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Superfund Record of Decision:

Powell Road Landfill, OH

50272-101

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First Remedial Action - Final

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16. Abstract (Limit: 200 words)

The 70-acre Powell Road Landfill site is a former gravel pit and landfill located in Huber Heights, Montgomery County, Ohio. Land use in the area is mixed agricultural, industrial, recreational, and residential. The site borders the Great Miami River, an intermittent stream, woodlands, and residential housing. Site features include the Great Miami River floodplain; the Great Miami River buried valley aquifer, which is a 36 acresole-source aquifer that is divided into the shallow and primary aquifers; and a landfill. Nearby residents use both private wells, installed in the primary aquifer, and municipal wells to obtain their drinking water. In 1959, the site was converted from a gravel pit into a landfill that operated under several owners. Commercial, industrial, and non-hazardous domestic waste was disposed of in the landfill during site operations. Degradation of this waste resulted in a release of hazardous substances to onsite media. It also is believed that improper disposal of certain types of industrial waste occurred at the landfill, including ink waste, paint sludge, strontium chromate, and benzidine. In 1984, landfilling operations ceased. Also in 1984, State investigations identified onsite ground water contamination and requested EPA assistance to assess site threats. Initial EPA investigations of 46 residential

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Powell Road Landfill, OH
First Remedial Action - Final
Contaminated Media: soil, debris, gw, landfill gas, leachate
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics (PAHs, PCBs, pesticides, phenols), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report) None

20. Security Class (This Page) None

21. No. of Pages 108

22. Price

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
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Powell Road Landfill, OH
First Remedial Action - Final

Abstract (Continued)

wells identified low levels of VOC contamination in 6 of the wells. Subsequent sampling identified additional contamination by VOCs, other organics, metals, and other inorganics migrating from the landfill. In 1985, the landfill was capped and seeded. This ROD addresses a first and final action for source and ground water contamination. The primary contaminants of concern affecting the soil, debris, ground water, landfill gas, and leachate are VOCs, including benzene, PCE, TCE, toluene, and xylenes; other organics, including PAHs, PCBs, pesticides, and phenols; and metals, including arsenic, chromium, and lead.

The selected remedial action for this site includes excavating and consolidating approximately 600 yd^3 of contaminated soil and debris under an upgraded landfill cap; extracting and treating contaminated ground water from the shallow aquifer onsite using a system to be determined during the RD phase, followed by offsite discharge of treated effluent; allowing ground water from the primary aquifer to naturally attenuate; collecting and treating contaminated landfill gas onsite by flaring, with discharge of treated residuals to the atmosphere; extracting and treating contaminated leachate from the landfill onsite using biological treatment to remove organics and metals, followed by air stripping and granular activated carbon to remove VOCs and SVOCs, as determined during the RD phase; discharging the treated effluent offsite to surface water; monitoring ground water; implementing engineering controls, such as flood protection and storm water controls; and implementing institutional controls, including deed restrictions and site access restrictions, such as fencing. The estimated present worth cost for this remedial action is $20,510,000, which includes an estimated annual O&M cost of $544,000.

PERFORMANCE STANDARDS OR GOALS:

Soil, debris, ground water, landfill gas, and leachate cleanup goals are based on chemical-specific ARARs or a risk-based level of 10^{-4} or less. Soil and debris cleanup goals include Aroclor 1016 0.3-61 mg/kg; Aroclor 1254 36-59 mg/kg; benzo(a)anthracene 0.05-5 mg/kg; benzo(a)pyrene 0.05-5 mg/kg; benzo(b)fluoranthene 0.05-5 mg/kg; benzo(k)fluoranthene 0.05-5 mg/kg; beryllium 0.1-10 mg/kg; chrysene 0.05-5 mg/kg; 4,4-DDT 2-200 mg/kg; dibenzo(a,h)anthracene 0.05-5 mg/kg; and indeno(1,2,3-cd)pyrene 0.05-5 mg/kg. Ground water cleanup goals are based on SDWA MCLs and MCLGs, and include aluminum 50-200 ug/l; antimony 0.015 mg/l; arsenic 0.00004-0.004 mg/l; benzo(a)anthracene 0.000007-0.0007 mg/l; beryllium 0.00002-0.002 mg/l; chrysene 0.000007-0.0007 mg/l; lead 15-50 ug/l; TCE 0.25-25 ug/l; and vinyl chloride 0.00004-0.004 mg/l. Landfill gas cleanup goals include benzene 0.12-12 ug/l and vinyl chloride 0.012-12 ug/l.

DECLARATION FOR THE
RECORD OF DECISION

SITE NAME AND LOCATION

Powell Road Landfill
Huber Heights, Ohio

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Powell Road Landfill in Huber Heights, Ohio, which was chosen in accordance with the Comprehensive, Environmental, Response, Compensation and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this Site.

The State of Ohio concurs with the selected remedial action.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDIAL ACTION

The remedial action will be a final site-wide remedy. The selected remedial action addresses the sources of the contamination by containment of the landfill and contaminated soils and treatment of leachate and ground water. The major components of the selected remedial action for the Powell Road Landfill are:

- institutional controls
- improved landfill cap with liner
- excavation of contaminated soils
- consolidation of soils under landfill cap
- ground water monitoring
- flood protection
- storm water controls
- active landfill gas collection with flare
- leachate extraction
- on-site leachate treatment
- extraction of ground water from the shallow aquifer adjacent to the landfill
- on-site ground water treatment
- discharge of treated ground water and leachate to river

The selected remedial action will address the principal threats posed by the Site.

