. The bedrock water is assumed to eventually mix with BVA groundwater, which is the potable water supply for the Mound Plant. Actual exposure to BVA groundwater is likely to be less than assumed here as the hazards were calculated assuming no dilution and using only the highest concentrations of chromium detected in groundwater. The uncertainties associated with this predictive model are discussed in greater detail in the RRE. It should be noted that the elevated levels of chromium and other metals in the bedrock and BVA groundwater are currently under investigation.

6.3.1.2 Cancer Risks

Overall risks from carcinogenic, including radiological, contaminants across all pathways were summed to provide an overall risk based on incremental (i.e., above background) exposures. Overall risks were also developed based on background and total exposures. The results from the RRE are also shown in Tables 6.1, 6.2, and 6.3.

Currently, incremental cancer risks for the Parcel 4 construction worker (2.2×10^{-5}) are within the 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000 incremental cancer incidence) acceptable risk range established by CERCLA and the NCP. Much of the risk for this scenario (1.3×10^{-5}) is attributable to plutonium-238 observed in the soil.

Future incremental cancer risks for the Parcel 4 construction worker (1.4×10^{-2}) exceed the 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000 incremental cancer incidence) acceptable risk range established by CERCLA and the NCP. This increase is due to potential presence of hexavalent chromium and tritium in the future groundwater. The uncertainties associated with the future groundwater model results were presented in Section 6 of the RRE.

6.3.2 Hazards and Risks for the Site Employee

The RRE methodology established for Mound is intentionally conservative and tends to over-estimate hazards and risk. For the site employee-related scenarios, a conservative assumption of daily exposure to Parcel 4 contamination throughout a 25-year period was used.

Table 6.1 Summary of Current and Future Incremental Risks at Release Block H - Mound Facility

Construction Worker Incremental	Soil	Air	Ground Water Current	Ground Water Future	Sum of Soil, Air, and Ground Water Current	Sum of Soil, Air, and Ground Water Future
Non-Carcinogenic Hazard Index for Organics & Inorganics	0.16	N/A	1.3	14	1.5	14
Carcinogenic Risks for Organics & Inorganics	1.2×10^{-6}	N/A	1.6×10^{-6}	1.4×10^{-2}	2.8×10^{-6}	1.4×10^{-2}
Carcinogenic Risks for Radionuclides	1.8×10^{-5}	2×10^{-7}	0	3.2×10^{-4}	1.9×10^{-5}	3.4×10^{-4}
			Construction Worker			
			Overall HI		1.5	14
			Overall Risk		2.2×10^{-5}	1.4×10^{-2}

Table 6.2 Summary of Current and Future Background Risks at Release Block H - Mound Facility

Construction Worker Background	Soil	Air	Ground Water Current	Ground Water Future	Sum of Soil, Air, and Ground Water Current	Sum of Soil, Air, and Ground Water Future
Non-Carcinogenic Hazard Index for Organics & Inorganics	0.03	N/A	0.017	11	0.047	11
Carcinogenic Risks for Organics & Inorganics	N/A	N/A	0	8.6×10^{-5}	0	8.6×10^{-5}
Carcinogenic Risks for Radionuclides	2.3×10^{-8}	7.7×10^{-9}	0	6.6×10^{-6}	3.7×10^{-8}	6.6×10^{-6}
			Construction Worker			
			Overall HI		0.047	11
			Overall Risk		3.1×10^{-8}	9.3×10^{-5}

Table 6.3 Summary of Current and Future Total Risks at Release Block H - Mound Facility

Construction Worker Total	Soil	Air	Ground Water Current	Ground Water Future	Sum of Soil, Air, and Ground Water Current	Sum of Soil, Air, and Ground Water Future
Non-Carcinogenic Hazard Index for Organics & Inorganics	0.19	N/A	1.4	26	1.6	26
Carcinogenic Risks for Organics & Inorganics	1.2×10^{-6}	N/A	1.6×10^{-6}	1.4×10^{-2}	2.8×10^{-6}	1.4×10^{-2}
Carcinogenic Risks for Radionuclides	1.8×10^{-5}	2×10^{-7}	N/A	3.2×10^{-4}	1.9×10^{-5}	3.2×10^{-4}
			Construction Worker			
			Overall HI		1.6	26
			Overall Risk		2.2×10^{-5}	1.4×10^{-2}

6.3.2.1 Non-Cancer Risks

Overall hazards across all pathways for soil + air + current groundwater, and for soil+ air + future groundwater, were summed to provide a comprehensive Hazard Index. The HI is based on incremental exposures above background to a hypothetical site employee working at Parcel 4. Comprehensive Hazard Indices were also developed based on background and total exposures. See Tables 6.4, 6.5, and 6.6. Background exposure and hazards are minimal.

For current exposure conditions, the ingestion of antimony from groundwater dominates the incremental comprehensive HI (1.1).

As seen previously, the primary difference between the calculated current and future groundwater incremental comprehensive HI (1.1 and 5.3, respectively) is due to the potential presence of hexavalent chromium, antimony, and thallium in modeled future groundwater.

6.3.2.2 Cancer Risks

Current and future incremental cancer risks for the Parcel 4 Site Employee (3.2×10^{-5} and 7.7×10^{-5}) are within the 10^{-4} to 10^{-6} (1 in

10,000 to 1 in 1,000,000 incremental cancer incidence) acceptable risk range established by CERCLA and the NCP. Overall risks from carcinogenic, including radiological, contaminants across all pathways were summed to provide an overall risk based on incremental exposures (above background) background, and total exposures. See Tables 6.4, 6.5, and 6.6.

For radionuclides, the soil and groundwater pathways make comparable contributions to the incremental risk (2.3×10^{-5} from soil, and 8×10^{-6} from current groundwater, and 4.6×10^{-5} from future groundwater). Much of the risk for this scenario is attributable to radium-228 in the soil; plutonium-239/240, thorium-228, and actinium-227 in current groundwater; and tritium in the modeled future groundwater.

Table 6.4 Summary of Current and Future Incremental Risks at Release Block H - Mound Facility

Site Employee Incremental	Soil	Air	Ground Water Current	Ground Water Future	Sum of Soil, Air, and Ground Water Current	Sum of Soil, Air, and Ground Water Future
Non-Carcinogenic Hazard Index for Organics & Inorganics	2×10^{-5}	N/A	1.1	5.3	1.1	5.3
Carcinogenic Risks for Organics & Inorganics	N/A	N/A	0	1.53×10^{-6}	0	1.53×10^{-6}
Carcinogenic Risks for Radionuclides	2.3×10^{-5}	9.9×10^{-7}	8×10^{-6}	4.6×10^{-5}	3.2×10^{-5}	7×10^{-5}
			Site Employee			
			Overall HI		1.1	5.3
			Overall Risk		3.2×10^{-5}	7.2×10^{-5}

Table 6.5 Summary of Current and Future Background Risks at Release Block H - Mound Facility

Site Employee Background	Soil	Air	Ground Water Current	Ground Water Future	Sum of Soil, Air, and Ground Water Current	Sum of Soil, Air, and Ground Water Future
Non-Carcinogenic Hazard Index for Organics & Inorganics	6.4×10^{-4}	N/A	0.014	0.021	0.014	0.022
Carcinogenic Risks for Organics & Inorganics	N/A	N/A	0	0	0	0
Carcinogenic Risks for Radionuclides	2.6×10^{-7}	3.9×10^{-8}	3.3×10^{-6}	4×10^{-6}	3.6×10^{-6}	4×10^{-6}
			Site Employee			
			Overall HI		0.015	0.022
			Overall Risk		3.6×10^{-6}	4.3×10^{-6}

Table 6.6 Summary of Current and Future Total Risks at Release Block H - Mound Facility

Site Employee Total	Soil	Air	Ground Water Current	Ground Water Future	Sum of Soil, Air, and Ground Water Current	Sum of Soil, Air, and Ground Water Future
Non-Carcinogenic Hazard Index for Organics & Inorganics	6.6×10^{-4}	N/A	1.1	5.5	1.1	5.5
Carcinogenic Risks for Organics & Inorganics	N/A	N/A	0	1.53×10^{-6}	0	1.53×10^{-6}
Carcinogenic Risks for Radionuclides	2.2×10^{-5}	1×10^{-6}	1.1×10^{-5}	5.1×10^{-5}	3.4×10^{-5}	7.4×10^{-5}
			Site Employee			
			Overall HI		1.1	5.5
			Overall Risk		3.4×10^{-5}	7.6×10^{-5}

6.4 Conclusions

Cancer risks for Parcel 4 are within the 10^{-4} to 10^{-6} (1 in 10,000 to 1 in 1,000,000 incremental cancer incidence) acceptable risk range established by CERCLA and the National Contingency Plan (NCP). Non-cancer risks for Parcel 4 were also determined to be acceptable for future industrial use. Based on the RRE conducted for the construction worker and site employee, US EPA and OEPA agree with DOE that all risks and hazards are acceptable for industrial use and no further remediation is required for this land use.

Because the scope of the RRE was limited to industrial use, the soils within Parcel 4 have not been evaluated for unrestricted release (e.g. residential use). Disposition of Parcel 4 soils without proper handling, sampling and management could create an unacceptable risk to human health and the environment.

6.5 Ecological Risk

Based on the results of an ecological characterization of the Mound Plant (*OU-9 Ecological Characterization* (March, 1984)), there are no endangered species or critical habitats of endangered species on Parcel 4. An Ecological Baseline Risk Assessment was performed for OU-5; no ecological contaminants of concern were identified (*OU-5 New Property Remedial Investigation Report, Final Rev 0* (February 1996)). The *Parcel 4 Ecological Risk Evaluation* (To Be Published) concluded there is no threat to the Parcel 4 ecology from residual contamination.

7. DESCRIPTIONS OF ALTERNATIVES

As documented in Section 6, the risk from both carcinogens and non-carcinogens from Parcel 4 is within the acceptable range for the current industrial use. In light of the planned exit of DOE from the site, and the residual levels of contaminants in the soil and groundwater in Parcel 4, a remedy must be implemented to protect human heath and the environment into the future. Two alternatives were considered for Parcel 4:

Alternative 1, No Action
Regulations governing the Superfund program require that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, DOE would take no action at Parcel 4 to prevent exposure to soil and groundwater contamination.

Alternative 2, Institutional Controls
Institutional controls in the form of deed restrictions on future land use would be placed on Parcel 4. The objective of these institutional controls is to prevent an unacceptable

risk to human health and the environment by restricting the use of Parcel 4, including Parcel 4 soils, to that which is consistent with assumptions in the Parcel 4 RRE. DOE or its successors would retain the right and responsibility to monitor, maintain, and enforce these institutional controls. In order to maintain protection of human health and the environment at Parcel 4 in the future, the institutional controls to be adopted would:

- Ensure that industrial land use is maintained;
- Prohibit the use of bedrock ground water;
- Provide site access for federal and state agencies for the purpose of sampling and monitoring; and
- Prohibit removal of Parcel 4 soils from the DOE Mound property (as owned in 1998) boundary without approval from the Ohio Department of Health and OEPA, or their successor agencies.

8. EVALUATION OF ALTERNATIVES

The USEPA has developed threshold, balancing and modifying criteria to aid in the evaluation of alternatives. There are two (2) threshold criteria, five (5) balancing criteria and two (2) modifying criteria. An evaluation of the alternatives in terms of these criteria follows.

8.1 THRESHOLD CRITERIA - *must be met for an alternative to be eligible for selection:*

8.1.1 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 acceptable only for an industrial scenario. No evaluation was made of the risks posed by unrestricted use of the property. Deed restrictions are therefore required as a mechanism to ensure the continued future use of Parcel 4 is limited to industrial purposes.

