Document Control No. ____________

Environmental Restoration Program

OPERABLE UNIT 1 RECORD OF DECISION

MOUND PLANT
MIAMISBURG, OHIO

June 1995

Final

U.S. Department of Energy
Ohio Field Office

EG&G Mound Applied Technologies

OhioEPA
State of Ohio Environmental Protection Agency

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May 22, 1995

RE: US DOE MOUND
OPERABLE UNIT 1
RECORD OF DECISION
CONCURRENCE LETTER

Mr. Valdas Adamkus
Regional Administrator
US EPA Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. J. Phil Hamric
Manager, Ohio Field Office
US Department of Energy
P.O. Box 3020
Miamisburg, Ohio 45343-3020

Dear Mr. Adamkus and Mr. Hamric:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the April 1995 Operable Unit 1 (OU1) Record of Decision (ROD) for the DOE Mound Superfund site in Montgomery County.

The OU1 ROD is the first ROD to be completed for the operable units at the DOE Mound. This remedial action is not the final remedial action for the DOE Mound site, but is intended to be a final remedial action for OU1. Decisions regarding remedial actions for other portions of the site are being addressed in other operable units, which will ultimately be considered in a Site-wide Remedial Investigation and Feasibility Study, which are in progress. A decision on the final remedial action for the DOE Mound Site will be made in a subsequent decision-making process.

The OU1 ROD addresses groundwater contamination by preventing migration of contamination (volatile organic compounds) toward the DOE Mound production well. The selected remedial action will result in the minimization of exposure to potential receptors of the groundwater contamination. The selected alternative includes the following components:

* Installation of two groundwater extraction wells within OU1, using standard equipment and procedures. Specifics regarding the design of the extraction system will be determined in the Remedial Design.

* Treating the extracted groundwater to remove volatile organic compounds and other constituents, as required, using cascade aeration, ultraviolet oxidation, conventional air stripping, or other suitable treatment units including innovative technologies which will achieve the remedial objectives .

* Discharging the treated groundwater to the Great Miami River through the existing plant NPDES outfall or a new outfall. Permit modifications may be needed to accommodate the final design of the remedy.

The estimated present cost of the selected remedy is $706,000 in 1995 dollars. The estimated annual present worth of operation and maintenance costs are $1,170,000 for a period of 30 years.

Ohio EPA concurs with the selected remedy based upon this review. Since the selected remedy does not involve establishment or modification of the site sanitary landfill, Ohio Administrative Code 3745-27-07 is not considered to be Applicable or Relevant and Appropriate (ARAR), although it would be a potential ARAR for other OU1 remedies.

Because this remedy may result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of this remedial action to ensure that the remedy continues to adequately protect human health and the environment.

Sincerely,

Donald R. Schregardus
Director

DRS/klf

cc: Jenny Tiell, Director's Office
Tim Fischer, USEPA Region V
Jeff Hurdley, OEPA Legal
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Jan Carlson, OEPA/DERR
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Ray Beaumier, OEPA/DERR

Because this remedy may result in hazardous substances remaining onsite above health-based levels, a review will be conducted within 5 years after commencement of this remedial action and at 5-year intervals thereafter to ensure that the remedy continues to adequately protect human health and the environment.

6. STATE CONCURRENCE

The State of Ohio (Ohio Environmental Protection Agency [OEPA]) concurs with the selected remedy. The Letter of Concurrence is attached to this ROD (Attachment A).

Michelle D. Jordan for | JUN 12 1995
Valdas V. Adamkus, Regional Administrator, U.S. Environmental Protection Agency, Region V | Date

J. Phil Hamric | 6/2/95
J. Phil Hamric, Manager, Ohio Field Office, U.S. Department of Energy | Date

ENVIRONMENTAL RESTORATION PROGRAM

OPERABLE UNIT 1
RECORD OF DECISION

MOUND PLANT
MIAMISBURG, OHIO

June 1995

U.S. DEPARTMENT OF ENERGY
OHIO FIELD OFFICE

ENVIRONMENTAL RESTORATION PROGRAM
EG&G MOUND APPLIED TECHNOLOGIES

Final

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ACRONYMS

ARAR	applicable or relevant and appropriate requirements
BVA	Buried Valley aquifer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
COPC	contaminant of potential concern
CTE	central tendency exposure
D&D	Decontamination and Decommissioning
DCA	dichloroethane
DCE	dichloroethene
DOE	U.S. Department of Energy
ECAO	Environmental Criteria and Assessment Office (EPA)
FS	feasibility study
ft	feet
HEAST	Health Effects Assessment Summary Tables
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
MCL	maximum contaminant level
MESH	Miamisburg Environmental Safety and Health
NCP	National Contingency Plan (CERCLA)
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List (EPA)
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OU	operable unit
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
pCi/L	picocuries per liter
PRG	preliminary remediation goal
RAPCA	Regional Air Pollution Control Authority
RfC	reference concentration
RfD	reference dose
RI	remedial investigation
RIR	remedial investigation report
RME	reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
TBC	to be considered
TCA	trichloroethane
TCDD	tetrachlorodibenzo-p-dioxin
TCE	trichloroethene
USEPA	U.S. Environmental Protection Agency
UV	ultraviolet
VOC	volatile organic compound
μg/L	micrograms per liter

RECORD OF DECISION
OPERABLE UNIT 1
AREA B, MOUND PLANT, OHIO
June 1995

DECLARATION

1. SITE NAME AND LOCATION

Operable Unit 1, Area B
Mound Plant
Miamisburg, Montgomery County, Ohio

2. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit (OU) 1 at Mound Plant, Miamisburg, Montgomery County, Ohio, which is one of six distinct areas that comprise one contiguous site as listed on the National Priorities List (NPL) (Administrative Docket Number VW-90-C-075). This remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the administrative record file for this site.

3. ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health and welfare or the environment.

4. DESCRIPTION OF REMEDY

This OU remedial action is the first of several actions planned as part of the overall remedial action for the Mound Plant Site. The function of this remedial action is to control groundwater contamination (primarily dilute volatile organic compounds [VOCs]), to prevent migration of contamination toward the Mound Plant production wells and to minimize exposure to potential receptors. The pathway of concern consists of leaching of contaminants from site soils or disposed waste; entrainment in the groundwater flow; and withdrawal by the Mound Plant production wells or by other, future wells.

This remedial action is not the final remedial action for the Mound Plant Site, but is intended to be a final remedial action for OU 1. The decisions regarding remedial actions for other portions of the plant are being addressed in other OUs. These decisions will ultimately be considered in a Site-wide remedial investigation (RI) and feasibility study (FS), which are in progress. Additional response actions, if warranted, are yet to be identified or planned. A decision on the final remedial action for the Site will be made in a subsequent decision-making process.

The selected remedy for OU 1 is collection and treatment of contaminated groundwater and disposal of treated water. The precise method for treating the contaminated water will be determined during the remedial design phase of the project. All extracted groundwater will be treated to levels that comply with the requirements of the Mound Plant National Pollutants Discharge Elimination System (NPDES) Permit. This remedy was selected using the remedial evaluation criteria set forth in the National Contingency Plan, 40 CFR Part 300.

The major components of the selected remedy include:

- Installing two groundwater extraction wells within OU 1, using standard equipment and procedures.
- Treating the extracted groundwater to remove VOCs and other constituents, as required, using cascade aeration, UV oxidation, conventional air stripping, or other suitable treatment units.
- Discharging the treated groundwater to the Great Miami River through the existing plant NPDES outfall or a new outfall.

Following installation and operation of the groundwater extraction wells, the chemical properties and hydraulic behavior of the groundwater system will be monitored to verify the adequacy of the remedy.

5. STATUTORY DETERMINATION

The selected remedy is protective of human health and the environment. It complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective. This is a final action ROD.

This remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. While the remedy calls for treatment of contaminated groundwater, treatment of soil at the site was not found to be practicable. The fact that the source of contamination is diffuse and no substantive onsite soil hot spots exist precludes a remedy consisting of excavation and treatment of contaminants in soil.

Because this remedy may result in hazardous substances remaining onsite above health-based levels, a review will be conducted within 5 years after commencement of this remedial action and at 5-year intervals thereafter to ensure that the remedy continues to adequately protect human health and the environment.

6. STATE CONCURRENCE

The State of Ohio (Ohio Environmental Protection Agency [OEPA]) concurs with the selected remedy. The Letter of Concurrence is attached to this ROD (Attachment A).

Michelle D. Jordan for — JUN 12 1995

Valdas V. Adamkus, Regional Administrator, U.S. Environmental Protection Agency, Region V — Date

[signature] — 6/2/95

J. Phil Hamric, Manager, Ohio Field Office, U.S. Department of Energy — Date

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OPERABLE UNIT 1

AREA B, MOUND PLANT, OHIO

June 1995

DECISION SUMMARY

1. SITE NAME, LOCATION, AND DESCRIPTION

The U.S. Department of Energy (DOE) Mound Plant Site (Figure 1) is located within the southern city limits of Miamisburg, in Southern Montgomery County, Ohio. The Site is approximately 10 miles south-southwest of Dayton and 45 miles north of Cincinnati. Miamisburg is predominantly a residential community with some supportive commercial facilities and limited industrial development. Much of the residential, commercial, and industrial development within a 5-mile radius of the Site is concentrated on the Great Miami River floodplain. The adjacent upland areas are used primarily for residences and agriculture or are unused open spaces.

Mound Golf Course and Miamisburg Mound State Memorial Park, both directly east of the facility across Mound Road, are heavily used during favorable weather. The park is the site of a 68-ft-high ancient Indian mound, located 380 ft east of the Mound Plant boundary. Other recreational areas within 1 mile of the facility include the Miamisburg municipal park and swimming pool (located immediately west of Mound Plant), 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 Conrail Railroad and the Dayton-Cincinnati Pike west of the site. This remnant of the old Miami-Erie Canal is designated as OU 4. The major water body in the vicinity of the Mound Plant is the Great Miami River. It is approximately 150 to 200 ft 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.

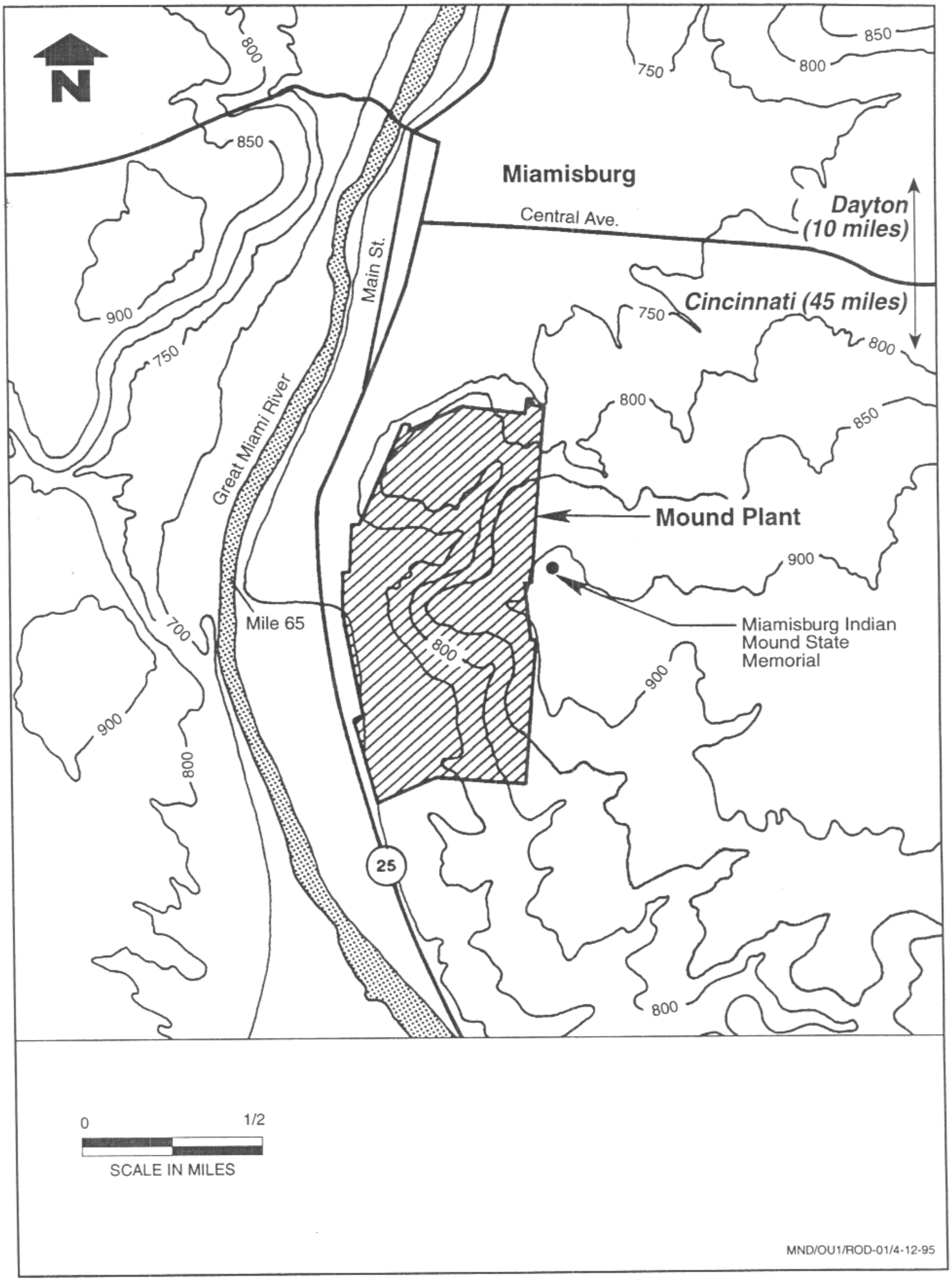

Figure 1. Topographic features of the Mound Plant area.

The only historic landmark in the vicinity of Mound Plant is the Miamisburg Mound, an ancient Indian mound located 280 ft east-southeast of Mound Plant in Miamisburg Mound State Memorial park. The mound — a symmetrical, conical earthwork 68 ft high and 800 ft in perimeter — is one of the largest of its type. It is believed to be the sepulcher of a chief of the Adena culture of Mound Builders who inhabited the Ohio region as early as 800 B.C.

OU 1 also includes the three plant production wells located along the southern plant boundary. An extended discussion of OU 1 history, including waste disposal and construction activities, is provided in the RI report (RIR).

The former waste disposal sites within OU 1 (the historic landfill and associated features) are concentrated within, beneath, and immediately adjacent to the current site sanitary landfill. These waste disposal sites are the result of a long history of dumping, burning, moving, reworking, burying, and partially removing wastes and placing them into the engineered structure (the Site sanitary landfill). Currently, the area bounded by the overflow pond to the north, the paved roads to the west and south, and the bunker area to the east can be considered a single entity. It is internally heterogeneous; not all portions are contaminated. However, subdividing the area does not increase understanding of the transport phenomena that are occurring, nor does it facilitate developing remedial alternatives.

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

Mound Plant was established at its present location in 1948. Currently, the facility is operated by EG&G Mound Applied Technologies for DOE as an integrated research, development, and production facility that supports the DOE weapons and energy programs. To reconfigure and consolidate the nuclear complex, DOE has decided to phase out the future defense mission. As a result, the Mound Site has been designated an environmental management site and the plant is in the process of being converted into a commercial and industrial site.

OU 1, also identified as Area B, occupies approximately 4 acres in the southwestern portion of the Mound Plant (Figure 2). OU 1 includes a historic landfill site that was used by the Mound Plant from 1948 to 1974. Plant waste materials that were disposed of in OU 1 included general trash and liquid waste. Much of this waste was later relocated and encapsuled in a site sanitary landfill constructed in 1977. An overflow pond was constructed at the same time, partially covering the historic landfill site. After 1974, waste was no longer disposed of in OU 1. There are known releases of volatile VOCs from OU 1 into the adjacent Buried Valley aquifer (BVA). In addition, tritium was detected in water samples taken from wells in OU 1, although the concentration was below the drinking water maximum contaminant level.

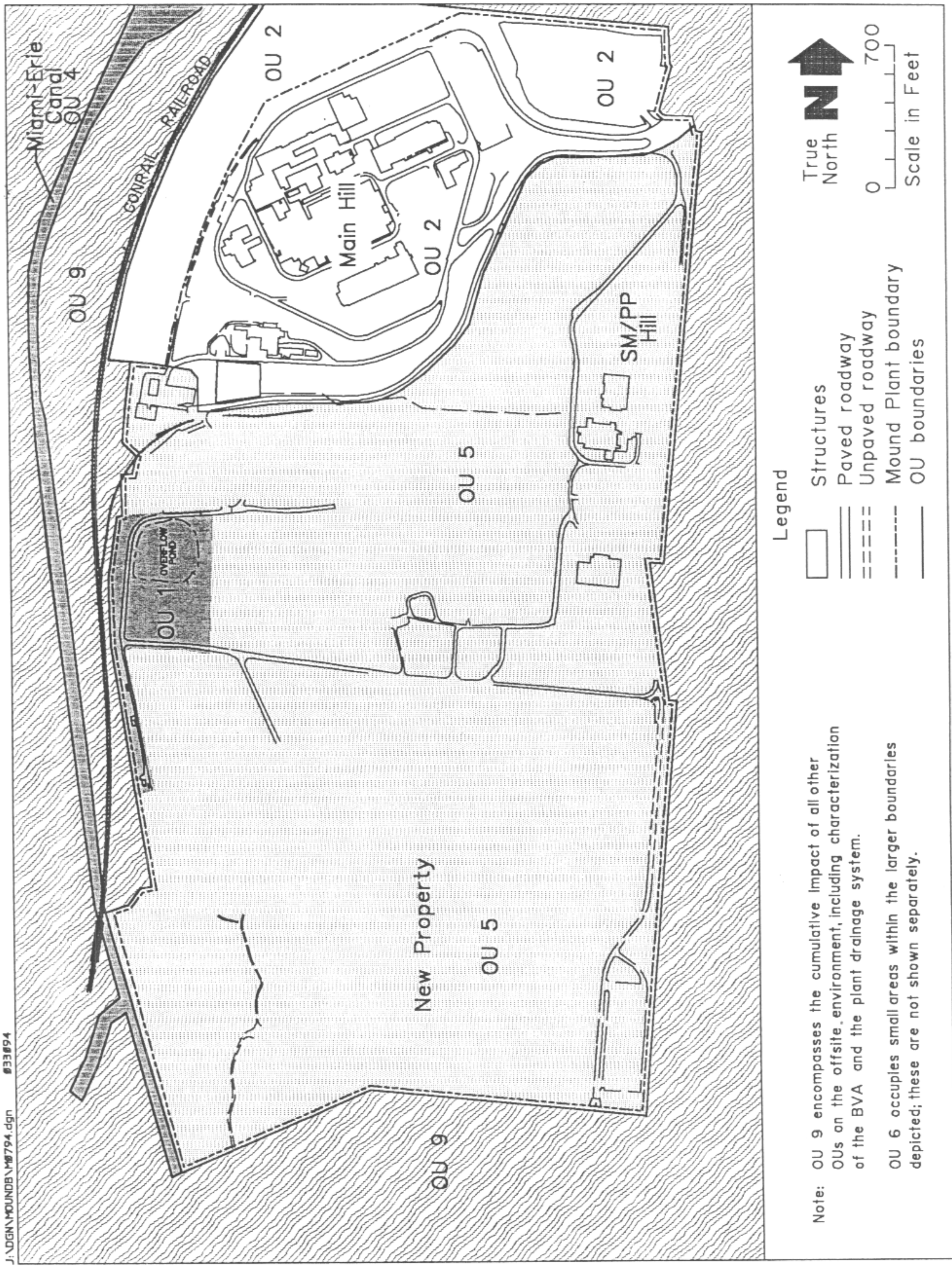

Figure 2. Mound Plant OU boundaries.

The Mound Plant Site was placed on the CERCLA NPL in 1989. The DOE signed a CERCLA Section 120 Federal Facility Agreement with the USEPA, effective October 1990. A similar tripartite agreement was signed among the DOE, USEPA, and OEPA in 1993. The OU 1 RI/FS was conducted between 1991 and 1994 to identify the types, quantities, and locations of contaminants and to develop ways of addressing the contamination problems.

3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

The FS and Proposed Plan for OU 1 were released to the public on 15 November 1994. These two documents were made available in both the Administrative Record and in an information repository maintained in the public reading room at the Miamisburg Senior Adult Center, 305 E. Central Avenue, Miamisburg, Ohio 45343. The notice of availability for these two documents was published in the *Dayton Daily News* on 2, 7, and 21 November, 5 and 19 December 1994; and 1, 15, and 25 January 1995; in the *Dayton Weekly News* on 11-18 November 1994; in the *Miamisburg News* on 2 and 30 November, 7, 14, and 28 December 1994 and 11 January 1995; and in the *Dayton Suburban News* on 28 December 1994. *Dayton Suburban News* advertising for the FS and Proposed Plan was available to 160,000 persons in 19 local communities. A public comment period was held from 15 November 1994 through 31 January 1995.

A public meeting was held on 8 December 1994, where representatives from the DOE, EG&G, USEPA, OEPA, Ohio Department of Health, Agency for Toxic Substances and Disease Registry, and city of Miamisburg answered questions about problems at the site and about the remedial alternatives under consideration. During this meeting, members of the public questioned DOE's selection of the preferred remedy, collection, treatment, and disposal and requested additional time to review the Proposed Plan. As a result, a 30-day extension period for public review of the Proposed Plan was requested of the USEPA and OEPA. This extension was approved and the public review period was extended to 31 January 1995. Substantive comments were received on the Proposed Plan; a response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD.

This Decision Summary presents the selected remedial action for OU 1 chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the NCP. The Responsiveness Summary discusses the involvement of the community during the RI/FS and remedy selection process and shows that the public participation requirements of CERCLA Sections 113(k) (2) (B) (i-v) and 117 have been met. The decision is based on the Administrative Record.

4. SCOPE AND ROLE OF OU

Because of the magnitude and complexity of the Mound Plant RI/FS, the Site has been divided into OUs as a means of managing the investigation. OUs 1, 2, 4, 5, 6, and 9 generally divide the Mound Plant Site into the geographic areas shown on Figure 2. These OUs and current objectives are as follows:

- Area B, OU 1, is the subject of this ROD. It occupies approximately 4 acres in the southwestern portion of the Mound Plant. OU 1 includes a historic landfill site that was used by the Mound Plant from 1948 to 1974. Plant waste materials that were disposed of in OU 1 included general trash and liquid waste. Much of this waste was later relocated and encapsuled in a site sanitary landfill constructed in 1977. An overflow pond was constructed at the same time, partially covering the historic landfill site. After 1974, waste was no longer disposed of in OU 1. There are known releases of VOCs from OU 1 into the adjacent BVA. In addition, tritium has been detected in water samples taken from wells in OU 1, although the concentration was below the drinking water maximum contaminant level.

- Main Hill, OU 2, includes potential release sites on the Mound Plant Main Hill, including some peripheral groundwater seeps. The scope of investigation includes characterization of the indurated bedrock and unconsolidated overburden on the Main Hill, associated soils, and groundwater.

- Miami-Erie Canal, OU 4, addresses an abandoned segment of the Miami-Erie Canal west of Mound Plant that contains plutonium-contaminated sediments (from a 1969 waste-line break) and tritium-contaminated soils. It is 1 mile long, and is considered to be one potential release site.

- South Property, OU 5, includes soils with known or suspected radioactive contamination, as well as the geographical area of the SM/PP Hill, the Plant Valley, and the New Property. The sites within OU 5 are not currently scheduled for decontamination and decommissioning (D&D) under the D&D Program at Mound Plant. It is anticipated that, as sites obtain funding under the D&D Program, they may be moved from OU 5 to OU 6, described below. As with the Main Hill, investigations of the potential source terms on the SM/PP Hill may require characterization of the bedrock and unconsolidated overburden.

- D&D Program Sites, OU 6, includes potential release sites with radioactively contaminated soils that are undergoing cleanup or are scheduled for cleanup in the near future. Because it is already known that the contaminated soil will be cleaned up, and because the D&D Program is an ongoing activity (under the Atomic Energy Act) that reduces potential impacts to human health and the environment, the scope of the RI/FS for these sites is verification of cleanup after the soil is removed. The cleanup levels are to be determined through the CERCLA risk assessment process.

- Site-wide RI/FS, OU 9, includes off-plant migration of contaminants in groundwater, soils, surface water and sediments, air, and flora and fauna. In addition, the Site-wide RI/FS will ensure that a comprehensive investigation is performed by compiling all data from individual OU investigations into a comprehensive report. Data reports from specific site-wide investigations conducted under this work plan will be initially reported in interim reports or technical memoranda to ensure that the off-plant and regional data are available early.

OU 1 encompasses an historical waste disposal area (landfill) from which there have been known releases of VOCs to the BVA, a sole-source aquifer. The cleanup remedy for OU 1 is selected from the alternatives discussed in the FS, which is available to the public for review. The contaminated groundwater in OU 1 is a principal threat at this site because of the possible offsite migration of the VOC-contaminated plume and the potential for direct ingestion of contaminants through drinking water wells. The soil contaminants in OU 1 are restricted to the area of past disposal activity with no discernible source detected.

5. SITE CHARACTERISTICS

5.1. History of OU 1

Cut-and-fill activities and refuse and waste disposal have occurred within OU 1 from 1948 to 1974. However, no written manifests of the waste types and quantities exist, and uniform disposal practices were not followed.

Before 1947, OU 1 was a residential area with two or three small houses and storage buildings. During plant construction, the area was exploited for its gravel deposits. Removal of gravel was routine until 1977. The gravel pit, as well as the waste disposal features discussed below, are shown in Figure 3.

The old gravel excavation and the disturbed area just north of the excavation were used for landfill, including open burning of trash and garbage from plant operations. A burn cage, consisting of a wire mesh structure that caught ashes from burning wood, paper, and other materials, was used. Solid waste, mostly paper, office, and kitchen garbage, was placed in the burn cage and ignited to reduce its volume.

In 1954, the first burial in OU 1 occurred along the southern boundary of the old gravel quarry, just north of and parallel to the east-west road that climbs the SM/PP Hill. A backhoe was used to excavate an irregularly shaped trench to the maximum depth possible. Residual steel and metal debris (such as rebar and pipe), the result of a fire that consumed the Dayton Unit salvage materials on another part of the plant (now Area 13), were progressively buried in the trench. The debris and backfill were regraded to just below the road level.

During 1955 and possibly 1956, empty drums that had contained thorium were buried in the southwest corner of OU 1. A shallow excavation was made, and about 2,500 55-gallon drums were crushed and then covered with a thin layer (about 1 to 2 ft) of soil cover. The buried drums and backfill were regraded to just below the level of the road.