STATUTORY DETERMINATIONS

The selected remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The remedial action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedial action will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to insure that the remedial action continues to provide adequate protection of human health and the environment.

David A. Ullrich — 9/30/93

Valdas V. Adamkus — Date

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DECISION SUMMARY

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

I. SITE NAME, LOCATION AND DESCRIPTION

The Powell Road Landfill Superfund Site (the Site) is located in Huber Heights, Ohio, a suburb in the northern Dayton metropolitan area of Montgomery County, Ohio. The Site occupies approximately 70 acres on the floodplain of the Great Miami River (see Figure 1). The landfill portion of the Site is located at 4060 Powell Road in Huber Heights, Ohio, and is bordered by Powell Road and residential housing on the north, an intermittent stream to the east, wooded areas to the south and west, and the Great Miami River to the south. The landfill covers roughly 36.3 acres and rises 30 to 40 feet above the surrounding terrain. The nearest residents live in homes owned by the current owner of the landfill. The homes are located approximately 200 feet north of the landfill along Powell Road. A residential area, known as Eldorado Plat, is located south of the landfill in an area immediately south of the Great Miami River.

The Great Miami River flows west to east along the southern boundary of the Site, approximately 150 feet south of the landfill. Two intermittent streams (Stream A and Stream B) to the east of the Site drain south to the river. The Great Miami River is classified as a warm water habitat (OAC 3745-1-21) and is used for agricultural, industrial and primary contact (i.e. wading) purposes.

Geologic materials in the area of the Site are outwash deposits (sand, sand and gravel, and silty sand and gravel), till (unsorted sand, clay, silt and gravel), lacustrine deposits (thin layers of clay, silt and very fine sand) and bedrock (see Figure 3). The outwash deposits constitute the regional aquifer known as the Great Miami River buried valley aquifer (GMR BVA) which has been designated a sole-source aquifer under U.S. EPA's Safe Drinking Water Act (SDWA).

The GMR BVA is locally divided into shallow and primary aquifers. Separation of the two aquifers by confining till deposits occurs under the southern portion of the landfill and under the river. (Hereinafter, these two locally separated aquifers are identified as the shallow aquifer adjacent to the landfill and the primary aquifer adjacent to the landfill.) The confining till deposits are also present south of the river (Eldorado Plat area), however, they are not continuous, therefore only one interconnected aquifer exists in this area. (Hereinafter, the aquifer south of the river (Eldorado Plat area) is identified as the primary aquifer.) Figure 2 identifies the location of hydrogeologic cross-section traces. Figure 3 identifies cross-sections C-C' (north-south) and J-J' (east-west, Eldorado Plat area) and labels the above-discussed local aquifers.

The GMR BVA is the main source of water supply to the Dayton metropolitan area. Residents located south of the Site, in the area immediately south of the river known as Eldorado Plat, obtain their water from private wells installed in the primary aquifer. Approximately 0.75 miles south of the Site are Ohio Suburban Water Company (OSWC) wells, which supply water to residents in most of Huber Heights and a small portion of Mad River Township. Approximately 1.5 miles south of the Site, the City of Dayton operates wells in the GMR BVA. These wells supply water to residents of Dayton, a number of other local municipalities, and Montgomery County. Approximately 0.5 miles west of the Site the city of Dayton has begun operation of a new well field.

II. SITE HISTORY AND ENFORCEMENT ACTIONS

A. SITE HISTORY

The Site is a former gravel pit which was converted to a landfill in 1959 and operated until 1984 under several different owners. The current owner is SCA Services of Ohio, a subsidiary of Waste Management of North America, Inc. Commercial, industrial, and non-hazardous domestic wastes were disposed of in the landfill. Degradation of these wastes resulted in a release of hazardous substances. It is also believed that improper disposal of certain types of industrial waste have occurred at the landfill, including ink waste, paint sludge, strontium chromate and benzidine. The landfill ceased operation in 1984 and was capped and seeded in 1985.

The Site was proposed for listing on the National Priorities List (NPL) on September 8, 1983 and was final on the NPL on September 21, 1984.

In December, 1984, after identifying contamination in the ground water in the area of the Site, the Ohio EPA requested U.S. EPA's support to determine if an imminent and substantial endangerment to human health or the environment existed. U.S. EPA's Technical Assistance Team (TAT) sampled 46 private residential wells. Sampling results identified low levels of VOCs in 6 residential wells. After reviewing these sampling results, U.S. EPA determined that an imminent and substantial risk to human health and the environment was not present at that time, and emergency actions were not required at that time. However, the U.S. EPA recommended that several activities be conducted in the area, which included conducting a detailed Remedial Investigation of the Powell Road Landfill (see Section V.).

B. ENFORCEMENT ACTIVITIES

In April, 1986, negotiations began for a 106 Administrative Order on Consent (AOC) under which Potentially Responsible Parties (PRPs) would perform the Remedial Investigation/Feasibility Study (RI/FS) at the Site. These negotiations terminated in May, 1986, and U.S. EPA began performance of the RI/FS at the Site.