8.1.2 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 which 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 under specified conditions. For Parcel 4, "Maximum Contaminant Levels" or "MCLs" established under the Safe Drinking Water Act constitute chemical-specific ARARs and are listed in Appendix B. They apply to the bedrock groundwater beneath Parcel 4. There is evidence of contamination above MCLs in this ground water. Consequently, ARARs with respect to ground water are not met by Alternative 1, but are met by Alternative 2.

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., floodplains, wetlands, historic places, etc. For Parcel 4, Ohio has identified two statutory provisions that describe site conditions that would prompt certain response actions. (See Appendix A). These provisions are similar to location-specific ARARs. Alternative 2 meets both of 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. For Alternative 2, the remedy is an institutional control - deed restrictions. The ARARs are applicable State requirements concerning the recording of deeds. (See

Appendix B). Alternative 2 will comply with these requirements.

It should be noted that any onsite management of Parcel 4 soils, not associated with a CERCLA response action, in a manner inconsistent with State law or any disposition of Parcel 4 soils away from the Mound Superfund Site would be subject to applicable Ohio regulations, which are enforceable independent of CERCLA.

8.2 BALANCING CRITERIA - *used to weigh major trade-offs among alternatives:*

8.2.1 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, provides some degree of 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 Parcel 4.

Because this remedy will result in hazardous substances remaining in Parcel 4 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.

8.2.2 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 Parcel 4 was accomplished previously on an individual PRS basis.

8.2.3 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. Alternative 2, Institutional Controls, provides this assurance.

8.2.4 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. Alternative 2, Institutional Controls, 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, USDOE dated February 17, 1999.

8.2.5 CRITERIA 7: Cost

The range of costs is zero dollars ($0) for Alternative 1, No Action, to approximately $5,000 annually for the maintenance of the deed restrictions for Alternative 2, Institutional Controls.

8.3 MODIFYING CRITERIA - *to be considered after public comment is received on the Proposed Plan and of equal importance to the balancing criteria*:

8.3.1 CRITERIA 8: State/Support Agency Acceptance

Both US EPA 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 Alternative 2, Institutional Controls.

8.3.2 CRITERIA 9: Community Acceptance

To evaluate community acceptance, this Proposed Plan will be the subject

of a formal public comment and review period of 30 days.

9. THE PREFERRED ALTERNATIVE

The preferred alternative is Alternative 2, Institutional Controls, in the form of deed restrictions on future land use. DOE or its successors would retain the right and responsibility to monitor, maintain and enforce these institutional controls. The objective of these restrictions is to:

- Ensure that industrial land use is maintained;
- Prohibit the use of bedrock ground water;
- Provide site access for federal and state agencies for the purpose of sampling and monitoring; and
- Prohibit removal of Parcel 4 soils from the DOE Mound property (as owned in 1998) boundary without approval from the Ohio Department of Health and OEPA, or their successor agencies.

The soils within Parcel 4 have not been evaluated for any use other than on-site industrial use. Any off-site disposition of Parcel 4 soil without proper handling, sampling and management could create an unacceptable risk to off-site receptors.

The initial costs associated with these deed restrictions are those associated with the writing and recording of the restrictions with the deed. DOE will ensure the deed restrictions are implemented prior or upon property transfer. The costs associated with monitoring and enforcing the land use and property deed restrictions are estimated to be $5,000 per year.

10. OPPORTUNITIES FOR COMMUNITY PARTICIPATION

This Proposed Plan will be available for public review and comment from Day 1, 2000 to Day 31, 1999. During this time, a public meeting will be held to discuss the Plan.

All of the supporting documentation for this Proposed Plan is located in the Administrative Record File, which is available for public review at the Mound CERCLA Public Reading Room located at the Miamisburg Senior Adult Center. Any questions or comments related to this Proposed Plan should be forwarded to Ms. Jane Greenwalt, Public Affairs Officer, DOE/MEMP at (937) 865-3116 or via e-mail at jane.greenwalt@em.doe.gov. Should you have questions or comments you wish to present directly to the regulators, the points-of-contact are Mr. Tim Fischer and Mr. Brian Nickel of the US EPA and OEPA, respectively. Mr. Fischer can be reached at (312) 886-5787; Mr. Nickel can be reached at (937) 285-6468.

11. REFERENCES

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

Operable Unit 3 Miscellaneous Sites Limited Field Investigation Report, Volumes 1, 2, and 3, Final, Revision 0, July 1, 1993.

Operable Unit 9 Site Scoping Report, Volume 3 - Radiological Site Survey, Final, June 1, 1993.

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

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

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

Operable Unit 5 New Property Remedial Investigation Report, Final, Revision 0, February 1996.

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

Operable Unit 9 Regional Soils Investigation Report, Revision 2, August 1, 1995.

Residual Risk Evaluation, Release Block D, Final, Rev. 0, December 1996.

The Mound 2000 Residual Risk Evaluation Methodology (RREM), Mound Plant, Final, Revision 0, January 6, 1997.

Workplan for Environmental Restoration at the Mound Plant, The Mound 2000 Approach, December 1998.

Risk-Based Guideline Values, Mound Plant, Miamisburg, Ohio, Final, Rev. 4, March 1997.

Parcel 4 Residual Risk Evaluation.

Comprehensive Environmental Resource Compensation and Liability Act (CERCLA)

Section 120 Federal Facility Agreement, August 1993.

An Archaeological Survey of Portions of the Mound Facility, Montgomery County, Ohio, December 1987.

Operable Unit 9, Regional Soils Investigation Report, August 1995.

OU-9 Surface Water and Sediment Report, Technical memo, Rev. 2, September 1996.

Mound Laboratory Environmental Plutonium Study 1974 (MLM-02249), September 1975.

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

Characterization Report for Soils at the EG&G Mound Waste Disposal (WD) Building, February 1992.

OU-9 Ecological Characterization, March 1984.

PRSs 306/314/406 Data Package, April 1996.

PRS 419 Data Package, April 2000.

Parcel 4 Ecological Risk Evaluation, Draft, October 2000.

Appendix A

Contaminant of Potential Concern Screening Table From Parcel 4 RRE

Table 2.1 Initial Identification of Soil Constituents of Potential Concern for the Construction Worker in Parcel 4. (Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guideline Value	Reference
Metals											
7429-90-5	Aluminum	363	21400.00	mg/kg	B409	65-65	12700	21400.00	19000.00	21000.00	f, b
7440-36-0	Antimony	0.27	42.20	mg/kg	MND33-0103	20-48	12.6	42.20		8.50	a
7440-38-2	Arsenic	1.7	17.10	mg/kg		65-65	6.99	17.10	8.60	6.40	a
7440-39-3	Barium	2	133.00	mg/kg	CH	65-65	86.5	133.00	180.00	1500.00	b
13966-02-4	Beryllium	0.12	0.94	mg/kg	CH	50-65	0.66	0.94	1.30	0.70	c
14733-03-0	Bismuth	0.76	70.40	mg/kg	CJ	48-51	73.3	70.40			
7440-43-9	Cadmium	0.31	7.70	mg/kg	MND33-0103	14-65	1.02	7.70	2.10	21.00	a
7440-70-2	Calcium	812	175000.00	mg/kg	NPS1	65-65	108000	175000.00	310000.00		
	Cerium	24	50.90	mg/kg		8-8	NC	50.90			
7440-47-3	Chromium	1	30.50	mg/kg	MND33-0103	65-65	17.9	30.50	20.00	110.00	a
10198-40-0	Cobalt	0.37	14.40	mg/kg	B409	65-65	12	14.40	19.00		
7440-50-8	Copper	1.4	27.50	mg/kg		65-65	17.5	27.50	26.00	790.00	a, f
57-12-5	Cyanide	0.12	0.38	mg/kg	MND33-0103	8-65	0.31	0.38		430.00	a
7439-89-6	Iron	1300	40500.00	mg/kg		65-65	22100	40500.00	35000.00		
15067-28-4	Lead	2	255.00	mg/kg		65-65	20.6	255.00	48.00		
7439-93-2	Lithium	2.7	41.40	mg/kg	B409	45-46	17.6	41.40	26.00		
7439-95-4	Magnesium	583	68800.00	mg/kg	MND33-0103	65-65	21700	68800.00	40000.00		
7439-96-5	Manganese	42.3	5240.00	mg/kg		65-65	1010	5240.00	1400.00	2700.00	b
7439-97-6	Mercury	0.14	0.42	mg/kg	NPS6	4-65	0.07	0.42		6.40	b
7439-98-7	Molybdenum	0.56	15.70	mg/kg		45-46	9.52	15.70	27.00		
	Neodymium	17	33.40	mg/kg		7-8	NC	33.40			
7440-02-0	Nickel	2.8	26.20	mg/kg	CJ	62-65	22	26.20	32.00	430.00	a
13966-00-2	Potassium	157	4320.00	mg/kg	B409	60-65	2530	4320.00	1900.00		
7782-49-2	Selenium	0.29	2.20	mg/kg	CJ	10-65	0.54	2.20		110.00	f,a
7440-22-4	Silver	0	17.00	mg/kg	MND33-0103	9-65	1.88	17.00	1.70	110.00	a
13966-32-0	Sodium	26.7	865.00	mg/kg		34-41	410	865.00	240.00		
14913-50-9	Thallium	0.35	2.10	mg/kg		11-50	0.66	2.10	0.46	1.70	f,a
7440-31-5	Tin	1.6	41.10	mg/kg		7-52	6.9	41.10	20.00	13000.00	f, a
7440-62-2	Vanadium	0.45	37.00	mg/kg	B409	63-65	34.9	37.00	25.00	150.00	a
7440-66-6	Zinc	4.1	1310.00	mg/kg		65-65	65.5	1310.00	140.00	6400.00	a

Semi-Volatile Organic Compounds											
120-82-1	1,2,4-Trichlorobenzene	33	33.00	ug/kg	MND33-0104	1-58	239	33.00		213000.00	f, b
95-57-8	2-Chlorophenol	38	38.00	ug/kg	MND33-0104	1-58	238	38.00		1064.58	f, a
91-57-6	2-Methylnaphthalene	63	110.00	ug/kg		2-58	238	110.00			
59-50-7	4-Chloro-3-methylphenol	7	7.00	ug/kg	MND33-0104	1-58	263	7.00			
	Acenaphthene	42	120.00	ug/kg		2-58	252	120.00			
	Acenaphthylene	50	690.00	ug/kg		4-58	243	690.00			
	Anthracene	50	690.00	ug/kg		7-58	243	690.00		6400000.00	a
56-55-3	Benzo(a)anthracene	58	2800.00	ug/kg		10-58	325	2800.00		4100.00	d
50-32-8	Benzo(a)pyrene	40	2500.00	ug/kg		11-58	330	2500.00		410.00	d
205-99-2	Benzo(b)fluoranthene	35	4800.00	ug/kg		21-58	439	4800.00		4100.00	d
191-24-2	Benzo(g,h,i)perylene	47	250.00	ug/kg		8-58	241	250.00			
207-08-9	Benzo(k)fluoranthene	58	8600.00	ug/kg		19-58	524	8600.00		41000.00	d
65-85-0	Benzoic Acid	12	86.00	ug/kg		5-55	1710	86.00		85000000.00	a
117-81-7	Bis(2-ethylhexyl)phthalate	34	340.00	ug/kg	B401	11-58	241	340.00		215000.00	d
	Carbazole	41	420.00	ug/kg		4-50	219	420.00			
218-01-9	Chrysene	43	2400.00	ug/kg		12-58	321	2400.00		410000.00	d
84-74-2	Di-n-butyl Phthalate	25	420.00	ug/kg	NPS5	8-58	252	420.00		2100000.00	a
117-84-0	Di-n-octyl Phthalate	47	130.00	ug/kg	B408	3-58	240	130.00		430000.00	a
	Dibenz(a,h)anthracene	46	130.00	ug/kg		4-58	240	130.00		408.33	f, c
	Dibenzofuran	42	250.00	ug/kg		2-58	243	250.00			
206-44-0	Fluoranthene	39	5000.00	ug/kg		21-58	433	5000.00		850000.00	a
	Fluorene	50	460.00	ug/kg		5-58	246	460.00		8516666.67	f,a
	Indeno(1,2,3-cd)pyrene	67	850.00	ug/kg		8-58	253	850.00		408.33	f, c
	Naphthalene	200	200.00	ug/kg		1-58	237	200.00			
85-01-8	Phenanthrene	78	3700.00	ug/kg		10-58	338	3700.00			
108-95-2	Phenol	23	23.00	ug/kg	MND33-0104	1-58	243	23.00		13000000.00	a
129-00-0	Pyrene	25	3300.00	ug/kg		21-58	371	3300.00		640000.00	a
Volatile Organic Compounds											
78-93-3	2-Butanone	8.5	8.50	ug/kg	NPS3	1-65	6.11	8.50		930000.00	b
67-64-1	Acetone	12	55.00	ug/kg		9-65	10.3	55.00		2100000.00	a
56-23-5	Carbon Tetrachloride	9.6	9.60	ug/kg	NPS3	1-65	3.74	9.60		12000.00	c
100-41-4	Ethylbenzene	2.1	2.10	ug/kg	NPS3	1-65	3.61	2.10		50.00	b
	Hexane	4	10.00	ug/kg		2-53	6.24	10.00		9100.00	b
75-09-2	Methylene Chloride	6	97.00	ug/kg	NPS3	10-65	10.9	97.00		100000.00	b
108-88-3	Toluene	1	4.70	ug/kg	NPS3	3-65	3.66	4.70		25000.00	b
	Xylenes, Total	2	2.10	ug/kg		1-65	3.61	2.10		43000000.00	a