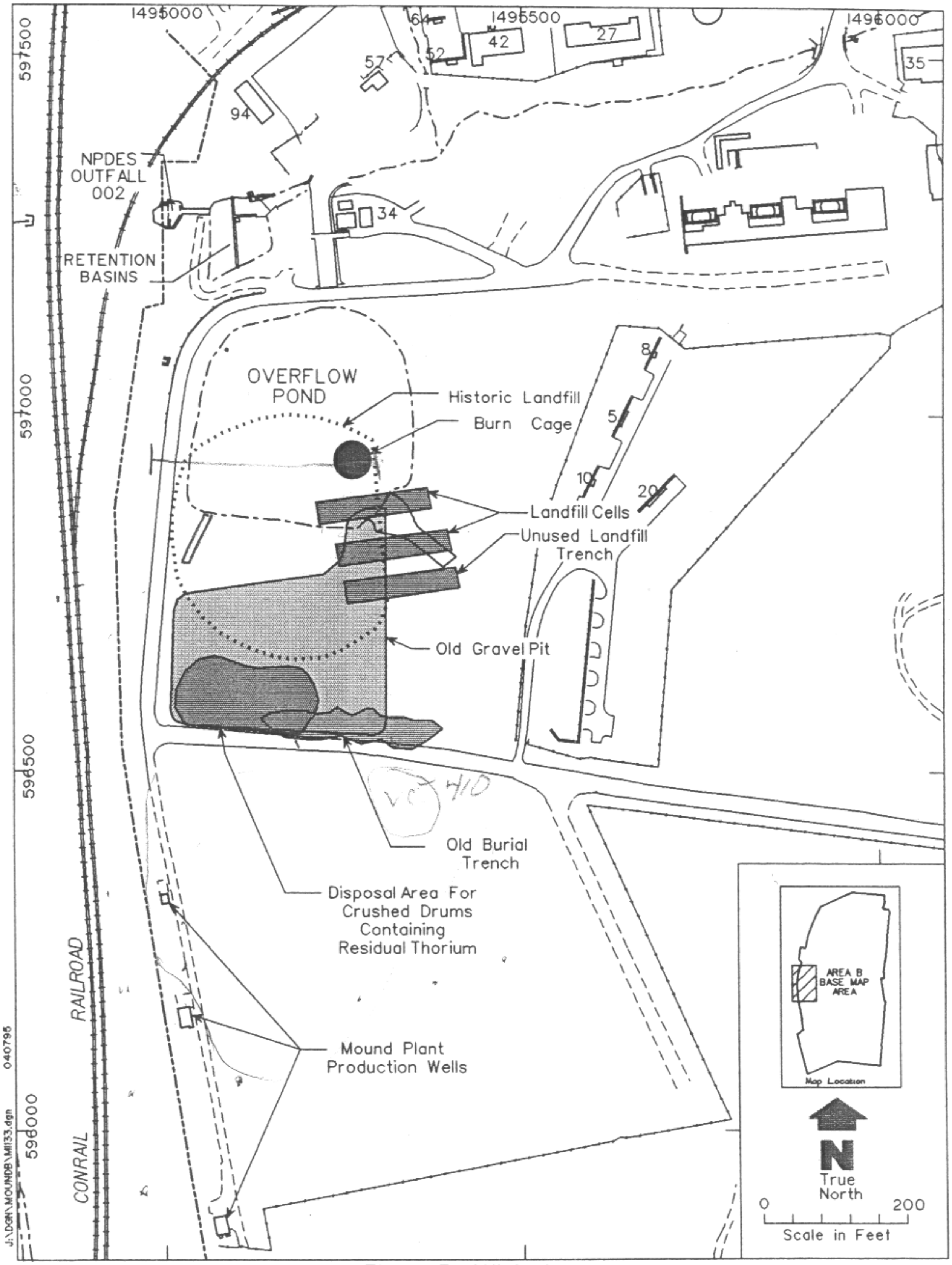

Figure 3. OUI features.

In 1969, the state of Ohio banned open burning, and Mound Plant prohibited open burning of solid and liquid waste in OU 1. Hazardous liquid waste was collected and disposed of offsite. Solid waste was placed in east-west-trending trenches cut by a bulldozer.

In 1977 and 1978, the overflow pond and site sanitary landfill were constructed on the site of OU 1. The overflow pond was built to complement the low-flow retention basins, which were constructed in 1976 on the lower reach of the plant drainage ditch. Much of the solid waste in the historic landfill was excavated and moved to the site sanitary landfill. Generally, debris from the Dayton Unit fire in the first trench and empty, crushed drums that had contained thorium in the second trench were not excavated and remained under the landfill. The volume excavated was limited by the volume required for the pond construction.

The pond was built with a natural clay-bearing compacted glacial till liner and earthen dikes. It has a 5,000,000-gallon capacity. Effluent in the overflow pond is discharged through a standpipe in the northwest corner of the pond to the stilling basin below the low-flow retention basins. It then goes to the Miami-Erie Canal and to the Great Miami River through NPDES Outfall 002 at a rate of approximately 660,000 gallons per day.

The site sanitary landfill was constructed with a 4- to 5-ft-thick clay liner consisting of onsite materials and a cap of 3 ft of clay with 2 to 5 ft of low-permeability topsoil. The clay liner was compacted to ensure a proper seal and integrity over time. A leachate collection system was constructed using collection drains at the top of the lower clay liner of the landfill. The drains located in the landfill allow any landfill liquids to move into the adjacent overflow pond. Five french drains were installed 2 to 25 ft below the landfill liner, partially in a fine gravel/sand layer and partially in a silty clay layer. These french drains drain moisture from under the site sanitary landfill to ensure soil slope stability.

A thin (<2-ft-thick) layer of burned trash on the west side was excavated directly beneath the landfill site. Approximately 100,000 cubic yards of trash was moved from the overflow pond site to the landfill. According to personal accounts, some of the trash was saturated during excavation and the liquid flowed from the drain pipe into the pond for 6 months afterward. No known samples of this leachate were collected. No known drainage has occurred since the initial 6-month period. The height of the landfill was surveyed and checked for settling a year or two after construction. Although no known written report exists, a verbal report suggests little or no settling occurred.

Currently (1995), OU 1 remains much as it did in 1978 after the overflow pond and site sanitary landfill were constructed. The road along the north and west boundary has been paved and, in the 1980s, a bridge was built over the overflow channel from the plant drainage ditch to the overflow pond.

Numerous monitoring wells have been installed around OU 1 as part of area environmental investigations.

5.2. Geologic Setting

OU 1 is partially located on a buried bedrock shelf that drops off to the west, north, and south. The surface of the bedrock is a preglacial erosional surface that is weathered, but grades rapidly into competent material. The bedrock section subjacent to OU 1 is dominated by shale with a significant limestone-bearing portion truncated by erosion immediately beneath the site sanitary landfill. The next nearest (vertically) significant limestone portion is approximately 30 ft lower in the section and does not intersect the bedrock interface until some distance to the west of OU 1, at or beyond the plant boundary. The opportunity for contaminant transport from OU 1 through limestone layers does not exist.

The bedrock is overlain by glacial outwash materials, glacial till, and artificial fill. The outwash materials that contain the BVA thin eastward against the Buried Valley margin, which is beneath the western edge of OU 1 adjacent to the waste disposal areas (site sanitary and historic landfills). Only the western portion of the site sanitary landfill overlies the BVA. The eastern portion overlies the bedrock shelf. To the north, these outwash materials extend up the Plant Valley. The portion of the BVA immediately adjacent to OU 1 (to the west) varies from 0 to 40 ft thick and is relatively free of fine-grained till layers within the outwash. Typical transmissivities are high (between 30,000 and 50,000 ft^2/day).

5.3. Hydrologic Setting

Groundwater occurs primarily in the outwash sediments of the BVA or in its extension up the Plant Valley. Within the valley, gradients are steep and are governed by topography and the thickness of the unconsolidated zone; flow is west-southwest along the valley axis. In the main part of the BVA, to the west of OU 1, gradients are nearly flat; flow is generally south, governed by the interrelationships among recharge, river stage, and the pumping of the Mound Plant production wells. In the immediate vicinity of OU 1, flow is governed by the plant production wells and is southward toward the pumping well, Well 0076 (Figure 4). Well 0076 is the primary plant production well.

The waste materials and contaminated soils within OU 1 are partially isolated from the hydrologic environment. Much of the surface is engineered to provide rapid runoff. The materials immediately below the waste disposal area are dominantly fine-grained, which may inhibit the downward movement of water and contaminants. The water table is at or below the bedrock interface in this area, so the

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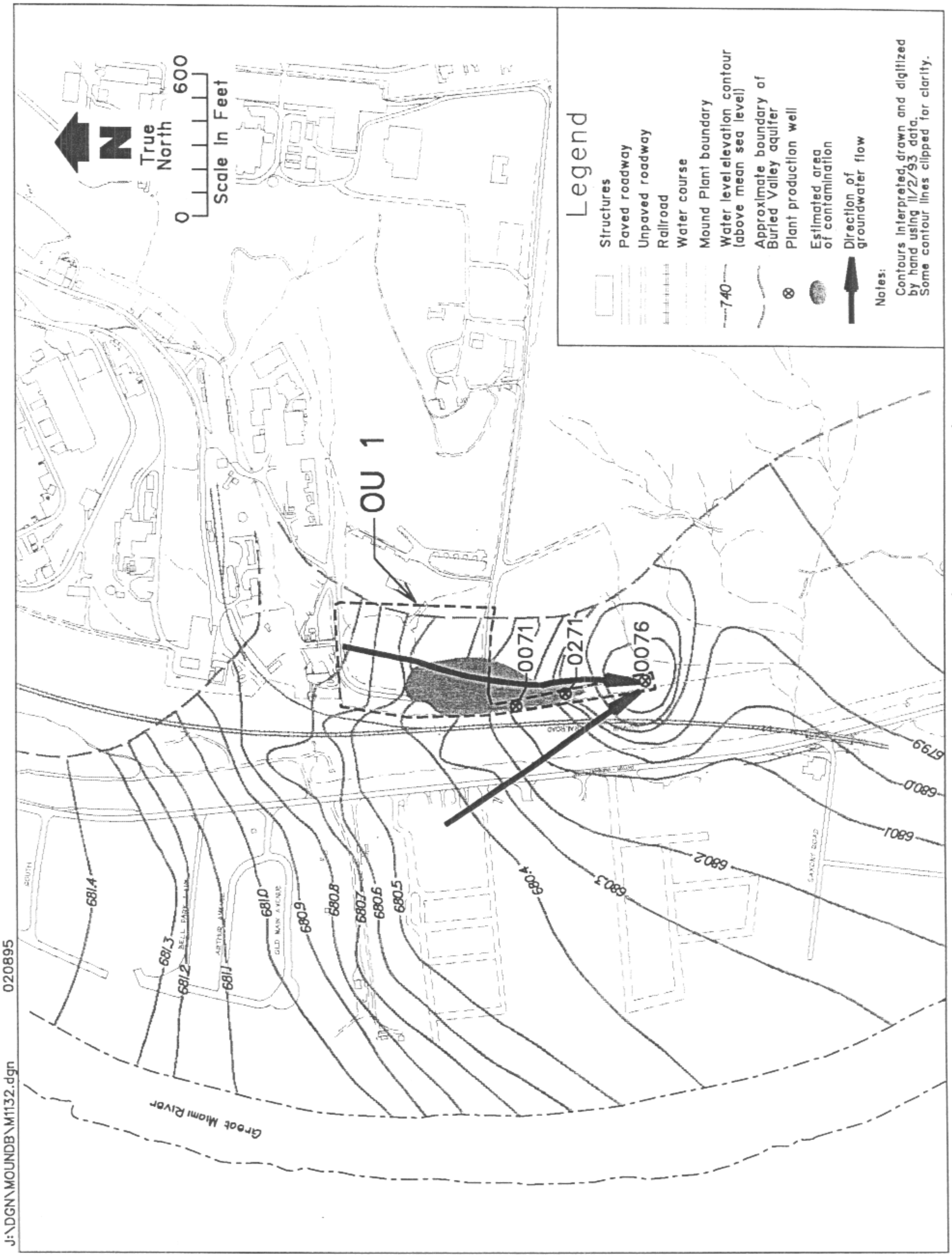


Figure 4. Location of OU 1, showing representative groundwater contours (11/02/93) and plant production wells.

unconsolidated materials are also in the vadose zone. However, during periods of high seasonal groundwater, some waste materials or contaminated soil are exposed to circulating waters.

5.4. Contaminant Occurrence

Contaminated media at OU 1 include both soils and waste materials within the site and the groundwater system beneath and adjacent to the site. Chemicals of potential concern (COPC) from the Baseline Risk Assessment are identified in Table 1.

5.4.1. Soils

The only discernible pattern for all the compounds detected during the surface and subsurface soil sampling appears directly related to activities in and around the site sanitary landfill. A single major source of the contaminants has not been detected and is not believed to exist. Rather, it is believed that a random pattern of dispersed contamination is the source of the compounds. While not exceeding established regulation limits, tetrachloromethane is present at risk-based levels of concern (see section 6.3)

5.4.2. Groundwater

The recent groundwater sampling data (June 1992 through March 1993) identified five VOCs at levels above proposed or established regulatory limits (40 CFR 141) in the groundwater beneath OU 1. These VOCs are vinyl chloride (chloroethene), trichloromethane (chloroform), 1,2-*cis*-dichloroethene (DCE), TCE, and tetrachloroethene (PCE). Only one VOC, 1,1,1-trichloroethane (TCA), shows concentrations offsite; the pattern of occurrence suggests a source outside OU 1. The general area impacted by VOCs is indicated in Figure 4. Two metals (chromium and nickel) were detected above primary drinking water standards from December 1991 to March 1993. No consistent trend exists for concentrations of metals in the area.

6. SUMMARY OF SITE RISKS

Based on analytical data collected during the RI, a Baseline Risk Assessment was performed using site-related contaminants. The Baseline Risk Assessment assumes no corrective action will take place and that no site use restrictions or institutional controls, such as fencing, groundwater use restrictions, or construction restrictions, will be imposed. The risk assessment determines actual or potential carcinogenic risks and/or toxic effects that the contaminants at the site pose under current and future land use assumptions. Therefore, the assessment serves as a baseline case that can be used to

Table 1. Summary of COPCs

Groundwater	
The organic COPCs for groundwater are:	
- 1,1,1-TCA	20 μg/L
- 1,2-*cis*-DCE	640 (J)
- *bis*-(2-ethylhexyl)phthalate	0.23 (J)
- chlordane (alpha)	0.061
- diethyl phthalate	10 (J)
- pyrene	10 (J)
- PCE	290 (J)
- tetrachloromethane	5.1
- TCE	160
- trichloromethane	130 (J)
- trichlorofluoromethane	12
- vinyl chloride	17
The radioactive COPCs (that exceeded background levels) are:	
- actinium-227	2.27 pCi/L
- plutonium-238	0.057
- plutonium-239/240	0.263
- strontium-90	0.766
- tritium	13,500
- uranium-235 and -236	0.188
- uranium 238	1.46
The following radionuclides were retained as groundwater COPCs because they are daughter products of the radionuclides that were found to exceed background levels:	
- radium-226	2.61 pCi/L
- thorium-228	0.97 (J)
- thorium-230	3.86
- thorium-232	0.588 (J)
- uranium-234	0.782
Soil	
The organic COPCs for soils are:	
- 1,2,3,4,6,7,8-HpCDF	214 pg/g
- 1,2,3,4,6,7,8-HpCDD	259
- 1,2,3,4,7,8,9-HpCDF	41.4
- 1,2,3,4,7,8-HxCDD	8.5
- 1,2,3,4,7,8-HxCDF	209
- 1,2,3,5,7,8-HxCDF	63.2
- 1,2,3,6,7,8-HxCDD	28.3
- 1,2,3,7,8,9-HxCDD	39.7
- 1,2,3,7,8-PeCDF	43.2
- 2,3,4,6,7,8-HxCDF	64.1
- 2,3,4,7,8-PeCDF	150
- 2,3,7,8-TCDD	22.5
- 2,3,7,8-TCDF	132

Table 1. (page 2 of 2)

Soil (Continued)	
- OCDD	2110
- OCDF	163
- 1,2-DCE	6,700 μg/kg
- 4-methyphenol	290
- aroclor-1248	220,000
- benzo(a)anthracene	3,400
- benzo(a)pyrene	2,500
- benzo(b)fluoranthene	4,000
- benzo(k)fluoranthene	1,500
- benzoic acid	1,700
- *bis*(2-ethylhexyl)phthalate	5,600
- vinyl chloride	190
- chrysene	2,600
- dichloromethane	81
- fluoranthene	8,300
- indeno(1,2,3-cd)pyrene	1,200
- phenol	120 (J)
- pyrene	7,200 (J)
- PCE	24,000
- toluene	7,100
- TCE	970 (J)
Inorganic COPCs consist of:	
- fluoride	12.6 mg/kg
- nitrate	16.87
- silver	6.3
The radioactive COPCs (that exceeded background levels) are:	
- plutonium-238	17.8 pCi/g
- plutonium-239/240	1.2
- strontium-90	5.78
- tritium	40.3
The following radionuclides were retained as soil COPCs because they are daughter products of the radionuclides that were found to exceed background levels:	
- thorium-228	1.3 pCi/G
- thorium-232	1.04
- uranium-235/236	0.091 (J)

COPC - contaminants of potential concern
DCE - dichloroethene
(J) - estimated quantity
mg/kg - milligram per kilogram
μg/kg - microgram per kilogram
PCE - tetrachloroethene
pCi/g - picocuries per gram
pCi/L - picocuries per liter
pg/g - picogram per gram
TCA - trichloroethane
TCE - trichloroethene
(shaded) - contaminant contributing significant risk

compare the relative effectiveness of alternative remedial strategies in reducing public health risks. This Baseline Risk Assessment focuses on exposure of hypothetical future workers or residents to soil and groundwater contamination.

The Baseline Risk Assessment estimates risk associated with potential pathways identified by the conceptual site model presented in Figure 5. It also identifies pathways that exceed acceptable risk, so that the remediation process is focused on pathways that present a threat to human health and the environment.

6.1. Contaminant Identification

The levels of contamination found in the different media at the Site are reported in the RIR. Identification of contaminants of potential concern (COPCs) is presented in Section 5 of the RIR. The COPCs were listed in Table 1. As discussed in section 6.4 below, the list of COPCs was reduced to only those contaminants that contribute significantly to the risk. These are highlighted in Table 1.

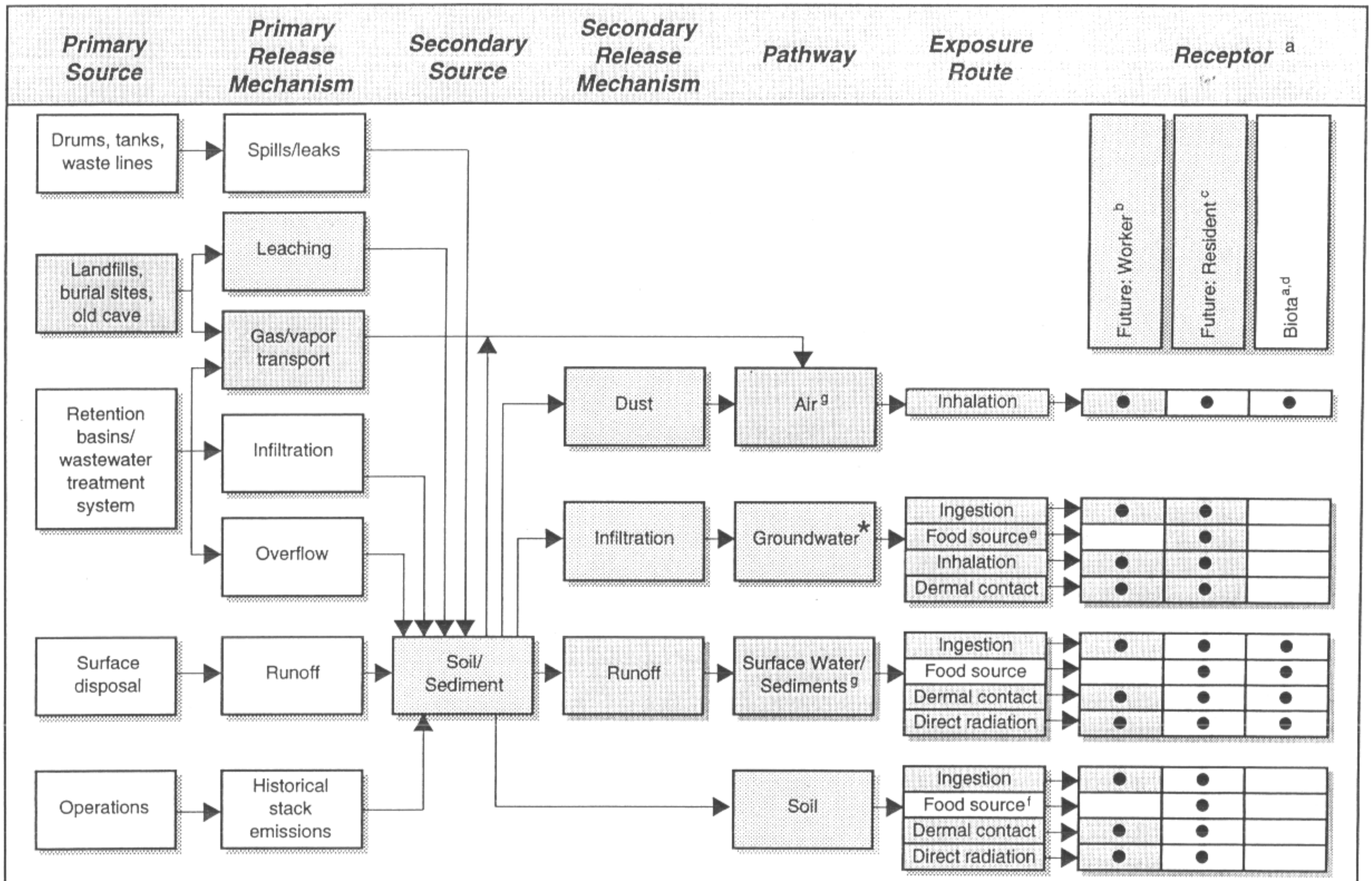
6.2. Exposure Assessment

The objective of the exposure assessment is to estimate the type and magnitude of exposures to COPCs that are present at or migrating from Area B. The exposure pathway is the mechanism by which an individual or population is exposed to chemicals at or originating from a site. Each exposure pathway requires a source or release from a source, an exposure point, and an exposure route.

6.2.1. <u>Exposure Setting</u>

The exposure setting, which includes Area B climate, vegetation, groundwater hydrology, and other characteristics, is described in detail in the RIR. The nearest populations are less than 750 ft west of OU 1, within the city of Miamisburg. The 1990 census gives the population of Miamisburg as 17,834, Dayton as 182,044, and Montgomery County as 573,809. Miamisburg is predominately a residential community, with some supportive commercial facilities and limited industrial and agricultural development.

Most of the residential, commercial, and industrial development within a 5-mile radius of the site is concentrated on the Great Miami River floodplain. The adjacent upland areas are used primarily for residences and agriculture or are unused open spaces. Agricultural land within a 5-mile radius of the site is primarily used for corn and soybean production and livestock grazing.



LEGEND

a ECOLOGICAL RISK assessment to be conducted in OU 9.

b FUTURE WORKER – Works outside or within a building on the site as a laborer. Receptor is exposed to contaminants in environmental media; not an evaluation of occupational exposure.

c FUTURE RESIDENT – Uses groundwater onsite.

d TERRESTRIAL BIOTA – Analysis of terrestrial biota will include quantitative analysis to the extent possible, but will not be possible for all exposure routes, such as dermal contact.

e FOOD INGESTION from the groundwater pathway will be based on consumption of vegetables grown in gardens irrigated with contaminated groundwater.

f FOOD INGESTION from the soil pathway will include ingestion of plants that have taken up contaminants from soil.

g INVESTIGATION to be conducted in OU 9

● Possible intersection of pathway and receptor.

* Because there are two groundwater receptors being used (future worker and future resident), the higher of the two risk calculations will be used in the assessment.

NOTE: Shaded areas indicate aspects relevant to Area B Feasibility Study

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Figure 5. Conceptual pathway model for OU 1.

The major water body in the vicinity of OU 1 is the Great Miami River. It is approximately 150 to 200 ft wide in this area. The river is used for pleasure boating and sport fishing, primarily during the summer. Swimming is not permitted in the river.

6.2.2. Characterization of Exposure Pathways

OU 1 is located within a government-owned and restricted facility. Unrestricted access and development of the site is possible only if DOE releases the property. No one presently lives on or otherwise uses the property; current workers do not work on a continual basis within Area B.

Three OU 1 production wells supply or have supplied water to the Mound Plant. One well, production well 0071, is no longer in use because volatile organic contaminants were detected at concentrations exceeding USEPA maximum contaminant levels (MCLs) and Ohio drinking water standards. The other two wells, production wells 0076 and 0271, are still in use and have organic concentrations below EPA MCLs and Ohio drinking water standards. Since Mound Plant is taking water from OU 1 that meets acceptable drinking water standards, a current worker scenario was not considered for the Baseline Risk Assessment.

The Baseline Risk Assessment involves 1) the determination of contaminant concentrations at exposure points for a future resident farmer scenario and future indoor and outdoor industrial park worker scenarios, and 2) the estimation of contaminant intake through potential exposure pathways.

Two types of exposures were evaluated for the future farmer resident scenario. These exposure types are denoted as the reasonable maximum exposure (RME) and the central tendency exposure (CTE). The RME is defined as a "reasonable worst case" that is conservatively high, yet still has a reasonable likelihood of occurring. Key features of an RME are that one would expect at least 90 percent of actual exposures to be lower and that it could occur. The CTE, on the other hand, is an "average case." Fifty percent of actual exposures are expected to be lower or higher than the CTE. High exposures will typically fall between the CTE and the RME.

The exposure scenario for the future farmer resident includes all potential pathways identified in the site conceptual model that could lead to quantifiable exposure. The farmer is assumed to be exposed through the following routes:

- Ingestion of groundwater.
- Incidental ingestion of and dermal contact with surface water while swimming.

- Dermal contact and inhalation of VOCs while showering with groundwater.
- Inhalation of resuspended dust while plowing/cultivating crops and garden produce and under usual dust resuspension conditions.
- Incidental ingestion of soil.
- External exposure to radiation emitted from radionuclides in soil.
- Dermal contact with chemicals in soil.
- Ingestion of homegrown produce grown in contaminated soil.
- Ingestion of livestock that have ingested contaminated soil and contaminated plants.

It is assumed that the future onsite industrial park worker will work within the Area B location for 25 years (RME). For the CTE, it is assumed that the worker will be employed on the site for 9 years (assumed equal to residential). As with the future farmer resident, the source of water for the industrial park comes from contaminated onsite wells that workers use for showering at the end of the workday.

In the future indoor industrial worker scenario, it is assumed that the worker performs job duties within a structure or building for 8 hours a day, 250 days a year. The indoor worker is assumed to be exposed through the following routes:

- Ingestion of groundwater.
- Inhalation of indoor vapors.
- Inhalation of indoor particulates.
- Inhalation of VOCs while showering with groundwater.
- Dermal contact with contaminants while showering with groundwater.

For the future outdoor industrial worker scenario, the following exposure routes were evaluated:

- Ingestion of groundwater.
- Inhalation of outdoor particulates and vapors.
- Ingestion of soil.
- Dermal contact with chemicals in soil.
- Inhalation of VOCs while showering with groundwater.
- Dermal contact with chemicals while showering with groundwater.

6.3. Toxicity Assessment

The purposes of the toxicity assessment are to weigh available evidence regarding the potential for particular contaminants to cause adverse effects in exposed individuals and to provide an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and/or severity of adverse effects. This includes the preparation of fate and toxicity profiles for each of the chemicals and identification of human health criteria. The sources of toxicity data include the Integrated Risk Information System (IRIS), the Health Effects Assessment Summary Tables (HEAST), the USEPA Environmental Criteria and Assessment Office (ECAO), and USEPA Region III.

6.3.1. Toxicity for Noncarcinogenic Effects

The USEPA Office of Research and Development has calculated acceptable intake values, denoted as reference doses (RfDs) or reference concentrations (RfCs), for long-term (chronic) exposure to noncarcinogens. The most recent oral RfDs and inhalation RfCs of the COCs and the associated sources are summarized in Table 2.

6.3.2. Toxicity for Carcinogenic Effects

For chemical carcinogens, the EPA Office of Research and Development has calculated estimates of the carcinogenic potential. These estimates, or slope factors, correlate intake of a carcinogen with an increased risk of cancer. The most recent oral and inhalation slope factors from IRIS, HEAST, USEPA, and ECAO, along with evidence and slope factor sources for COCs, are summarized in Table 3.

The USEPA currently classifies all radionuclides as Group A, known human carcinogens. The ingestion, inhalation, and ground exposure slope factors for the various radionuclides of concern at Mound Plant are summarized in Table 4.

6.4. Risk Characterization

In this section, toxicity and exposure assessment are summarized and integrated into quantitative expressions of risk. Both noncarcinogenic and carcinogenic effects are evaluated.