During June of 1987, one PRP, SCA Services of Ohio, Incorporated, contacted U.S. EPA and expressed interest in taking over performance of the RI/FS. On November 12, 1987, an AOC was entered into between the U.S. EPA, the Ohio EPA, and SCA Services of Ohio, Incorporated (SCA) (currently a subsidiary of Waste Management of North America, Inc.). This AOC requires SCA to meet a number of requirements, including conducting an RI/FS and paying all past costs associated with the Site. The final RI report was approved in March of 1992 and the FS was approved in March of 1993.

Initial PRP search activities at this Site identified seven (7) PRPs. General Notices of Potential Liability and CERCLA Section 104(e) Information Requests were issued to all seven (7) PRPs on December 2, 1985. Since 1985, U.S. EPA has issued 232 Information Request and 83 follow-up Information Requests. General Notice letters were sent to thirty-seven (37) PRPs in May, 1993.

Additional future Information Requests and follow-up Information Requests will be issued as appropriate. All PRP information which has been gathered to date is being reviewed. Special Notice letters inviting participation in RD/RA negotiations are expected to be issued to appropriate PRPs by U.S. EPA in the near future.

III. COMMUNITY PARTICIPATION

The public participation requirements of CERCLA sections 113(k)(2)(B)(i-v) and 117 were met in the remedial action selection process by the following:

- A Proposed Plan was finalized and released to the public on May 13, 1993;
- The public was able to comment on the Proposed Plan during a public comment period which started on May 20, 1993 and ended on July 9, 1993 (extended 21 days from original date of June 18, 1993); and
- The public also had the opportunity to participate in a Proposed Plan public meeting held Wednesday, June 2, 1993, in Huber Heights, Ohio.
- An informational letter was sent to all parties on the mailing list on August 23, 1993. The letter discussed residential well sampling which has been conducted at

the Site from 1984 to present and the results of the sampling.

Public interest at the Site has been high since the RI began. In August, 1989 a Technical Assistance Grant was awarded to the Miami Valley Landfill Coalition (MVLC), a local citizen's group. During the RI, MVLC reviewed numerous documents and met with the U.S. EPA and Ohio EPA on several occasions to discuss documents, present their ideas on additional field work, and their interpretations of RI data. MVLC also commented on technologies identified in the FS, and the proposed remedial action presented in the Proposed Plan.

In 1989, when the RI was close to completion, MVLC concerns, which reflect community concerns in general, were a major factor in the U.S. EPA's and Ohio EPA's decision to install and sample additional monitoring wells and resample select existing monitoring and residential wells again. MVLC was concerned that the connection between the Site and ground water contamination identified approximately 4,000 feet south of the landfill, in the Needmore Road area, had been missed. Installation of new monitoring wells was planned specifically with the intent of confirming the existence of any connection. Despite this additional round of sampling, a connection between the Site and the Needmore Road ground water contamination was not identified.

Public comments, verbal and written, received at the public meeting on the Proposed Plan and during the public comment period along with supporting documents, and response to significant comments, are contained in the Responsiveness Summary attached to this ROD.

IV. SCOPE AND ROLE OF RESPONSE ACTION

The selected remedial action will address the principal threats in contaminated media identified at the Site. These principal threats are landfill gases, contaminated ground water, landfill liquids (leachate) and contaminated soils. The landfill will be covered by an improved landfill cap with a liner which will prevent uncontrolled migration of landfill gases into the air, and prevent infiltration of precipitation into the landfill, thereby reducing the generation of leachate and also reducing the percolation of leachate from the landfill into ground water.

Landfill gases will be actively collected with extraction wells and thermally-treated on site with a flare.

Ground water contamination was identified in the primary and shallow aquifers adjacent to the landfill and in the primary aquifer south of the river (Eldorado Plat area). The selected remedial action will address ground water contamination by extracting ground water from the shallow aquifer adjacent to the landfill, treating ground water on-site, and discharging treated ground water to the Great Miami River in compliance with NPDES permit requirements.

Leachate is present in the landfill and is a source of ground water contamination adjacent to the Site. Leachate will be extracted from the landfill, treated on-site, and discharged to the Great Miami River in compliance with NPDES permit requirements.

Contaminated soils will be excavated and consolidated on the landfill prior to construction of the landfill cap.

The geology of the Site indicates that ground water contamination identified in the shallow aquifer, adjacent to the landfill, could migrate under the Great Miami River and is a possible source of ground water contamination identified in monitoring wells south of the river (Eldorado Plat area). By extracting and treating leachate from the landfill, and ground water in the shallow aquifer adjacent to the landfill, the two sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area), will be removed. Once the sources are removed, ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area), is expected to decrease and meet cleanup levels.

A ground water monitoring network will be established on the Site (around the landfill and south of the river (Eldorado Plat area)). The purpose of ground water monitoring is to: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (primary and shallow aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

The selected remedial action is expected to be the final response for the Site. Because this remedial action will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to insure that the remedial action continues to provide adequate protection of human health and the environment.

V. SUMMARY OF SITE CHARACTERISTICS

The RI determined the nature and extent of on-site and off-site contamination, and estimated the risks posed by the Site to human health and the environment. The RI Report, finalized in February, 1992, identified the following on-site and off-site contamination:

ON-SITE (contamination associated with the Site)

- Landfill gases consisting of methane with detectable concentrations of volatile organic compounds (VOCs)
- Leachate consisting of VOCs, semivolatile organic compounds, and inorganic compounds
- Surface and near-surface soils which contain semivolatile organics, pesticides, and polychlorinated biphenyls (PCBs).
- Shallow and primary aquifers adjacent to the landfill contain VOCs
- Primary aquifer south of the river (Eldorado Plat area) contains VOCs

OFF-SITE (contamination not associated with the Site)

- Primary aquifer south of the river (Needmore Road area) contains VOCs. A connection between the Site and contamination found in this area could not be confirmed and is therefore not addressed by the final remedial action.