Pesticides/PCBs											
72-54-8	4,4'-DDD	0.4	6.60	ug/kg	B409	2-64	2.6	6.60	4200.00		
72-55-9	4,4'-DDE	0.25	3.50	ug/kg	MND22-4101	6-64	2.07	3.50	4300.00	9000.00	d
50-29-3	4,4'-DDT	0.19	0.48	ug/kg		4-65	2.69	0.48	13000.00	9000.00	c
309-00-2	Aldrin	0.074	0.35	ug/kg	B401	6-64	1.26	0.35		640.00	f,a
5103-71-9	Alpha Chlordane	0.044	3.50	ug/kg		6-65	1.97	3.50		8500.00	f,c
319-86-8	Delta-BHC	0.08	5.30	ug/kg	MND22-4101	3-65	1.64	5.30			
60-57-1	Dieldrin	1.20	1.20	ug/kg		4-65	2.17	1.20		185.00	c
33213-65-9	Endosulfan I	0.051	0.27	ug/kg	B407	3-63	1.81	0.27		130000.00	f,a
33213-65-9	Endosulfan II	0.053	7.10	ug/kg	MND22-4001	5-65	2.41	7.10		130000.00	f,a
1031-07-8	Endosulfan Sulfate	0.13	0.56	ug/kg	MND22-4101	2-65	3.35	0.56			
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	4-60	3.34	0.93			
53494-70-5	Endrin Ketone	0.24	0.86	ug/kg		4-65	3.43	0.86			
5103-74-2	Gamma Chlordane	0.058	0.93	ug/kg	MND22-4003	2-65	1.85	0.93		8500.00	f,c
58-89-9	Gamma-BHC (Lindane)	0.065	0.10	ug/kg	MND22-4101	2-65	1.26	0.10		2300.00	f,d
1024-57-3	Heptachlor	0.056	1.20	ug/kg		7-65	1.17	1.20		660.00	f,d
1024-57-3	Heptachlor Epoxide	0.072	0.94	ug/kg	MND22-4102	6-65	1.79	0.94		280.00	f,a
72-43-5	Methoxychlor	0.13	0.95	ug/kg	MND22-4101	4-63	23.2	0.95	30000.00		
								0.00			
Explosives								0.00			
99-65-0	1,3-Dinitrobenzene	0.098	0.10	mg/kg	B405	1-39	0.87	0.10		2.10	f,a
118-96-7	2,4,6-Trinitrotoluene	0.2	0.20	mg/kg	B405	1-39	0.84	0.20		11.00	f,a
	Tetryl	0.29	0.29	mg/kg	?	1-39	1.35	0.29			

Radionuclides											
AC-227DA	Actinium-227	0.13	3.02	pCi/g		63-153	0.64	3.02		1.00	e
14596-10-2	Americium-241	0.23	0.23	pCi/g		11-187	0.14	0.23		4.95	e
10045-97-3	Cesium-137	0.90	0.90	pCi/g		126-188	0.36	0.90	0.42	0.46	e
10198-40-0	Cobalt-60	0.16	0.16	pCi/g		9-188	0.06	0.16		0.10	e
14255-04-0	Lead-210	0.38	3.70	pCi/g		89-117	1.84	3.70		1.60	f,e
13994-20-2	Neptunium-237	0.023	0.01	pCi/g	#6B	6-8	NC	0.01		1.50	f,e
13981-16-3	Plutonium-238	0.01	76.11	pCi/g		156-480	111	76.11	0.13	5.50	e
PU-239/240	Plutonium-239	0.01	0.01	pCi/g		3-10	NC	0.01	0.18	5.50	e
PU-239/240	Plutonium-239/240	0.00667	0.21	pCi/g		18-63	0.02	0.21	0.18	5.50	e
13982-10-0	Plutonium-242	0.0102	0.01	pCi/g	GJ	1-31	0.02	0.01		5.60	f,e
13966-00-2	Potassium-40	10.5	34.46	pCi/g	B405	55-66	22.6	34.46	37.00	1.60	f,e
13982-63-3	Radium-226	0.39	3.64	pCi/g		147-179	1.53	3.64	2.00	0.14	e
	Radium-228	1	2.57	pCi/g		9-9	NC	2.57		0.28	f,e
10098-97-2	Strontium-90	0.158	2.77	pCi/g	B405	4-37	1.07	2.77	0.72	3.00	e
14274-82-9	Thorium-228	0.195	1.79	pCi/g		66-80	1.07	1.79	1.50	0.16	e
14269-63-7	Thorium-230	27.17	27.17	pCi/g		86-178	4.61	27.17	1.90	44.00	e
7440-29-1	Thorium-232	0.037	5.60	pCi/g	S1049	182-491	0.84	5.60	1.40	50.00	e
10028-17-8	Tritium	3.00	3.00	pCi/g		7-64	0.88	3.00	1.60	23500.00	e
13966-29-5	Uranium-234	1.17	1.17	pCi/g	B406	56-65	0.77	1.17	1.10	37.50	e
15117-96-1	Uranium-235	0.019	0.20	pCi/g	B406	51-59	0.1	0.20	0.11	3.35	e
24678-82-8	Uranium-238	1.95	1.95	pCi/g		109-114	1.08	1.95	0.96	11.00	e

a= 1/10th HI for ingestion

b= 1/10th HI for ingestion + inhalation

c= cancer risk for ingestion + inhalation

d= cancer risk for ingestion

e= cancer risk for ingestion + inhalation + external

f= Calculated values based on procedures in Mound's approved Risk-Based Guidance Values, Final Rev. 4, March 1997 and updated toxicity criteria

NO:1 - <5% Detects

NO:2 - <Background

NO:3 - < Screening Toxicity Value

NO:2,3 - <Background,Screening Toxicity

NO:4 - Essential Human Nutrient

Table 2.2 Final Identification of Soil Constituents of Potential Concern for the Construction Worker in Parcel 4.
(Exposure Point Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Rationale for Contaminant Deletion or Selection
Metals										
7429-90-5	Aluminum	363	21400.00	mg/kg	B409	65-65	12700	12700.00	19000.00	NO
7440-36-0	Antimony	0.27	42.20	mg/kg	MND33-0103	20-48	12.6	12.60		YES
7440-38-2	Arsenic	1.7	17.10	mg/kg		65-65	6.99	6.99	8.60	NO
14733-03-0	Bismuth	0.76	70.40	mg/kg	CJ	48-51	73.3	70.40		YES
	Cerium	24	50.90	mg/kg		8-8	NC	50.90		YES
15067-28-4	Lead	2	255.00	mg/kg		65-65	20.6	20.60	48.00	NO
7439-93-2	Lithium	2.7	41.40	mg/kg	B409	45-46	17.6	17.60	26.00	NO
7439-95-4	Magnesium	583	68800.00	mg/kg	MND33-0103	65-65	21700	21700.00	40000.00	NO
7439-96-5	Manganese	42.3	5240.00	mg/kg		65-65	1010	1010.00	1400.00	NO
	Neodymium	17	33.40	mg/kg		7-8	NC	33.40		YES
14913-50-9	Thallium	0.35	2.10	mg/kg		11-50	0.66	0.66	0.46	YES
Semi-Volatile Organic Compounds										
	Acenaphthylene	50	690.00	ug/kg		4-58	243	243.00		YES
50-32-8	Benzo(a)pyrene	40	2500.00	ug/kg		11-58	330	330.00		YES
205-99-2	Benzo(b)fluoranthene	35	4800.00	ug/kg		21-58	439	439.00		YES
191-24-2	Benzo(g,h,i)perylene	47	250.00	ug/kg		8-58	241	241.00		YES
	Carbazole	41	420.00	ug/kg		4-50	219	219.00		YES
	Indeno(1,2,3-cd)pyrene	67	850.00	ug/kg		8-58	253	253.00		YES
85-01-8	Phenanthrene	78	3700.00	ug/kg		10-58	338	338.00		YES
Pesticides/PCBs										
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	4-60	3.34	0.93		YES
53494-70-5	Endrin Ketone	0.24	0.86	ug/kg		4-65	3.43	0.86		YES

Radionuclides										
AC-227DA	Actinium-227	0.13	3.02	pCi/g		63-153	0.64	0.64		YES
10045-97-3	Cesium-137	0	0.90	pCi/g		126-188	0.36	0.36	0.42	NO
14255-04-0	Lead-210	0.38	3.70	pCi/g		89-117	1.84	1.84		YES
13981-16-3	Plutonium-238	0.01	76.11	pCi/g		156-480	111	76.11	0.13	YES
13982-63-3	Radium-226	0.39	3.64	pCi/g		147-179	1.53	1.53	2.00	NO
	Radium-228	1	2.57	pCi/g		9-9	NC	2.57		YES
14274-82-9	Thorium-228	0.195	1.79	pCi/g		66-80	1.07	1.07	1.50	NO

a= 1/10th HI for ingestion

b= 1/10th HI for ingestion + inhalation

c= cancer risk for ingestion + inhalation

d= cancer risk for ingestion

e= cancer risk for ingestion + inhalation + external

f= Calculated values based on procedures in Mound's approved Risk-Based Guidance Values, Final Rev. 4, March 1997 and updated toxicity criteria