6.4.1. Carcinogenic Risk Characterization - Future Resident Farmer Scenario

For potential carcinogenic risks, the probability that an individual will develop cancer over a lifetime of exposure is estimated from daily intakes and dose response information (carcinogen potency

Table 2. Toxicity Values - Potential Noncarcinogenic Effects

Chemical	Chronic Inhalation RfC (mg/m^3)	RfC Source	Chronic Ingestion RfD (mg/kg/day)	RfD Source
Organic Chemicals				
1,2-*cis*-Dichloroethene	--	--	1.0E-02	HEAST
1,2-Dichloroethane	1.0E-02	ECAO	--	--
2,3,7,8-TCDD (Dioxins)	--	--	--	--
Archlor-1248 (PCB)	--	--	--	--
Benzo(a)pyrene	--	--	--	--
Chlordane (alpha)	--	--	6.0E-05	IRIS
Tetrachloroethene (PCE)	--	--	1.0E-02	IRIS
Tetrachloromethane	2.0E-03	ECAO	7.0E-04	IRIS
Trichloroethene	--	--	6.0E-03	ECAO
Trichlormethane	--	--	1.0E-02	IRIS
Vinyl chloride	--	--	--	--

ECAO - USEPA Environmental Criteria and Assessment Office
IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
mg/kg/day - milligrams per kilogram per day
mg/m^3 - milligrams per cubic meter
RfC - reference concentration
RfD - reference dose

Table 3. Toxicity Values - Potential Carcinogenic Effects

Chemical	USEPA Weight of Evidence[a]	Inhalation Slope Factor ($1/\mu g/m^3$)	Inhalation Slope Factor Source	Ingestion Slope Factor (1/mg/kg/day)	Ingestion Slope Factor Source
Organic Chemicals					
1,2-*cis*-Dichloroethene	D	--	--	--	--
1,2-Dichloroethane	B2	2.6E-05	IRIS	9.1E-02	IRIS
2,3,7,8-TCDD (Dioxins)	B2	3.3E-11	HEAST	1.5E+05	HEAST
Aroclor-1248 (PCB)	B2	--	--	7.7E+00	IRIS
Benzo(a)pyrene	B2	1.7E-03	HEAST	7.3E+00	IRIS
Chlordane (alpha)	B2	3.7E-04	IRIS	1.3E+00	IRIS
Tetrachloroethene (PCE)	NA	5.8E-07	ECAO	5.2E-02	ECAO
Tetrachloromethane	B2	1.5E-05	IRIS	1.3E-01	IRIS
Trichloroethene	NA	1.7E-06	ECAO	1.1E-02	ECAO
Trichloromethane	B2	2.3E-05	IRIS	6.1E-03	IRIS
Vinyl chloride	A	8.4E-05	HEAST	1.9E+00	HEAST

[a]Key:
- A = Known human carcinogen
- B1 = Probable human carcinogen, limited human data
- B2 = Probable human carcinogen, inadequate or no human data
- C = Possible human carcinogen
- D = Not classifiable as human carcinogen
- E = Evidence that not carcinogenic in humans

ECAO - USEPA Environmental Criteria and Assessment Office
HEAST - Health Effects Assessment Summary Tables
IRIS - Integrated Risk Information System
$\mu g/m^3$ - micrograms per cubic meter
mg/kg/day - milligrams per kilogram per day
NA - Weight of evidence information not available
USEPA - U.S. Environmental Protection Agency

Table 4. Slope Factors for Radionuclides of Concern at Mound Plant

Radionuclide[a]	Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	Ground Surface (Risk/year per pCi/g)
Actinium-227 + D	3.5E-10	8.8E-08	8.5E-07
Plutonium-238	2.2E-10	3.9E-08	2.8E-11
Plutonium-239	2.3E-10	3.8E-08	1.7E-11
Plutonium-240	2.3E-10	3.8E-08	2.7E-11
Radium-226 + D	1.2E-10	3.0E-09	6.0E-06
Strontium-90 + D	3.6E-11	6.2E-11	0.0E+00
Tritium	5.4E-14	7.8E-14	0.0E+00

[a]All radionuclides have an A (known human carcinogen) weight of evidence classification.

D - daughter
pCi - picocuries
pCi/g - picocuries per gram

factors). Carcinogenic risk depends on three factors: the dose, the carcinogenic potency of the chemical or radionuclide, and the exposure duration. To calculate carcinogenic risk, the products of the individual chemical exposures and carcinogenic slope factors were summed to provide the estimated risk to the future resident.

Future resident farmer RME carcinogenic risks to the child and adult from all chemicals, radionuclides, and pathways are 2 excess cancers per 10,000 persons exposed and 5 excess cancers per 10,000 persons exposed, respectively. The overall CTE carcinogenic risks to the child and adult are 4 excess cancers per 100,000 persons exposed and 1 excess cancer per 10,000 persons exposed, respectively.

For the future resident farmer scenario, the ingestion and inhalation pathways contribute more than 80 percent of the carcinogenic risk. The remainder of the carcinogenic risk is attributable to dermal contact. The overall carcinogenic risk due to external radiation exposure is less than 1×10^{-7}.

The overall carcinogenic risks posed by groundwater are 6×10^{-4} and 1×10^{-4} for the RME and CTE, respectively. The overall risks (RME and CTE) posed by soil COPCs are more than one order of magnitude less than those for groundwater.

6.4.2. Carcinogenic Risk Characterization - Future Indoor Industrial Park Worker Scenario

For the future onsite indoor worker, the overall RME and CTE risks were found to be 2×10^{-4} and 5×10^{-5}, respectively (does not include daughter product radionuclides). PCE had the highest RME risk of 8×10^{-5}. Groundwater COPCs contribute virtually all of the carcinogenic risk (greater than 99 percent). The soil RME and CTE risk levels are less than the lowerbound value of the USEPA target risk range.

6.4.3. Carcinogenic Risk Characterization - Future Outdoor Industrial Park Worker Scenario

For the future onsite outdoor worker, the overall RME and CTE risks were found to be 1×10^{-4} and 2×10^{-5}, respectively (does not include daughter product radionuclides). The ingestion and dermal contact pathways contribute approximately 83 percent of the carcinogenic risk. PCE had the highest RME risk of 7×10^{-5}. Groundwater COPCs contribute the majority (approximately 95 percent) of the overall RME and CTE carcinogenic risks.

6.4.4. Noncarcinogenic Risk Characterization - Future Resident Farmer Scenario

Noncarcinogenic risk was evaluated by calculating the hazard quotient (HQ), which is the ratio of the estimated daily exposure of each contaminant, to the applicable chronic RfC or RfD for that contaminant. The HQs were then summed to derive a hazard index (HI) for each exposure route and for all exposures combined. All RME and CTE noncarcinogenic HQs and HIs from all pathways are presented in the RIR.

An HI of greater than 1.0 at any time during an individual's lifetime indicates that there may be a potential for noncarcinogenic effects. The overall RME HIs for the child and adult in the future farmer scenario are 21 and 18, respectively. For the future farmer CTE, the overall HIs are 12 for the child and 11 for the adult.

For the future farmer scenario, the inhalation pathway contributes to approximately 80 percent of the overall noncarcinogenic risk. Tetrachloromethane, TCE, and PCE were the only COPCs with overall RME HIs exceeding unity. These COPCs contributed to approximately 90 percent of the overall noncarcinogenic risk. Tetrachloromethane had the highest overall RME and CTE HI of 31 and 20, respectively.

Groundwater COPCs contribute virtually all of the noncarcinogenic risk (greater than 99 percent). The soil RME and CTE HIs are two orders of magnitude less than unity.

6.4.5. Noncarcinogenic Risk Characterization - Future Indoor Industrial Park Worker Scenario

For the future indoor industrial park worker scenario, the overall RME and CTE HIs were 17 and 11, respectively. The inhalation pathway contributes approximately 96 percent of the overall noncarcinogenic risk. Tetrachloromethane had the highest RME and CTE HIs of approximately 15 and 10, respectively.

Tetrachloromethane was the only COPC with RME and CTE HIs that exceeded unity. The overall RME and CTE HIs, with the exception of tetrachloromethane, were found to be below unity. The groundwater COPC HIs contributed almost 100 percent of the noncarcinogenic risk. The soil COPC HIs were approximately 10 orders of magnitude less than unity.

6.4.6. Noncarcinogenic Risk Characterization - Future Outdoor Industrial Park Worker Scenario

For the future outdoor industrial park worker scenario, the overall RME and CTE HIs were 15 and 9, respectively. The inhalation pathway contributes approximately 95 percent of the overall noncarcinogenic risk. Tetrachloromethane had the highest RME and CTE HIs of approximately 14 and 9, respectively.

Tetrachloromethane was the only COPC with RME and CTE HIs that exceeded unity. The overall RME and CTE HIs, with the exception of tetrachloromethane, were found to be below unity.

The groundwater COPC HIs contributed almost 100 percent of the noncarcinogenic risk. The soil COPC HIs were approximately three to four orders of magnitude less than unity.

6.4.7. Risk Characterization

Tables 5 and 6 present the range of potential carcinogenic and noncarcinogenic risks associated with Area B, respectively. The lowerbound values represent CTE values, while the upperbound values represent RME values. These ranges indicate the uncertainties associated with Area B risks and provide information on the sensitivity of each exposure scenario to the values of its numerical parameters.

6.5. Summary

The risk assessment performed for OU 1, Area B, has provided estimates of potential relative risk for the future farmer resident and for future worker exposure to groundwater and soils. The scenarios that were developed are conservative and hypothetical; relative risks determined for these can be interpreted more accurately by considering the assumptions in the calculations.

For the future farmer resident, the total RME carcinogenic risks to the child and adult from all chemicals, radionuclides, and pathways are 2 and 5 excess cancers in 10,000 persons exposed, respectively. The combined overall RME adult and child risk may be of potential concern because it lies outside the upperbound value of the EPA target carcinogenic risk range of 1×10^{-6} to 1×10^{-4}. The majority of the carcinogenic risk comes from PCE and trichloromethane.

Radium-226 and thorium-228 were the only daughter product radionuclides with RME carcinogenic risks that exceed 1×10^{-6} for the future farmer resident. The RME carcinogenic risk for thorium-228 was found to be 1×10^{-4} in soil, which is higher than the risks for all other chemicals and radionuclides

Table 5. Carcinogenic Risk Characterization Summary Table

Chemical	Carcinogenic Risk Range (Lowerbound Value = CTE, Upperbound Value = RME)		
	Future Farmer Resident (Adult + Child)	Future Indoor Industrial Park Worker	Future Outdoor Industrial Park Worker
Organic Chemicals			
1,2-Dichloroethane	8E-07 - 3E-06	3E-07 - 2E-06	7E-08 - 4E-07
2,3,7,8-TCDD (Dioxins)	2E-06 - 8E-06	4E-22 - 2E-21	3E-07 - 2E-06
Aroclor-1248 (PCB)	7E-07 - 5E-06	------	9E-08 - 8E-07
Benzo(a)pyrene	2E-06 - 1E-05	3E-10 - 1E-09	2E-07 - 2E-06
Chlordane (alpha)	3E-06 - 2E-05	9E-07 - 4E-06	4E-07 - 2E-06
Tetrachloroethene	6E-05 - 3E-04	2E-05 - 8E-05	1E-05 - 7E-05
Tetrachloromethane	5E-06 - 2E-05	2E-06 - 8E-06	6E-07 - 3E-06
Trichloroethene	9E-06 - 4E-05	4E-06 - 2E-05	1E-06 - 5E-06
Trichloromethane	4E-05 - 1E-04	2E-05 - 7E-05	2E-06 - 1E-05
Vinyl chloride	2E-05 - 8E-05	6E-06 - 3E-05	2E-06 - 1E-05
Radionuclides			
Actinium-227	3E-06 - 2E-05	9E-07 - 5E-06	9E-07 - 5E-06
Plutonium-238	2E-06 - 7E-06	5E-07 - 2E-06	5E-07 - 2E-06
Plutonium-239/240	2E-06 - 1E-05	7E-07 - 4E-06	7E-07 - 4E-06
Strontium-90	2E-06 - 1E-05	4E-08 - 2E-07	4E-08 - 2E-07
Tritium	2E-06 - 1E-05	5E-07 - 3E-06	5E-07 - 3E-06

CTE - central tendency exposure
RME - reasonable maximum exposure
TCDD - tetrachlorodibenzo-p-dioxin

Table 6. Noncarcinogenic Risk Characterization Summary Table

Chemical	Noncarcinogenic Hazard Index Range (Lowerbound Value = CTE, Upperbound Value = RME)		
	Future Farmer Resident (Adult + Child)	Future Indoor Industrial Park Worker	Future Outdoor Industrial Park Worker
Organic Chemicals			
1,2-*cis*-Dichloroethene	5.3E-01 - 1.1E+00	5.5E-02 - 1.0E-01	5.5E-02 - 1.0E-01
1,2-Dichloroethane	5.2E-01 - 8.2E-01	2.6E-01 - 4.1E-01	2.2E-01 - 3.7E-01
Chlordane (alpha)	2.3E-01 - 1.4E+00	3.7E-02 - 5.7E-02	3.7E-02 - 5.7E-02
Tetrachloroethene	1.4E+00 - 3.0E+00	2.1E-01 - 3.5E-01	2.1E-01 - 3.5E-01
Tetrachloromethane	2.0E+01 - 3.1E+01	9.9E+00 - 1.5E+01	8.6E+00 - 1.4E+01
Trichloroethene	5.6E-01 - 1.1E+00	6.8E-02 - 1.2E-01	6.8E-02 - 1.2E-01
Trichloromethane	1.2E-01 - 2.4E-01	1.3E-02 - 2.5E-02	1.3E-02 - 2.5E-02

CTE - central tendency exposure
RME - reasonable maximum exposure

detected in soil. However, thorium-228 was detected at concentration levels equivalent to background.

HIs that exceed unity indicate that the chemical may cause adverse health effects to exposed individuals. As a rule, the greater a chemical HI exceeds unity, the greater the level of potential concern. For the future onsite resident scenario, tetrachloromethane and PCE pose the most significant noncarcinogenic risks, with overall RME HIs 3 to 31 times greater than unity. Since the sum of all COPC RME and CTE HIs are 24 to 39 times greater than unity, exposure to all COPCs could produce adverse health effects for the potential future residential farmer.

For the future indoor industrial park worker, the overall probability of cancer occurrence was 2 excess cancers in 10,000 persons exposed (RME) and 5 excess cancers in 100,000 persons exposed (CTE). PCE, chlordane (alpha), 1,2-dichloroethane, tetrachloromethane, trichloromethane, vinyl chloride, TCE, actinium-227, plutonium-238, plutonium-239/240, and tritium had RME risk levels exceeding 1×10^{-6}. The majority of carcinogenic risk contribution is from PCE and trichloromethane. The overall indoor worker RME risk may be of potential concern because it exceeds the USEPA target risk range of 1×10^{-6} to 1×10^{-4}.

For the future outdoor industrial park worker, the overall probability of cancer occurrence was 1 excess cancer in 10,000 persons exposed (RME) and 2 excess cancers in 100,000 persons exposed (CTE). PCE contributes more than half of the carcinogenic risk. The overall outdoor worker RME risk may be of potential concern because it lies at the upperbound limit of the USEPA target risk range.

Thorium-228 was the only daughter product radionuclide with RME and CTE carcinogenic risks that exceeded 1×10^{-6} for both the future indoor and outdoor workers. The future indoor and outdoor worker RME carcinogenic risks for thorium-228 were both found to be 2×10^{-5} in soil; these risk levels are significantly higher than the risks for all other chemicals and radionuclides detected in soil. However, thorium-228 was detected at concentration levels equivalent to background.

Tetrachloromethane is the only COPC that had RME and CTE HIs exceeding unity for both the future indoor and outdoor industrial park worker scenarios. Without tetrachloromethane, the overall RME and CTE HIs are approximately equal to or less than unity for the future indoor and outdoor workers.

The risks to future indoor and outdoor workers are based on chemical and radionuclide concentrations in groundwater and soil within and directly adjacent to the sanitary landfill in Area B. The future worker scenarios assume that exposures take place within Area B and that the drinking and domestic water supply is exclusively from Area B.

The contaminants of concern (COCs) that are the focus of remedial action efforts are defined as COPCs with either risks that exceed the minimum acceptable levels or risks that provide a significant contribution to the overall risk in any one of the exposure scenarios. A COPC provides a significant contribution to the overall risk if its hazard index exceeds 0.1 or its carcinogenic risk exceeds 1×10^{-6}. Based on these criteria, the COCs delineated by the OU 1, Area B, risk assessment for the resident scenario are the following:

- For groundwater:

    - 1,2-Dichloroethane.
    - 1,2-*cis*-DCE.
    - Benzo(b)fluoranthene.
    - Chlordane (alpha).
    - PCE.
    - Tetrachloromethane.
    - TCE.
    - Trichloromethane.
    - Vinyl chloride.
    - Actinium-227.
    - Plutonium-238.
    - Plutonium-239/240.
    - Radium-226.
    - Tritium.

- For soil:

    - 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) (dioxins).
    - Aroclor-1248 polychlorinated biphenyl (PCB).
    - Benzo(a)pyrene.
    - Plutonium-238.
    - Strontium-90.

6.6. Additional Considerations

6.6.1. <u>Ecological Risk</u>

An evaluation of the potential ecological impacts of OU 1 was not conducted. The ecological risk assessment will be performed on a site-wide basis during the OU 9 Site-Wide RI. The Mound Plant ecological risk assessment will be performed in conjunction with the site-wide ecological assessment. The site-wide ecological risk assessment will be based on data collected as part of the OU 9 RI, along with the information obtained from the site-wide ecological assessment and other studies that have evaluated ecological conditions around the Mound Plant facility. The issue of ecological impacts will be addressed in the final determination for the site as a whole.

6.6.2. Immediate Points of Exposure

The most immediate point of exposure for contaminants originating in OU 1 also lies within the confines of OU 1—the system of plant production wells. Production well 1 was taken offline due to increasing levels of VOCs in the discharge water. Production well 3 is now the primary source of process and potable water for the plant. Production well 2 is pumped as required to provide a supplemental source of plant water.

6.7. Risk Assessment for the Selected Industrial Future Use Scenario

The preceding sections discussed the Baseline Risk Assessment—that is, a measure of the risks posed by the site if no remediation took place. To select a remedy, a realistic future use scenario was determined to help define cleanup goals. It has been agreed among the USEPA, OEPA, and DOE that the appropriate land use for OU 1 is industrial. Offsite, the appropriate land use remains residential. Thus, the context for onsite soil remediation is that of an industrial park, with no *onsite* groundwater use or standards. By the same token, the offsite contamination (limited to the groundwater pathway) must be protected to residential use standards. The point of compliance is established outside the roadways that bound the former waste disposal areas to the south and west. The assessment of risk expected under this future use scenario is discussed below.

The risk assessment for OU 1 addressed future public health risks, defining the performance requirements that remedial actions would meet. The conceptual pathway model is shown in Figure 5. This risk assessment focused on the exposure of hypothetical future site workers to soil contamination through inhalation, incidental ingestion, external exposure to radiation emitted from radionuclides in soil, or dermal contact with the soil by an onsite industrial worker.

The results of the risk assessment of the future outdoor worker show that two of the COPCs were found to have RME lifetime excess cancer-risks above $1x10^{-6}$. 2,3,7,8-TCDD and benzo(a)pyrene each had an estimated excess cancer risk of $2x10^{-6}$. The combined carcinogenic risk is $4x10^{-6}$. Because the NCP specifies a target cancer risk range of $1x10^{-4}$ to $1x10^{-6}$, and because this risk is already near the lower end of this range, the soil pathway does not need further consideration. For noncarcinogens, the HI was less than one for soil, indicating that noncarcinogenic health effects are not of concern.

The risk assessment also evaluated risks associated with future potential offsite residential use of groundwater. The risks could result from direct exposure to contaminants by groundwater ingestion, ingestion of groundwater-irrigated produce, and dermal contact and inhalation of VOCs while showering with groundwater. The analysis dealt with all the COCs. Results of the analysis are shown in Table 7.

Table 7. Summary of Risk for OU 1 (Soil and Groundwater) and Contaminants with Greatest Risk Contribution

	Overall Risk		Percent of Exposure Due to Ingestion and Inhalation	Percent of Risk via Groundwater Pathways	COC with Greatest Effect	COC Effect	
	RME	CTE				RME	CTE
Carcinogenic Risk							
Resident Farmer or Resident[a]			83	96	Tetrachloroethene	2×10^{-4} (Adult + Child)	6×10^{-5} (Adult + Child)
Adult	5×10^{-4}	1×10^{-4}			Trichloromethane	1×10^{-4} (Adult + Child)	4×10^{-5} (Adult + Child)
Child	1×10^{-4}	3×10^{-5}					
Industrial Worker (Indoor)	2×10^{-4}	5×10^{-5}	80	100	Tetrachloroethene	8×10^{-5}	2×10^{-5}
					Trichloromethane	7×10^{-5}	2×10^{-5}
Industrial Worker (Outdoor)	1×10^{-4}	2×10^{-5}	83 (Inhalation and Dermal)	95	Tetrachloroethene	7×10^{-5}	1×10^{-5}
Noncarcinogenic HI							
Resident Farmer or Resident[b]			96	100	Tetrachloromethane	31 (Adult + Child)	20 (Adult + Child)
Adult	17	11					
Child	19	12					
Industrial Worker (Indoor)	16	10	98	100	Tetrachloromethane	15	10
Industrial Worker (Outdoor)	15	9	95 (Inhalation)	100	Tetrachloromethane	14	9

[a]Although the resident farmer scenario includes more exposure pathways than the resident, these pathways collectively contribute less than 0.5% additional risk for carcinogens.

[b]Additional pathways for resident farmer collectively contribute less than 0.1% additional risk for noncarcinogens.

COC - contaminant of concern
CTE - central tendency exposure
HI - hazard index
RME - reasonable maximum exposure

Ingestion/inhalation contribute almost all of the risk; groundwater is the most important exposure medium (90 to 100 percent of each category). PCE had the highest overall carcinogenic risk in each exposure scenario; tetrachloromethane had the highest noncarcinogenic HI (80 to 90 percent of the contribution in each category). Because groundwater would contribute most of the carcinogenic and noncarcinogenic risks, it is the focus of the remedial efforts.

6.8. Remedial Action Objectives

Remedial action objectives are descriptions of how the remedial actions will protect human health and the environment and achieve the remediation goals.

6.8.1. Soils

To protect human health, the remedial action objective will be to prevent or reduce infiltration and migration of contaminants that would result in groundwater contamination in excess of remediation goals. Additionally, soil contaminants should not lead to an aggregate excess cancer risk greater than 1×10^{-5} or an HI greater than one for occupational exposures.

6.8.2. Groundwater

To protect human health, the remedial action objective will be to prevent ingestion of water with contaminant concentrations in excess of remediation goals (1×10^{-4} aggregate cancer risk for chemical risk and radiological risk combined). To protect environmental health, the objective will be to control or reduce (to remediation goals) the contaminant concentrations in the aquifer adjacent to OU 1. The preliminary remediation goals for the groundwater medium are shown in Table 8. This will prevent contaminant movement into the BVA and ensure that the BVA remains a safe drinking water source. The specific cleanup level of each contaminant is based on federal primary drinking water standards (40 CFR 141) and the limits of analytical capability to measure, as discussed in the FS. The point of compliance for groundwater is outside (south and west) of the road bounding the site sanitary landfill, as identified in 2 May 1994 correspondence (Attachment B).

7. DESCRIPTION OF ALTERNATIVES

The alternatives analyzed for OU 1 are discussed below. Detailed descriptions of the alternatives are provided in the OU 1 FS.

Table 8. Preliminary Remediation Goals

Constituent	Risk-based PRG[a] (µg/L)	SDWA MCL (µg/L)	Ohio Drinking Water Rule (µg/L)	Maximum Concentration[b] (µg/L)	Estimated Quantitation Limit (µg/L)	Proposed PRG (µg/L)	Lifetime Risk at Proposed PRG
Actinium-227[c]	0.1	NL[d]	NL	1.6	0.2	2	2×10^{-5}
Chlordane(alpha)	0.06	2	NL	ND	0.05	0.06	1×10^{-6}
1,2-Dichloroethane	0.1	NL	NL	ND	0.3	0.1	1×10^{-6}
1,2-*cis*-Dichloroethene	60	70	NL	12	1.0	60	HQ = 1
Plutonium-238[c]	0.2	15[e]	NL	0.0536	0.2	0.2	1×10^{-6}
Plutonium-239/240[c]	0.2	15[e]	NL	0.317	0.2	0.6	3×10^{-6}
Tetrachloroethene	1	5	NL	2.5	0.3	5	5×10^{-6}
Tetrachloromethane	0.2	5	5	ND	1.2	0.2	1×10^{-6}
Trichloroethene	2	5	5	ND	1.2	2	1×10^{-6}
Trichloromethane	0.2	100	100	14	0.5	2	1×10^{-5}
Tritium[c]	900	20,000	20,000	4,220	500	3,000	3×10^{-6}
Vinyl chloride	0.02	2	2	3.6	1.0	1	5×10^{-5}

[a]Risk-based PRGs concentration from residential water use scenario. When a contaminant had both carcinogenic and noncarcinogenic risks, the lower was chosen. Risk-based PRGs were calculated as shown below.
[b]Values listed are the maximum detected values outside of the remediation area (wells 71, 154, 155, 377, and 378).
[c]Picocuries per liter (pCi/L).
[d]The proposed MCL for beta and photon emitters is 4 milliroentgen equivalent in man (mrem) ede/yr with a screening level of 50 pCi/L.
[e]MCL listed is a proposed value for adjusted gross alpha.

MCL - maximum contaminant level
NL - not listed
ND - not detected
PRG - preliminary remediation goal
SDWA - Safe Drinking Water Act
µg/L - micrograms per liter

$$\text{Chemical Carcinogen Risk-based PRG } (\mu g/L) = \frac{TR \times BW \times AT \times 1000\ \mu g/mg}{EF \times ED \times ([VF \times IRA \times SF_i] + [IRW \times SF_o])}$$

$$\text{Noncarcinogen Risk-based PRG } (\mu/L) = \frac{TR \times BW \times AT \times 1000\ \mu g/mg}{EF \times ED \times \left[\frac{VF \times IRA}{RfD_i} + \frac{IRW}{RfD_o}\right]}$$

$$\text{Radionuclide Carcinogen Risk-based PRG } (pCi/L) = \frac{TR}{EF \times ED \times ([VF \times IRA \times SF_i] + [IRW \times SF_o])}$$

Where:

TR = Target risk (1×10^{-6} for carcinogens, hazard quotient of 1 for noncarcinogens)
BW = Body weight (age-adjusted for carcinogens-59 kg, for noncarcinogens - 70 kg)
AT = averaging time (25,550 days)
EF = exposure frequency (350 days/year)
ED = exposure duration (30 years)
VF = volatilization factor (where applicable = 0.5)
IRA = inhalation rate (age-adjusted for carcinogens - 19 m^3/day, for noncarcinogens - 20 m^3/day)
IRW = ingestion rate of water (age-adjusted for carcinogens - 1.8 L/day, for noncarcinogens - 2 L/day)
SF_i = inhalation slope factor (chemicals - kg-day/mg, radionuclides 1/pCi)
SF_o = oral slope factor (chemicals - kg-day/mg, radionuclides 1/pCi)
RfD_i = inhalation reference dose (kg-day/mg)
RfD_o = oral reference dose (kg-day/mg)

7.1. Common Elements

All alternatives now being considered for the site will include several common components. Each alternative includes surface controls, the implementation of institutional controls to limit access to the site, and long-term groundwater monitoring. Surface controls, such as grading and lining of existing ditches, will manage the surface water runon and runoff and reduce infiltration. Reducing infiltration will slow the rate at which contaminants migrate from the unsaturated soil into the groundwater. Institutional controls will be designed to control land and groundwater use. Such controls can take the form of access restrictions and fencing around the site to minimize contact with soils and deed restrictions to prevent groundwater usage onsite and downgradient on property currently owned by DOE. The site is currently fenced. Appropriate deed restrictions will be obtained at the time the facility is transferred. The monitoring activities will be conducted to document the effectiveness of the selected remedy.

Alternatives 3 through 7 include extracting the groundwater for disposal through the Mound Plant NPDES-permitted outfall. This groundwater extraction will be effective at capturing contaminated groundwater before offsite migration can occur.

7.2. Description of the Alternatives

The alternatives contain elements that range from limited action through capping, containment, and *in situ* treatment. Descriptions of these elements are provided below. More detailed descriptions of the alternatives are provided in the FS.