A. ON-SITE

The Powell Road Landfill is the source of ground water contamination found in the immediate vicinity of the landfill and is responsible for the generation of landfill gases and leachate. The landfill consists of approximately 2.6 million cubic yards of material.

Landfill gases found in the landfill gas vents and air at the Site consisted mostly of methane with detectable concentrations of volatile organic compounds (VOCs). Figure 4 shows the locations of gas vents and the total VOC concentrations found in the gas vents. Table 1 shows concentrations of methane detected in gas vents and Table 2 shows concentrations of VOCs detected in gas vents.

Thirteen samples of leachate were collected from gas vents in the landfill (Figure 5). Analysis identified VOCs (Table 3), semivolatile compounds (Table 4), metals, and other inorganics (Table 5). Figure 5 shows the leachate/ground water total VOC concentrations at the Site.

One sample of leachate was collected from the landfill surface. Analysis identified VOCs, semivolatile compounds, metals, and other inorganics. Table 6 presents the results of the surface leachate sample analysis.

The chemicals and concentrations found in the surface leachate were essentially the same as the leachate collected from gas vents. Therefore, surface leachate and leachate collected from gas vents are grouped together in further discussions.

Ambient air samples were collected at the Site (Figure 6). Results identified trace amounts of VOCs (Table 7).

Eight sediment samples were collected from surface water bodies on and around the Site (Figure 7). Analysis showed no impact from the landfill in the form of VOCs or inorganic contaminants (Table 8). Several semivolatiles were detected in both upstream and downstream sediment samples.

Surface water samples were collected from the same locations as sediment samples (Figure 7). Analysis showed no impact from the landfill in the form of VOCs, semivolatile compounds, or inorganic contaminants (Table 9).

Thirty-two surface soil samples and twelve sub-surface soil samples were collected on the Site and in surrounding areas (Figure 8). Surface and near-surface soils at the Site contain semivolatile organics, pesticides and PCBs at limited locations (Tables 10 and 11). Figure 9 identifies the location and approximate extent of surface and subsurface soils contamination.

Ground water quality was investigated by analyzing water sampled from 44 new and existing monitoring wells (four sampling events) and 30 residential and water supply wells on two occasions.

VOCs were the major contaminant group found in ground water. A total of 15 VOCs were detected in ground water samples collected during the RI.

VOCs were detected in six monitoring wells in the shallow aquifer adjacent to the landfill and in two monitoring wells in the primary aquifer adjacent to the landfill (Table 12).

VOCs were identified in the primary aquifer south of the river (Eldorado Plat area) during the last sampling round (Table 13).

Ground water sample analyses identified that MCLs were exceeded for two VOCs (vinyl chloride and trichloroethene) and two metals (aluminum and beryllium).

Ground water samples obtained during the RI, from residential wells south of the river (Eldorado Plat area) did not identify any contamination. Additional ground water samples of residential wells in the Eldorado Plat area were collected and analyzed in March, 1993. VOCs were detected in one residential well. Similar levels of the same VOCs were found in this well prior to the RI, but were not detected during the RI sampling of the well.

B. OFF-SITE

VOCs were identified in ground water 4,000 feet south of the landfill (Needmore Road area) (Figure 10). The VOCs identified in the Needmore Road area consisted mainly of "ethene" VOCs. The ground water contamination found in the Needmore Road area could not be connected to contamination found on the Site. If the Site were the source of ground water contamination found in the Needmore Road area, ground water contaminants would have been found between the Site and the Needmore Road area. Additionally, dispersion of contaminants caused by migration from the Site to the Needmore Road area would occur, and downgradient contaminants in the Needmore Road area, would be equal-to, or more likely, less-than the ground water contamination found on the Site. However, ground water contamination was not found between the Needmore Road area and the Site, nor were the Needmore Road area ground water contamination levels equal-to or less-than contamination found at the Site. The "ethene" VOC contaminants found in the Needmore Road area were found at levels up to 4-times greater than "ethene" VOCs found in ground water adjacent to the landfill.

However, if in the future a connection is found which identifies PRL as the source of contamination in the Needmore Road area, either a ROD amendment or an Explanation of Significant Differences will be prepared, as appropriate.

VI. SUMMARY OF SITE RISKS

RI data identified the following contaminated media: air, surface and near-surface soils, and ground water.
The RI data from each media was evaluated to select chemicals of potential concern (CPCs). CPCs are those chemicals present at the Site most likely to be of concern to human health and the environment. CPCs were selected based on a comparison of contaminants found in each media to background and blank sample data for each media. Table 14 (organics) and Table 15 (inorganics) summarize the CPCs selected for each media. (See RI

Report, section 6.2, for tables summarizing RI data for each media and CPCs for each media.)

Based on the results of the RI, U.S. EPA and Ohio EPA directed the PRPs in calculating the risks that the Site would pose to human health and the environment if no remedial actions were taken at the Site. This process is called the Baseline Risk Assessment (Risk Assessment). Risk assessment involves assessing the toxicity, or degree of hazard, posed by the substances found at the Site, and the routes by which humans and the environment could come into contact with these substances.