NO:1 - <5% Detects

NO:2 - <Background

NO:3 - < Screening Toxicity Value

NO:2,3 - <Background,Screening Toxicity

NO:4 - Essential Human Nutrient

Table 2.3 Initial Identification of Surface Soil Constituents of Potential Concern for the Site Employee in Parcel 4.
(Maximum Detected Concentration Compared to Background and Mound Guidance Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Screening Guidance Values	Reference	Rationale for Contaminant Deletion or Selection
Metals												
7429-90-5	Aluminum	1680	21400	mg/kg	B409	22-22	8570.00	21400	19000.00	190000.00	f, b	YES
7440-36-0	Antimony	26.1	42	mg/kg	MND33-0103	8-21	367.00	42.20		82.00	a	NO:3
7440-38-2	Arsenic	3.90	11.8	mg/kg	B406	22-22	7.00	11.8	8.60	61.00	a	YES
7440-39-3	Barium	12.4	111.00	mg/kg		22-22	58.30	111.00	180.00	14000.00	b	NO:2,3
13966-02-4	Beryllium	0.12	0.85	mg/kg		21-22	0.70	0.85	1.30	1.30	c	NO:2,3
14733-03-0	Bismuth	0.76	28.50	mg/kg	CJ	12-14	NC	28.50				YES
7440-43-9	Cadmium	0.31	7.70	mg/kg	MND33-0103	11-22	40.10	7.70	2.10	200.00	a	NO:3
7440-70-2	Calcium	812	150000.00	mg/kg		22-22	662000.00	150000.00	310000.00			NO:2
7440-47-3	Chromium	1.7	30.50	mg/kg	MND33-0103	22-22	26.70	30.50	20.00	1000.00	a	NO:3
10198-40-0	Cobalt	1.4	14.40	mg/kg	B409	22-22	10.80	14.40	19.00			NO:2
7440-50-8	Copper	3.4	21.70	mg/kg		22-22	18.10	21.70	26.00	7600.00	a, f	NO:2,3
57-12-5	Cyanide	0.12	0.38	mg/kg	MND33-0103	8-22	0.35	0.38		4100.00	a	NO:3
7439-89-6	Iron	2790	28800.00	mg/kg		22-22	17600.00	28800.00	35000.00			NO:2
15067-28-4	Lead	5	32.00	mg/kg	B401	22-22	19.20	32.00	48.00			NO:2
7439-93-2	Lithium	2.7	27.30	mg/kg	B409	12-13	26.80	27.30	26.00			YES
7439-95-4	Magnesium	583	6800.00	mg/kg	MND33-0103	22-22	110000.00	6800.00	40000.00			NO:2
7439-96-5	Manganese	116	1250.00	mg/kg	MND22-4101	22-22	722.00	1250.00	1400.00	15000.00	b	NO:2,3
7439-97-6	Mercury	0.14	0.14	mg/kg		1-22	0.07	0.14		61.00	b	NO:1
7439-98-7	Molybdenum	0.56	6.20	mg/kg	B409	13-13	NC	6.20	27.00			NO:2
7440-02-0	Nickel	2.8	25.80	mg/kg		21-22	30.10	25.80	32.00	4100.00	a	NO:2,3
13966-00-2	Potassium	270	3550.00	mg/kg	B409	22-22	1650.00	3550.00	1900.00			NO:4
7440-22-4	Silver	12	17.00	mg/kg	MND33-0103	8-22	149.00	17.00	1.70	1000.00	a	NO:3
13966-32-0	Sodium	26.7	530.00	mg/kg	MND22-4101	21-22	407.00	530.00	240.00			NO:4
14913-50-9	Thallium	0	0.44	mg/kg		8-22	0.89	0.44	0.46	16.00	f,a	NO:2,3
7440-31-5	Tin	2.6	4.80	mg/kg	MND22-4102	3-14	6.48	4.80	20.00			NO:2
7440-62-2	Vanadium	0.75	37.00	mg/kg	B409	22-22	33.20	37.00	25.00	1400.00	a	NO:3
7440-66-6	Zinc	6.7	74.10	mg/kg		22-22	45.50	74.10	140.00	61000.00	a	NO:2,3

Semi-Volatile Organic Compounds												
120-82-1	1,2,4-Trichlorobenzene	33	33	ug/kg	MND33-0104	1-15	NC	33.00		2040000.00	f, b	NO:3
95-57-8	2-Chlorophenol	38	38	ug/kg	MND33-0104	1-15	NC	38.00		1022000.00	f, a	NO:3
91-57-6	2-Methylnaphthalene	63	63	ug/kg	B401	1-15	NC	63.00				YES
59-50-7	4-Chloro-3-methylphenol	7	7	ug/kg	MND33-0104	1-15	NC	7.00				YES
56-55-3	Benzo(a)anthracene	58	58	ug/kg	B401	1-15	NC	58.00		78000.00	d	NO:3
50-32-8	Benzo(a)pyrene	51	51	ug/kg	B401	1-15	NC	51.00		780.00	d	NO:3
205-99-2	Benzo(b)fluoranthene	37	98	ug/kg	B401	4-15	NC	98.00		7800.00	d	NO:3
207-08-9	Benzo(k)fluoranthene	65	170	ug/kg	B401	4-15	NC	170.00		78000.00	d	NO:3
65-85-0	Benzoic Acid	12	12	ug/kg	MND33-0104	1-15	NC	12.00		820000000.00	a	NO:3
218-01-9	Chrysene	78	78	ug/kg	B401	1-15	NC	78.00		780000.00	a	NO:3
84-74-2	Di-n-butyl Phthalate	25	68	ug/kg		3-15	NC	68.00		20000000.00	a	NO:3
206-44-0	Fluoranthene	39	110	ug/kg	B401	4-15	NC	110.00		8200000.00	a	NO:3
85-01-8	Phenanthrene	78	78	ug/kg	B401	1-15	NC	78.00				YES
108-95-2	Phenol	23	23	ug/kg	MND33-0104	1-15	NC	23.00		120000000.00	a	NO:3
129-00-0	Pyrene	25	120	ug/kg	MND33-0103	7-15	NC	120.00		6100000.00	a	NO:3
Volatile Organic Compounds												
67-64-1	Acetone	13	17	ug/kg	MND22-4101	2-22	7.16	17.00		20000000.00	a	NO:3
75-09-2	Methylene Chloride	6	14	ug/kg		7-22	9.54	14.00		100000.00	d	NO:3
108-88-3	Toluene	2	2	ug/kg		1-22	3.12	2.00		25000.00	b	NO:1
Pesticides/PCBs												
72-54-8	4,4'-DDD	0.4	660.00	ug/kg	B409	2-21	4.04	660.00	4200.00			NO:2
72-55-9	4,4'-DDE	0.25	3.50	ug/kg	MND22-4101	3-22	2.36	3.50	4300.00	17000.00	d	NO:2,3
50-29-3	4,4'-DDT	0.19	0.25	ug/kg	B406	3-22	5.46	0.25	13000.00	17000.00	c	NO:2,3
309-00-2	Aldrin	0.35	0.35	ug/kg	B401	6-22	2.38	0.35		340.00	f, c	NO:3
5103-71-9	Alpha Chlordane	1.10	1.10	ug/kg	MND22-4003	3-22	6.87	1.10		16000.00	f, c	NO:3
319-86-8	Delta-BHC	0.08	5.3	ug/kg	MND22-4101	3-22	4.67	5.3				YES
60-57-1	Dieldrin	0.96	0.96	ug/kg	MND22-4003	1-22	1.95	0.96		360.00	c	NO:1
33213-65-9	Endosulfan I	0.27	0.27	ug/kg	B407	3-22	6.11	0.27		1200000.00	f, a	NO:3
33213-65-9	Endosulfan II	7.10	7.10	ug/kg	MND22-4001	4-22	4.45	7.10		1200000.00	f, a	NO:3
1031-07-8	Endosulfan Sulfate	0.13	0.56	ug/kg	MND22-4101	2-22	10.20	0.56				YES
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	3-22	9.30	0.93				YES
53494-70-5	Endrin Ketone	0.24	0.25	ug/kg	B407	2-22	10.10	0.25				YES
5103-74-2	Gamma Chlordane	0.058	0.93	ug/kg	MND22-4003	2-22	5.92	0.93		16000.00	f, c	NO:3
58-89-9	Gamma-BHC (Lindane)	0.065	0.10	ug/kg	MND22-4101	2-22	2.05	0.10		4400.00	f, d	NO:3
1024-57-3	Heptachlor	0.056	0.32	ug/kg	MND22-4102	3-22	1.62	0.32		1300.00	f, c	NO:3
1024-57-3	Heptachlor Epoxide	0.072	0.94	ug/kg	MND22-4102	4-22	7.05	0.94		630.00	f, c	NO:3
72-43-5	Methoxychlor	0.13	0.95	ug/kg	MND22-4101	4-22	204.00	0.95	30000.00			NO:2

Explosives												
99-65-0	1,3-Dinitrobenzene	0.10	0.10	mg/kg	B405	1-7	NC	0.10		20.00	f, a	NO:3
118-96-7	2,4,6-Trinitrotoluene	0.2	0.20	mg/kg	B405	1-7	NC	0.20		100.00	f, a	NO:3
Radionuclides												
AC-227	Actinium-227	0.13	3.02	pCi/g		63-123	0.82	3.02		1.10	e	YES
14596-10-2	Americium-241	0.26	0.26	pCi/g		11-136	0.10	0.26		9.20	e	NO:3
10045-97-3	Cesium-137	0.90	0.90	pCi/g		115-137	0.38	0.90	0.42	0.42	e	YES
10198-40-0	Cobalt-60	0.16	0.16	pCi/g		9-137	0.05	0.16		0.09	e	YES
14255-04-0	Lead-210	0.38	3.70	pCi/g		89-117	1.84	3.70		3.20	f, e	YES
13994-20-2	Neptunium-237	0.023	0.067	pCi/g	#6B	4-6	0.11	0.067		1.60	f, e	YES
13981-16-3	Plutonium-238	76.11	76.11	pCi/g		102-358	26.40	76.11	0.13	11.00	e	YES
PU-239/240	Plutonium-239	0.01	0.02	pCi/g	CANAL NW	3-5	0.01	0.02	0.18	10.00	e	NO:2,3
PU-239/240	Plutonium-239/240	0.00667	0.19	pCi/g		14-37	0.02	0.19	0.18	10.00	e	NO:3
13966-00-2	Potassium-40	13	34.46	pCi/g	B405	23-23	24.20	34.46	37.00			NO:2
13982-63-3	Radium-226	3.64	3.64	pCi/g		105-130	1.64	3.64	2.00	0.13	e	YES
	Radium-228	1	2.57	pCi/g		9-9	NC	2.57		0.26	f, e	YES
10098-97-2	Strontium-90	0.158	2.10	pCi/g	#4B	2-14	NC	2.10	0.72	57.00	e	NO:3
14274-82-9	Thorium-228	1.66	1.66	pCi/g	B405	38-40	1.03	1.66	1.50	0.16	e	YES
14269-63-7	Thorium-230	0.316	27.17	pCi/g		48-138	5.51	27.17	1.90	81.00	e	NO:3
7440-29-1	Thorium-232	0.037	5.60	pCi/g	S1049	139-369	0.74	5.60	1.40	92.00	e	NO:3
13966-29-5	Uranium-234	1	1.17	pCi/g	B406	20-23	0.86	1.17	1.10	70.00	e	YES
15117-96-1	Uranium-235	0.2	0.2	pCi/g	B406	29-32	0.11	0.2	0.11	3.10	e	YES
24678-82-8	Uranium-238	2	2	pCi/g		71-74	1.24	1.95	0.96	11.00	f,e	NO:3

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion + inhalation
c= cancer risk for ingestion + inhalation
d= cancer risk for ingestion
e= cancer risk for ingestion + inhalation + external
f= Calculated values based on procedures in Mound's approved Risk-Based Guidance Values, Final Rev. 4, March 1997 and updated toxicity criteria

NO:1 - <5% Detects
NO:2 - <Background
NO:3 - < Screening Toxicity Value
NO:2,3 - <Background,Screening Toxicity
NO:4 - Essential Human Nutrient

Table 2.4 Final Identification of Surface Soil Constituents of Potential Concern for the Site Employee in Parcel 4.
(Exposure Point Concentration Compared to Background Values)