- The no-action alternative (Alternative 1) involves no additional activities at the site.
- The limited-action alternative (Alternative 2) consists only of the common elements described above.
- The collection-and-disposal alternative (Alternative 3) also encompasses extraction of groundwater for disposal through the Mound Plant NPDES-permitted Outfall. Under this alternative, the soil contamination would be left in place.
- Under the alternatives incorporating a treatment option (Alternatives 4 through 7), groundwater would be extracted and treated onsite to remove VOCs.
- Under the capping alternatives (Alternatives 5, 7, and 9), a surface cap of low-permeability soil would be placed on the ground surface above known waste disposal arEeas that could be considered potential sources of groundwater contamination. The cap would be designed for integration into the existing cap for the site sanitary landfill and surface drainage structures so that erosion and infiltration would be minimized.

- Under alternatives incorporating a subsurface barrier (Alternatives 6 and 7), groundwater would be contained onsite with a low-permeability subsurface wall around the western and southern perimeter of OU 1, which would be constructed by the slurry column technique. Groundwater within OU 1 would be extracted only at a rate sufficient to maintain a hydraulic gradient across the containment barrier toward OU 1.

- Under the *in situ* treatment alternatives (Alternatives 8 and 9), subsurface permeable treatment walls composed of a mixture of iron shavings and sand would be installed in the subsurface downgradient of the site. Slurry columns would serve to direct the flow of groundwater toward the treatment walls and minimize movement of groundwater offsite.

8. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents a detailed analysis of the alternatives that were considered. Each alternative is evaluated in detail using nine CERCLA evaluation criteria, which are categorized into the following three criteria groups:

- Threshold Criteria

  - **Overall protection of human health and the environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

  - **Compliance with applicable or relevant and appropriate requirements** (ARARs) addresses whether a remedy will meet all of the ARARs or other federal and state environmental laws and/or justifies a waiver on the basis of technical impracticability.

- Primary Balancing Criteria

  - **Long-term effectiveness and performance** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

  - **Reduction of toxicity, mobility, or volume** through treatment may be used as the performance measure of the treatment technologies.

  - **Short-term effectiveness** addresses the period of time needed to achieve protection. Short-term effectiveness also considers any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

  - **Implementability** is the technical and administrative feasibility of remedy, including the availability of materials and services needed to implement a particular option.

  - **Cost** includes estimated capital, operations, and maintenance costs expressed as net present worth costs.

- Modifying Criteria

  - **State/support agency acceptance** reflects aspects of the preferred alternative and other alternatives that the support agency favors or to which the agency objects, as well as any specific comments regarding state ARARs or the proposed use of waivers. The assessment of state concerns may not be complete until after the public comment period on the RI/FS and Proposed Plan is held.

  - **Community acceptance** summarizes the public's general response to the alternatives described in the Proposed Plan and in the RI/FS, based on public comments received. Like state acceptance, evaluations under this criterion usually will not be completed until after the public comment period is held.

The evaluation of alternatives is summarized in Table 9; cost detail is provided in Table 10. This section profiles the performance of the selected remedy against the remedial evaluation criteria, noting how it compares to the other options under consideration. Because the no-action and institutional controls alternatives, by themselves, do not protect human health and the environment, they are not considered an option for this site.

8.1. Threshold Criteria

To be considered a viable option, a remedial alternative must meet the threshold criteria or, in the case of compliance with ARARs, justify a waiver of a particular ARAR.

8.1.1. Overall Protection

All of the alternatives except 1 and 2 would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls.

8.1.2. Compliance with ARARs

The chemical-specific and action-specific ARARs are presented in Attachment B. All alternatives (except the no-action and institutional controls alternatives) were designed to meet all of the ARARs. Under the no-action and institutional controls alternatives, ARARs would be exceeded at the point of compliance. All remaining alternatives would meet their respective ARARs. The selected remedy treats VOC concentrations in the discharge water from the remediation system and will, in particular, comply with the Chronic Freshwater Criteria ARARs.

8.2. Balancing Criteria

Once the threshold criteria are satisfied, the balancing criteria are used to weigh the relative merits of various alternatives. The issues concerning the balancing criteria are displayed in Table 9.

Table 9. Summary of Remedial Action Alternative Comparison

Alternative	Short Title	Complies With ARARs	Short-term Effectiveness	Long-term Effectiveness	Protects Human Health and the Environment	Reduces Toxicity, Mobility, or Volume	Implementability	Total Cost
1	No action	No	No	No	No	No	Easy	$0
2	Institutional	No	No	No	No	No	Easy	$3,980,000
3	Collect/ disposal	Yes	Adequate[a]	Yes	Adequate	Yes MV	Less difficult	$262,000[c]
4	Collect/treat/ disposal	Yes	Adequate[a]	Yes	Adequate	Yes TMV	Less difficult	$1,740,000[c]
5	Collect/treat/ disposal/cap	Yes	Adequate[b]	Yes	Adequate	Yes TMV	Less difficult	$2,390,000[c]
6	Contain/collect/ treat/disposal	Yes	Adequate[b]	Yes	Adequate	Yes TMV	Moderately difficult	$2,650,000[c]
7	Contain/collect/ treat/disposal/ cap	Yes	Adequate[b]	Yes	Adequate	Yes TMV	Moderately difficult	$3,300,000[c]
8	*In situ* groundwater treatment	Yes	Adequate[b]	Yes	Adequate	Yes TMV	More difficult	$1,980,000[c]
9	*In situ* groundwater treatment/cap	Yes	Adequate[b]	Yes	Adequate	Yes TMV	More difficult	$2,630,000[c]

[a] Quicker implementation when compared to other alternatives.
[b] Longer construction time when compared to other alternatives.
[c] This total cost is in addition to the total cost shown for Alternative 2 (common cost).

ARARs - applicable or relevant and appropriate requirements
MV - mobility and volume
TMV - toxicity, mobility and volume

Table 10. Summary of Detailed Cost Analysis

Alternative Number	Short Title	Total Capital Cost[a]	Annual Operation and Maintenance without Common Cost[a]	Present Value of 30-year Annual Operation and Maintenance without Common Cost[a]	Total Present Value without Common Cost[a]
1	No action	$0	$0	$0	$0
2	Institutional	$139,000	$201,000	$3,840,000	$3,980,000
Each of the following entries is IN ADDITION TO the cost shown for line 2 (Alternative 2).					
3	Collect/disposal	$205,000	$3,000	$57,300	$262,000
4	Collect/treat/disposal	$567,000	$61,000	$1,170,000	$1,740,000[b]
5	Collect/treat/disposal/cap	$857,000	$80,000	$1,530,000	$2,390,000
6	Contain/collect/treat/disposal	$1,330,000	$69,000	$1,320,000	$2,650,000
7	Contain/collect/treat/disposal/cap	$1,620,000	$88,000	$1,680,000	$3,300,000
8	*In situ* groundwater treatment	$1,650,000	$17,000	$325,000	$1,980,000
9	*In situ* groundwater treatment/cap	$1,940,000	$36,000	$688,000	$2,630,000

[a] Represents the common cost used in each cost estimate.
[b] Represents highest likely cost for treatment technology.

NOTE: Figures rounded to three significant digits after computations completed.

8.2.1. Short-Term Effectiveness

Alternatives 5, 7, and 9 provide the greatest short-term effectiveness because, immediately after installation, the surface cap would prevent contact with contaminated soils. Some dust generation is expected during installation of the cap; however, this risk could be easily reduced by dust control methods and worker protection. The cap would also rapidly reduce leachate movement from the unsaturated zone into the groundwater.

Alternatives 3, 4, 6, and 8, which do not include a surface cap but do include a fence around Area B, would have little short-term effectiveness because contact with contaminated soils would not be completely prevented. Potentially, onsite workers would be exposed to contaminated soils and the community could potentially be exposed to COCs through airborne dust.

Environmental impacts common to all alternatives include disturbance of biota in the construction areas. However, these would not be significant environmental impacts.

8.2.2. Long-Term Effectiveness and Permanence

Alternatives 7 and 9 provide the highest degrees of long-term effectiveness and permanence because they use a subsurface containment system (slurry columns) to passively reduce offsite movement of contaminated groundwater. Alternative 7 also employs groundwater recovery wells to extract contaminated groundwater from Area B and to ensure a hydraulic gradient toward Area B. Groundwater recovery wells would be effective over the long term at fulfilling these tasks. The permanence of these alternatives would also be considered high because, once the PRGs are met, groundwater contamination would remain onsite. These alternatives also use a surface cap to passively reduce leachate movement from the unsaturated zone. This technology would contribute to the high degree of effectiveness and permanence of these alternatives due to the resultant decrease in contaminant flux from the unsaturated zone.

Alternatives 6 and 8 also employ subsurface containment systems (slurry columns) around Area B. However, because these do not implement a surface cap to control contaminant flux from the unsaturated zone, their permanence would be considered less than Alternatives 7 and 9.

Alternatives 3, 4 and 5, which utilize groundwater recovery wells but no subsurface containment, would be less effective at preventing offsite movement of contaminated groundwater. Even if properly monitored and adjusted according to changing hydrogeologic conditions, a small amount of groundwater could potentially not be captured if one or more recovery wells were shut down for maintenance.

8.2.3. Overall Protection of Human Health and the Environment

Alternatives 5, 7, and 9 provide adequate protection of human health and the environment by reducing the risk of soil contact and contaminated groundwater ingestion. Alternatives 3, 4, 6, and 8 reduce risk of contaminated groundwater ingestion but provide minimal reduction of soil contact risk.

Alternative 1 (no action) provides no protection of human health and the environment. Alternative 2 provides minimal reduction of the risk of contact with soil. Alternative 2 also provides some reduction of risk through groundwater ingestion onsite, but there is some uncertainty about the prevention of offsite groundwater ingestion.

8.2.4. Reduction of Mobility, Toxicity, and Volume Through Treatment

All alternatives except 1, 2, and 3 reduce the mobility, toxicity, and volume of contaminated groundwater by employing UV/oxidation water treatment technology prior to its discharge through the NPDES-permitted outfall. This technology is reliable with proper operation and maintenance.

Alternatives 1 (no action) and 2 (institutional controls) do not reduce mobility, toxicity, or volume of contaminated groundwater through treatment. Alternative 3 reduces only contaminant volume and mobility in the groundwater by implementing groundwater extraction.

8.2.5. Implementability

Technically, Alternative 2 would be the easiest to implement because it only involves construction of a fence. However, this alternative would be the most difficult to implement administratively because of uncertainties involving acquisition of land or water rights to prevent groundwater ingestion.

Alternatives 3, 4, and 5 could be implemented using standard construction techniques and practices. The water treatment technology required in Alternatives 4, 5, 6, and 7 is not widely used but, because it has been put into practice at several sites and is relatively uncomplicated to operate, it should be readily implementable.

Alternatives 5, 7, and 9, which involve the surface cap, would be less implementable than their counterparts that do not include a surface cap (Alternatives 4, 6, and 8). To make augmentation of the existing cap feasible, the low-permeability soil option was chosen since it was the best match to the existing cap and could be used to extend the cap over the desired areas with less disruption to the current containment system. Given the steep sides of the existing landfill, however, an added degree of difficulty exists in the design and implementation of the surface cap extension.

Alternatives 6 and 7, which involve construction of a subsurface barrier with slurry columns around Area B, would not be as readily implementable as the previous alternatives. Prior to slurry column installation, a soil-boring program for contaminant sampling and geotechnical testing must be conducted. The slurry column installation would then be implemented using common construction practices.

Alternatives 8 and 9, which involve subsurface barriers and a subsurface permeable treatment wall, would be less implementable than Alternatives 6 and 7 because treatability studies would be required to design the permeable treatment wall. The slurry column construction for this alternative would be the same as described above.

9. SELECTED REMEDY

The selected remedy for controlling contamination from the soils and groundwater at OU 1 is Alternative 4 — Collection, Treatment, and Disposal of Groundwater. As discussed previously, the common elements of surface water controls, institutional controls to limit site access, and long-term groundwater monitoring will be part of the remedy as well. Based on groundwater studies conducted during the FS, it is currently envisioned that the collection (groundwater extraction) system will consist of two wells pumping at a combined rate of 45 gallons per minute. Additional groundwater modeling will be conducted during the remedial design phase, which will establish optimum location and pumping rates for the extraction wells. Some changes may be made to the remedy as a result of the remedial design and construction process. Such changes, in general, will reflect modifications resulting from the engineering design process.

Based on current information, this alternative would meet the USEPA remedial evaluation criteria. The alternative meets the threshold criteria (is protective of human health and the environment and satisfies all the ARARs) and satisfies the primary balancing criteria (short- and long-term effectiveness; reduction of toxicity, mobility, or volume; and implementability) for the least cost. Because it reduces toxicity and volume and controls mobility, the alternative also protects the Mound Plant production wells. The preferred alternative would be effective in capturing contaminated groundwater beneath the OU 1 site before it migrates offsite. The groundwater pump-and-treat system will reduce the contaminant mass in the subsurface and will continue to operate until groundwater meets the Preliminary Remediation Goals specified in Table 8. It is difficult to predict how long this will take, but for costing purposes, it was assumed the system would operated for a period of 30 years. The treatment system specified for this site could efficiently remove the VOCs to the preliminary remediation goals listed in Table 8. All extracted groundwater would be treated to levels that will comply with the requirements of the Mound Plant NPDES Permit.

The contemplated treatment system will primarily consist of a unit designed to remove VOCs from the water prior to discharge. Final determination of all required treatment will be made as part of the detail design. There are several potentially viable treatment trains for VOCs, including cascade aeration, UV oxidation, and conventional air stripping; all offer the possibility of adequate treatment. Additionally, the CERCLA process allows for and promotes the use of innovative technologies whenever potentially practicable and cost-effective. Final selection of technologies will be made during remedial design, when any of these systems may be determined to be optimal. Cascade aeration, as well as the other treatment trains, constitutes best available treatment.

Thus, the selected remedy—collection, treatment, and disposal—will provide a cost-effective remedial option that is easy to implement and that will adequately protect human health and the environment.

Following issuance of the ROD, three kinds of changes that require documentation can be made to the selected remedy. These are as follows:

- Minor changes that require differences to be documented in the post-ROD file.
- Significant changes that require the development of an explanation of significant differences for inclusion in the Administrative Record. Significant changes are those that modify or replace a component of the selected remedy.
- Fundamental changes that require the development of a ROD amendment and, thus, additional public comment. Fundamental changes are changes of the selected remedy that do not reflect the ROD with regard to scope (e.g., overall approach), performance, or cost.

At the time DOE proposes the specific treatment technology to be used, DOE, in consultation with USEPA and OEPA, will determine whether changes need to be made in the ROD and will implement the specified modification procedures.

10. STATUTORY DETERMINATIONS

The selected remedy protects human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate (ARAR) to the remedial action, and is cost-effective. A list of ARARs that will be attained by the selected remedy, along with the "To Be Considered" (TBC) item that was used, is provided as Attachment B. In implementing the selected remedy, DOE, USEPA, and OEPA have agreed to consider a procedure that is not legally binding. In implementing the selected remedy, DOE, USEPA, and OEPA have agreed to consider as a TBC the OEPA policy on wastewater discharge resulting from cleanup of response action sites contaminated with VOCs.

This remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site, and satisfies the statutory preference for treatment as a principal element of the remedy. While the remedy calls for treatment of contaminated groundwater, treatment of soil at the site was not found to be practicable. The fact that the source of contamination is diffuse and no substantive onsite soil hot spots exist precludes a remedy consisting of excavation and treatment of contaminants in soil.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within 5 years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

11. DOCUMENTATION OF SIGNIFICANT CHANGES

The OU 1 Proposed Plan was released for public comment in November 1994. The Proposed Plan identified Alternative 4 (Collection, Treatment, and Disposal) as the preferred alternative for groundwater remediation. DOE reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes were necessary to the remedy as originally identified in the Proposed Plan.

RESPONSIVENESS SUMMARY

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RECORD OF DECISION
OPERABLE UNIT 1
AREA B, MOUND PLANT, OHIO
June 1995

RESPONSIVENESS SUMMARY

1. OVERVIEW

At the time of the public comment period (15 November 1994), DOE had identified a preferred alternative for OU 1, Area B. The recommended alternative, as published in the Proposed Plan, consisted of collection, treatment, and disposal of groundwater. The treated groundwater would be released to the Great Miami River.

Judging from the limited number of comments received during the public comment period, the citizens and other interested parties did not question the overall remediation strategy. Comments were directed to the nature and need for treatment, as well as the manner in which the treatment system would be operated.

These sections follow:

- Section 2, Background on Community Involvement.
- Section 3, Summary of Comments Received During the Public Comment Period and DOE Responses.
  - Section 3.1, Summary and Response to Local Community Concerns.
  - Section 3.2, Comprehensive Response to Specific Legal and Technical Questions.
- Section 4, Remaining Concerns.
- Attachment C, Community Relations Activities for OU 1, Area B.

2. BACKGROUND ON COMMUNITY INVOLVEMENT

Community reaction to Mound Plant has been mixed. Unlike most sites that handle nuclear material and hazardous chemicals, Mound Plant does not sit in an isolated location. The plant can be seen from downtown, schools, farm fields, parks, and homes. The backyards of a few Miamisburg residences end at Mound Plant's fence. Also, Mound Plant has had a highly visible community image, with a long record of community service and philanthropy. Historically, the majority of the local residents have viewed Mound Plant as no threat to the community.

Community involvement for OU 1 has been integrated with community involvement activities for the Mound Plant Site as a whole. The Mound Plant CERCLA Community Relations Plan, published in 1990, provided for soliciting comment while informing the public about planned and ongoing actions. The public information activities are carried out through quarterly CERCLA public meetings and by periodic publication of a newsletter, the *Superfund Update*.

As the field investigation of OU 1 was completed, public information activities directed toward OU 1 were initiated. Specific items are:

- An update on the field investigation was included in the October 1993 *Superfund Update*.
- The budget priorities for OU 1 and the balance of the CERCLA program were the subject of a workshop at the October 1993 CERCLA public meeting.
- A briefing on the site conditions and environmental issues relating to OU 1 was presented at CERCLA public meetings on 14 June 1993 and 22 September 1994.
- The OU 1 RIR, containing results and interpretations of field investigations, was placed in the public reading room in May 1994.
- A brochure, *Environmental Restoration at Mound*, was published in July 1994 and included a short description of OU 1. A brochure providing more detail on OU 1 was published in September 1994.
- A fact sheet announcing the availability of the FS and the Proposed Plan was published in November 1994.
- Public comments were solicited and received at a public hearing on 8 December 1994. The transcript of that hearing is available in the public reading room.
- In response to comments, a second fact sheet was published in December 1994.
- The public comment period remained open until 31 January 1995.

3. SUMMARY OF PUBLIC COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND DOE RESPONSES

The public comment period extended from 15 November 1994 through 31 January 1995. A public meeting and hearing was held on 8 December 1994. Two comments were received at the hearing. Two sets of written comments were received from technical advisors to Miamisburg Environmental Safety and Health (MESH). The state of Ohio raised one additional technical issue.

3.1. Summary and Response to Local Community Concerns

1. Selection of Alternative 4 over Alternative 3.

At the 8 December 1994 public meeting for the OU 1 Proposed Plan, a question was raised concerning Table 1 on page 9 of the Proposed Plan. The question concerned the apparent similarity of Alternatives 3 and 4, with the exception of maximum total cost.

DOE Response: Table 9, in the ROD, updates and clarifies Table 1 by identifying the reduction of toxicity, mobility, or volume of contaminants that each alternative addresses. Alternative 3 meets the mobility and volume reduction statutory preference for selecting remedial actions (page 4-10 of the OU 1 FS). It does not address toxicity reduction, which is also a statutory preference for selecting remedial actions. Therefore, DOE, in consultation with the USEPA and OEPA, has determined that Alternative 4, which includes treatment to reduce toxicity, is preferable. The reduction of toxicity, mobility, or volume for Alternative 4 is explained on page 4-14 of the FS.

Guidance from the OEPA indicates that wastewater discharges resulting from cleanup of response action sites contaminated with VOCs need to be treated with the best available technology for toxicity reduction. The state of Ohio believes that Alternative 3 does not meet those requirements.

The NCP (40 CFR 300) identifies two additional "modifying criteria," which are (1) state acceptance and (2) community acceptance. Based on the state's position on Alternative 3, Alternative 4 was chosen as the preferred alterative. This Responsiveness Summary incorporates an evaluation of community acceptance based on public comments.

2. Compatibility with overall remedy for the Site.

At the 8 December 1994 public meeting for the OU 1 Proposed Plan, a question was raised whether the remedy for OU 1 would help or hinder remedial action for the Site as a whole. The recommendation was made to "put your arms around the whole project."

DOE Response: DOE is ultimately concerned with a remedy for the Mound Plant CERCLA Site as a whole. The Site has been broken down into separate OUs to facilitate the planning and investigation. OU 1 is the first unit to be considered for final remedial action. The other OUs also likely will be considered one at a time to maintain a reasonable rate of progress. However, each removal action, interim remedial action, or final remedial action is evaluated to ensure that it is unlikely to interfere with any overall remedy for the complete Site.

The selected remedy for OU 1 will withdraw groundwater from beneath and immediately adjacent to OU 1. A small portion of the groundwater that now flows down the tributary valley and enters the BVA could be diverted into the remediation wells. The effect of the remediation on the hydraulic performance of the plant production wells is expected to be immeasurably small. Thus, the selected remedy is expected to be compatible with potential remedial actions in other parts of the plant. Further, it should support or assist in controlling migration of contamination, thus directly supporting a range of alternatives. As other portions of the plant are considered for remediation, DOE will reconsider this issue.

3. Peter Townsend, MESH Technical Advisor, stated, "I conclude that remedial alternative 4 is the most reasonable alternative for clean-up of the landfill and overflow pond area. Alternative 4 will involve ground water collection and treatment, and appears capable of preventing further contamination of groundwater in the immediate area of the overflow pond and existing landfill."

Mr. Townsend went on to comment on the occurrence of 1,1,1-TCA in the BVA. He agreed with the assertion in the RIR that OU 1 was not the source of this contaminant, but suggested that it could still be the result of Mound Plant activities. He identified the NPDES 001 outfall pipe as a possible source, since it had (formerly) been an unsealed, butted cement pipe. Mr. Townsend recommended that consideration of this possible source be considered in the OU 1 FS or a future document.

DOE Response: This commentor agrees with the DOE selection of the remedial alternative presented in the OU 1 Proposed Plan. However, concern is raised regarding offsite contamination, which DOE has concluded is not related to OU 1 or, in fact, to Mound Plant. The commentor misinterprets a statement on page 2-20 of the RIR and concludes that VOC contamination was discovered and caused some private residences to be connected to Miamisburg city water. The statement says that "In January 1988, residences that used groundwater from wells 0901, 0902, 0903, 0906, 0907, and 0908 (Figure 2.6 in the RIR) were connected to Miamisburg city water due to local organic contamination." This group of wells was owned by the operator of a trailer park, who supplied drinking water to the residents. This system met the definition of a community water system and was subject to the Safe Drinking Water Act (SDWA) regulations. It is DOE's position that these residences did not discontinue use of these wells as a result of VOC contamination originating from Mound Plant. The switch to city water was caused, we believe, by the owner's difficulty and expense involved with the testing and operating conditions required to comply with SDWA regulations. During 1986 to 1988, Mound Plant conducted at least six separate sampling events for wells 0901 through 0908. No VOCs were detected in any of these events; specifically, 1,1,1-TCA was not detected. This commentor also speculates that the source of the alleged 1,1,1-TCA plume was the Mound Plant NPDES outfall 001 pipeline. To clarify the situation, Mound Plant drawings and long-time employees were consulted. Drawings indicate that the pipeline is 12-inch-diameter vitrified clay pipe, of bell and spigot configuration, from west of Cincinnati-Dayton Pike to the river. This configuration would require each joint to be filled with mortar to allow proper alignment. As part of a site-wide program to upgrade sewer lines, this pipeline was slip-lined with a continuous plastic liner in approximately 1980 to 1981. This was done as a good management practice, not because of a known contamination problem. No VOC contamination has been detected from the wells (0127, 0128, 0302, 0303, 0343, 0383) located due south of the 001 outfall pipe, which confirms there is no VOC contamination as a result of possible leakage from the 001 discharge pipe.

4. Jeff Fisher, MESH Technical Advisor, provided the following comments:

a. No remediation goals (except ARARs were described for surface and ground water, surface and deep soil, sediment and air. Clean up or treatment is fine, but goals need to be established and agreed upon by the USEPA, OEPA, Mound, and Stakeholders. A clear assessment of the treatment system's ability to meet cleanup goals is necessary. Without a target you are just "shooting arrows at a wall."

DOE Response: All of these issues are addressed in the OU 1 FS, which was released for public review with the Proposed Plan. Remediation goals were established and cleanup targets were agreed upon in extensive discussions among Mound Plant, DOE, USEPA and OEPA.

b. Offsite contamination needs to be addressed and workable solutions discussed by the Mound, regulators, and stakeholders. Environmental contamination extends beyond the boundaries of Mound.

DOE Response: Offsite issues are being addressed through the OU 9 (site-wide) RI/FS process, as well as through additional OUs (such as the Miami-Erie Canal). Since conditions at OU 1 do not lead to offsite contamination, it is not addressed in the current documents.

Mr. Fisher went on to address comments to the OU 1 RIR, which was placed in the reading room in May 1994. Although not pertinent to the Proposed Plan, the comments and responses are provided below.

a. Please explain the concept of "background" as it pertains to cleanup of chemicals and radionuclides. Is it US EPA policy to use background values obtained from the Mound site? How are these used or compared to background values obtained from sites distant from the Mound?

DOE Response: Chemical and radiological background for the Mound Plant Site is being defined in a series of data reports published as part of the OU 9 (site-wide) RI. The background data for surface soils were published in 1994 (Background Soils Investigation Soil Chemistry Report, Technical Memorandum, Revision 2, September 1994). This document is available in the public reading room. Background statements for groundwater, surface water, and sediments are being prepared. All background will be based on data from the vicinity of, but beyond the influence of, Mound Plant. Use of background data will be on a case-by-case basis. No reliance on background was used in selecting the remedy for OU 1.

b. For toxicity values that reference the ECAO [Environmental Criteria and Assessment Office], please supply written documentation showing the derivation of the toxicity value. Please state what year of HEAST tables were cited. Are Heast tables prior to 1994 used?

DOE Response: Toxicity values were obtained from the USEPA, as cited in the text and Appendix J of the OU 1 RIR. No independent derivation of toxicity was made, so no additional documentation is available. HEAST tables from 1993 were used, since this effort was completed in 1993.

c. There are several typographical errors, but the errors did not detract from the intent of the document.

DOE Response: Noted.

d. The overflow pond appears to be without adequate analytical data and was not included in the risk assessment. Without this added to the baseline risk assessment, the baseline risk assessment is inadequate and does not address all important pathways of exposure.

DOE Response: As discussed in the RIR, the overflow pond is part of the plant drainage system, which is being studied as part of the OU 9 investigation. The limited data available suggest that the overflow pond is not a significant direct source of contamination to the aquifer system. The pond water and sediment are not highly contaminated, and the leakage through the liner is not anticipated to be significant. These issues are addressed in sections 4.2 and 4.4.4 of the RIR. The pond is not an important pathway of exposure for OU 1.

e. The documents pertaining to OU 1 need to be available to the public in draft form. This is a very serious problem that needs to be corrected.

DOE Response: All documents are reviewed in draft by both regulatory agencies (USEPA and OEPA), who approve the final versions prior to public release. This is consistent with CERCLA guidance.

5. The following written comments were received from an anonymous reviewer of the OU 1 Proposed Plan:

a. Are the Miami Erie Canal sediments the only potential source of tritium in the BVA?

DOE Response: No. The canal is the major source, but small amounts of tritium have also been detected in wells in the Old Burn Area and Old Landfill Area.

b. What proof do you have that Mound is the source of the VOC contamination presently detected in the BVA?

DOE Response: The highest levels of VOCs have been detected onsite in the OU 1 location. Historical Mound well monitoring data also confirm this.

c. Are there any known current tritium sources that may eventually reach the BVA? Are there any known current tritium sources that may reach the canal?

DOE Response: c1) Yes, under the SW Building. However, it is unlikely that the SW Building tritium source will reach the BVA. c2) Yes, tritium reached the canal as a result of Mound discharging tritiated plant water in the Mound drainage ditch that flows into the canal.

d. What are the tritium levels in the main hill seeps?