The primary sources of uncertainty in the preparation of a risk assessment are:

- Environmental sampling and analysis, and selection of chemicals
- Exposure parameter estimation
- Toxicological data

See the RI Report, Section 6.0, for specific information on the Baseline Risk Assessment prepared during the RI/FS.

A. HUMAN HEALTH RISKS

1. Exposure Assessment

Potential pathways by which human populations may be exposed to chemicals at or originating from the Site were identified under both current use and potential future residential land-use conditions. Twelve complete exposure pathways were selected for detailed evaluation under current use conditions. Current use conditions were determined, and are presented, in the RI Report. These pathways are:

- Incidental ingestion of chemicals in surface soil by trespassers on-site,
- Dermal absorption of chemicals in surface soil by trespassers on-site,
- Inhalation of volatile organic chemicals emitted from the landfill by trespassers on-site,
- Inhalation of volatile organic chemicals emitted from the landfill by nearby residents,
- Incidental ingestion of chemicals in intermittent stream A and Great Miami River sediment by nearby residents,

- Dermal absorption of chemicals in intermittent stream A and Great Miami River sediment by nearby residents,
- Incidental ingestion of chemicals in intermittent stream A and Great Miami River (backwater area) surface water by nearby residents,
- Dermal absorption of chemicals in intermittent stream A and Great Miami River (backwater area) surface water by nearby residents,
- Ingestion of fish from the Great Miami River (backwater area) by nearby residents,
- Ingestion of ground water by nearby residents,
- Inhalation of volatile organic chemicals by nearby residents while showering, and
- Dermal absorption of chemicals in ground water while showering by nearby residents.

Six complete exposure pathways were selected for detailed evaluation under potential future residential land-use conditions. Future residential land-use conditions were determined, and are presented, in the RI Report. These pathways are:

- Incidental ingestion of surface soils by a hypothetical on-site resident,
- Dermal absorption of chemicals in surface soils by a hypothetical on-site resident,
- Inhalation of volatile organic chemicals emitted from the landfill by a hypothetical on-site resident,
- Ingestion of ground water by a hypothetical on-site resident,
- Inhalation of volatile organic chemicals by a hypothetical on-site resident while showering, and
- Dermal absorption of chemicals in ground water while showering by a hypothetical on-site resident.

Representative exposure point concentrations were developed for the CPCs and each media based on RI data. The chronic daily intake (CDI) of each chemical was estimated to assess exposure associated with the selected pathways. (See RI Report, section 6.4, for tables identifying the exposure point concentrations and resulting CDI for each CPC.) The exposures are quantified by estimating the reasonable maximum exposure (RME) associated with pathways of concern. RME is a conservative estimate of potential risk.

2. Toxicity Assessment

Toxicity information was compiled for each chemical of potential concern. Individual chemicals were separated into two categories of chemical toxicity based on whether they exhibited principally noncarcinogenic or carcinogenic effects. Next, the health effects of both categories of chemicals were evaluated. Table 16 presents oral health effects criteria for the chemicals of potential concern. Table 17 presents inhalation health effects criteria for the chemicals of potential concern.

3. Risk Characterization

Potential human health risks for carcinogenic and noncarcinogenic chemicals of potential concern were calculated for each pathway identified under current use and future residential land-use exposures. (See RI Report, section 6.5, for tables identifying chemical-specific carcinogenic and non-carcinogenic risks for current use and future residential land-use exposure pathways.)

The Risk Assessment estimates the excess risk, posed by the Site, of getting cancer, over and above the average risk. Cancer risks from various exposure pathways are assumed to be additive. Excess lifetime cancer risks less than $1x10^{-6}$ (one-in-one million) are considered acceptable by U.S. EPA. Excess lifetime cancer risks between $1x10^{-4}$ (one-in-ten thousand) to $1x10^{-6}$ require U.S. EPA and Ohio EPA (the Agencies) to decide if remediation is necessary to reduce risks and to what levels cleanup will occur. Excess lifetime cancer risks greater that $1x10^{-4}$ generally require remediation.

For noncarcinogens, potential risks are expressed as a hazard index. A hazard index represents the sum of all ratios of the level of exposure of the contaminants found at the Site to that of contaminants' various reference doses. In general, hazard indices which are less than one are not likely to be associated with any health risks.

Ground water chemical concentrations found in monitoring wells adjacent to the landfill and in the Eldorado Plat area were compared to U.S. EPA drinking water standards (maximum contaminant levels (MCLs)). Three of the 19 chemicals of concern in monitoring wells adjacent to the landfill were detected at concentrations which exceed MCLs. One of the five chemicals of potential concern in the Eldorado Plat monitoring wells exceeded MCLs. See Table 18 for results.

Although RI data does not support a connection between ground water contamination located on the Site and the ground water contamination found in Needmore Road area, U.S. EPA requested risk calculations be performed on ground water data from the Needmore Road area. These risk calculations are included in the RI Report, and will no longer be discussed in this section.