CAS Number	Chemical	Minimum Concentration	Maximum Concentration	Units	Location of Maximum Concentration	Detection Frequency	95% UCL	Concentration Used for Screening	Background Value	Rationale for Contaminant Deletion or Selection
Metals										
7429-90-5	Aluminum	1680	21400	mg/kg	B409	22-22	8570.00	8570.00	19000.00	NO
7440-38-2	Arsenic	3.90	11.8	mg/kg	B406	22-22	7.00	7.00	8.60	NO
14733-03-0	Bismuth	0.76	28.50	mg/kg	CJ	12-14	NC	28.50		YES
7439-93-2	Lithium	2.7	27.30	mg/kg	B409	12-13	26.80	26.80	26.00	YES
Semi-Volatile Organic Compounds										
91-57-6	2-Methylnaphthalene	63	63	ug/kg	B401	1-15	NC	63.00		YES
59-50-7	4-Chloro-3-methylphenol	7	7	ug/kg	MND33-0104	1-15	NC	7.00		YES
85-01-8	Phenanthrene	78	78	ug/kg	B401	1-15	NC	78.00		YES
Pesticides/PCBs										
319-86-8	Delta-BHC	0.08	5.3	ug/kg	MND22-4101	3-22	4.67	4.67		YES
1031-07-8	Endosulfan Sulfate	0.13	0.56	ug/kg	MND22-4101	2-22	10.20	0.56		YES
7421-93-4	Endrin Aldehyde	0.28	0.93	ug/kg	MND22-4102	3-22	9.30	0.93		YES
53494-70-5	Endrin Ketone	0.24	0.25	ug/kg	B407	2-22	10.10	0.25		YES
Radionuclides										
AC-227	Actinium-227	0.13	3.02	pCi/g		63-123	0.82	0.82		YES
10045-97-3	Cesium-137	0.90	0.90	pCi/g		115-137	0.38	0.38	0.42	NO
10198-40-0	Cobalt-60	0.16	0.16	pCi/g		9-137	0.05	0.05		YES
14255-04-0	Lead-210	0.38	3.70	pCi/g		89-117	1.84	1.84		YES
13994-20-2	Neptunium-237	0.023	0.067	pCi/g	#6B	4-6	0.11	0.11		YES

Radionuclides (continued)										
13981-16-3	Plutonium-238	76.11	76.11	pCi/g		102-358	26.40	26.40	0.13	YES
PU-239/240	Plutonium-239	0.01	0.02	pCi/g	CANAL NW	3-5	0.01	0.01	0.18	NO
PU-239/240	Plutonium-239/240	0.00667	0.19	pCi/g		14-37	0.02	0.02	0.18	NO
13966-00-2	Potassium-40	13	34.46	pCi/g	B405	23-23	24.20	24.20	37.00	NO
13982-63-3	Radium-226	3.64	3.64	pCi/g		105-130	1.64	1.64	2.00	NO
	Radium-228	1	2.57	pCi/g		9-9	NC	2.57		YES
10098-97-2	Strontium-90	0.158	2.10	pCi/g	#4B	2-14	NC	2.10	0.72	YES
14274-82-9	Thorium-228	1.66	1.66	pCi/g	B405	38-40	1.03	1.03	1.50	NO
14269-63-7	Thorium-230	0.316	27.17	pCi/g		48-138	5.51	5.51	1.90	YES
7440-29-1	Thorium-232	0.037	5.60	pCi/g	S1049	139-369	0.74	0.74	1.40	NO
13966-29-5	Uranium-234	1	1.17	pCi/g	B406	20-25	0.86	0.86	1.10	NO
15117-96-1	Uranium-235	0.2	0.2	pCi/g	B406	29-32	0.11	0.11	0.11	YES
24678-82-8	Uranium-238	2	2	pCi/g		71-74	1.24	1.24	0.96	YES

a= 1/10th HI for ingestion

b= 1/10th HI for ingestion + inhalation

c= cancer risk for ingestion + inhalation

d= cancer risk for ingestion

e= cancer risk for ingestion + inhalation + external

f= Calculated values based on procedures in Mound's approved Risk-Based Guidance Values, Final Rev. 4, March 1997 and updated toxicity criteria

NO:1 - <5% Detects

NO:2 - <Background

NO:3 - < Screening Toxicity Value

NO:2,3 - <Background,Screening Toxicity

NO:4 - Essential Human Nutrient

Table 2.5 Initial Identification of Current Groundwater Constituents of Potential Concern for the Construction Worker Scenario
(Maximum Detected Values Compared to Background and Screening Guidance Values)

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	Concentration Used for Screening and Risk	Background Value	Construction Worker Risk-Based GV	Reference Risk-Based GV	Initial COPC
Inorganics									
Aluminum	67.91	148.00	ug/L	7-29	148.00	37.523	10200	a, e	NO:3
Antimony	2.8	40.20	ug/L	5-29	40.20	0.578	4.1	a	YES
Barium	75	115.00	ug/L	27-29	115.00	310.209	710	a	NO:2,3
Cadmium	4.6	7.70	ug/L	6-32	7.70		5.1	a	YES
Calcium	94300	126000.00	ug/L	33-33	126000.00	111110.664	0		YES
Chromium	18.3	24.91	ug/L	6-32	24.91	6.076	10000	a	NO:3
Copper	1.6	593.00	ug/L	22-32	593.00	1.167	409	a,e	YES
Iron	18.8	1890.00	ug/L	14-31	1890.00	4064.888	0		NO:2
Lithium	2.9	2.90	ug/L	4-10	2.90	55.7	0		NO:2
Magnesium	29100	39600.00	ug/L	32-32	39600.00	40428.111	0		NO:2
Manganese	2.8	224.00	ug/L	30-32	224.00	229.568	51	a	NO:2
Molybdenum	1.6	2.70	ug/L	5-10	2.70	5.597	0		NO:2
Nickel	2.1	27.10	ug/L	5-32	27.10	34.957	200	a	NO:2,3
Potassium	2390	3761.00	ug/L	27-33	3761.00	4461.063	0		NO:2
Selenium	1.5	1.50	ug/L	1-32	1.50		0		NO:1
Silver	16.9	24.20	ug/L	6-29	24.20		51	a	NO:3
Sodium	46600	84200.00	ug/L	32-32	84200.00	62425.563	0		NO:4
Thallium	2.4	2.40	ug/L	1-29	2.40		0		NO:1
Tin	8.7	8.70	ug/L	1-10	8.70	34.382	0		NO:2
Vanadium	3.9	14.60	ug/L	12-29	14.60	17.1	71	a	NO:2,3
Zinc	4.5	57.70	ug/L	10-32	57.70	119.6	3100	a	NO:2,3
Volatile Organic Compounds									
1,1,1-trichloroethane	0.30	3.30	ug/L	79-193	3.30	0.668	169.00	a, e	NO:3
1,1,2 trichloro-1,2,2-trifluoroethane	2.00	34.00	ug/L	13-18	34.00		303000.00	a, e	NO:3
1,1-Dichloroethane	2.50	3.50	ug/L	2-191	3.50		950.00	a	NO:1
1,1-Dichloroethene	1.70	1.70	ug/L	1-193	1.70				NO:1
1,2-cis-Dichloroethene	0.47	4.00	ug/L	103-159	4.00	0.999	102.00	b, e	NO:3
1,2-trans-Dichloroethene	0.50	3.00	ug/L	8-195	3.00		200.00	b	NO:1
1,3-cis-Dichloropropene	0.50	1.20	ug/L	2-195	1.20				NO:1
2-Butanone	7.00	41.00	ug/L	3-12	41.00		5300.00	a	NO:3
Acetone	1.00	12.00	ug/L	6-12	12.00		1000.00	a	NO:3
Bromodichloromethane	2.20	3.70	ug/L	2-193	3.70		4.50	c	NO:1
Chloroform	0.50	5.40	ug/L	9-197	5.40	0.516			NO:1
Dichloromethane	3.00	13.00	ug/L	8-195	13.00		38.00	c	NO:1
Ethylbenzene	0.50	0.60	ug/L	2-197	0.60		69.00	a	NO:1
Tetrachloroethane	0.15	2.20	ug/L	109-196	2.20		12.00	c	NO:3
Toluene	0.60	1.50	ug/L	4-197	1.50		16000.00	a	NO:1

Trichloroethene	0.47	5.90	ug/L	176-197	5.90		15.00	c	NO:3
Trichlorofluoromethane	2.20	2.50	ug/L	2-188	2.50		22000.00	a	NO:1
Xylenes, Total	0.60	3.60	ug/L	8-190	3.60		20000.00	b	NO:1
Radionuclides									
Actinium-227	0.50	0.50	pCi/L	1-10	0.50		1.30	c	NO:3
Americium-241	0.03	0.03	pCi/L	1-9	0.03	0.139	2.40	c	NO:2,3
Bismuth-210	0.11	0.39	pCi/L	2-19	0.39		110.00	c, e	NO:3
Plutonium-238	0.01	0.25	pCi/L	8-48	0.25	0.087	2.70	c	NO:3
Plutonium-239/240	0.002	2.00	pCi/L	6-20	2.00	0.125	2.50	c	NO:3
Radium-226	0.10	0.52	pCi/L	6-19	0.52	0.996	2.70	c	NO:2,3
Strontium-85	25.00	25.00	pCi/L	1-2	25.00				NO:5
Strontium-90	0.50	0.50	pCi/L	3-19	0.50	0.975	14.00	c	NO:2,3
Thorium-227	0.01	0.10	pCi/L	8-14	0.10		19.80	c, e	NO:3
Thorium-228	0.01	2.17	pCi/L	14-35	2.17	0.779	3.50	c	NO:3
Thorium-230	0.01	1.99	pCi/L	11-32	1.99		21.00	c	NO:3
Thorium-232	0.0025	0.10	pCi/L	8-33	0.10	0.314	24.00	c	NO:2,3
Tritium	110.00	7200.00	pCi/L	112-128	7200.00	1485.47	11000.00	d	NO:3
Uranium-233/234	0.17	0.36	pCi/L	30-30	0.36		18.00	c	NO:3
Uranium-234	0.20	8.14	pCi/L	14-19	8.14	0.792	18.00	c	NO:3
Uranium-235	0.10	2.30	pCi/L	23-43	2.30	0.814	17.00	c	NO:3
Uranium-238	0.13	8.25	pCi/L	41-48	8.25	0.688	13.00	c	NO:3

NC= 95% UCL not calculated, less than 20 samples in the data set.

a= 1/10th HI for ingestion + inhalation + dermal
b= 1/10th HI for ingestion
c= cancer risk for ingestion
d= cancer risk for ingestion + inhalation + external
e= New Risk-Based Guideline Values calculated according to Mound GV 3/97 methodology

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient
NO:5 - Low detected, low frequency, short half life

Table 2.6 Final Identification of Current Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Exposure Point Concentration Compared to Background Values)

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	95 Percent UCL	Concentration Used for Screening and Risk	Background Value	COPC for RRE
Inorganics								
Antimony	2.8	40.20	ug/L	5-29	80.30	40.20	0.578	YES
Cadmium	4.6	7.70	ug/L	6-32	5.25	5.25		YES
Calcium	94300	126000.00	ug/L	33-33	109000.00	109000.00	111110.664	NO
Copper	1.6	593.00	ug/L	22-32	57.40	57.40	1.167	YES

NO <Background Value
NC= 95% UCL not calculated, less than 20 samples in the data set.