DOE Response: The highest levels are in the low 100s nanocurie per liter range. The seeps are not a threat to the aquifer.

e. What historic maximum levels of VOCs were detected in the upstream aquifer (from the Mound Plant) during a Mound sampling/analysis event or "other's" sampling/analysis event?

DOE Response: The observed levels of VOCs in the background wells (completed in the BVA) are as follows:

Chemical	Range of Detected Concentrations (µg/L)	Mean of Concentrations (µg/L)
1,1,1-TCA	0.46 - 2.3	0.53
1,2-*cis*-DCE	1.1 - 1.1	0.55
PCE	11. - 12.	2.21
Trichloromethane (chloroform)	0.50 - 0.57	0.30

f. What are the current levels of VOCs upstream from Mound Plant?

DOE Response: The OU 9 Groundwater Sweeps Report, dated January 1995, showed the following monitoring well data:

Well 0118	0.68 µg/L	1,2-Dichloroethane
Well 0137	1.6 µg/L	Trichloroethane
Well 0137	0.58 µg/L	Trichloromethane (chloroform)
Well 0138	0.53 µg/L	1,2-Dichlorethene
Well 0138	6.0 µg/L	Acetonitrile
Well 0138	0.58 µg/L	Trichloromethane (chloroform)
Well 0138	9.9 µg/L	Trichloromethane (chloroform)
Well 0327	2.3 µg/L	1,1,1-Trichloroethane
Well 0327	12.0 µg/L	Tetrachloroethene
Well 0327	0.50 µg/L	Trichloromethane (Chloroform)
Well 0328	1.1 µg/L	1,2-*cis*-Dichloroethene
Well 0328	9.0 µg/L	*Bis* (2-Ethylhexyl) Phthalate
Well 0332	8.9 µg/L	Dichloromethane (Methylene Chloride)

g. What ground water model was used to determine the contribution of VOC contamination from the Mound historic landfill verses the historic upstream VOC contamination?

DOE Response: For the VOCs, the Darcy Model was used.

h. How does the OU 4 canal remediation schedule, the OU 1 remediation schedule and the OU 2 remediation schedule tie into one another?

DOE Response: Because OU 1 groundwater contamination is the reason the Mound site was put on the NPL, or Superfund, OU 1 has been given a high priority for cleanup by the DOE. The OU 1 VOC contamination problem is a result of past disposal practices in OU 1 and is not interactive with the other Mound Plant OU schedules.

i. Will all other known sources of VOCs be completely remediated prior to the implementation of the OU 1 Proposed Plan?

DOE Response: No. However, at this time no other plant VOC sources are impacting OU 1.

j. Do you plan to remediate OU 4 (the canal), contain the main hill seeps (OU 2), or remediate the VOC contaminated soils in the landfill prior to remediating the aquifer?

DOE Response: j1) No. OU 2 and OU 4 are not affecting OU 1 (see response to h). j2) The site sanitary landfill and overflow pond overlie most of OU 1, making large-scale excavation prohibitive.

k. What are the calculated risks (cancer) for the no-action alternative for OU 1?

DOE Response: The highest overall risk for the onsite resident is 5×10^{-4}.

l. What is the total cost for the OU 1 Proposed Plan implementation?

DOE Response: The estimated cost for the proposed remedy, collection, treatment, and disposal is $1,740,000. This includes installation costs and annual operations and maintenance costs for an estimated 30-year remediation cycle.

m. What long term ground water monitoring and sampling will be necessary after remediation is complete? Is there sufficient Congressional budget available to support the long term monitoring work?

DOE Response: m1) Monitoring and sampling requirements after OU 1 remediation is completed will be determined based on USEPA groundwater regulatory guidance. m2) Budget provisions have been made for this work, but this funding is subject to change.

n. What is the cost for the long term monitoring and sampling in the current five-year plan? How much will the long term monitoring and sampling cost?

DOE Response: No long-term monitoring and sampling funding has been specifically identified in the OU 1 5-year plan. Costs for the long-term monitoring and sampling after OU 1 is remediated will be determined based on USEPA groundwater guidance requirements (see response to m).

o. Has OEPA and US EPA approved the proposed remedial actions based on risk concerns?

DOE Response: Yes. The Proposed Plan preferred alternative has been approved by both USEPA and OEPA.

p. What risk level is acceptable as a no action level by Ohio EPA for tritium? for VOCs? for tritium and VOCs based on levels found in the BVA?

DOE Response: The acceptable USEPA cancer risk levels are $1x10^{-4}$ to $1x10^{-6}$.

q. What risk level is acceptable as a no action level by US EPA for tritium? for VOCs? for tritium and VOCs based on levels found in the BVA?

DOE Response: The acceptable USEPA cancer risk levels are $1x10^{-4}$ to $1x10^{-6}$.

r. What levels of risk are necessary for the "no action alternative" to be approved by the Ohio EPA and US EPA regulators assigned to oversee work at Mound? at WPAFB?

DOE Response: The acceptable USEPA cancer risk levels are $1x10^{-4}$ to $1x10^{-6}$.

3.2. Comprehensive Response to Specific Legal and Technical Questions

As part of its continuing review of the OU 1 FS and Proposed Plan, the OEPA and the Regional Air Pollution Control Authority (RAPCA) examined the need for air-related permits for the remedy. These agencies suggested that an application to and review by RAPCA are appropriate. Subsequent conversations and correspondence confirmed that neither a permit application nor a design review is needed.

4. REMAINING CONCERNS

None.

ATTACHMENT A

STATE CONCURRENCE LETTER

Ohio EPA
State of Ohio Environmental Protection Agency

STREET ADDRESS:
1800 WaterMark Drive
Columbus, OH 43215-1099

TELE: (614) 644-3020 FAX: (614) 644-2329

MAILING ADDRESS:
P.O. Box 1049
Columbus, OH 43216-1049

May 22, 1995

RE: US DOE MOUND
OPERABLE UNIT 1
RECORD OF DECISION
CONCURRENCE LETTER

Mr. Valdas Adamkus
Regional Administrator
US EPA Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. J. Phil Hamric
Manager, Ohio Field Office
US Department of Energy
P.O. Box 3020
Miamisburg, Ohio 45343-3020

Dear Mr. Adamkus and Mr. Hamric:

The Ohio Environmental Protection Agency (Ohio EPA) has received and reviewed the April 1995 Operable Unit 1 (OU1) Record of Decision (ROD) for the DOE Mound Superfund site in Montgomery County.

The OU1 ROD is the first ROD to be completed for the operable units at the DOE Mound. This remedial action is not the final remedial action for the DOE Mound site, but is intended to be a final remedial action for OU1. Decisions regarding remedial actions for other portions of the site are being addressed in other operable units, which will ultimately be considered in a Site-wide Remedial Investigation and Feasibility Study, which are in progress. A decision on the final remedial action for the DOE Mound Site will be made in a subsequent decision-making process.

The OU1 ROD addresses groundwater contamination by preventing migration of contamination (volatile organic compounds) toward the DOE Mound production well. The selected remedial action will result in the minimization of exposure to potential receptors of the groundwater contamination. The selected alternative includes the following components:

- Installation of two groundwater extraction wells within OU1, using standard equipment and procedures. Specifics regarding the design of the extraction system will be determined in the Remedial Design.

- Treating the extracted groundwater to remove volatile organic compounds and other constituents, as required, using cascade aeration, ultraviolet oxidation, conventional air stripping, or other suitable treatment units including innovative technologies which will achieve the remedial objectives .

* Discharging the treated groundwater to the Great Miami River through the existing plant NPDES outfall or a new outfall. Permit modifications may be needed to accommodate the final design of the remedy.

The estimated present cost of the selected remedy is $706,000 in 1995 dollars. The estimated annual present worth of operation and maintenance costs are $1,170,000 for a period of 30 years.

Ohio EPA concurs with the selected remedy based upon this review. Since the selected remedy does not involve establishment or modification of the site sanitary landfill, Ohio Administrative Code 3745-27-07 is not considered to be Applicable or Relevant and Appropriate (ARAR), although it would be a potential ARAR for other OU1 remedies.

Because this remedy may result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of this remedial action to ensure that the remedy continues to adequately protect human health and the environment.

Sincerely,

Donald R. Schregardus
Director

DRS/klf

cc: Jenny Tiell, Director's Office
Tim Fischer, USEPA Region V
Jeff Hurdley, OEPA Legal
Graham Mitchell, OEPA/OFFO
Jan Carlson, OEPA/DERR
Warren Sherard, DOE MB
Oba Vincent, DOE MB
Art Kleinrath, DOE MB
Brian Nickel, OEPA/OFFO
Ruth Vandegrift, ODH
Ray Beaumier, OEPA/DERR

ATTACHMENT B

ARARs TABLES

Table 1. State Chemical-Specific ARARs for OU 1

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Prohibits Violation of Air Pollution Control Rules/3704.05 A-I	Prohibits emission of an air contaminant in violation of Section 3704 or any rule, permit, order, or variance issued pursuant to that section of the ORC.	May pertain to any site where emissions of an air contaminant occur either as a preexisting condition of the site or as a result of remedial activities. Should be considered for virtually all sites.	ARAR	Implementation of the substantive provisions of state air requirements as ARARs is required by Section 121(d) of CERCLA.
Handling Low-Level Radioactive Waste Prohibited/3734.02.7 A,B	A) Prohibits commingling low-level radioactive waste with any type of solid, hazardous, or infectious waste. B) No owner or operator of a solid, infectious, or hazardous waste facility shall accept any radioactive waste for transfer, storage, treatment, or disposal.	Pertains to all sites at which low-level radioactive waste has come to be located.	ARAR	Radioactive wastes generated as part of remedial actions at OU 1 will be managed separately from non-radioactive materials.
"Five Freedoms" for Surface Water/ 3745-1-04 A,B,C,D,E	All surface waters of the state shall be free from: A) Objectionable suspended solids. B) Floating debris, oil, and scum. C) Materials that create a nuisance. D) Toxic, harmful, or lethal substances. D) Nutrients that create nuisance growth.	Pertains to discharges to surface waters as a result of remediation and to any onsite surface waters affected by site conditions.	ARAR	Surface water bodies subject to quality criteria standards do not occur within OU 1. Alternatives that involve discharge to surface water will be addressed in action-specific ARARs.
Antidegradation Policy for Surface Water/ 3745-1-05 A,B,C	Prevents degradation of surface water quality below designated use or existing water quality. Existing instream uses shall be maintained and protected. The most stringent controls for treatment shall be required by the director of the USEPA for all new and existing point source discharges. Prevents any degradation of "State Resource Waters."	Pertains to discharges to surface water as a result of remedial action and to any surface water affected by site conditions.	ARAR	Surface water bodies subject to quality criteria standards do not occur within OU 1. Alternatives that involve discharge to surface water will be addressed in action-specific ARARs.
Mixing Zones for Surface Water/ 3745-1-06 A,B	A) Presents the criteria for establishing non-thermal mixing zones for point source discharges. B) Presents the criteria for establishing thermal mixing zones for point source discharges.	Applied as a term of discharge permit to install.	ARAR	Alternatives involving direct discharge will comply.
Water Quality Criteria/ 3745-1-07 C	Establishes water quality criteria for pollutants that do not have specific numerical or narrative criteria identified in Tables 7-1 through 7-15 of this rule.	Pertains to discharges to surface waters as a result of remedial action and any surface waters affected by site conditions.	ARAR	Surface water bodies subject to quality criteria standards do not occur within OU 1. Alternatives that involve discharge to surface water will be addressed in action-specific ARARs.

Table 1. (page 2 of 5)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Particulate Ambient Air Quality Standards/ 3745-17-02 A,B,C	Establishes specific standards for total suspended particulates.	Pertains to any site that may emit measurable quantities of particulate matter (both stack and fugitive). Consider for sites that will undergo excavation, demolition, cap installation, clearing and grubbing, incineration, and waste fuel recovery.	ARAR	Air emissions may be involved as part of the treatment in several of the alternatives. Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure particulate emissions are within acceptable limits.
Particulate Nondegradation Policy/3745-17-05	Degradation of air quality in any area where air quality is better than required by 3745-17-02 is prohibited.	Pertains to sites in certain locations that may emit or allow the escape of particulates (both stack and fugitive). Consider for sites that will undergo excavation, demolition, cap installation, clearing and grubbing, and incineration.	ARAR	Air emissions may be involved as part of the treatment in several of the alternatives. Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure particulate emissions are within acceptable limits.
Evaluation of Wastes/3745-52-11 A-D	Any person generating a waste must determine if that waste is a hazardous waste (either through listing or by characteristic).	Pertains to sites at which wastes of any type (both solid and hazardous) are located.	ARAR	Any materials generated during construction or implementation of remedial actions will be evaluated to determine if they are identifiable as a hazardous waste, or if they are sufficiently similar to hazardous wastes so that hazardous waste management standards should be applied.
Ground Water Protection: Applicability/ 3745-54-90	Establishes circumstances under which an operator of a hazardous waste facility must implement a groundwater protection program or a corrective action program.	Pertains to all sites with land-based hazardous waste units (surface impoundments, waste piles, land treatment units, and landfills), including existing land-based areas of contamination.	ARAR	Historic disposal of hazardous waste occurred within OU 1. Groundwater monitoring implemented as part of the remedial alternatives will incorporate the requirements of the hazardous waste regulations.
Required Programs/ 3745-54-91 (A)-(B)	Establishes requirements for conducting a groundwater compliance monitoring and response program.	Whenever hazardous constituents from a regulated unit are detected at the compliance point, or whenever groundwater protection standards are exceeded between the compliance point and the downgradient facility property boundary.	ARAR	Exceedences of groundwater protection standards have been observed within OU 1. Groundwater monitoring program is ongoing; a program will be implemented as part of a remedial alternative that will follow requirements of this ARAR.

Table 1. (page 3 of 5)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Maximum Contaminant Levels for Inorganic Chemicals/3745-81-11 A,B	Presents maximum contaminant levels for inorganics.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Because of the potential impacts to the BVA, this standard will be applied.
Maximum Contaminant Levels for Organic Chemicals/3745-81-12 A,B,C	Presents maximum contaminant levels for organics.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Because of the potential impacts to the BVA, this standard will be applied.
Maximum Contaminant Levels for Turbidity/ 3745-81-13 A,B	Presents maximum contaminant levels for turbidity.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Because of the potential impacts to the BVA, this standard will be applied.
Maximum Microbiological Contaminant Levels/ 3745-81-14 A-E	Presents maximum contaminant levels for microbiological contaminants.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Because of the potential impacts to the BVA, this standard will be applied.
Maximum Contaminant Levels for Radium-226, -228, and Gross Alpha/ 3745-81-15 A,B	Presents maximum contaminant levels for radium-226, radium-228, and gross alpha particle activity.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Because of the potential impacts to the BVA, this standard will be applied.
Maximum Contaminant Levels for Beta Particle and Photon Radioactivity/ 3745-81-16 A,B	Presents maximum contaminant levels for beta particle and photon radioactivity from man-made radionuclides.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Because of the potential impacts to the BVA, this standard will be applied.

Table 1. (page 4 of 5)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Microbiological Contaminant Sampling and Analytical Requirements/ 3745-81-21 A-B	Presents sampling and analytical requirements for microbiological contaminants.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Appropriate methods for monitoring compliance with ARARs will be coordinated with OEPA and USEPA.
Turbidity Contaminant Sampling and Analytical Requirements/ 3745-81-22 A-B	Presents sampling and analytical requirements for turbidity.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Appropriate methods for monitoring compliance with ARARs will be coordinated with OEPA and USEPA.
Inorganic Contaminant Monitoring Requirements/ 3745-81-23 A-E	Presents monitoring requirements for inorganic contaminants.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Appropriate methods for monitoring compliance with ARARs will be coordinated with OEPA and USEPA.
Organic Contaminant Monitoring Requirements/ 3745-81-24 A-E	Presents monitoring requirements for organic contaminants.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Appropriate methods for monitoring compliance with ARARs will be coordinated with OEPA and USEPA.
Analytical Methods for Radioactivity/ 3745-81-25 A-D	Presents analytical methods for radioactivity.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Appropriate methods for monitoring compliance with ARARs will be coordinated with OEPA and USEPA.
Monitoring Frequency for Radioactivity/ 3745-81-26 A-C	Presents monitoring requirements for radioactivity.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Appropriate methods for monitoring compliance with ARARs will be coordinated with OEPA and USEPA.

Table 1. (page 5 of 5)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Analytical Techniques/ 3745-81-27 A-E	Presents general analytical techniques for maximum contaminant levels.	Pertains to any site that has contaminated surface or groundwater that is either being used or has the potential for being used as a drinking water source.	ARAR	Appropriate methods for monitoring compliance with ARARs will be coordinated with OEPA and USEPA.
Requirements for a Variance from MCLs/ 3745-81-40 A-C	Provides criteria by which director may grant variance from MCLs.	Pertains to any site which has contaminanted ground or surface water that is either being used, or has the potential for use, as a drinking water source.	ARAR	If required, the remedy will comply with this provision.
Alternative Treatment Technique Variance/ 3745-81-46	Allows for the use of alternative treatment techniques to attain MCLs.	Pertains to any site which has contaminated ground or surface water that is either being used, or has the potential for use, as a drinking water source.	ARAR	If required, the remedy will comply with this provision.
Prohibition of Nuisances/3767.14	Prohibition against throwing refuse, oil, or filth into lakes, streams, or drains.	Pertains to all sites located adjacent to lakes, streams, or drains.	ARAR	

ARAR - applicable or relevant and appropriate requirement
BVA - Buried Valley aquifer
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
MCL - maximum contaminant level
OEPA - Ohio Environmental Protection Agency
ORC - Ohio Revised Code
OU 1 - Operable Unit 1
USEPA - U.S. Environmental Protection Agency

Table 2. Federal Chemical-Specific ARARs for OU 1

Regulatory Program	Requirement	ARAR	Comment
CWA	Acute CWA freshwater toxicity criterion (CWA §304).	ARAR	Compliance is specifically required by CERCLA §121(d) where relevant and appropriate. Will be applied except where more appropriate standards exist. For example, standards specifically intended for groundwater or drinking.
	Chronic CWA freshwater toxicity criterion (CWA §304).		
	USEPA ambient water quality criteria for protection of human health aquatic organisms, and drinking water standards (CWA §304).		
	USEPA ambient water quality criteria for protection of human health aquatic organisms only (CWA §304).		
Safe Drinking Water Act	Maximum contaminant levels (40 CFR .11 to 141.16).	ARAR	Compliance is specifically required by CERCLA §121(d) where relevant and appropriate.
	Maximum contaminant level goals (40 CFR § 141.50)		
Resource Conservation and Recovery Act Groundwater Monitoring Requirements	Groundwater Protection Program for Hazardous Waste "Regulated Units" (40 CFR 264 Subpart F).	ARAR	Considered relevant and appropriate because of historic disposal of apparent hazardous wastes.

ARAR - applicable or relevant and appropriate requirement
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CWA - Clean Water Act
USEPA - U.S. Environmental Protection Agency

Table 3. State Location-Specific ARARs for OU 1

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
"Digging" Where Hazardous or Solid Waste Facility Was Located/3734.02 (H)	Filling, grading, excavating, building, drilling or mining on land where a hazardous waste or solid waste facility was operated is prohibited without prior authorization from the director of the OEPA.	Pertains to any site where hazardous or solid waste is located.	ARAR	Implementation of the substantive provisions of state requirements relating to intrusive activities at former disposal sites as ARARs is required by Section 121(d) of CERCLA.
Prohibits Open Dumping or Burning/ 3734.03	Prohibits open burning or open dumping of solid waste or treated or untreated infectious waste.	Pertains to any site at which solid waste has come to be located or will be generated during a rememdial action.	ARAR	Solid wastes generated as part of the remedy will be subject to this requirement.
Hazardous Waste Facility Environmental Impact/3734.05 (D)(6)(c)	A hazardous waste facility installation and operation permit shall not be approved unless the facility is proven to represent the minimum adverse environmental impact considering the state of available technology, the nature and economics of various alternatives, and other pertinent considerations.	Pertains to all sites where hazardous wastes are located and/or where hazardous wastes will be treated, stored, or disposed of. May function as siting criteria.	ARAR	While no permit is required, remedial alternatives will be coordinated with the USEPA and OEPA.
Hazardous Waste Siting Criteria/ 3734.05 (D)(6)(d)(g)(h)	(D)(6)(d). A hazardous waste facility installation and operation permit shall not be approved unless it proves that the facility represents the minimum risk of all of the following: (i) Contamination of ground and surface waters. (ii) Fires or explosions from treatment, storage, or disposal methods. (iii) Accident during transportation. (iv) Impact on public health and safety. (v) Soil contamination. (D)(6)(g)(h). Prohibits the following location for treatment, storage and disposal of acute hazardous waste: (i) Within 2,000 feet of any residence, school, hospital, jail, or prison. (ii) Any naturally occurring wetland. (iii) Any flood hazard area. (iv) Within any state park or national park or recreation area.	Pertains to all sites at which hazardous waste has come to be located and/or at which hazardous will be treated, stored, or disposed of. May function as siting criteria.	ARAR	
Water Use Designations for Southwest Ohio Tributaries/ 3745-1-17	Establishes water use designations for stream segments within the Southwest Ohio Tributaries Basin.	Pertinent if stream or stream segment is onsite and is affected by site conditions or if remedy includes direct discharge. Used by DWQPA to establish waste load allocations.	ARAR	Applicable to discharge.

Table 3. (page 2 of 2)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Water Use Designations for Great Miami River/ 3745-1-21	Establishes water use designations for stream segments within the Great Miami River Basin.	Pertinent if stream or stream segment is onsite and is affected by site conditions or if remedy includes direct discharge. Used by DWQPA to establish waste load allocations.	ARAR	Applicable to discharge.
Location/Siting of New GW Wells/3745-9-04 A,B	Mandates that groundwater wells be: A) Located and maintained to prevent contaminants from entering the well. B) Located to be accessible for cleaning and maintenance.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 1975. Would pertain during the FS if new wells are constructed for treatability studies.	ARAR	Wells installed as part of the remedy will comply with this requirement.
Particulate Nondegradation Policy/3745-17-05	Degradation of air quality in any area where air quality is better than required by 3745-17-02 is prohibited.	Pertains to sites in certain locations that may emit or allow the escape of particulates (both stack and fugitive). Consider for sites that will undergo excavation, demolition, cap installation, clearing and grubbing, and incineration.	ARAR	Fugitive dust emission controls may be required during construction. Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure particulate emissions are within acceptable limits.
Open Burning Standards in Restricted Areas/3745-19-03 A-D	Open burning without prior authorization from OEPA is prohibited.	Pertains to sites within a restricted area (within the boundary of a municipality and a zone extending beyond such municipality).	ARAR	
Disturbances Where Hazardous or Solid Waste Facility Was Operated/ 3745-27-13 C	Prohibits any filling, grading, excavating, building, drilling, or mining on land where a hazardous waste facility or solid waste facility was operated without prior authorization from the director of the USEPA. Special terms to conduct such activities may be imposed by the director to protect the public and the environment.	Pertains to any site where hazardous or solid waste has been managed, either intentionally or otherwise. Does not pertain to areas that have had one-time leaks or spills.	ARAR	Implementation of the substantive provisions of state requirements relating to intrusive activities at former disposal sites as ARARs is required by Section 121(d) of CERCLA.

ARAR - applicable or relevant and appropriate requirement
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DWQPA - Department of Water Quality Planning and Assessment
FS - Feasibility Study
OEPA - Ohio Environmental Protection Agency
USEPA - U.S. Environmental Protection Agency

Table 4. State Action-Specific ARARs for OU 1

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Prohibits Violation of Air Pollution Control Rules/3704.05 A-I	Prohibits emission of an air contaminant in violation of Section 3704 or any rule, permit, order, or variance issued pursuant to that section of the ORC.	May pertain to any site where air contaminant emissions occur either as a preexisting condition of the site or as a result of remedial activities. Should be considered for virtually all sites.	ARAR	Implementation of the substantive provisions of state air requirements as ARARs is required by Section 121(d) of CERCLA.
"Digging" Where Hazardous or Solid Waste Facility Was Located/3734.02 H	Filling, grading, excavating, building, drilling, or mining on land where a hazardous waste or solid waste facility was operated is prohibited without prior authorization from the director of the OEPA.	Pertains to any site where hazardous or solid waste is located.	ARAR	Implementation of the substantive provisions of state requirements relating to intrusive activities at former disposal sites as ARARs is required by Section 121(d) of CERCLA.
Air Emissions from Hazardous Waste Facilities/3734.02 I	No hazardous waste facility shall emit any particulate matter, dust, fumes, gas, mist, smoke, vapor, or odorous substance that interferes with the comfortable enjoyment of life or property or that is injurious to public health.	Pertains to any site where hazardous waste will be managed so that air emissions may occur. Consider for sites that will undergo movement of earth or incineration.	ARAR	Air emissions may be involved as part of the treatment in several of the alternatives. Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure emissions are within acceptable limits.
Handling Low-Level Radioactive Waste Prohibited/ 3734.02.7 A,B	A) Prohibits commingling low-level radioactive waste with any type of solid, hazardous, or infectious waste. B) No owner or operator of a solid, infectious, or hazardous waste facility shall accept any radioactive waste for transfer, storage, treatment, or disposal.	Pertains to all sites where low-level radioactive waste is located.	ARAR	Radioactive wastes generated as part of remedial actions at OU 1 will be managed separately from non-radioactive materials.
Prohibits Open Dumping or Burning/ 3734.03	Prohibits open burning or open dumping of solid waste or treated or untreated infectious waste.	Pertains to any site at which solid waste has come to be located or will be generated during a rememdial action.	ARAR	Solid wastes generated as part of the remedy will be subject to this requirement.
Hazardous Waste Facility Environmental Impact/3734.05 (D)(6)(c)	A hazardous waste facility installation and operation permit shall not be approved unless the facility is proven to represent the minimum adverse environmental impact considering the state of available technology, the nature and economics of various alternatives, and other pertinent considerations.	Pertains to all sites where hazardous wastes are located and/or where hazardous wastes will be treated, stored, or disposed of. May function as siting criteria.	ARAR	While no permit is required, remedial alternatives will be coordinated with the USEPA and OEPA.

Table 4. (page 2 of 8)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Hazardous Waste Siting Criteria/ 3734.05 (D)(6)(d)(g)(h)	(D)(6)(d). A hazardous waste facility installation and operation permit shall not be approved unless it proves that the facility represents the minimum risk of all of the following: (i) Contamination of ground and surface waters. (ii) Fires or explosions from treatment, storage, or disposal methods. (iii) Accident during transportation. (iv) Impact on public health and safety. (v) Soil contamination. (D)(6)(g)(h). Prohibits the following location for treatment, storage and disposal of acute hazardous waste: (i) Within 2,000 feet of any residence, school, hospital, jail, or prison. (ii) Any naturally occurring wetland. (iii) Any flood hazard area. (iv) Within any state park or national park or recreation area.	Pertains to all sites at which hazardous waste has come to be located and/or at which hazardous will be treated, stored, or disposed of. May function as siting criteria.	ARAR	
Conditions for Disposal of Acute Hazardous Waste/3734.14.1	Prohibits disposal of acute hazardous waste unless it: (1) cannot be treated, recycled, or destroyed; (2) has been reduced to its lowest level of toxicity; and (3) has been completely encapsulated or protected to prevent leaching.	Pertains to any site where acute hazardous waste has come to be located.	ARAR	Based on available information, only one waste disposed of prior to construction of the sanitary landfill, beryllium machining wastes, may be determined to be an acute hazardous waste. Currently, there is some question whether such wastes would have been considered off-specification commercial chemical products, identifiable as P015 listed acute hazardous wastes. If such a listing is appropriate, this standard will be regarded as ARAR for any alternatives involving generation of listed beryllium hazardous wastes.