Under current use conditions the excess lifetime cancer risks were within a 10^{-6} to 10^{-4} cancer risk range for the following pathways (Table 19):

- inhalation of landfill gas emissions by nearby residents;
- dermal absorption through contact with Great Miami River surface water by nearby child/teenager residents;
- dermal absorption through contact with Great Miami River surface water by nearby adult residents;
- dermal absorption through contact with Stream A surface water by a nearby adult resident;
- inhalation of volatiles from showering with ground water in the Eldorado Plat area (based on monitoring well data);
- ingestion of ground water in the Eldorado Plat area (based on monitoring well data);

Under current use conditions, the excess lifetime cancer risks exceeded 10^{-4} for the following current use pathways:

- ingestion of fish caught from the backwater area of the Great Miami River;

Under current use conditions, the hazard index value was greater than one for the following current use pathways:

- ingestion of fish caught from the backwater area of the Great Miami River;

The current use risks shown in Table 19 have also been summarized across pathways for several potential receptor populations. For the combination of pathways shown in Table 19, the excess lifetime cancer risks exceeded a cancer risk level of 10^{-4} and the hazard index value of one for residents who live in the Eldorado Plat area. This receptor population's increased carcinogenic and noncarcinogenic risk is based on the regular ingestion of fish caught from the backwater area of the Great Miami River.

Under future residential land-use conditions the excess lifetime cancer risks were within a 10^{-6} to 10^{-4} cancer risk range for the following future residential land-use pathways (Table 20):

- Incidental ingestion of on-site surface soil;
- dermal adsorption while showering with on-site ground water (based on leachate data);
- inhalation of landfill gas emissions; and
- ingestion of on-site ground water (based on leachate data).

Under future residential land-use conditions, the excess lifetime cancer risks did not exceed a 10^{-4} cancer risk level for any future residential land-use pathways.

Under future residential land-use conditions, the hazard index value was greater than one for the following future residential land-use pathway:

- ingestion of on-site ground water (based on leachate data)

The future residential land-use risks shown in Table 20 have also been summarized across pathways for the hypothetical on-site resident. For this potential receptor, the excess lifetime cancer risks was 10^{-4} and the hazard index value was greater than one.

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

B. ECOLOGICAL RISK ASSESSMENT

An ecological assessment was conducted to evaluate the potential risks to non-human receptors associated with the Site. Potential receptors and exposure pathways were evaluated, including the presence of endangered or threatened species in the area. A site survey was conducted during the RI to identify terrestrial and aquatic receptors. The following indicator species and exposure pathways were selected for detailed evaluation: plants exposed to surface soil, soil organisms (earthworms were used as indicator species), and aquatic organisms (fish and aquatic invertebrates) in surface water and sediment of the Great Miami River and intermittent Stream A. Based on available toxicity information [for four inorganic chemicals for plants based on Kebata-Pendias and Pendias (1984) and Adriano (1986) and one inorganic and one organic chemical for earthworms based on

Malecki et al. (1982) and van Rhee (1977)], adverse effects to plants and earthworms from exposure to soil are unlikely to occur. Ambient water quality criteria was equalled or exceeded for modeled concentrations of PCBs and DDT in the backwater area of the Great Miami River. Ambient water quality criteria was equalled or exceeded for measured concentrations of mercury in intermittent Stream A. Adverse impacts to most species of fish and aquatic invertebrates are, however, not expected to occur.

The Ohio Department of Natural Resources had no records of rare or endangered species in the area of the Site. The U.S. Fish and Wildlife Service did not have endangered species information specific to the area where the Site is located; however, the Indiana Bat is an endangered species that occurs in numerous counties in Ohio, including Montgomery County, and may be present at the Site.

C. RISK-BASED CLEANUP LEVELS

Based on the above information, risk-based cleanup levels were developed and are listed on Table 21. These cleanup levels were calculated for each individual compound based on a 10^{-4} risk and a 10^{-6} risk. Risk-based cleanup levels were calculated using U.S. EPA's Risk Assessment Guidance for Superfund, Part B, dated December 1991.

Final cleanup levels for individual contaminants in all media will be chemical-specific ARARs (see Section X.B.1). If multiple contaminants are present in a media, and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of 10^{-4} across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21).

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to human health and the environment.

VII. DESCRIPTION OF ALTERNATIVES

A feasibility study was conducted to develop and evaluate remedial alternatives for the Powell Road Landfill. Remedial alternatives were assembled from applicable remedial technology process options and were initially evaluated for effectiveness, implementability and cost. The alternatives meeting these criteria were then evaluated and compared to the nine criteria required by the NCP (See Section VIII.). Treatability studies were not performed during the RI or the FS, and are not anticipated to be a necessary part of implementation of any of the alternatives for this Site. In addition to the remedial alternatives, the NCP requires that a no-action alternative be considered at every Site. The no-action alternative serves primarily as a point of comparison for other alternatives.

Alternative 1
Description: No Action

Estimated Capital Cost:	$0
Estimated Annual O&M Costs:	$0
Estimated Present-Worth Costs:	$0
Estimated Implementation Timeframe:	None

This alternative does not take any action to remediate the Site and does not consist of any treatment components, engineering controls, monitoring, or institutional controls.

Alternative 2
Description: Institutional controls, improved landfill cap with liner, consolidation of contaminated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare.

The treatment component of this alternative is landfill gas treatment. Landfill gas will be actively collected by gas extraction wells installed in the landfill and treated thermally on-site via a flare. The estimated volume of landfill gases to be treated is 850 cubic feet/minute (cfm).

The containment component is capping the landfill with an improved landfill cap with liner in accordance with Ohio EPA Solid Waste Management Regulations (OAC-3745-27-11(G)). The landfill cap will prevent migration of contaminated soils into surface water, reduce infiltration of precipitation into the landfill thereby reducing generation of leachate and also reducing the percolation of leachate from the landfill into ground water.