Table 2.7 Initial Identification of Current Groundwater Constituents of Potential Concern for the Site Employee Scenario (Maximum Detected Values Compared to Background and Screening Guidance Values)

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	Concentration Used for Screening and Risk	Background Value	Site Employee Risk-Based GV	Reference Risk-Based GV	Initial COPC
Inorganics									
Aluminum	67.91	148.00	ug/L	7-29	148.00	37.523	10200.00	a,d	NO:3
Antimony	2.8	40.20	ug/L	5-29	40.20	0.578	4.10	a	YES
Barium	75	115.00	ug/L	27-29	115.00	310.209	720.00	a	NO:2,3
Cadmium	4.6	7.70	ug/L	6-32	7.70		5.10	a	YES
Calcium	94300	126000.00	ug/L	33-33	126000.00	111110.664			NO:4
Chromium	18.3	24.91	ug/L	6-32	24.91	6.076	51.00	b	NO:3
Copper	1.6	593.00	ug/L	22-32	593.00	1.167	409.00	a, d	YES
Iron	18.8	1890.00	ug/L	14-31	1890.00	4064.888			NO:2
Lithium	2.9	2.90	ug/L	4-10	2.90	55.7			NO:2
Magnesium	29100	39600.00	ug/L	32-32	39600.00	40428.111			NO:2
Manganese	2.8	224.00	ug/L	30-32	224.00	229.568	51.00	a	NO:2
Molybdenum	1.6	2.70	ug/L	5-10	2.70	5.597			NO:2
Nickel	2.1	27.10	ug/L	5-32	27.10	34.957	200.00	a	NO:2,3
Potassium	2390	3761.00	ug/L	27-33	3761.00	4461.063			NO:2
Selenium	1.5	1.50	ug/L	1-32	1.50				NO:1
Silver	16.9	24.20	ug/L	6-29	24.20		51.00	a	NO:3
Sodium	46600	84200.00	ug/L	32-32	84200.00	62425.563			NO:4
Thallium	2.4	2.40	ug/L	1-29	2.40				NO:1
Tin	8.7	8.70	ug/L	1-10	8.70	34.382			NO:2
Vanadium	3.9	14.60	ug/L	12-29	14.60	17.1	72.00	a	NO:2,3
Zinc	4.5	57.70	ug/L	10-32	57.70	119.6	3100.00	a	NO:2,3
Volatile Organic Compounds									
1,1,1-trichloroethane	0.30	3.30	ug/L	79-193	3.30	0.668	307.00	a, d	NO:3
1,1,2 trichloro-1,2,2-trifluoroethane	2.00	34.00	ug/L	13-18	34.00		307000.00	a, d	NO:3
1,1-Dichloroethane	2.50	3.50	ug/L	2-191	3.50		1000.00	a	NO:1
1,1-Dichloroethene	1.70	1.70	ug/L	1-193	1.70				NO:1
1,2-cis-Dichloroethene	0.47	4.00	ug/L	103-159	4.00	0.999	102.00	a, d	NO:3
1,2-trans-Dichloroethene	0.50	3.00	ug/L	8-195	3.00		200.00	a	NO:1
1,3-cis-Dichloropropene	0.50	1.20	ug/L	2-195	1.20				NO:1
2-Butanone	7.00	41.00	ug/L	3-12	41.00		6100.00	a	NO:3
Acetone	1.00	12.00	ug/L	6-12	12.00		1000.00	a	NO:3
Bromodichloromethane	2.20	3.70	ug/L	2-193	3.70		4.60	c	NO:1
Chloroform	0.50	5.40	ug/L	9-197	5.40	0.516			NO:1
Dichloromethane	3.00	13.00	ug/L	8-195	13.00		38.00	c	NO:1
Ethylbenzene	0.50	0.60	ug/L	2-197	0.60		1000.00	a	NO:1
Tetrachloroethane	0.15	2.20	ug/L	109-196	2.20		100.00	a	NO:3
Toluene	0.60	1.50	ug/L	4-197	1.50		2000.00	a	NO:1

Trichloroethene	0.47	5.90	ug/L	176-197	5.90		26.00	c	NO:3
Trichlorofluoromethane	2.20	2.50	ug/L	2-188	2.50		3100.00	a	NO:1
Xylenes, Total	0.60	3.60	ug/L	8-190	3.60		20000.00	a	NO:1
Radionuclides									
Actinium-227	0.50	0.50	pCi/L	1-10	0.50		0.26	c	YES
Americium-241	0.03	0.03	pCi/L	1-9	0.03	0.139	0.49	c	NO:2,3
Bismuth-210	0.11	0.39	pCi/L	2-19	0.39		2.19	a, d	NO:3
Plutonium-238	0.01	0.25	pCi/L	8-48	0.25	0.087	0.54	c	NO:3
Plutonium-239/240	0.00	2.00	pCi/L	6-20	2.00	0.125	0.51	c	YES
Radium-226	0.10	0.52	pCi/L	6-19	0.52	0.996	0.54	c	NO:2,3
Strontium-85	25.00	25.00	pCi/L	1-2	25.00				NO:5
Strontium-90	0.50	0.50	pCi/L	3-19	0.50	0.975	2.90	c	NO:2,3
Thorium-227	0.01	0.10	pCi/L	8-14	0.10		3.96	a, d	NO:3
Thorium-228	0.01	2.17	pCi/L	14-35	2.17	0.779	0.69	c	YES
Thorium-230	0.01	1.99	pCi/L	11-32	1.99		4.30	c	NO:3
Thorium-232	0.00	0.10	pCi/L	8-33	0.10	0.314	4.90	c	NO:2,3
Tritium	110.00	7200.00	pCi/L	112-128	7200.00	1485.47	2200.00	c	YES
Uranium-233/234	0.17	0.36	pCi/L	30-30	0.36		3.60	c	NO:3
Uranium-234	0.20	8.14	pCi/L	14-19	8.14	0.792	3.60	c	YES
Uranium-235	0.10	2.30	pCi/L	23-43	2.30	0.814	3.40	c	NO:3
Uranium-238	0.13	8.25	pCi/L	41-48	8.25	0.688	2.60	c	YES

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion of Cr VI
c= cancer risk for ingestion
d= New Risk-Based Guideline Values calculated according to Mound GV 3/97 methodology

NC= 95% UCL not calculated, less than 20 samples in the data set.

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient
NO:5 - short half life, one detect

Table 2.8 Final Identification of Current Groundwater Constituents of Potential Concern for the Site Employee Scenario (Exposure Point Concentration Compared to Background Values)

Chemical	Minimum Concentration	Maximum Concentration	Units	Detection Frequency	95 Percent UCL	Concentration Used for Screening and Risk	Background Value	COPC for RRE
Inorganics								
Antimony	2.8	40.20	ug/L	5-29	80.30	40.20	0.578	YES
Cadmium	4.6	7.70	ug/L	6-32	5.25	5.25		YES
Copper	1.6	593.00	ug/L	22-32	57.40	57.40	1.167	YES
Radionuclides								
Actinium-227	0.50	0.50	pCi/L	1-10	NC	0.50		YES
Plutonium-239/240	0.00	2.00	pCi/L	6-20	8.87	2.00	0.125	YES
Thorium-228	0.01	2.17	pCi/L	14-35	105.00	2.17	0.779	YES
Tritium	110.00	7200.00	pCi/L	112-128	861.00	861.00	1485.47	NO
Uranium-234	0.20	8.14	pCi/L	14-19	NC	8.14	0.792	YES
Uranium-238	0.13	8.25	pCi/L	41-48	0.47	0.47	0.688	NO

NO <Background Value

NC= 95% UCL not calculated, less than 20 samples in the data set.

Table 2.9 Initial Identification of Future Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Construction Worker Risk-Based GV	Reference Risk-Based GV	COPC?
Inorganics										
Aluminum	3.5	31500.00	ug/L	107/ 115	6840.00	31500.00	37.523	1.0E+04	a, d	YES
Ammonia**	100	37500.00	ug/L	34/ 61	4.03	37500.00	162			NO:4
Antimony	0.22	41.60	ug/L	21/ 122	2.82	41.60	0.578	4.1	a	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	933.00	37.295	3.1	a	YES
Barium	17.5	329.00	ug/L	112/ 114	130.00	329.00	310.209	710	a	NO:3
Beryllium**	0.02	2.30	ug/L	41/ 115	0.47	2.30		6.60E-02	c	YES
Bismuth**	0.09	264.00	ug/L	23/ 103	23.20	264.00				YES
Boron**	100	110.00	ug/L	1/ 2	0.00	110.00		900	a, d	NO:3
Cadmium	0.1	13.10	ug/L	11/ 124	0.75	13.10		5.1	a	YES
Calcium	116	1510000.00	ug/L	164/ 164	199000.00	1510000.00	111110.664	0		NO:4
Chloride**	8100	17700000.00	ug/L	74/ 74	908.00	17700000.00	105821			NO:4
Chromium	0.15	44800.00	ug/L	78/ 120	5010.00	44800.00	6.076	51	a*	YES
Cobalt**	0.18	295.00	ug/L	46/ 115	18.50	295.00	1.032	600	a, d	NO:3
Copper	0.3	514.00	ug/L	81/ 117	26.80	514.00	1.167	400	a, d	YES
Cyanide**	5	14.20	ug/L	3/ 45	4.79	14.20	na	200	a	NO:2,3
Dissolved Solids	499000	32500000.00	ug/L	47/ 47	2480.00	32500000.00				NO:4
Fluoride**	100	2400.00	ug/L	57/ 58	0.68	2400.00	419			YES
Iron	0.154	192000.00	ug/L	151/ 165	45400.00	192000.00	4064.888	0		NO:4
Lead**	0.4	32.00	ug/L	55/ 125	4.90	32.00	10.05			YES
Lithium	2.6	4280.00	ug/L	87/ 102	123.00	4280.00	55.7	0		YES
Magnesium	26.9	719000.00	ug/L	165/ 165	77500.00	719000.00	40428.111	0		NO:4
Manganese	0.037	3030.00	ug/L	155/ 165	737.00	3030.00	229.568	51	a	YES
Mercury**	0.1	1.40	ug/L	3/ 115	0.06	1.40		3.1	a	NO:1
Molybdenum	0.79	474.00	ug/L	51/ 98	32.50	474.00	5.597	50	a, d	YES
Nickel	1.1	6600.00	ug/L	82/ 120	749.00	6600.00	34.957	200	a	YES
Phosphate**	20	10100.00	ug/L	31/ 41	0.79	10100.00	231			NO:4
Potassium	2.12	214000.00	ug/L	150/ 164	15200.00	214000.00	4461.063	0		NO:4
Selenium	0.7	100.00	ug/L	10/ 112	1.78	100.00		50	a, d	YES
Silicon**	2230	3280.00	ug/L	6/ 6	17000.00	3280.00				NO:4
Silver	0.2	29.40	ug/L	7/ 115	1.24	29.40		51	a	NO:3
Sodium	68.2	7270000.00	ug/L	162/ 162	346000.00	7270000.00	62425.563	0		NO:4
Sulfate	5000	456000.00	ug/L	73/ 76	205.00	456000.00		0		NO:4
Thallium	0.9	22.00	ug/L	6/ 107	4.44	22.00		0		YES
Tin	0.92	357.20	ug/L	27/ 100	14.90	357.20	34.382	6000	a, d	NO:3