Table 4. (page 3 of 8)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Analytical and Collection Procedures/3745-1-03	Specifies analytical methods and collection procedures for surface water discharges.	Pertains both to discharges to surface waters as a result of remediation and to any onsite surface waters affected by site conditions.	ARAR	Alternatives involving direct discharge will comply.
Water Quality Criteria/ 3745-1-07 C	Establishes water quality criteria for pollutants that do not have specific numerical or narrative criteria identified in Tables 7-1 through 7-15 of this rule.	Pertains both to discharges to surface waters as a result of remedial action and to any surface waters affected by site conditions.	ARAR	Alternatives involving direct discharge will comply.
Water Use Designations for Southwest Ohio Tributaries/3745-1-17	Establishes water use designations for stream segments within the Southwest Ohio Tributaries Basin.	Pertinent if stream or stream segment is onsite and is affected by site conditions or if remedy includes direct discharge. Used by DWQPA to establish waste load allocations.	ARAR	Applicable to discharge.
Water Use Designations for Great Miami River/3745-1-21	Establishes water use designations for stream segments within the Great Miami River Basin.	Pertinent if stream or stream segment is onsite and is affected by site conditions or if remedy includes direct discharge. Used by DWQPA to establish waste load allocations.	ARAR	Alternatives involving direct discharge will comply.
Location/Siting of New GW Wells/ 3745-9-04 A,B	Mandates that groundwater wells be: A) Located and maintained to prevent contaminants from entering the well. B) Located to be accessible for cleaning and maintenance.	Pertains to all groundwater wells on the site that either will be installed or have been installed since February 1975. Would pertain during the FS if new wells are constructed for treatability studies.	ARAR	Will be applied for new well installation as part of any alternatives.
Construction of New GW Wells/ 3745-9-05 A1,B-H	Specifies minimum construction requirements for new groundwater wells with regard to casing material, casing depth, potable water, annular spaces, use of drive shoe, openings to allow water entry, and contaminant entry.	Pertains to all groundwater wells on the site that either will be installed or have been installed since 15 February 1975. Would pertain during the FS if new wells are constructed for treatability studies.	ARAR	Will be applied for new well installation as part of any alternatives.

Table 4. (page 4 of 8)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Casing Requirements for New GW Wells/ 3745-9-06 A,B,D,E	Establishes specific requirements for well casings, such as suitable material, diameters, and conditions.	Pertains to all groundwater wells on the site that either will be installed or have been installed since 15 February 1975. Would pertain during the FS if new wells are constructed for treatability studies.	ARAR	Will be applied for new well installation as part of any alternatives.
Surface Design of New GW Wells/ 3745-9-07 A-F	Establishes specific surface design requirements, such as height above ground, well vents, and well pumps.	Pertains to all groundwater wells on the site that either will be installed or have been installed since 15 February 1975. Would pertain during the FS if new wells are constructed for treatability studies.	ARAR	Will be applied for new well installation as part of any alternatives.
Start-up and Operation of GW Wells/ 3745-9-08 A,C	Requires disinfection of new wells and use of potable water for priming pumps.	Pertains to all groundwater wells on the site that either will be installed or have been installed since 15 February 1975. Would pertain during the FS if new wells are constructed for treatability studies.	ARAR	Will be applied for new well installation as part of any alternatives.
Maintenance and Operation of GW Wells/ 3745-9-09 A-C,D1,E-G	Establishes specific maintenance and modification requirements for casing, pump, and wells in general.	Pertains to all groundwater wells on the site that either will be installed or have been installed since 15 February 1975. Would pertain during the FS if new wells are constructed for treatability studies.	ARAR	Will be applied for new well installation as part of any alternatives.
Abandonment of Test Holes and GW Wells/ 3745-9-10 A,B,C	Following completion of use, wells and test holes shall be completely filled with grout or similar material and shall be maintained in compliance of all regulations.	Pertains to all groundwater wells on the site that either will be installed or have been installed since 15 February 1975.	ARAR	Will be applied for new well installation as part of any alternatives.
"De minimis" air contaminant source exemption/ 3745-15-05	Provides that an air contaminant source is exempt from permitting requirements, provided it has the potential to emit no more than 10 pounds per day of criteria pollutants or 1 ton per year of hazardous air pollutants.	Pertains to any site emitting air pollutants.	ARAR	Will be applied to any remedy that has the potential to emit criteria or hazardous air pollutants.

Table 4. (page 5 of 8)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Air Pollution Nuisances Prohibited/ 3745-15-07 A	Defines air pollution nuisance as the emission or escape into the air (from any source) of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors, and combinations of the above that endanger health, safety, or welfare of the public or cause personal injury or property damage. Such nuisances are prohibited.	Pertains to any site that causes, or may reasonably cause, air pollution nuisances. Consider for sites that will undergo excavation, demolition, cap installation, methane production, incineration, and waste fuel recovery.	ARAR	Air emissions may be involved as part of the treatment in several of the alternatives. Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure emissions are within acceptable limits.
Emission Restrictions for Fugitive Dust/ 3745-17-08 A1,A2,B,D	All emissions of fugitive dust shall be controlled.	Pertains to sites that may have fugitive emissions (non-stack) of dust. Consider for sites that will undergo grading, loading operations, demolition, clearing and grubbing, and construction.	ARAR	Air emissions may be involved as part of the treatment in several of the alternatives. Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure fugitive dust emissions are within acceptable limits.
Open Burning Standards in Restricted Areas/3745-19-03 A-D	Open burning without prior authorization from OEPA is prohibited.	Pertains to sites within a restricted area (within the boundary of a municipality and a zone extending beyond such municipality).	ARAR	
Ambient Air Quality Standards and Guidelines/ 3745-21-02 A,B,C	Establishes specific air quality standards for carbon monoxide, ozone and non-methane hydrocarbons.	Pertains to any site that will emit carbon oxides, ozone, or non-methane hydrocarbons. Consider for sites that will undergo water treatment, incineration, and fuel burning (waste fuel recovery).	ARAR	Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure emissions are within acceptable limits.
Methods of Ambient Air Quality Measurement/ 3745-21-03 B,C,D	Specifies measurement methods to determine ambient air quality for carbon monoxide, ozone, and non-methane hydrocarbons.	Pertains to any site that will emit carbon monoxide, ozone, or non-methane hydrocarbons. Consider for sites where treatment systems will result in air emissions.	ARAR	Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure emissions are within acceptable limits.
Non-degradation Policy/3745-21-05	Prohibits significant and avoidable deterioration of air quality.	Pertains to any site that will emit carbon oxides and non-methane hydrocarbons. Consider for sites that will undergo water treatment, incineration, and fuel burning (waste fuel recovery).	ARAR	Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure emissions are within acceptable limits.

Table 4. (page 6 of 8)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Organic Materials Emission Control; Stationary Sources/ 3745-21-07 A,B,G,I,J	Requires control of emissions of organic materials from stationary sources and best available technology.	Pertains to any site that is emitting or will emit organic material. Consider for sites that will undergo water treatment, incineration, and fuel burning (waste fuel recovery).	ARAR	Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure organic materials emissions are within acceptable limits.
VOC Emissions Control: Stationary Sources/3745-21-09	Establishes limitations for emissions of VOCs from stationary sources.	Pertains to any site that is emitting or will emit VOCs. Consider for sites that will undergo water treatment.	ARAR	Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure VOC emissions are within acceptable limits.
Exemptions to Solid Waste Regulations/ 3745-27-03 B	Defines exemptions to solid waste regulations and establishes limitations on temporary storage of putrescible waste or any solid waste that causes a nuisance or health hazard. Storage of putrescible waste beyond 7 days is considered open dumping.	Pertains to any site where solid waste will be managed. Consider especially for old landfills where solid waste may be excavated and/or consolidated.	ARAR	Will be applied to any alternative that involves generation of solid wastes.
Authorized, Limited and Prohibited Solid Waste Disposal/ 3745-27-05 A,B,C	Establishes allowable methods of solid waste disposal: sanitary landfill, incineration, composting. Prohibits management by open burning and open dumping.	Pertains to any site where solid wastes will be managed. Prohibits management by open burning and open dumping.	ARAR	Will be applied to any alternative that involves generation of solid wastes. None of the alternatives involve open burning or open dumping.
Sanitary Landfill - Ground Water Monitoring/ 3745-27-10 B-D	Groundwater monitoring program must be established for all sanitary landfill facilities. The system must consist of a sufficient number of wells that are located so that samples indicate both upgradient (background) and downgradient water samples. The system must be designed per the minimum requirements specified in this rule. The sampling and analysis procedures used must comply with this rule.	Pertains to any new solid waste facility and any expansions of existing solid waste landfills onsite. Also may pertain to existing areas of contamination that are capped in-place per the solid waste rules.	ARAR	Groundwater monitoring is contemplated as an element of the remedy.
Disturbances Where Hazardous or Solid Waste Facility Was Operated/ 3745-27-13 C	Prohibits any filling, grading, excavating, building, drilling, or mining on land where a hazardous waste facility or solid waste facility was operated without prior authorization from the director of the USEPA. Special terms to conduct such activities may be imposed by the director to protect the public and the environment.	Pertains to any site where hazardous or solid waste has been managed, either intentionally or otherwise. Does not pertain to areas that have had one-time leaks or spills.	ARAR	The RD/RA Work Plan will comply with this requirement.

Table 4. (page 7 of 8)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Post-Closure Care of Sanitary Landfill Facilities/ 3745-27-14 A	Specifies the required post-closure care for solid waste facilities. Includes continuing operation of leachate and surface water management systems, maintenance of the cap system, and groundwater monitoring.	Substantive requirements pertain to newly created solid waste landfills onsite, expansions of existing solid waste landfills onsite, and existing areas of contamination that are capped per the solid waste rules.	ARAR	Evaluation of existing closed sanitary landfill conditions will be included in all but the no-action alternative and necessary modifications/repairs will be made.
Water/Air Permit Criteria for Decision by the Director/ 3745-31-05	A permit to install or plans must demonstrate best available technology and shall not interfere with or prevent the attainment or maintenance of applicable ambient air quality standards.	Pertains to any site that will discharge to onsite surface water or will emit contaminants into the air.	ARAR	Alternatives involving onsite water discharge will comply. Air emissions may be involved as part of the treatment in several of the alternatives. Alternatives involving air emissions will be coordinated with USEPA and OEPA to ensure emissions are within acceptable limits.
Evaluation of Wastes/ 3745-52-11 A-D	Any person generating a waste must determine if that waste is a hazardous waste (either through listing or by characteristic).	Pertains to sites where wastes of any type (both solid and hazardous) are located.	ARAR	Any materials generated during construction or implementation of remedial actions will be evaluated to determine if it is identifiable as a hazardous waste, or if it is sufficiently similar to a hazardous waste that hazardous waste management standards should be applied.
Prohibition of Nuisances/3767.14	Prohibition against throwing refuse, oil, or filth into lakes, streams, or drains.	Pertains to all sites located adjacent to lakes, streams, or drains.	ARAR	
Acts of Pollution Prohibited/6111.04	Pollution of waters of the state is prohibited.	Pertains to any site that has contaminated onsite surface water or groundwater or will have a discharge to onsite surface water or groundwater.	ARAR	Implementation of the substantive provisions of state water requirements as ARARs is required by Section 121(d) of CERCLA.
Rules Requiring Compliance with National Effluent Stds/ 6111.04.2	Establishes regulations requiring compliance with national effluent standards.	Pertains to any site that will have a point source discharge.	ARAR	Alternatives involving onsite discharge will comply.

Table 4. (page 8 of 8)

Regulation Title or Subject/Revised Code Section and Pertinent Paragraph	Regulation Description	Regulation Application	ARAR	Comments
Water Pollution Control Requirements-Duty to Comply/6111.07 A,C	Prohibits failure to comply with requirements of sections 6111.01 to 6111.08 or any rules, permit, or order issued under those sections.	Pertains to any site that has contaminated groundwater or surface water or will have a discharge to onsite surface or groundwater.	ARAR	Implementation of the substantive provisions of state water requirements as ARARs is required by Section 121(d) of CERCLA.
OEPA Policy #DSW-DERR 0100.027	National Pollution Discharge Elimination System: Wastewater Discharges Resulting from Clean-up of Response Action Sites Contaminated with VOCs.	Establishes guidelines for the disposal of wastewaters, of both short- and long-term discharge categories, resulting from cleanup response action sites contaminated with VOCs, and the operating interface between the involved OEPA divisions. For discharges to surface water or storm sewers, the Best Available Treatment Technology/Best Available Demonstrated Control Technology (BATT/BADCT) must be applied to achieve 5 μg/L or less for each VOC parameter listed.	TBC, Not ARAR	This policy addresses short-term discharges (pump tests and treatability tests) and long-term discharges (interim and remedial actions). This policy provides guidelines for achievement of less that 5 μg/L for specific VOC parameters by utilizing BATT/BADCT for those compounds. BATT/BADCT consists of air stripping, carbon columns, or both or equivalent to achieve the 5 μg/L or less.

ARAR - applicable or relevant and appropriate requirement
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DWQPA - Department of Water Quality Planning and Assessment
FS - feasibility study
μg/L - micrograms per liter
OEPA - Ohio Environmental Protection Agency
ORC - Ohio Revised Code
TBC - to be considered
USEPA - U.S. Environmental Protection Agency
VOC - volatile organic compound

Table 5. Federal Action-Specific ARARs for OU 1

Action	Requirement	Prerequisite	Citation	ARAR	Comments
Discharge of Treatment System Effluent	Best Available Technology: Use of best available technology economically achievable is required to control toxic and nonconventional pollutants. Use of best conventional pollutant control technology is required to control conventional pollutants. Technology-based limitations may be determined on a case-by-case basis.	Point source discharge to waters of the United States.	40 CFR 122.44(a)	ARAR	Alternatives involving discharges to surface waters will comply.
	Water Quality Standards: Must comply with applicable federally approved state water quality standards. These standards may be in addition to or more stringent than other federal standards under the CWA.		40 CFR 122.44 and state regulations approved under 40 CFR 131		Alternatives involving discharges to surface waters will comply.
	Discharge limitation must be established at more stringent levels than technology-based standards for toxic pollutants.		40 CFR 122.44(o)		
	Best Management Practices: Develop and implement a best management practices program to prevent the release of toxic constituents to surface waters.		40 CFR 125.100		
	The best management practices program must: - Establish specific procedures for the control of toxic and hazardous pollutant spills. - Include a prediction of direction, rate of flow, and total quantity of toxic pollutants where experience indicates a reasonable potential for equipment failure. - Ensure proper management of solid and hazardous waste in accordance with regulations promulgated under RCRA.		40 CFR 125.104		

Table 5. (page 2 of 3)

Action	Requirement	Prerequisite	Citation	ARAR	Comments
Discharge of Treatment System Effluent (cont.)	Management Requirements: Discharge must be monitored to ensure compliance. Discharge will monitor:		40 CFR 122.41(i)		
	- The mass of each pollutant. - The volume of effluent. - Frequency of discharge and other measurements as appropriate.		40 CFR 136.1-136.4		
	Approved test methods for waste constituent to be monitored must be followed. Detailed requirements for analytical procedures and quality controls are provided.		40 CFR 122.41(i)		
	Comply with additional substantive conditions such as: - Duty to mitigate any adverse effects of any discharge. - Proper operation and maintenance of treatment systems.				
	Movement of excavated materials to new location and placement in or on land will trigger land disposal restrictions for the excavated waste or closure requirements for the unit in which the waste is being placed.	Materials containing RCRA hazardous wastes subject to land disposal restrictions are placed in another unit.	40 CFR 268 (Subpart D)		
	The area from which materials are excavated may require cleanup to levels established by closure requirements.	RCRA hazardous waste placed at site after the effective date of the requirements.	See Closure in this exhibit.		
Discharge to Storm Sewers	Requires storm water discharges to be permitted under the federal (or state) NPDES program. Different requirements are applicable for different classes and types of discharges.	Protection of surface waters against degradation resulting from site discharges.	40 CFR 122 40 CFR 125	ARAR	Alternatives involving onsite discharge to sewer systems will comply.

Table 5. (page 3 of 3)

Action	Requirement	Prerequisite	Citation	ARAR	Comments
Discharge of Water into Surface Water Bodies	An NPDES permit is required for discharging water offsite into surface water bodies. All surface water discharges must be in compliance with promulgated Ohio Stream Discharge Standards	Protection of surface waters against degradation resulting from site discharges.	40 CFR 122 and 40 CFR 125	ARAR	Alternatives involving onsite discharge will comply.

ARAR - applicable or relevant and appropriate requirement
CWA - Clean Water Act
NPDES - National Pollutant Discharge Elimination System
RCRA - Resource Conservation and Recovery Act

3.0 GROUNDWATER MONITORING NETWORK

Groundwater monitoring at Mound has been an ongoing activity dating back to early plant production days and continuing on through to the present. The groundwater both on and offsite has historically been monitored to determine potential impacts from operations utilizing various radioisotopes. In the mid-1980s Mound began to analyze the groundwater for potential impacts due to operations that utilized non-radiological constituents such as various halogenated organic solvents, petroleum hydrocarbons and several explosive compounds.

Previous site characterization involved the installation of over 150 monitoring wells. Those wells were sampled quarterly for a period of two years (1993 through 1994) during site Remedial Investigation/Feasibility Studies (RI/FS). The results of those sampling events provided a detailed picture with regards to contaminant concentrations and distribution in groundwater at and around the Mound Facility. The results also allowed Mound to focus monitoring efforts on areas of known contamination and contaminants of concern. The current active groundwater monitoring network is designed to provide information on water quality in the groundwater flow systems at Mound. The network consists of approximately 60 groundwater monitoring wells, 10 groundwater seeps and several monitoring trenches. The network is sampled on a routine basis for select organic compounds, metals and radionuclides.

As previously noted the monitoring network is designed to meet the following overall objectives of then monitoring program:

- assure site workers that drinking water is safe for consumption,
- assure containment of know groundwater contamination,
- assure local residents and communities that their drinking water has not been adversely impacted by plant activities
- monitor and provide early warning of impacts due to continuing decontamination and decommissioning activities and environmental restoration efforts, and to,
- monitor the progress and effectiveness of ongoing groundwater remediation efforts.

Table 1 provides a summary of the wells, sampling parameters and sampling schedule included in the current MEMP groundwater monitoring program. Plates 1 and 2 show the distribution of monitoring wells located outside and inside the facility boundaries .

Additional details of the MEMP groundwater monitoring program can be found in *"Groundwater Monitoring Program and Groundwater Protection Program Management Program Plan, August 1997, Revision 2", and Groundwater Monitoring Plan Review, summary changes, letter from L.R. Bauer (BWX Technologies) to Mr. R. Folker (Director MEMP, DOE). September 30, 1998.*

Executive Summary

Operable Unit One (OU-1), or Area B as it was originally called, occupies approximately 4 acres in the southwestern portion of the Mound Plant. The BVA is a designated sole source aquifer that provides drinking water for many cities along the Miami River, as well as the Mound Plant. It encompasses the historic landfill, the site sanitary landfill, the overflow pond, and the three plant production wells situated in the Buried Valley Aquifer (BVA).

The OU-1 Remedial Investigation (RI) characterized the BVA in this area as a shallow wedge-shaped highly permeable sand and gravel aquifer. There are zones of lower permeable silt and clay within the sand and gravel. Due to the high permeability and shallow depths the aquifer tends to be anaerobic. The primary VOC contaminants identified during the RI were PCE, TCE, and DCE. OU-1 has a complex configuration due to the location of the engineered landfill over a portion of the site.

The Mound Plant was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priority List, in 1989. As part of the Mound CERCLA process, a Federal Facility Agreement (FFA) was signed between the Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA) and Ohio EPA. The agreement required DOE to produce a Remedial Investigation Feasibility Study (RI/FS) report, which is based on remedial investigative fieldwork. As a result of the RI process DOE and the U.S. EPA and Ohio EPA signed a CERCLA Record of Decision (ROD) for a remediation remedy to control groundwater VOC contamination in OU-1, and in the adjacent Buried Valley Aquifer (BVA).

The ROD specifies a pump-and-treat system as the remedy to control groundwater VOC contamination in OU-1. In consideration of the estimated amount of time required for the pump-and-treat system to contain the contaminants until eventual termination, the Innovative Technology Remediation Demonstration (ITRD) group was contacted and asked to work with the Mound ER Program to review and evaluate applicable innovative remediation technologies and suggest enhancements to a site-selected baseline pump-and-treat system. The ITRD group is an advisory group composed of DOE, EPA, industry, and regulatory agency representatives.

Based on detailed engineering assessments and cost and performance evaluations, the ITRD group identified two technologies for application at the site. The two technologies are air sparging and soil vacuum extraction (AS/SVE). It has been estimated that clean up could be achieved in approximately three years, based upon simultaneous operation of these systems.

Due to a time differential associated with the implementation of the remediation methods, the pump-and-treat system has been operating the longest. The pump-and-treat system, from February 18, 1997 to January 12, 2000, has removed an estimated 21.29 pounds of contaminants from the aquifer. The SVE system has removed an estimated 3,283.45 pounds of contaminants, from December 18, 1997 to January 12, 2000. The estimated contaminant removal for calendar year 1999 is 793 pounds (SVE: 789.87, P&T: 3.26). Both systems are anticipated to continue remediation efforts and could be shut down as early as December 2000, at which time a rebound test would be initiated.

1.0 Introduction

Operable Unit One (OU-1), or Area B as it was originally called, occupies approximately 4 acres in the southwestern portion of the Mound Plant. It encompasses the historic landfill, the site sanitary landfill, the overflow pond, and the three plant production wells. The Mound Plant began a periodic water-sampling program for Volatile Organic Compounds (VOCs) in 1984. Under the Environmental Restoration (ER) Program, a Remedial Investigation (RI) was started in 1987 and focused on groundwater contamination. Since 1986, VOCs have been detected and monitored in the groundwater in Area B. An extended discussion of Area B history, including waste disposal and construction activities, is provided in the OU-1 RI Report, Section 1, March 1994.

The OU-1 Remedial Investigation (RI) characterized the BVA in this area as a shallow wedge-shaped highly permeable sand and gravel aquifer. There are zones of lower permeable silt and clay within the sand and gravel. Due to the high permeability and shallow depths the aquifer tends to be anaerobic. The primary VOC contaminants identified during the RI were PCE, TCE, and DCE. Generally, contaminants are in the range of 100 ppb but in some areas to levels as high as 7-25 ppm. OU-1 has a complex configuration due to the location of the engineered landfill over a portion of the site.

As a result of the VOC contamination found in OU-1 groundwater, the Mound Plant was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priority List, in 1989. As part of the Mound CERCLA process, a Federal Facility Agreement (FFA) was signed between the Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA) and Ohio EPA. The FFA agreement required DOE to produce a Remedial Investigation Feasibility Study (RI/FS) report, which is based on remedial investigative fieldwork. As a result of the RI process, which took approximately three years (1992-1995), DOE and the U.S. EPA and Ohio EPA signed a CERCLA Record of Decision (ROD) for a remediation remedy to control groundwater VOC contamination in OU-1, and in the adjacent Buried Valley Aquifer (BVA).

The ROD specifies a pump-and-treat system as the remedy to control groundwater VOC contamination in OU-1. In consideration of the treatment time required for the pump-and-treat system to remediate the site, two additional systems were selected for expedition of contaminant removal. An air sparging/soil vacuum extraction (AS/SVE) system was selected for deployment. It has been estimated that clean up could be achieved in approximately three years, based upon simultaneous operation of these systems.

2.0 Scope/Purpose of Report

This report is the second annual report written covering the remedial activities in OU-1. These activities include, but are not limited to, system maintenance (including preventative and problems/failures), sampling, measurements on system operating parameters, and VOC mass removal calculations. The purpose of this annual report is to gather together, in one place, a ready reference of all of the aforementioned data into a coherent package.

3.0 Groundwater (ROD)

A groundwater contaminant plume emanates southward from the OU-1 landfill area and travels toward the Mound Plant drinking water wells. The primary contaminants of concern are cis-1,2-dichloroethene; trans-1,2-dichloroethene; tetrachloroethene; tetrachloromethane; 1,1,1-trichloroethane; trichloroethene; trichlorofluoromethane; chloroform, and vinyl chloride. The chosen remedial method for containment of VOC contaminants was a pump-and-treat system. The pump-and-treat system will prevent further migration of affected groundwater and treat extracted water to acceptable levels for disposal.

A remedial design was developed for the pump and treat system which consists of extraction and monitoring wells and an air stripper system. The extraction and monitoring wells for the OU-1 remediation project were installed in 1996, and the installation of the air stripper and associated equipment was completed and operation started on February 18, 1997. The first 180 days of operation were under a Treatability Test to ensure discharge and air emission requirements were met. Operation of the system following the Treatability Test period has been conducted in accordance with the Authorization to Discharge. The effluent discharge location is also known as Outfall 003. The monitoring for VOC contamination in OU-1 is ongoing and part of the Mound Plant Environmental Monitoring Program. Based upon the monitoring results, the system is fulfilling the criterion set forth by the ROD. Due to the aforementioned, the ROD was considered to be fully implemented.

3.1 Pump-and-Treat System Description

The pump-and-treat system extracts the contaminated groundwater, treats the affected groundwater in a low-profile air stripper, and discharges the treated effluent to a storm drain. The storm drain was installed in 1996 as part of the Miami-Erie Canal remediation and passes along the West boundary of OU-1. The pump-and-treat system consists of a system of pumps, tanks, valves, instruments and electrical controls.

Each of the three pump-and-treat system extraction wells is equipped with submersible pumps and water level controls. The pumps are 480 volt three phase submersible Grundfos pumps with a one horsepower motor. Each well has three level control transducers operating with 120 volts. These transducers feed a switch that prevents the well pump from running dry and burning up the motor. When the individual water level drops below the low-level transducer, the pump is turned off. The pump automatically restarts when water level rises above the operating-level transducer and after a programmable delay. The delay is controlled by a timer, which eliminates the possibility of cycling of the well pump too rapidly. The programmable delay timer is located in Building 300.

The piping system that carries the groundwater from the extraction wells to the air stripper is the influent system. The pipelines conveying the water are constructed of schedule 80 PVC plastic and are attached via a pitless adapter through each well casing. There is an individual pipe from each extraction well to within Building 300 where they are joined in a manifold. Just before before the influent pipes are joined each line has a flow meter with totalizer and control valve. The current flow rate can be read off the meter and the control valve adjusted to achieve the desired flow rate. Two check valves, one in the top of each pump and one in each influent line in Building 300, assures that water cannot flow backward to a well.

Most of the pipe run is approximately three feet below grade, but a small portion of the pipe run where the pipe enters the side of the building is aboveground. The aboveground portion of the influent piping, outside of Building 300, is heat traced and insulated to prevent freezing during very low temperatures.

The piping system within Building 300 is designed to allow for collecting water samples from influent and effluent lines. Water samples can be collected from sampling ports that are located on each influent line as well as the influent manifold (composite sample). An effluent sampling port is also on the discharge line for the air stripper. These ports allow for monitoring of influent and effluent water quality by the Environmental Safeguards and Compliance group. After the influent manifold, the water flows into a low-profile air stripper.

VOCs are removed from the groundwater collected by the extraction wells via the air stripper. The air stripper uses a series of four (4) stainless steel trays with perforated bottoms for the distribution of water, which is met with a countercurrent of forced air. Water enters at the top of the stripper through a diffuser and follows a "U" pattern in each tray while air enters at the bottom. The air stripper blower accomplishes the air induction at the bottom of the stripper and forces the air up through the perforated trays aerating the water (ie. Removing VOCs from the water) as it travels the channels downward. The system is equipped with air pressure switches and a differential air pressure indicator. The pressure switches shut off the blower in the case of low or excessive pressure at the air injection point of the stripper.

The shutdown of the blower by a pressure switch activates the appropriate alarm and shuts down the three well pumps. A typical cause of excessive pressure is fouling of the stripper tray air holes, indicating a need to clean the trays. A typical cause of low pressure would be the loss of the large port cover.

The water, following treatment in the trays, collects in the air stripper sump. This sump is equipped with an alarm, which is sounded if a high-level indicator is triggered within the stripper sump. If the high level alarm is actuated, the well pumps are all shut down as well as the air stripper blower is shut down. The water in the sump is transported by air pressure into a gravity-flow effluent pipe. The effluent pipe is constructed as an inverted "U" trap of schedule 80 PVC plastic and is adjustable to optimize the water level in the air stripper sump. The effluent pipe flows below-grade to a storm drain that runs along the West boundary of OU-1. The air stripper reduces the water COC concentrations to less than MCLs (typically Not Detectable) before discharge. The air concentration of the contaminants of concern is below OSHA air regulatory limits.

A floor sump inside of Building 300 collects spilled water. Spilled water can be manually returned to the stripper by bailing or by the electric sump pump. An alarm is sounded if a high-level indicator is triggered in the floor sump. Simultaneously, the well pumps are all shut down, which then in turn causes the stripper to shut down.