Ground water contamination and leachate are not addressed in this alternative.

The preliminary screening of alternatives indicated that Alternative 2 does not provide overall protection of human health and the environment, therefore, Alternative 2 was screened out of the detailed analysis of alternatives (see Feasibility Study for details). Costs were not developed for Alternative 2.

Common Components
Alternatives 3, 4, 5, 6, and 7, described below, include the following common components:

1. Institutional Controls
Institutional controls include fencing, deed restrictions, and warning signs. Site access will be controlled by an 8-foot chain-link fence topped with barbed wire. Warning signs will be posted to discourage unauthorized entry onto the Site. Deed restrictions will prohibit disturbance of the Site and preclude future development of the Site.

2. Flood Protection
Erosion control measures will be implemented during and after construction to ensure the reduction of flood water velocity during future flooding.

3. Storm Water Controls
Storm water control measures will be implemented and may consist of runoff control berms and rip-rap-lined discharge ditches.

4. Improved Landfill Cap with Liner
An improved landfill cap with liner will be constructed over the landfill in accordance with the Ohio EPA's Solid Waste Management Regulations. The landfill consists of approximately 2.6 million cubic yards of material. The landfill cap will prevent migration of contaminated soils into surface water, reduce infiltration of precipitation into the landfill thereby reducing generation of leachate and also reducing the percolation of leachate from the landfill into ground water.

5. Ground Water Monitoring
A ground water monitoring network will be established on the Site (around the landfill and south of the river (Eldorado Plat area)). Existing monitoring wells, new monitoring wells, and select residential wells may be used to monitor upgradient and downgradient ground water conditions. Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site. The specifics of the ground water monitoring system, including frequency and duration, will be determined during the remedial design.

6. Consolidation of Contaminated Soils Under Landfill Cap
Approximately 600 cubic yards of soil contaminated with DDT and/or PCBs will be excavated and consolidated on the top of the landfill and then covered by the landfill cap. The areas currently identified for excavation and consolidation are within

approximately 400 feet of the landfill (see Figure 9). The Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) are not an ARAR for excavation of soils around the landfill and consolidation of the soils under the landfill cap because the soils being removed are from one "area of contamination (AOC)". This AOC consists of the landfill, surrounding contaminated soils, leachate and contaminated ground water. Movement of waste within the AOC does not constitute placement.

7. Active Gas Collection and Treatment with Flare
An estimated 850 cubic feet per minute of landfill gases will be actively collected with gas extraction wells and thermally treated on-site via a flare. The system will be designed to comply with the Clean Air Act, Section 101 and 40 CFR 52.

8. Leachate Extraction
Leachate will be extracted from the landfill at a rate sufficient to create a slight influx of ground water into the landfill and prevent migration of leachate out of the landfill. A series of vertical extraction wells will be installed in the landfill and screened in the permeable water-bearing zones. Leachate will be collected by a system of piping buried under the landfill cap and will be temporarily stored in a holding tank prior to treatment. The leachate extraction system may remove up to 50,000 gallons per day (gpd) of leachate from the landfill.

9. Leachate Treatment
The leachate treatment system will be designed to remove volatile organic compounds, semivolatile organic compounds, and metals. The leachate treatment system may consist of a system of biological bulk organic removal and metals removal, with remaining volatile and semi-volatile organic removal by air stripping and activated carbon treatment, respectively. Details of the leachate treatment system will be identified during the remedial design. Leachate will be treated to levels which will allow discharge of effluent to the river under the NPDES permit requirements (see discussion below). The leachate treatment system could remove an estimated 1,100 lbs. total of VOCs from the leachate.

10. Discharge
Treated leachate effluent will be discharged to the Great Miami River. Discharge will comply with all Federal and State of Ohio National Pollutant Discharge Elimination System (NPDES) requirements (40 CFR 122.44, Clean Water Act Section 208, 40 CFR 125, 40 CFR 136, Ohio Revised Code). NPDES requires compliance with state and federal water quality standards, whichever is more stringent, and regulates discharge into surface water.

Alternative 3

Description: Institutional controls, improved landfill cap with liner, consolidation of contaminated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, discharge to river.

Estimated Capital Cost:	$11,463,000
Estimated Annual O&M Costs:	$ 398,000
Estimated Present-Worth Costs:	$16,820,000
Estimated Implementation Timeframe:	6 years

This alternative consists of all the common elements described above and addresses landfill gas, contaminated soils, and leachate. Existing ground water contamination will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media, ground water, leachate, and air, will be chemical-specific ARARs (see Section X.B.1.). If multiple contaminants are present in a media, and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of 10^{-4} across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21). The point of compliance for ground water cleanup levels will be at the boundary of the landfill. Ground water cleanup levels shall be achieved at and beyond the landfill boundary. The point of compliance for cleanup levels of landfill gas emissions shall be the fence surrounding the landfill.

Treatment components include landfill gas treatment via flare and leachate treatment. Landfill gases will be actively collected with gas extraction wells and thermally treated on-site via a flare. Leachate will be extracted from the landfill at a rate sufficient to create a slight influx of ground water into the landfill and prevent migration of leachate out of the landfill. A series of vertical extraction wells will be installed in the landfill and screened in the permeable water-bearing zones. Leachate will be collected by a system of piping buried under the landfill cap and will be temporarily stored in a holding tank prior to treatment.