Vanadium	0.15	277.00	ug/L	65/ 115	33.00	277.00	17.1	71	a	YES
Zinc	0.5	399.00	ug/L	78/ 117	47.10	399.00	119.6	3100	a	NO:3
Volatiles & Organic Compounds										
1,1,1-trichloroethane	0.30	7.00	ug/L	20/ 238	0.67	7.00	0.668			YES
1,1,2 trichloro-1,2,2-trifluoroethane	1.00	2.20	ug/L	1/ 118	1.08	2.20				NO:1
1,1-Dichloroethane^^	0.50	2.00	ug/L	1/ 238	0.75	2.00		950.00	a	NO:1
1,1-Dichloroethene	0.20	1.30	ug/L	0/ 238	0.00	1.30				NO:1
1,2-cis-Dichloroethene	0.12	17.00	ug/L	48/ 148	1.61	17.00	0.999			YES
1,2-Dichloroethane**	0.30	0.30	ug/L	0/ 240	0.00	0.30		2.90	c	NO:1
1,2-Dichloroethene**	1.00	35.00	ug/L	13/ 38	6.61	35.00				YES
1,2-Dichloropropane**	0.40	0.40	ug/L	0/ 238	0.00	0.40				NO:1
1,2-trans-Dichloroethene	0.50	10.00	ug/L	13/ 217	0.76	10.00		200.00	b	NO:3
1,3-cis-Dichloropropene	0.50	1.00	ug/L	0/ 229	0.00	1.00				NO:1
1,3-Dichlorobenzene**	0.40	3.20	ug/L	1/ 147	3.92	3.20				NO:1
1,4-Dichlorobenzene**	0.30	2.40	ug/L	0/ 148	0.00	2.40				NO:1
2-Butanone	2.00	65.00	ug/L	14/ 106	6.48	65.00		5300.00	a	NO:3
4-Methylphenol	10.00	61.00	ug/L	2/ 71	6.05	61.00				NO:1
Acetone	1.00	28.00	ug/L	25/ 81	9.19	28.00		1000.00	a	NO:3
Alpha Chlordane**	0.01	0.069	ug/L	3/ 62	0.11	0.07				NO:1
Benzene**	0.20	2.50	ug/L	1/ 241	1.26	2.50		7.50	c	NO:1
Benzoic Acid**	1.00	990.00	ug/L	2/ 68	35.70	990.00		9.90	c	NO:1
Bis(2-ethylhexyl)phthalate**	1.00	950.00	ug/L	16/ 72	17.20	950.00	8.41	12.00	c	NO:6
Carbon Tetrachloride**	0.50	1.50	ug/L	1/ 238	0.94	1.50		2.00	c	NO:1
Chloroform	0.50	0.70	ug/L	2/ 239	0.65	0.70	0.516			NO:1
Chloromethane**	0.50	3.40	ug/L	1/ 85	4.12	3.40				NO:1
Dibromomethane**	1.00	3.00	ug/L	1/ 182	1.01	3.00				NO:1
Dichloromethane	0.50	3.40	ug/L	41/ 239	3.28	3.40		38.00	c	NO:3
Di-n-butyl Phthalate**	0.60	11.00	ug/L	5/ 71	5.80	11.00		410.00	a	NO:6
Endosulfan Sulfate**	0.02	2.20	ug/L	0/ 59	0.00	2.20				NO:1
Tetrachloroethene**	0.30	25.00	ug/L	55/ 247	3.37	25.00		12.00	a	YES
Toluene	0.20	8.00	ug/L	13/ 243	1.27	8.00		1500.00	a	NO:3
Trichloroethene	1.20	46.00	ug/L	152/ 273	5.12	46.00		15.00	c	YES

Radionuclides										
Americium-241	0.0045	30.90	pCi/L	6/ 43	2.87	30.90	0.139	2.40	d	YES
Bismuth-210	0.12	20.00	pCi/L	2/ 55	7.99	20.00			d	NO:1
Cesium-137	1.65	51.30	pCi/L	0/ 54	0.00	51.30				NO:1
Cobalt-60	1.22	30.40	pCi/L	0/ 54	0.00	30.40				NO:1
Gross Alpha**	0.45	1930.00	pCi/L	8/ 12	158000.00	1930.00				NO:4
Plutonium-238	0.012	0.236	pCi/L	8/ 60	0.15	0.24	0.087	2.70	d	NO:3
Plutonium-239/240	0.020	1.00	pCi/L	12/ 51	0.42	1.00	0.125	2.50	d	NO:3
Potassium-40**	0.100	800.00	pCi/L	3/ 61	133.00	800.00				NO:1
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	39.47	0.996	2.70	d	YES
Radium-228**	1.50	1.50	pCi/L	1/ 1	0.00	1.50				NO:5
Strontium-90	0.39	42.40	pCi/L	7/ 57	2.22	42.40	0.975	14.00	d	YES
Thorium-228	0.02	2440.00	pCi/L	39/ 54	90.70	2440.00	0.779	3.50	d	YES
Thorium-230	0.0044	4.07	pCi/L	43/ 56	0.57	4.07		21.00	d	NO:3
Thorium-232	0.0006	2.11	pCi/L	31/ 63	0.78	2.11	0.314	24.00	d	NO:3
Tritium	421.00	2816310.00	pCi/L	4440/4455	206000.00	2816310.00	1485.47	11000.00	c	YES
Uranium-233/234	0.154	0.928	pCi/L	4/ 4	61.90	0.93		18.00	d	NO:3
Uranium-234	0.03	67.10	pCi/L	60/ 69	2.12	67.10	0.792	18.00	d	YES
Uranium-235	0.02	50.30	pCi/L	18/ 45	5.71	50.30	0.814	17.00	d	YES
Uranium-235/236**	0.04	1.00	pCi/L	2/ 26	0.10	1.00		17.00	d	NO:3
Uranium-238	0.00	1.34	pCi/L	57/ 75	0.51	1.34	0.688	13.00	d	NO:3

a= 1/10th HI for ingestion + inhalation + dermal
b= 1/10th HI for ingestion
c= cancer risk for ingestion+ inhalation+dermal
d= cancer risk for ingestion
e= Risk-Based Guideline Values calculated using the methodology, equations, and parameters presented in Mound Screening GV 3/97
NC= 95% UCL not calculated, less than 20 samples in the data set.
**RED = Constituent detected in bedrock well, but not in production well
^^Green = Constituent detected in production well, not in bedrock wells; reported frequency of detection based on production wells analyses

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient or General Quality Parameter

NO:5 - Low detected, low frequency, short half life
NO:6 - Common laboratory contaminant (EPA, 1998)

Table 2.10 Final Identification of Future Groundwater Constituents of Potential Concern for the Construction Worker Scenario (Exposure Point Concentration Compared to Background Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	COPC?
Inorganics								
Aluminum	3.5	31500.00	ug/L	107/ 115	6840.00	6840.00	37.523	YES
Antimony	0.22	41.60	ug/L	21/ 122	2.82	2.82	0.578	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	11.80	37.295	NO
Beryllium**	0.02	2.30	ug/L	41/ 115	0.47	0.47		YES
Bismuth**	0.09	264.00	ug/L	23/ 103	23.20	23.20		YES
Cadmium	0.1	13.10	ug/L	11/ 124	0.75	0.75		YES
Chromium	0.15	44800.00	ug/L	78/ 120	5010.00	5010.00	6.076	YES
Copper	0.3	514.00	ug/L	81/ 117	26.80	26.80	1.167	YES
Fluoride**	100	2400.00	ug/L	57/ 58	0.68	0.68	419	NO
Lead**	0.4	32.00	ug/L	55/ 125	4.90	4.90	10.05	NO
Lithium	2.6	4280.00	ug/L	87/ 102	123.00	123.00	55.7	YES
Manganese	0.037	3030.00	ug/L	155/ 165	737.00	737.00	229.568	YES
Molybdenum	0.79	474.00	ug/L	51/ 98	32.50	32.50	5.597	YES
Nickel	1.1	6600.00	ug/L	82/ 120	749.00	749.00	34.937	YES
Selenium	0.7	100.00	ug/L	10/ 112	1.78	1.78		YES
Thallium	0.9	22.00	ug/L	6/ 107	4.44	4.44		YES
Vanadium	0.15	277.00	ug/L	65/ 115	33.00	33.00	17.1	YES
Volatiles & Organic Compounds								
1,1,1-trichloroethane	0.30	7.00	ug/L	20/ 238	0.67	0.67	0.668	NO
1,2-cis-Dichloroethene	0.12	17.00	ug/L	48/ 148	1.61	1.61	0.999	YES
1,2-Dichloroethane**	1.00	35.00	ug/L	13/ 38	6.61	6.61		YES
Tetrachloroethene**	0.30	25.00	ug/L	55/ 247	3.37	3.37		YES
Trichloroethene	1.20	46.00	ug/L	152/ 273	5.12	5.12		YES
Americium-241	0.0045	30.90	pCi/L	6/ 43	2.87	2.87	0.139	YES
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	2.34	0.996	YES
Strontium-90	0.39	42.40	pCi/L	7/ 57	2.22	2.22	0.975	YES
Thorium-228	0.02	2440.00	pCi/L	39/ 54	90.70	90.70	0.779	YES
Tritium	421.00	2816310.00	pCi/L	4440/4455	206000.00	206000.00	1485.47	YES
Uranium-234	0.03	67.10	pCi/L	60/ 69	2.12	2.12	0.792	YES
Uranium-235	0.02	50.30	pCi/L	18/ 45	5.71	5.71	0.814	YES

a= 1/10th HI for ingestion + inhalation + dermal
b= 1/10th HI for ingestion
c= cancer risk for ingestion+ inhalation+dermal
d= cancer risk for ingestion
e= Risk-Based Guideline Values calculated using the methodology, equations, and parameters presented in Mound Screening GV 3/97
NC= 95% UCL not calculated, less than 20 samples in the data set.
**RED = Constituent detected in bedrock well, but not in production well
^^Green = Constituent detected in production well, not in bedrock wells; reported frequency of detection based on production wells analyses

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient or General Quality Parameter

NO:5 - Low detected, low frequency, short half life
NO:6 - Common laboratory contaminant (EPA, 1998)

Table 2.11 Initial Identification of Future Groundwater Constituents of Potential Concern for the Site Employee Scenario (Maximum Detected Concentration Compared to Background and Mound Guideline Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	Site Employee Risk-Based GV	Reference Risk-Based GV	COPC?
Inorganics										
Aluminum	3.5	31500.00	ug/L	107/ 115	6840.00	31500.00	37.523			YES
Ammonia**	100	37500.00	ug/L	34/ 61	4.03	37500.00	162			NO:4
Antimony	0.22	41.60	ug/L	21/ 122	2.82	41.60	0.578	4.10	a	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	933.00	37.295	3.10	a	YES
Barium	17.5	329.00	ug/L	112/ 114	130.00	329.00	310.209	720.00	a	NO:3
Beryllium**	0.02	2.30	ug/L	41/ 115	0.47	2.30	na	6.70E-02	c	NO:2
Bismuth**	0.09	264.00	ug/L	23/ 103	23.20	264.00	na			NO:2
Boron**	100	110.00	ug/L	1/ 2	0.00	110.00	na			NO:2
Cadmium	0.1	13.10	ug/L	11/ 124	0.75	13.10	na	5.10	a	NO:2
Calcium	116	1510000.00	ug/L	164/ 164	199000.00	1510000.00	111110.664			NO:4
Chloride**	8100	17700000.00	ug/L	74/ 74	908.00	17700000.00	105821			NO:4
Chromium	0.15	44800.00	ug/L	78/ 120	5010.00	44800.00	6.076	51.00	b	YES
Cobalt**	0.18	295.00	ug/L	46/ 115	18.50	295.00	1.032			YES
Copper	0.3	514.00	ug/L	81/ 117	26.80	514.00	1.167			YES
Cyanide**	5	14.20	ug/L	3/ 45	4.79	14.20	na	200.00	a	NO:2,3
Dissolved Solids	499000	32500000.00	ug/L	47/ 47	2480.00	32500000.00				NO:4
Fluoride**	100	2400.00	ug/L	57/ 58	0.68	2400.00	419			YES
Iron	0.154	192000.00	ug/L	151/ 165	45400.00	192000.00	4064.888			NO:4
Lead**	0.4	32.00	ug/L	55/ 125	4.90	32.00	10.05			YES
Lithium	2.6	4280.00	ug/L	87/ 102	123.00	4280.00	55.7			YES
Magnesium	26.9	719000.00	ug/L	165/ 165	77500.00	719000.00	40428.111			NO:4
Manganese	0.037	3030.00	ug/L	155/ 165	737.00	3030.00	229.568	51.00	a	YES
Mercury**	0.1	1.40	ug/L	3/ 115	0.06	1.40	na	3.10	a	NO:1
Molybdenum	0.79	474.00	ug/L	51/ 98	32.50	474.00	5.597			YES
Nickel	1.1	6600.00	ug/L	82/ 120	749.00	6600.00	34.957	200.00	a	YES
Phosphate**	20	10100.00	ug/L	31/ 41	0.79	10100.00	231			NO:4
Potassium	2.12	214000.00	ug/L	150/ 164	15200.00	214000.00	4461.063			NO:4
Selenium	0.7	100.00	ug/L	10/ 112	1.78	100.00	na			NO:2
Silicon**	2230	3280.00	ug/L	6/ 6	17000.00	3280.00	na			NO:4
Silver	0.2	29.40	ug/L	7/ 115	1.24	29.40	na	51.00	a	NO:2,3
Sodium	68.2	7270000.00	ug/L	162/ 162	346000.00	7270000.00	62425.563			NO:4
Sulfate	5000	456000.00	ug/L	73/ 76	205.00	456000.00		0		NO:4
Thallium	0.9	22.00	ug/L	6/ 107	4.44	22.00	na			NO:2
Tin	0.92	357.20	ug/L	27/ 100	14.90	357.20	34.382			YES
Vanadium	0.15	277.00	ug/L	65/ 115	33.00	277.00	17.1	72.00	a	YES
Zinc	0.5	399.00	ug/L	78/ 117	47.10	399.00	119.6	3100.00	a	NO:3