The treatment system is equipped with an automated dialer and enunciator, which is activated upon any alarm condition. The automatic dialer will call up to eight numbers seeking acknowledgment of the alarm condition. If the alarm condition is not acknowledged, the automatic dialer will continue to cycle through the programmed call list until it receives an acknowledgment. Once the alarm is acknowledged, the alarm condition must be rectified within four hours or the automated dialer will resume automatic calling again.

3.2 System Maintenance

Regular inspection and maintenance of the pump-and-treat system is required for continued effective operation. Regular activities include those performed weekly, monthly, quarterly, and annually. The following describes the maintenance required for the pump-and-treat system. Maintenance and monitoring activities are to be logged in the system logbook, which resides in Building 300. A copy of the aforementioned logbook can be found in Attachment A.

3.3 Compliance Monitoring

The VOC contaminants of concern (COC) have been monitored monthly on both the influent and effluent. The influent data shows that the pump-and-treatment system, in conjunction with the SVE system, is being effective in the removal of the COCs from the groundwater by the rate of which the concentration of contaminants present in the influent is dropping. The effluent data demonstrates the effectiveness of the air stripper in removing the COCs from the water being treated and demonstrates compliance to the Authorization to Discharge from Outfall 003. The Environmental Safeguards and Compliance group performs the monitoring of and monthly reporting on "OU1 Authorization to Discharge Monitoring Results." This report is sent to the DOE and OEPA. A sample group of these reports is contained in Attachment B. A synopsis of the VOC COC data and Water Level Measurement data are in Attachment C.

Another facet of compliance monitoring involves Mound's Quarterly Groundwater Monitoring Program which monitors groundwater contamination concentrations over time. Thirteen existing monitoring wells are located within or near OU-1 (305, 308, 313, 370, 373, 397, 410, 415, 416, 417, 418 422, and 423). These wells are sampled by dedicated bladder pumps or bailers and are analyzed at an off-site contract lab utilizing analytical method SW-846. The samples are collected while pump-and-treat wells are operating. The results from these quarterly events can be found in the "Annual Groundwater Monitoring Report."

3.4 System Performance

The Pump-and-treat system performance is assessed by three different metrics. The first metric is based upon COC mass removal and mass removal rate. Second, the system uptime verse down time is assessed. Third, the hydraulic containment of the contaminant plume/area is assessed. When these three factors are maximized, then the system is operating in an acceptable manner.

3.4.1 Mass Removal

Mass Removal calculations are based upon the analytical test results obtained from the Environmental Safeguards and Compliance group. Examples of the analytical results are contained in Attachment D. The influent COC concentration (reported in ug/L) is mathematically fitted, with respect to liters of water pumped from the extraction wells. The mathematical algorithm fitting is accomplished with TableCurve 2D version four. The equation that best represents the data is selected and integrated with respect to liters of water pumped from the extraction wells and multiplied by the conversion factor of $2.205*10^{-9}$ which converts from micrograms to pounds. The individual COC calculated pounds removed are then summed together to obtain total pounds of VOCs removed. An Example of this can be found in Attachment E.

3.4.2 Uptime/Downtime

The pump-and-treat system is to be on and pumping as much as humanly possible. It is the primary system that contains the contaminant plume and ensures regulatory compliance. The compliance boundaries are the West and South plant roads. The DOE has also established the uptime as an Award Fee related item for BWXTO. The monthly goal for system is to have greater than 95% running time. The pump-and-treat system was operating approximately 99.33% of the time for the reporting period.

The pump-and-treatment system well 414 was shut down from May 25, 1999 to June 1, 1999 and on September 25, 1999 for well redevelopment. The extraction well pump for 414 was pulled and replaced on August 23, 1999 due to lower than acceptable yields. The ½ HP motor on well 412 pump was replaced with a 1 HP motor to make the system more compatible and reduce the number of spare parts kept on reserve.

Additional down periods for filter cleaning/replacement, lubrication, power outages, etceteras can be gleaned from the system logbook copy in Attachment A.

3.4.2.1 System Cleaning

The pump-and-treat system did not require cleaning during the reporting period. The cleaning dates can normally be found in the copy of the system logbook, which is in Attachment A.

3.4.2.2 Sequestering Agent

The use of Drewsperse 752 Antifoulant/sequestering agent was continued since it still prevailed as the most cost-effective treatment that the EPA has approved for use. Drewsperse 752 has been used since 3/18/98. The product is metered in at a rate of approximately 1.5 gallons per day. The Drewsperse, in a 55-gallon drum, requires replacement approximately monthly.

3.5 Hydraulic Containment

The system continues to be assessed on a monthly basis with a three-point calculation performed on data obtained from wells West and South of the capture zone. The wells used to determine the inward gradient along the West compliance boundary are 422, 423, and P003. The wells used to determine the inward gradient along the South compliance boundary are 305, 410, and 417. In an effort to more accurately assess the South compliance boundary, wells CP-1 through CP-6 were installed. Water level measurements are performed monthly in these wells and the results are reviewed by Mr. Mark Gilliat. The monthly gradient results can be found in the FFA Monthly Report.

The system, with respect to the effect to the BVA, is also monitored. This monitoring is performed with Telog data loggers connected to pressure transducers located in wells P001, P003, P005, 313, 370, 412, 413, 414, 415, 416, 417, 418, 422, and 423. The pressure transducers are the means used to determine the BVA water level elevation based upon the water column pressure upon the transducer and knowing the transducer depth with respect to elevation. This data is downloaded on a monthly basis and evaluated. The data is stored to the Common area of the ER server at K:\Shared\Telogers directory, depending upon the data recorder. Examples of the recorder data can be found in Attachment C.

4.0 Soils (ROD Enhancement)

In consideration of the treatment time required for the conventional pump-and-treat system to remediate the site, which included waiting for any contaminate suspended in the unsaturated zone to naturally migrate to the BVA, additional treatment systems were required to expedite the process. The pump-and-treat, on its own, would take more than an estimated 30 years to achieve completion. The Innovative Technology Remediation Demonstration (ITRD) group; an advisory group composed of DOE, EPA, industry, and regulatory agency representatives; was contacted and asked to work with the Mound ER Program to review and evaluate applicable innovative remediation technologies and suggest enhancements to a site-selected baseline pump-and-treat system.

Based on detailed engineering assessments and cost and performance evaluations, the ITRD group identified two technologies for application at the site. The two selected technologies were high vacuum extraction for treatment of the contaminated fill and till material and air sparging/soil vapor extraction for treatment of the contaminated soil and ground water in the high permeability aquifer. Pilot-studies of both technologies were completed in April 1996. The results were very encouraging, with both systems showing quick and cost-effective contaminant removal capabilities. With the implementation of these technologies it was estimated that clean up could be achieved in approximately three years.

Based on the pilot system results, the Mound ER Program decided to install a full-scale air sparging/high vacuum extraction (AS/SVE) system. Construction of the full-scale system started in April 1997 and was completed in November 1997. The system consists of 23 air sparge and 17 vapor extraction wells divided into two zones that can be operated alternately. The soil vapor extraction system is designed to operate at a vacuum of up to 18 inches of mercury (at the intake to blowers) and a flow rate of approximately 500-cfm. The sparging system is designed to operate at nominally 150 cfm. After initial trial operations, the system became operational December 18, 1997.

4.1 System Description (AS/SVE)

The AS/SVE system relies on mass transfer of VOC contaminants from the dissolved-, sorbed-, and non-aqueous-phases to a gaseous phase that is extracted under negative pressure in the subsurface by the soil vapor extraction system. This mass transfer occurs, in accordance with the partitioning laws and vapor densities of the individual contaminant constituents, under a pressure gradient from the deep subsurface, created by the air sparging system, to a negative pressure in the vadose zone, created by the soil vapor extraction system.

The air sparging system operates by injecting air, under pressure, through a diffuser screen into the aquifer through conventionally constructed wells. A Sutorbilt 5H blower accomplishes the air production, which is belt-driven by a 25-horse power 480 volt three phase electric motor. The air intake to the blower is filtered ambient air from outside of Building 301. The blower compresses the air which is fed to either the northern or southern section of the treatment area (Zone 1 or Zone 2 respectively). The diffuser screen, at each air sparge well, forces the air stream into very small bubbles (approximately 50 microns each) just above bedrock. The dissolved-phase and any non-aqueous- and sorbed-phase contamination below the water table should partition into these injected bubbles and be carried up to the vadose zone. In the vadose zone, these gaseous-phase contaminants mix with the soil gas.

The soil vapor extraction system consists of conventionally constructed extraction wells screened above the water table. These wells are connected via manifold to vacuum pumps that create a negative pressure in the vadose zone. Contaminants present as non-aqueous- and sorbed phase are volatilized and mixed with existing soil gas and gaseous-phase contaminants driven upward into the vadose zone from the air sparging system. Contaminated soil gas is extracted via the SVE wells and transported to the offgas treatment system, which is granular activated carbon (GAC). A unique attribute of the vapor extraction system is the use of a relatively high vacuum extraction vacuum, approximately 13 inches of mercury at the wells, to remove VOCs from relatively low permeability, $1x10^{-7}$ cm/sec, fill and till soils.

General system design parameters were based on two pilot studies conducted at Mound OU-1. The Radian Corporation and Groundwater Technology pilot test reports document the results of these studies. The installed system is divided up into North and South subsystems. The North subsystem has six SVE wells (two were installed during the ITRD pilot study), well points installed in each of the five French drains to function as SVE wells, and fourteen AS wells (six of which were installed at a 45-degree angle (approximately) to sparge the area that is under the landfill). The South subsystem has six SVE wells and nine AS wells. The system can operate with either the North or the South AS and SVE subsystems for variable time periods. Each of the AS and SVE wells have a valve to adjust injection or extraction air flows and pressures as needed to optimize system operation.

Additional details about the AS/SVE construction are found in "Groundwater Treatment System: Air Sparging/Soil Vapor Extraction" United States Department of Energy Mound Plant Final Design Submission R. E. Wright Project No. 97548, March 1997.

A Sutorbilt 5LP (Model: GAELDPA) and Sutorbilt 6LP (Model: GAFLDPA) are used in a two-stage system to provide for the Soil Vapor Extraction system. Both the 5LP and 6LP are driven by a 50-horse power 480 volt three phase electric motor. The system influent goes through a liquid knock out tank, a coalescing filter, an air filter, and carbon filtration prior to input to the 6LP blower. The 6LP blower is the lead blower with its effluent going through a heat exchanger prior to going into the 5LP blower. The average influent temperature to the 6LP blower was approximately 60 degrees Fahrenheit. The average effluent temperature of the 6LP blower was approximately 233 degrees Fahrenheit. The average effluent temperature of the 5LP blower was approximately 226 degrees Fahrenheit.

The average system vacuum, prior to blowers, was approximately –17.62 inches of mercury. The average system flow (5LP+6LP) was approximately 541.84 standard cubic feet per minute. The 6LP operates at 1,667 revolutions per minute while the 5LP operates at 2,368 revolutions per minute. The system has two two-inch vacuum relief valves, prior to the intake of the 5LP and 6LP blowers, that actuate between –18.5 and –19.0 inches of mercury gauge.

4.2 System Maintenance

Regular inspection and maintenance of the AS, SVE, and Gas Chromatography (GC) systems are required for continued effective operation. Regular activities include those performed daily, weekly, monthly, and quarterly as well as on an as needed basis. The following describes the maintenance required for the aforementioned systems. Maintenance and monitoring activities are to be logged in the system logbook (which resides in Building 301-A), in the system calendar book (which resides with the Technician or Engineer), and in the system data tracking spreadsheets (residing on the ER server in the K:\SHARED\SPIVEY\ITRD directory). Example copies of the aforementioned can be found in Attachment F, G, and H respectively.

4.2.1 Air Sparge System

Record readings on all system measuring devices (e.g., temperature, pressure, Magnehelic, etc.) within the treatment building daily.

Grease blowers every 500 hours (every three weeks) of operation.

- Change synthetic oil in blowers every 6,000 hours of operation (every eight months).
- Check and clean/change as required the blower intake filter monthly.
- Record AS well readings monthly and rebalance if necessary, Attachment P.
- Ensure drive belt tension and alignments are correct, adjust as required.
- Change blower drive belts as required due to wear.
- Grease electric blower motor quarterly.
- Note any alarms or reading discrepancies. Determine the underlying cause of the

alarm/reading. Perform necessary maintenance or adjustment(s) to resolve the underlying cause. Perform as required.

- Periodically disassemble gauges and meters and clean according to manufacturers' directions as needed.

- Periodically check AS wells for fouling and clean to permit proper flow of air through sparge points. Perform as indicated by differential pressure (flow) and pressure gauges.

- Determine the underlying cause of any new noises or vibrations then correct the underlying cause as needed.

4.2.2 Soil Vapor Extraction

The SVE lubrication records were changed to primarily being kept on a check sheet, which is maintained in Building 301, and also in a calendar-planning book. A copy of the book can be found in Attachment G. A consolidation of just the lubrication information, on a check sheet that was initiated June 1999, is in Attachment J.

Record readings on all system measuring devices (e.g., temperature, pressure, Magnehelic, etc.) within the treatment building daily.

Grease blowers every 500 hours (every three weeks) of operation.

Change synthetic oil in blowers every 6,000 hours of operation (every eight months).

Check and clean/change as required the intake filters monthly.

Record individual SVE and Piezometer well readings monthly and rebalance if necessary, Attachment P.

Ensure drive belt tension and alignments are correct, adjust as required.

Change blower drive belts as required due to wear.

Grease electric blower motor quarterly.

Note any alarms or reading discrepancies. Determine the underlying cause of the alarm/reading. Perform necessary maintenance or adjustment(s) to resolve the underlying cause. Perform as required.

Periodically disassemble gauges and meters and clean according to manufacturers' directions as needed.

Determine the underlying cause of any new noises or vibrations then correct the underlying cause as needed.

Drain excess water from carbon tanks with a wet vacuum as required.

Change Vapor Phase Carbon as needed.

4.2.3 Gas Chromatography System

Record measurement and maintenance activities performed in the system logbook.

Replace calibration and carrier gas cylinders when pressure reaches 250 and 500 pounds respectively.

Drain water from coalescing filter prior to pulling a sample for GC analysis.
Clean intake check valves as required.

Bake the oven out at manufactures recommended temperature as indicated by measurement performance.

Periodically set automatic modes to run overnight pulling samples from room to purge input lines and reduce residual carryover.

Replace Tedlar bags as required due to degradation in integrity with use.

Note any alarms or reading discrepancies. Determine the underlying cause of the alarm/reading. Perform necessary maintenance or adjustment(s) to resolve the underlying cause. Perform as required.

Determine the underlying cause of any new noises or vibrations then correct the underlying cause as needed.

4.3 Monitoring

The objective of the monitoring performed on the AS/SVE system is to support the monitoring plan that the ITRD group (including BWXTO personnel) agreed upon. This will ensure that adequate and appropriate data are collected to help optimize the system operation and support evaluation of the cost and performance of the AS/SVE system. Specific objectives include:

Characterizing changes in subsurface hydrogeology and contamination over time,

quantifying the mass removal rates for VOCs achieved by the AS/SVE system,

quantify the cost of removal in units appropriate to the manner of operation,

facilitate optimization of the system,

assess potential interaction with other remedial system components,

assess the ability of the SVE system to capture contaminants volatilized by the AS system, identify hydraulic impacts under different operating scenarios, and

meet any regulatory requirements for data collection and system performance.

One objective of the monitoring and data collection plan is to ensure that adequate and appropriate data are collected to allow evaluation of the AS/SVE systems ability to remove VOCs and chlorinated VOCs from all contaminated media in the subsurface. To best accomplish this objective, an understanding of the existing contamination and site characteristics is required. Soil samples were collected during system installation to evaluate the extent and nature of contamination and to refine the understanding of the site geology and hydrogeology. Groundwater and soil gas samples were collected and analyzed prior to system start-up to further refine the initial site contamination and geochemistry. The period before start-up and system acceptance is referred to as T_0.

Once the system had begun operating, additional data was collected to evaluate performance and to allow optimization of operations. A number of issues that are of concern in this system include:

The possible formation of an air pocket under a confining glacial till layer that lies atop the groundwater.

The possible formation of preferential pathways for air bubbles in the saturated zone which may hinder system performance.

The ability of the SVE wells to capture contaminants mobilized by the air sparging system.

The effective radius of influence of the SVE wells with large variability in soil air permeability between wells.

The impact of atmospheric air introduced by air sparging on the groundwater geochemistry (e.g., formation of calcite and iron precipitates) and aquifer transmissivity.

The impact of groundwater mounding on the existing hydrodynamics of the site.

The frequency with which the system should be cycling between north and south subsystems.

Once the system construction was completed, a thirty-day start-up period began under the responsibility of the installation contractor. The purpose of this was to insure all the equipment that was installed worked correctly as per the design and to provide a training period for Mound personnel. In addition, the system vacuum/pressures and flow rates were balanced to the extent practicable in order to maximize system performance. This was accomplished by varying the applied vacuum/pressure at each well and adjusting the cycle time on the north and south subsystems to maximize contaminant removal rates. After the system was accepted by Mound, the system was put into continuous operation under Mound personnel responsibility.

4.3.1 Sampling

Activity: Soil Gas Sampling – Static, Attachment N.

Purpose: Monitor soil gas concentrations over time.

Locations: SVE Extraction wells and vadose zone piezometers

Sampling Method: Purge well volume and capture in Tedlar bag or Summa canister.

Analytical Method:

Tedlar bags: On-site Sentex Systems, Inc. continuous monitor Gas Chromatograph (GC).

Summa Canister: TO-14 off-site contract lab.

Frequency: T_0 (Time zero) prior to operation of the AS/SVE system and quarterly, thereafter. Also, after change in SVE system (vacuum or flow in any extraction wells).

Comments: Samples collected with SVE system not active on well while being sampled. A portable GC capable of measuring target contaminants at MDL of ~one ppm Loop Mode, ~10 ppb Preconcentrator Mode.

Activity: Soil Vapor Extraction System Monitoring, Attachment Q.

Purpose: Measure mass of contaminants removed as a function of system operations.

Locations: Extraction manifold(s)

Sampling Method: Automated vapor sampling from extraction manifolds.

Analytical Method: A GC/micro argon ionization detector (10-ppb sensitivity).

Frequency: Twice per week. Possible shorter term tests with higher frequency to facilitate system optimization (cycle lengths).

Comments: Sentex Systems, Inc. Sentoscan System.

Activity: Groundwater Extraction Well Monitoring, Attachment C and D.

Purpose: To assess AS/SVE impacts on groundwater extracted by pump and treat system.

Locations: Three existing extraction wells.

Sampling Method: Traditional, samples from each operating extraction well.

Analytical Method: SW-846 off-site contract lab

Frequency: Monthly.

Comments: Sept. 1997 and earlier samples were composites from all three extraction wells.

4.3.2 Tracer Test

Activity: Tracer Test –AS/SVE Vapor Capture/Mobility, Attachment R.

Purpose: To determine if AS vapors are being effectively captured by SVE wells and if there is potential off-site mobilization of contaminants beyond SVE capture zone.

Locations: Inject tracer gas into AS system. Collect soil gas samples from SVE well influent header and monitor additional wells with screens open above the water table.

Sampling Method: Slow purge gas sampling.

Analytical Method: On-site GC for halon 1211.

Frequency: Once, during a low water table condition.

Comments: Measure of relative AS vapor capture efficiency for individual SVE wells. Check to see if AS and SVE operate properly in tandem. Tracer detection in wells outside the radius of influence would indicate potential for off-site migration of contaminants.

4.3.3 System Optimization

Activity: AS Well Pneumatic Performance.

Purpose: Establish baseline AS well performance (sparge flow rates).

Locations: AS wells.

Method: Establish pressure/flow performance curves for AS wells.

Frequency: Complete during startup phase, postponed to 2000.

Comments: Fluctuations in water table elevations can alter flow rates.

Activity: AS System Pneumatics.

Purpose: Monitor air injection pressures/flows on AS system as well as individual well performance.

Locations: AS header and each injection well.

Method: Pressure gauge and Pitot tube/Magnahelic or a thermal anemometer.

Frequency: Daily on the header, monthly on each well (subject to being shortened to weekly), and after any change in system.

Comments: None.

Activity: SVE System Pneumatics, Attachment H, J, and L.

Purpose: To monitor the vacuum and flows from each extraction well.

Locations: SVE header, all extraction well locations, and all piezometer locations.

Method: Vacuum gauge and Pitot tube/Magnahelic or a thermal anemometer.

Frequency: Daily on the header, monthly on each well (subject to being shortened to weekly), and after any change in system.

Comments: None.

4.4 System Performance

The systems performance is assessed by two metrics. First, the system is evaluated upon the amount of time it is actively remediating verses the amount of time the system is down (off or not actively remediating), which is known as Uptime/Downtime. Second, the system is evaluated upon the amount of contaminants that are removed from the area being remediated, which is known as Mass Removal.

4.4.1 Uptime/Downtime

The SVE system is operated and monitored by BWXTO and overseen by the customer (DOE). Performance is based upon the amount of time, in percent, the system is in operation. Each month the uptime is reported via the FFA Monthly Report. An example of the data reported is contained in Attachment M. Typically the system would be down only for maintenance events described in section 4.2; however, unforeseen equipment failures contribute to this number as well.

The SVE system is interlocked with the Pump-and-Treat (P&T) system air stripper. This means that in order for the SVE system to run the P&T system must be active, or running. If for any reason the P&T system is shut down (i.e., cleaning of air stripper trays) the SVE system is consequently down. This is necessary due to the transport of liquids from the SVE Condensate knockout (KO) tank, which potentially contain contaminants, to the air stripper for treatment.

The SVE system shut down on six extended occasions during the reporting period. First, the lower float switch in the water knock out tank failed on January 13, 1999 for a down time of 32.5 hours. Second, the 50 HP electric motor bearings failed on February 23, 1999 for a down time 50 hours. Third, the small SVE blower (5LP) experienced a failure on May 25, 1999, which resulted in 456 hours of down time. Fourth and fifth, the large SVE blower (6LP) failed twice and resulted in the system being down for approximately 26.25 and 288 hours. The 6LP failure was attributed to bypassing the carbon and going with direct emission, since the tracer test required a bypass of the carbon filtration. The 50 HP electric motor was also replaced during this outage. Sixth, the system was down for the replacement of the float switches in the water knock out tank which resulted in 27.75 hours of down time.

The system total down time for the reporting period was 1044 hours (88.14% uptime). If the downtime is adjusted not to include equipment failure, the total uptime for the reporting period is 98.77% (8808 total hours, 108 hours maintenance, 936 hours equipment failure). A more detailed breakdown of the system uptime/downtime can be gleaned from the copy of the system logbook, calendar book and down time report in Attachment F, G and K respectively.

4.4.2 Mass Removal

Mass removal, for the remediation system, can be estimated in many ways. Two different methods of estimation are utilized for the SVE system. First, Sandia National Laboratory (SNL) method estimates the VOCs removed based upon mathematically fitted functions and an hour by hour calculation of contaminants removed. This method induces a slight positive bias due to calculating on an hourly basis. However, it is negligible when compared to other possible errors and variables within the system.

Second, Mound calculations for mass removal are based upon the analytical test results obtained from Summa and GC data. Examples of the Summa analytical results are contained in Attachment O. The influent contaminant concentration (in PPM) is mathematically fitted, with respect to zone elapsed time. The mathematical algorithm fitting is accomplished with TableCurve 2D version four. The equation that best represents the data is selected and integrated with respect to running time with Mathcad Professional version seven. Two conversion factors are used in the calculation. First, 24.5 is used to convert to mg/m^3. Second, 6.2428E-8 is used to convert to lbs/ft^3. The individually calculated pounds removed for each contaminant are then summed together to obtain total pounds of VOCs removed. An Example of this can be found in Attachment P.

Mass removal calculations are typically performed on a monthly basis, approximately. As time progresses and mass removal rates decline the frequency of calculations will lessen. The approach utilized by SNL and Mound are the same. The only difference is that SNL uses an Excel spreadsheet to calculate verses Mound choosing to use Mathcad to integrate the entire period. Both approaches end up with numbers in good agreement. The two independent calculations act as a cross check on the results obtained. Approximately 789.45 pounds of contaminants were removed by the SVE system from December 31, 1998 to January 12, 2000. This equates to 3,283.45 pounds of contaminates removed by SVE from date of inception.

4.4.3 Notable Events

The functional components of the GC system were shipped back to Sentex Systems on January 13, 1999 for repair. The reworked components were installed on January 21, 1999. The GC has been operating much better since.

SNL has experienced a severe cut in budgetary support for the Mound project and has accordingly curtailed involvement. The current plan for the ITRD group is to complete the cost performance report in FY 2000.

The restart of the AS system has been delayed because the EPA has requested that additional contaminant removal due to the AS be quantified. This requires a stable influent contamination level prior to the initiation of the AS, as well as operation of the GC in purge and trap mode in order to detect the estimated small contaminant influent increase that is expected from air sparging. Details as to the monitoring that will be required are being resolved. The AS is expected to resume in 2000 and the draft plan can be found in Attachment S.

5.0 System Operations Projections

It is anticipated that the P&T will continue full time remediation until the criterion set forth in "CRITERIA FOR INITIATING A REBOUND TEST AT OU-1" is achieved, Attachment T. When cleanup COC levels (agreed upon in concert with the EPA, DOE, ITRD, and BWXTO) are achieved, cycling of the system will be initiated to assess if there will be any rebound effects.

By extrapolation of the mathematical functions for the SVE system, it is estimated that it will take an additional two years of remediation to get the majority of the COCs in the soil below their respective reporting limit of the off-site laboratory. Since this is not a practical approach, a risk based approach will be investigated. It is anticipated that the systems could be shut down for rebound testing as early as December 2000, provided the criterion set forth in Attachment T are met. Miamisburg Environmental Management Project (MEMP), in conjunction with regulators, will oversee and evaluate progress verses ROD compliance as well as the technical performance of the systems.

Building 38 F-Line
The F-Line Phase I Work Plan was submitted to DOE for review June 15. F-Line work cannot start for 3-6 months due to lack of resources. Phase II Work Plan (removal of glovebox piping and associated equipment, and surplus building equipment) will be developed over the next 3-6 months.

Building 88
Close-Out Report working draft was submitted to DOE May 3. Document will be finalized in early July. Trenching to support construction of the NE Island retaining wall will begin in July.

Buildings 36 and 37
Building data package for Building 37 was submitted to Core Team May 4. OEPA comments on responses to 5/12 comments for Building 36 BDP were received June 20.

Soils Project

OU-1 Pump & Treat, Soil Vapor Extraction, Air Sparge and ITRD
An interruption of electrical service occurred on June 16, 2000 at approximately 5:40 P.M. It appears that the interruption was related to thunderstorm activity at that time. The P&T and SVE systems were reset and restarted within two and one-half hours.