Volatiles & Organic Compounds										
1,1,1-trichloroethane	0.30	7.00	ug/L	20/ 238	0.67	7.00	0.668			YES
1,1,2 trichloro-1,2,2-trifluoroethane	1.00	2.20	ug/L	1/ 118	1.08	2.20				NO:1
1,1-Dichloroethane^^	0.50	2.00	ug/L	1/ 238	0.75	2.00		1000.00	a	NO:1
1,1-Dichloroethene	0.50	1.30	ug/L	0/ 238	0.00	1.30				NO:1
1,2-cis-Dichloroethene	0.12	17.00	ug/L	48/ 148	1.61	17.00	0.999		a	YES
1,2-Dichloroethane**	0.30	0.30	ug/L	0/ 240	0.00	0.30		3.10		NO:1
1,2-Dichloroethene**	1.00	35.00	ug/L	13/ 38	6.61	35.00				YES
1,2-Dichloropropane**	0.40	0.40	ug/L	0/ 238	0.00	0.40				NO:1
1,2-trans-Dichloroethene	0.50	10.00	ug/L	13/ 217	0.76	10.00		200.00	a	NO:3
1,3-cis-Dichloropropene	0.50	1.00	ug/L	0/ 229	0.00	1.00				NO:1
1,3-Dichlorobenzene**	0.40	3.20	ug/L	1/ 147	3.92	3.20				NO:1
1,4-Dichlorobenzene**	0.30	2.40	ug/L	0/ 148	0.00	2.40				NO:1
2-Butanone	2.00	65.00	ug/L	14/ 106	6.48	65.00		6100.00	a	NO:3
4-Methylphenol	10.00	61.00	ug/L	2/ 71	6.05	61.00				NO:1
Acetone	1.00	28.00	ug/L	25/ 81	9.19	28.00		1000.00	a	NO:3
Alpha Chlordane**	0.01	0.069	ug/L	3/ 62	0.11	0.07				NO:1
Benzene**	0.20	2.50	ug/L	1/ 241	1.26	2.50		9.90	c	NO:1
Benzoic Acid**	1.00	990.00	ug/L	2/ 68	35.70	990.00				NO:1
Bis(2-ethylhexyl)phthalate**	1.00	950.00	ug/L	16/ 72	17.20	950.00	8.41	20.00	c	NO:6
Carbon Tetrachloride**	0.50	1.50	ug/L	1/ 238	0.94	1.50		2.20	c	NO:1
Chloroform	0.50	0.70	ug/L	2/ 239	0.65	0.70	0.516			NO:1
Chloromethane**	0.50	3.40	ug/L	1/ 85	4.12	3.40				NO:1
Dibromomethane**	1.00	3.00	ug/L	1/ 182	1.01	3.00				NO:1
Dichloromethane	0.50	3.40	ug/L	41/ 239	3.28	3.40		38.00	c	NO:3
Di-n-butyl Phthalate**	0.60	11.00	ug/L	5/ 71	5.80	11.00		1000.00	a	NO:6
Endosulfan Sulfate**	0.02	2.20	ug/L	0/ 59	0.00	2.20				NO:1
Tetrachloroethene**	3.00	25.00	ug/L	55/ 247	3.37	25.00		100.00	a	NO:3
Toluene	0.20	8.00	ug/L	13/ 243	1.27	8.00		2000.00	a	NO:3
Trichloroethene	1.20	46.00	ug/L	152/ 273	5.12	46.00		26.00	c	YES

Americi[illegible]1	0.0045	30.90	pCi/L	[illegible]/ 43	2.87	30.90	0.139	0.49	[illegible]	YES
Bismuth-210	0.12	20.00	pCi/L	2/ 55	7.99	20.00				NO:1
Cesium-137	1.65	51.30	pCi/L	0/ 54	0.00	51.30				NO:1
Cobalt-60	1.22	30.40	pCi/L	0/ 54	0.00	30.40				NO:1
Gross Alpha**	0.45	1930.00	pCi/L	8/ 12	158000.00	1930.00				NO:4
Plutonium-238	0.012	0.236	pCi/L	8/ 60	0.15	0.24	0.087	0.54	c	NO:3
Plutonium-239/240	0.020	1.00	pCi/L	12/ 51	0.42	1.00	0.125	0.51	c	YES
Potassium-40**	0.100	800.00	pCi/L	3/ 61	133.00	800.00				NO:1
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	39.47	0.996	0.54	c	YES
Radium-228**	1.500	1.50	pCi/L	1/ 1	0.00	1.50				NO:5
Strontium-90	0.39	42.40	pCi/L	7/ 57	2.22	42.40	0.975	2.90	c	YES
Thorium-228	0.02	2440.00	pCi/L	39/ 54	90.70	2440.00	0.779	0.69	c	YES
Thorium-230	0.0044	4.07	pCi/L	43/ 56	0.57	4.07		4.30	c	NO:3
Thorium-232	0.0006	2.11	pCi/L	31/ 63	0.78	2.11	0.314	4.90	c	NO:3
Tritium	421.00	2816310.00	pCi/L	4440/4455	206000.00	2816310.00	1485.47	2200.00	c	YES
Uranium-233/234	0.154	0.928	pCi/L	4/ 4	61.90	0.93		3.60	c	NO:3
Uranium-234	0.03	67.10	pCi/L	60/ 69	2.12	67.10	0.792	3.60	c	YES
Uranium-235	0.02	50.30	pCi/L	18/ 45	5.71	50.30	0.814	3.40	c	YES
Uranium-235/236**	0.04	1.00	pCi/L	2/ 26	0.10	1.00		3.40	c	NO:3
Uranium-238	0.00	1.34	pCi/L	57/ 75	0.51	1.34	0.688	2.60	c	NO:3

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion of Cr VI
c= cancer risk for ingestion

NC= 95% UCL not calculated, less than 20 samples in the data set.
**RED = Constituent detected in bedrock well, but not in production well
^^Green = Constituent detected in production well, not in bedrock wells; reported frequency of detection based on production wells analyses

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
NO:4 - Essential Nutrient or General Quality Parameter
NO:5 - Low detected, low frequency, short half life
NO:6 - Common laboratory contaminant (EPA, 1998)

Table 2.12 Final Identification of Future Groundwater Constituents of Potential Concern for the Site Employee Scenario (Exposure Point Concentration Compared to Background Values)

Chemical	Minimum Concentration In Bedrock Wells	Maximum Concentration In Bedrock Wells	Units	Detection Frequency In Bedrock Wells	95 Percent UCL	Concentration Used for Screening	Background Value	COPC?
Inorganics								
Aluminum	3.5	31500.00	ug/L	107/ 115	6840.00	6840.00	37.523	YES
Antimony	0.22	41.60	ug/L	21/ 122	2.82	2.82	0.578	YES
Arsenic**	0.3	933.00	ug/L	26/ 114	11.80	11.80	37.295	NO
Chromium	0.15	44800.00	ug/L	78/ 120	5010.00	5010.00	6.076	YES
Cobalt**	0.18	295.00	ug/L	46/ 115	18.50	18.50	1.032	YES
Copper	0.3	514.00	ug/L	81/ 117	26.80	26.80	1.167	YES
Fluoride**	100	2400.00	ug/L	57/ 58	0.68	0.68	419	NO
Lead**	0.4	32.00	ug/L	55/ 125	4.90	4.90	10.05	NO
Lithium	2.6	4280.00	ug/L	87/ 102	123.00	123.00	55.7	YES
Manganese	0.037	3030.00	ug/L	155/ 165	737.00	737.00	229.568	YES
Molybdenum	0.79	474.00	ug/L	51/ 98	32.50	32.50	5.597	YES
Nickel	1.1	6600.00	ug/L	82/ 120	749.00	749.00	34.957	YES
Tin	0.92	357.20	ug/L	27/ 100	14.90	14.90	34.382	NO
Vanadium	0.15	277.00	ug/L	65/ 115	33.00	33.00	17.1	YES
Volatiles & Organic Compounds								
1,1,1-trichloroethane	0.30	7.00	ug/L	20/ 238	0.67	0.67	0.668	NO
1,2-cis-Dichloroethene	0.12	17.00	ug/L	48/ 148	1.61	1.61	0.999	YES
1,2-Dichloroethene**	1.00	35.00	ug/L	13/ 38	6.61	6.61		YES
Trichloroethene	1.20	46.00	ug/L	152/ 273	5.12	5.12		YES
Americium-241	0.0045	30.90	pCi/L	6/ 43	2.87	2.87	0.139	YES
Plutonium-239/240	0.020	1.00	pCi/L	12/ 51	0.42	0.42	0.125	YES
Radium-226	0.1260	39.47	pCi/L	43/ 59	2.34	2.34	0.996	YES
Strontium-90	0.39	42.40	pCi/L	7/ 57	2.22	2.22	0.975	YES
Thorium-228	0.02	2440.00	pCi/L	39/ 54	90.70	90.70	0.779	YES
Tritium	421.00	2816310.00	pCi/L	4440/4455	206000.00	206000.00	1485.47	YES
Uranium-234	0.03	67.10	pCi/L	60/ 69	2.12	2.12	0.792	YES
Uranium-235	0.02	50.30	pCi/L	18/ 45	5.71	5.71	0.814	YES

a= 1/10th HI for ingestion
b= 1/10th HI for ingestion of Cr VI
c= cancer risk for ingestion

NO:1 - <5% Detects
NO:2 - <Background Value
NO:3 - < Risk-Based Guideline Value
NO:2,3 - <Background and Risk-Based Guideline Value
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NC= 95% UCL not calculated, less than 20 samples in the data set.
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Appendix B

Listing of Applicable Relevant and Appropriate Requirements (ARARs)

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 Ohio EPA Director's power for Protection of Public Health and the Environment

Action Specific ARARs

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