Operable Unit 1 Performance

Monthly Pump & Treat Wells (Gallons)	Monthly SVE Knockout Tank (Gallons)	Monthly Total Water Treated (Gallons)	Cumulative Pump & Treat Wells (Gallons)	Cumulative SVE Knockout Tank (Gallons)	Cumulative Total (Gallons)
4,005,320	6,694	4,012,014	159,560,120	185,938	159,746,058
Last Calculated SVE Mass Removal (Pounds)	Date of Last Calculated SVE Mass Removal	Last Estimated Cumulative SVE Mass Removal (Pounds)	Date of Last Estimated Cumulative SVE Mass Removal		
3,420	05/11/00				(BWXTO Calculated)
Possible Monthly Operating Hours	Air Stripper Down Time Hours	Operating Time (%)	Down Time (%)		
696	2.75	99.60	0.40		
Last Calculated Cumulative Air Stripper Mass Removal (Pounds)	Date of Last Calculated Cumulative Air Stripper Mass Removal	Last Estimated Cumulative Air Stripper Mass Removal (Pounds)	Date of Last Estimated Cumulative Air Stripper Mass Removal		
22.38	06/01/00				(BWXTO Calculated)
SVE Down Time Hours	SVE Operating Time (%)	SVE Down Time (%)			
3.75	99.46	0.54			

Note: Operating hours based on 05/31/00 AM to 06/29/00 AM

ATTACHMENT C

COMMUNITY RELATIONS ACTIVITIES FOR OU 1, AREA B

MOUND

Environmental Restoration Program

Operable Unit 1/Area B

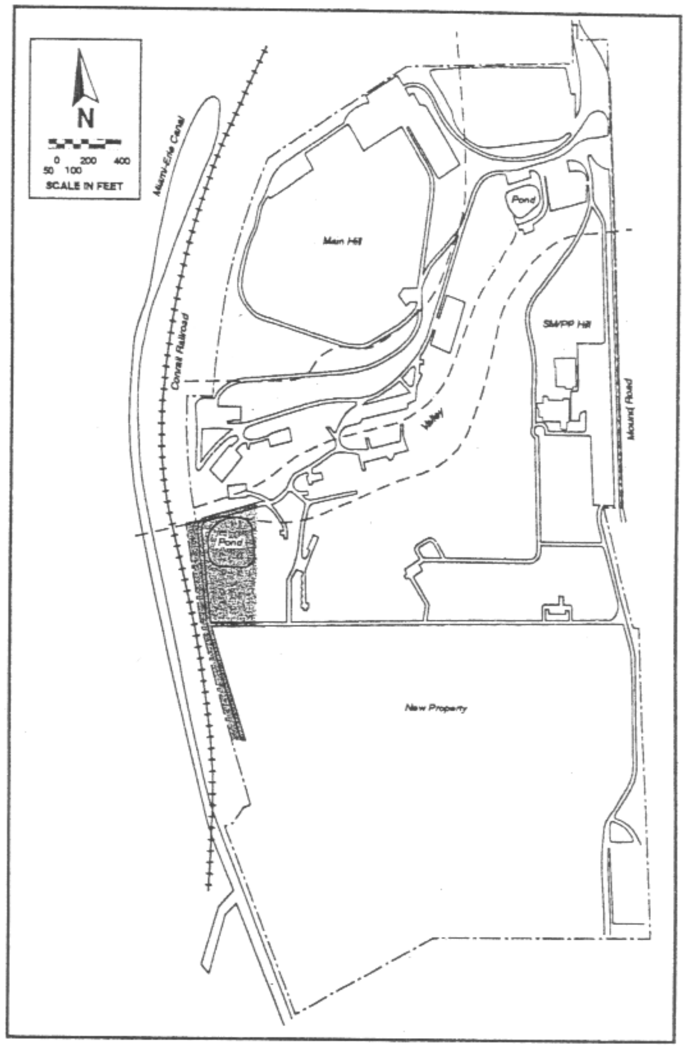
Ken Hacker, Manager

September 1994

Addresses possible volatile organic chemical contamination of the portion of the Buried Valley Aquifer which underlies the southwest corner of the original Mound Plant.

OU1 covers four acres and includes an historic landfill, the site sanitary landfill and an overflow pond.

The main concerns at this site are volatile organic compounds that may be migrating into the groundwater. It is believed that such contamination originates from the historic landfill site that was formerly used for open burning and waste disposal.



PURPOSE

- Determine possible contamination of the Buried Valley Aquifer from:
  - **historic landfill** containing:
    - Mound Plant used this area as burn area to dispose of solid and liquid wastes
    - Empty crushed thorium drums buried in this area in 1955 and 1956
  - **sanitary landfill**
    - Built in 1977 with materials excavated during construction of overflow pond
    - Constructed over site of encapsulated waste relocated from historic landfill
  - **overflow pond** (stormwater retention pond)
- Gather enough information from this area to determine if a cleanup is necessary and, if so, how best to proceed with the remedial action.

PRIMARY CONTAMINANTS OF CONCERN

Volatile organic compounds (VOCs)

WORK SCOPE

Determine by use of soil sampling, soil gas surveys and hydrogeology surveys, whether contaminants found in Area B are being carried off-site through groundwater.

PROGRESS TO DATE

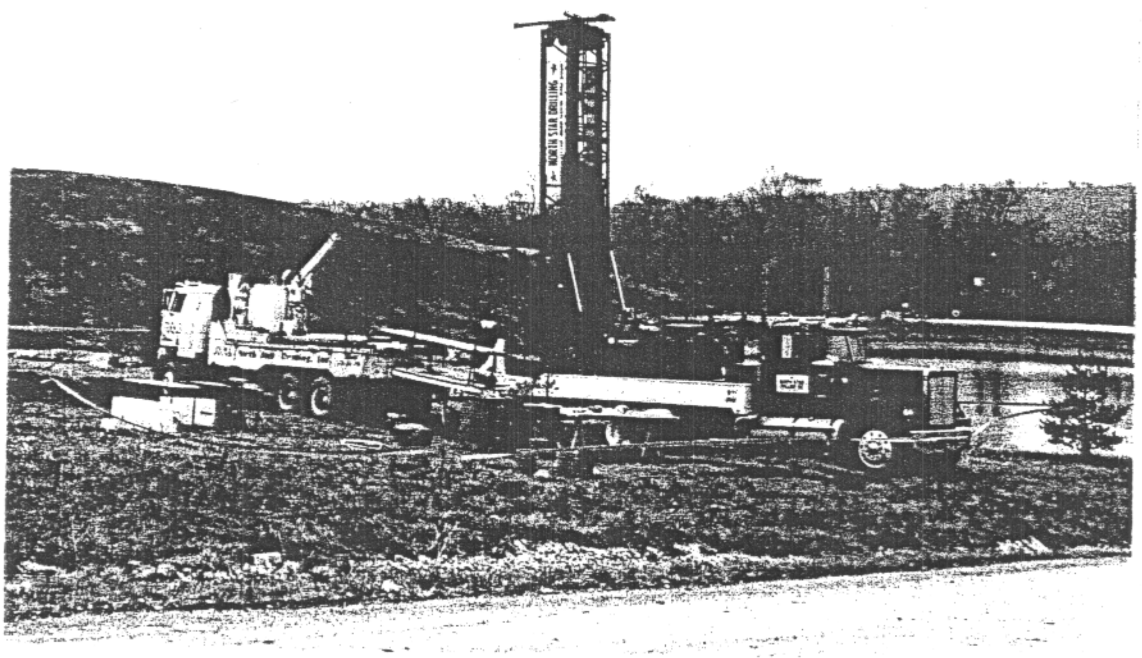
- Subsurface soil sampling and soil gas sampling to identify contaminants in the soil, August-December, 1992
- Installation of 27 monitoring wells and piezometers. October-March, 1993
- Aquifer pump test conducted using newly-installed and existing test wells to characterize groundwater flow in the immediate vicinity of Area B. May-June, 1993
- Fieldwork for RI/FS complete after aquifer pump test

DOCUMENTS IN PUBLIC REPOSITORY

- History of Area B (February, 1991)
- Proposal for Additional Work (September, 1992)
- Remedial Investigation Report (RI) (July, 1994)

SCHEDULE FOR REMAINDER OF 1994

- FSR/Proposed Plan to be complete in calendar year 1994
- Begin work on Record of Decision (ROD)



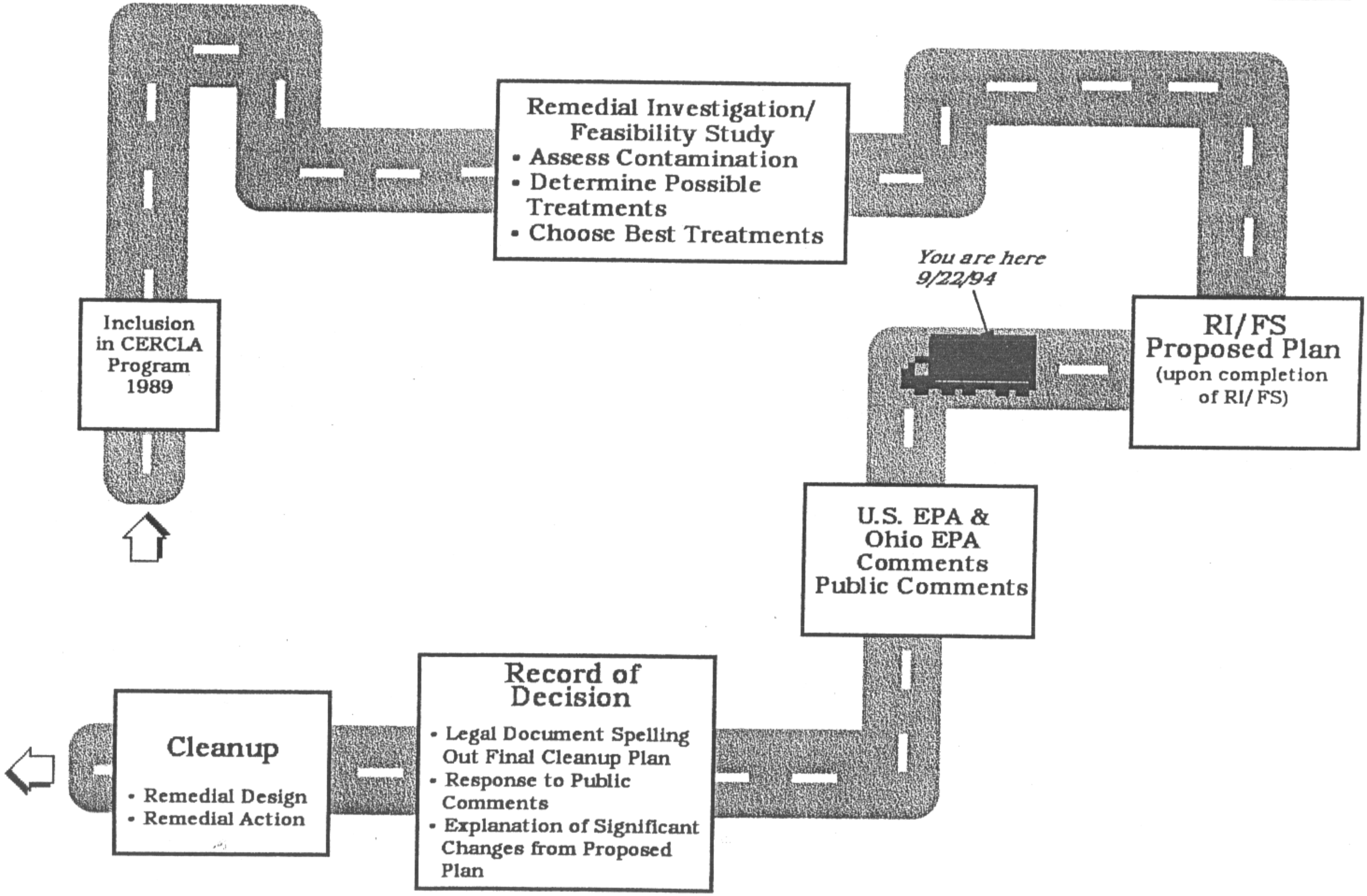
FUTURE SCHEDULE MILESTONES (Fully Funded)

FY95
- Prepare Feasibility Study/prepare Proposed Plan
- Complete FSR/PP
- Complete Record of Decision (ROD)
- Begin work on RD/RA Work Plan

FY96:
- Begin work on Remedial Design

For more information, contact: EG&G Mound Community Relations at (513) 865-4140.

OU1 - Area B



Inclusion in CERCLA Program 1989
Remedial Investigation/ Feasibility Study
• Assess Contamination
• Determine Possible Treatments
• Choose Best Treatments
You are here 9/22/94
RI/FS Proposed Plan (upon completion of RI/FS)
U.S. EPA & Ohio EPA Comments Public Comments
Record of Decision
• Legal Document Spelling Out Final Cleanup Plan
• Response to Public Comments
• Explanation of Significant Changes from Proposed Plan
Cleanup
• Remedial Design
• Remedial Action


OU1 - Area B

MOUND

Environmental Restoration Program

Operable Unit 1/Area B

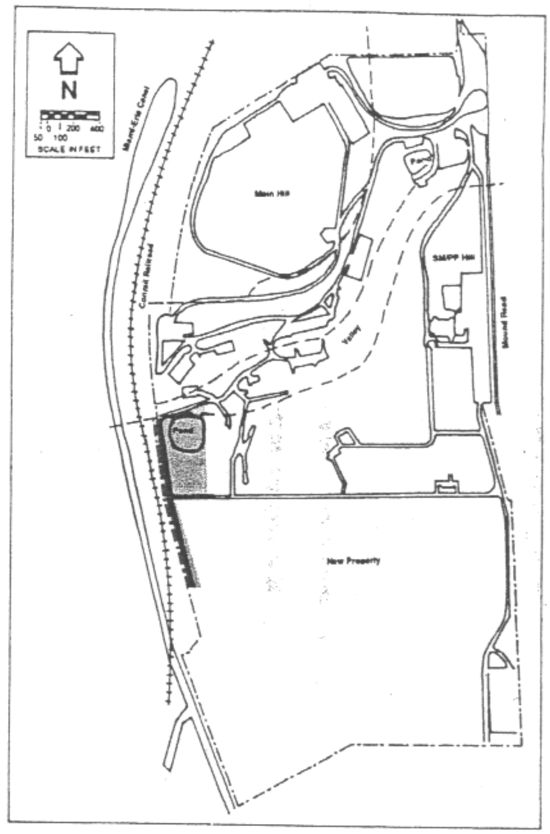
Ken Hacker, Manager

FACT SHEET

November 1994

DOE Issues a Proposed Plan

Operable Unit 1 (OU1), Area B, of the Mound Plant occupies approximately four acres in the southwestern portion of the plant site. This area of the plant is located over the eastern side of the Buried Valley Aquifer (BVA) which has been designated as a sole source aquifer by the U.S. EPA. From 1948 to 1977, Mound used Area B, formerly a gravel excavation area, for disposing of general trash and nonradioactive liquid waste. Solid wastes, mostly paper, office and kitchen garbage, were typically placed in a burn cage at Area B and ignited to reduce their volume; liquid wastes, including solvents, oils, and chemicals were typically dumped or burned. Much of this waste was later relocated and encapsulated in a new site sanitary landfill constructed in 1977. At that time, an overflow pond for stormwater runoff was also constructed, partially covering the historic landfill site. After 1977, waste was no longer disposed of in Area B. Now, testing has revealed that the volatile organic compounds (VOCs) from the Area B historic landfill have migrated through soils and groundwater into a portion of the Buried Valley aquifer beneath the landfill. In addition, tritium was detected in past water samples taken from wells in Area B, although the concentration was below the drinking water maximum contaminant level. Mound studies have shown the source of tritium in the BVA to be contaminated sediments in the Miami-Erie Canal. Thus, the environmental concerns in Area B center on VOCs in the contaminated soils and waste materials contained within the area and on the groundwater system directly beneath and adjacent to the Mound site. The contaminated groundwater in OU1 is a concern at the site because of the potential for directly ingesting contaminants through drinking water and the possible offsite migration of the VOC-contaminated portion of the aquifer.



Remedial Investigation and Feasibility Study Completed

To address VOC soil and water contamination concerns in Area B, a baseline risk assessment was done, followed by a remedial investigation and feasibility study (RI/FS). The baseline risk assessment was structured to address future public health risks, assuming no remedial actions were undertaken. The study focused on exposure of hypothetical future residents and site workers to soil and groundwater contamination through inhalation, incidental ingestion, external exposure to radiation emitted from radionuclides in the soil, and skin contact with the soil. Ingestion and inhalation contribute almost all of the risk, and groundwater is the most important exposure medium. Because groundwater would contribute most of the carcinogenic and noncarcinogenic risks to future residents or workers, it is the focus of the remedial efforts to reduce the overall risk.

The (RI/FS) examined seven alternatives for protecting human health and the environment while achieving the remedial goals. All seven of the alternatives include several common components. Each alternative includes surface controls, such as grading and lining existing ditches to manage runon and runoff; institutional controls, such as fencing and access restrictions to limit access to the site; and long-term groundwater monitoring. Each of the alternatives is discussed in the "Operable Unit 1 Proposed Plan." This and other documents on OU1 are available to the public in the CERCLA Reading Room at the Miamisburg Senior Adult Center.

WHAT ARE VOLATILE ORGANIC COMPOUNDS?

Readers of ***Superfund Update*** may recall the feature article on volatile organic compounds (VOCs) in the January/February 1994 issue. VOCs comprise a wide array of everyday chemicals. From gasoline, antifreeze, and pesticide sprays, to paints, glues, and waxes-VOCs are found in household and industrial products all around us. Though indispensable to modern life, VOCs can pose some significant hazards. And because they are so common, they often turn up as contaminants in the environment. VOCs evaporate readily and so can quickly fill an enclosed space with noxious and dangerous fumes. They do not dissolve easily in water and so pose water contamination problems when they find their way to lakes, rivers, and streams. Long-term exposure to low concentrations can affect the liver, kidneys, heart, blood, reproductive organs, and nervous system. Some VOCs, such as benzene, are known to cause cancer. VOCs are released into the environment through evaporation, accidental spills, leaks, or inadequate disposal methods. Drinking VOC-contaminated water, inhaling evaporated VOCs, or absorbing VOCs through skin contact are the main exposure routes for humans.

The CERCLA statute currently considers 33 VOCs to be hazardous substances that may pose a potential hazard to human health or the environment if improperly treated, stored, transported, or disposed. At Mound, VOCs have been used in the past to clean or degrease metal parts, tools, molds, and other equipment. Among those in common use were acetone, benzene, chloroform, freon, and toluene.

If VOCs are discovered in soil or water in concentrations above federal or state standards, environmental laws such as CERCLA require cleanup action. There are a number of remedies for handling VOC contamination in soil and groundwater. Contaminated soils can be covered with caps to eliminate potential exposure routes; excavated soil may be transported to a landfill or incinerator for disposal; soils may be treated in place by soil vapor extraction; VOC-contaminated groundwater may be pumped out for treatment and discharge.

The Preferred Alternative

The preferred alternative for cleaning up the VOC-contaminated soils and groundwater at OU1 combines collection, treatment, and disposal. Because this alternative reduces the toxicity and volume of contaminated water and controls its migration, it is protective of both the Mound Plant well field and the Buried Valley aquifer. The action would effectively capture contaminated groundwater beneath the Operable Unit 1 site for treatment before it migrates offsite. Treatment methods for VOCs then could include ultraviolet (UV) oxidation treatment, cascade aeration, or conventional air stripping. A final selection of treatment technologies will be done following the public comment period during the remedial design phase. Based on current information, the DOE, in consultation with the U.S. and Ohio Environmental Protection Agencies, will select a final remedy for the site after the public comment period has ended and the information submitted during this time will have been reviewed and considered.

Soil Sampling at Operable Unit 1

PUBLIC COMMENT PERIOD

Beginning November 15, 1994, and continuing through December 30, 1994, the Department of Energy is accepting public comments on the Proposed Plan for Operable Unit 1.

The public is invited, and encouraged to review the Proposed Plan, at the CERCLA Public Reading Room, Miamisburg Senior Adult Center, 305 Central Avenue, Miamisburg, Ohio.

Comments can be sent in writing to:

Jolene Walker
EG&G Mound Community Relations
P.O. Box 3000, OSE-245
Miamisburg, Ohio 45343-3000

The public can also give comments at a public hearing for OU1 on Thursday, December 8, 1994, at 7:00 p.m. in the Miamisburg Civic Center Council Chambers, 10 N. First Street, Miamisburg, Ohio.

MOUND

Environmental Restoration Program

Operable Unit 1/Area B

Ken Hacker, Manager

FACT SHEET #2

December 1994

Proposed Plan Supplementary Information

Based on official Public Comments received at the December 8, 1994, Public Meeting for Operable Unit 1 Proposed Plan, a question was raised concerning Table 1 on page 9 of the Proposed Plan. The question concerned the apparent similarity of Alternatives 3 and 4 with the exception of maximum total cost. The attachment clarifies Table 1 by summarizing the reduction of toxicity, mobility or volume of contaminants that each Alternative addresses.

Alternative 3 meets the mobility and volume reduction statutory preference for selecting remedial actions (page 4-10 of the Operable Unit 1 Feasibility Study). It does not address toxicity reduction, which is also a statutory preference for selecting remedial actions. Therefore, DOE in consultation with U.S. EPA and Ohio EPA, has determined that Alternative 4, which includes treatment to reduce toxicity, is preferable. The reduction of toxicity, mobility or volume for Alternative 4 is explained on page 4-14 of the Operable Unit 1 Feasibility Study.

Guidance from the Ohio Environmental Protection Agency states that waste water discharges resulting from cleanup of response action sites contaminated with volatile organic compounds (VOCs) need to be treated with best available technology for toxicity reduciton. The State of Ohio believes that Alternative 3 does not meet those requirements.

Table 1 identifies the 7 primary evaluation criteria required by 40 CFR 300. This law also gives 2 additional "modifying criteria" which are (1) state acceptance and (2) community acceptance. Based on the States position on Alternative 3, Alternative 4 was chosen as the preferred alternative. The final decision will also include evaluation of community acceptance based on public comments received.

Alternatives 3 through 9 comply with ARARs and achieve adequate protection of human health and the environment. These alternatives are correctly identified in Table 1 of the Proposed Plan, however, the text on page 8 of the Proposed Plan incorrectly stated that all alternatives met ARARs.

Please keep in mind that the Proposed Plan only identifies the preferred option for cleanup of contamination of Operable Unit 1. A more detailed description of the alternatives is provided in the Operable Unit 1 Feasibility Study.

Public Comment Period

The public comment period for the Proposed Plan has been extended to January 31, 1995. The public is invited, and encouraged, to review the Proposed Plan, Feasibility Study, and Supplementary Information, at the DOE Public Reading Room, Miamisburg Senior Adult Center, 305 Central Ave., Miamisburg, Ohio. For questions or comments, contact EG&G Community Relations at (513) 865-4140.

Table 1. Summary of Remedial Action Alternative Comparison

Alternative	Short Title	Complies With ARARs	Short-term Effectiveness	Long-term Effectiveness	Protects Human Health and the Environment	Reduces TMV	Implementability	Total Cost
1	No Action	No	No	No	No	No	Easy	$0
2	Institutional	No	No	No	No	No	Easy	$3,980,000
3	Collect/ Disposal	Yes	Adequate[a]	Yes	Adequate	Yes MV	Less Difficult	$262,000[c]
4	Collect/Treat/ Disposal	Yes	Adequate[a]	Yes	Adequate	Yes TMV	Less Difficult	$1,740,000[c]
5	Collect/Treat/ Disposal/Cap	Yes	Adequate[b]	Yes	Adequate	Yes TMV	Less Difficult	$2,390,000[c]
6	Contain/Collect/ Treat/Disposal	Yes	Adequate[b]	Yes	Adequate	Yes• TMV	Moderately Difficult	$2,650,000[c]
7	Contain/Collect/ Treat/Disposal/ Cap	Yes	Adequate[b]	Yes	Adequate	Yes TMV	Moderately Difficult	$3,300,000[c]
8	In-situ GW Treatment	Yes	Adequate[b]	Yes	Adequate	Yes TMV	More Difficult	$1,980,000[c]
9	In-situ GW Treatment/Cap	Yes	Adequate[b]	Yes	Adequate	Yes TMV	More Difficult	$2,630,000[c]

[a]Quicker implementation when compared to other alternatives.
[b]Longer construction time when compared to other alternatives.
[c]This Total Cost is in addition to the Total Cost shown for Alternative 2 (common cost).
ARARs - Applicable or relevant and appropriate requirements.
TMV - Toxicity, Mobility, or Volume.

10

Department of Energy
Washington, DC 20585

February 5, 2002

MEMORANDUM FOR DISTRIBUTION

FROM: MICHAEL W. OWEN
Director, Office of Worker and Community Transition

SUBJECT: Documentation for Work Force Restructuring Activities

As you know, the Secretary Abraham has made several significant decisions in regards to delegating authority for the review and approval of contractor work force restructuring activities (see attachment). We believe these changes reflect many of the ideas expressed by a number of the Field Offices concerning the various thresholds associated with the approval/disapproval of work force restructuring plans and activities.

In light of the changes in approval authority, we reviewed a number of request packages that have been submitted in recent months. We have determined that it is critically important that certain documentation pertinent to the review and approval of work force restructuring actions continue to be provided as part of the packages submitted to Headquarters. We examined the packages currently being submitted to be sure we were only requesting those items that were absolutely essential to the review and assessment of contractor work force restructuring actions. At the very least, we wanted to be very careful not to place any new reporting requirements on our Field Offices or the Department's contractors. To this end, the documentation list below represents items that are already included in the work force restructuring request packages you currently submit to Headquarters.

Work force restructuring request packages should continue to include the following: justification for work force restructuring action; costs and savings associated with the action; source of funding; schedule for separations; employee notification package; diversity analysis; and, employee retirement plans.

I am confident that the new streamlined approach to reviewing and approving work force restructuring plans will allow for a more efficient process. If you should have any questions, please contact Tony Carter of my staff at (202) 586-3323.

Attachment

The Secretary of Energy
Washington, DC 20585

February 4, 2002

MEMORANDUM FOR DISTRIBUTION

FROM: SPENCER ABRAHAM Spencer Abraham

SUBJECT: Changes to the Department's Contractor Work Force Restructuring Approval Authority

It has been brought to my attention that the review and approval process for contractor work force restructuring plans that are submitted to Congress is cumbersome.

In an effort to streamline this process, effective immediately, I am hereby delegating authority for the review and approval of all work force restructuring plans to the Under Secretary for Energy, Science and Environment and the Under Secretary for Nuclear Security for their respective departmental elements and to the Director of the Office of Worker and Community Transition (WT) as outlined in the attachment to this memorandum.

I believe these changes to the review and approval process of contractor work force restructuring plans are in line with my intention to assure appropriate Headquarters involvement in the Department's contractor work force activities. WT will continue to maintain its lead role in coordinating with the two Under Secretaries in the review and approval of work force restructuring plans and related activities.

Attachment

Distribution:
Deputy Secretary Blake
Under Secretary Card
Under Secretary Gordon
WT-1
CI-1
EM-1
GC-1
ME-1
NNSA-1

ATTACHMENT

Work Force Restructuring Actions of 300 and Above

Under Secretary for Nuclear Security and Under Secretary for Energy, Science and Environment:

- Approves/disapproves contractor separations of 300 and above in a 12-month period.
  - Headquarters General Counsel will review diversity analyses within five working days for a Voluntary Separation Program (VSP) action and within 10 working days for an Involuntary Separation Program (ISP) action
  - WT will be given ample time to provide prior notification of separations to the Secretary and receive his acknowledgment, as well as provide prior notification to appropriate congressional offices
- Approves/disapproves work force restructuring plans that are submitted to Congress.
- Submits work force restructuring plans and updates to Congress.

Work Force Restructuring Actions of Between 100 and 300

Director, Office of Worker and Community Transition:

- Approves/disapproves contractor separations of between 100 and 300 in a 12-month period for facilities within the jurisdiction of the Under Secretary for Energy, Science, and Environment. For NNSA related work force restructuring plans, the Director will staff proposals for decision by the Under Secretary for Nuclear Security or his delegate.
  - Headquarters General Counsel will review diversity analyses within five working days for a VSP action and within 10 working days for a ISP action.
  - WT will inform Field Office of decision within five working days for VSP actions and within 10 working days for ISP actions
  - WT will be responsible for making certain all appropriate notifications are made by coordinating with the Office of Congressional and Intergovernmental Affairs and the Office of Public Affairs. Senior Secretarial staff notifications will be made, and acknowledgment received, in advance of all other notifications
- Provides direction and guidance in the development and implementation of work force restructuring plans when a community is significantly affected by changes in the work force.
- Recommends to the Under Secretary for approval all work force restructuring plans that are submitted to Congress.

Work Force Restructuring Actions of Between 50 and 100

Manager, DOE Field Office (to include NNSA Site Offices):

- Approves/disapproves contractor separations of between 50 and 100 in a 12-month period.
  - The Field Office may confer with Headquarters (or NNSA, as appropriate) General Counsel in the review of diversity analyses within five working days for a VSP action and within 10 working days for an ISP action
  - WT must be given ample time to provide prior notification on separations to Secretary and receive his acknowledgment, as well as provide prior notification to appropriate congressional offices

Work Force Restructuring Actions Below 50

DOE Contractor:

Authorized for contractor separations of below 50 in a 12-month period without prior approval from Headquarters or the Field Office.

- The contractor will provide prior notification to the Field Office
- The Field Office will then notify Headquarters and congressional district offices