The containment components are consolidation of contaminated soils on top of the landfill, and an improved landfill cap with liner. Contaminated soils will be excavated and consolidated on top of the landfill followed by construction of an improved landfill cap with liner. The landfill cap will comply with Ohio

EPA's Solid Waste Management Regulations.

Alternative 4
Description: Institutional controls, improved landfill cap with liner, consolidation of contaminated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, extraction of ground water from the shallow aquifer adjacent to the landfill, on-site ground water treatment, discharge to river.

Estimated Capital Cost:	$12,911,000
Estimated Annual O&M Costs:	$ 544,000
Estimated Present-Worth Costs:	$20,510,000
Estimated Implementation Timeframe:	6 years

This alternative consists of all the components of Alternative 3 with the addition of ground water extraction from the shallow aquifer adjacent to the landfill, on-site ground water treatment, and discharge of treated effluent to the river. This alternative addresses landfill gas, contaminated soils, leachate and contaminated ground water in the shallow aquifer adjacent to the landfill. Existing ground water contamination in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area), will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks posed by existing ground water contamination.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare and leachate treatment, as discussed in Alternative 3 above, and ground water extraction from the shallow aquifer and ground water treatment on-site. An estimated 400,000 gallons of ground water will be pumped per day from extraction wells in the shallow aquifer adjacent to the landfill, treated on-site, and effluent discharged to the river (in compliance with all NPDES requirements).

The containment components are consolidation of contaminated soils on top of the landfill, and an improved landfill cap with liner, as discussed above in Alternative 3.

Alternative 5

Description: Institutional controls, improved landfill cap with liner, treatment of contaminated soils, consolidation of treated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, extraction of ground water from the shallow and primary aquifers adjacent to the landfill, on-site ground water treatment, discharge to river.

Estimated Capital Cost:	$13,884,000
Estimated Annual O&M Costs:	$ 618,000
Estimated Present-Worth Costs:	$22,620,000
Estimated Implementation Timeframe:	6 years

This alternative consists of all the components of Alternative 4 with the addition of ground water extraction from the primary aquifer adjacent to the landfill and treatment of contaminated soils prior to placement under the landfill cap. This alternative addresses landfill gas, contaminated soils, leachate, and contaminated ground water in the shallow and primary aquifers adjacent to the landfill. Existing ground water contamination in the primary aquifer south of the river (Eldorado Plat area), will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare, leachate treatment, and ground water treatment, as discussed above in Alternative 4, and treatment of contaminated soils prior to consolidation under the landfill cap. An estimated 600 cubic yards of contaminated soils will be treated to dewater, stabilize and solidify the contaminated soils prior to placement under the landfill cap. This alternative also includes the extraction of ground water from the primary aquifer adjacent to the landfill. An estimated 900,000 gallons of ground water will be pumped per day from extraction wells in the shallow and primary aquifers adjacent to the landfill, treated on-site and effluent discharged to the river (in compliance with all NPDES requirements).

The containment components are consolidation of treated soils on top of the landfill, and an improved landfill cap with liner as discussed above in Alternative 3.

Alternative 6

Description: Institutional controls, improved landfill cap with liner, treatment of contaminated soils, consolidation of treated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, ground water extraction from the primary aquifer south of the river (Eldorado Plat area), on-site ground water treatment, discharge to river.

Estimated Capital Cost:	$12,600,000
Estimated Annual O&M Costs:	$ 519,000
Estimated Present-Worth Costs:	$19,810,000
Estimated Implementation Timeframe:	8 years

This alternative consists of all the components of Alternative 3 with the addition of ground water extraction from the primary aquifer south of the river (Eldorado Plat area), on-site ground water treatment, discharge of treated effluent to the river, and treatment of contaminated soils prior to consolidation under the landfill cap. This alternative addresses landfill gas, contaminated soils, leachate and contaminated ground water south of the river (Eldorado Plat area). Existing ground water contamination in the shallow and primary aquifers adjacent to the landfill will not be actively remediated. Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare, leachate treatment, ground water treatment, and treatment of contaminated soils prior to consolidation under the landfill cap as discussed above in Alternative 5. The ground water treatment component of this alternative includes the extraction of ground water from the primary aquifer south of the river (Eldorado Plat area). An estimated 250,000 gallons of ground water will be pumped per day from extraction wells in the primary aquifer south of the river (Eldorado Plat area), treated on-site and effluent discharged to the river (in compliance with all NPDES requirements). Ground water extracted from the primary aquifer south of the river (Eldorado Plat area) will be piped across the river for on-site treatment.

The containment components are consolidation of treated soils on top of the landfill, and an improved landfill cap with liner as discussed above in Alternative 3.

Alternative 7
Description: Institutional controls, improved landfill cap with liner, treatment of contaminated soils, consolidation of treated soils under landfill cap, ground water monitoring, flood protection, storm water controls, active gas collection with flare, leachate extraction, on-site leachate treatment, extraction of ground water from the shallow and primary aquifers adjacent to the landfill and from the primary aquifer south of the river (Eldorado Plat area), on-site ground water treatment, discharge to river.

Estimated Capital Cost:	$14,341,000
Estimated Annual O&M Costs:	$ 617,000
Estimated Present-Worth Costs:	$23,060,000
Estimated Implementation Timeframe:	8 years

This alternative consists of all the components of Alternative 5 with the addition of ground water extraction from the primary aquifer south of the river (Eldorado Plat area). This alternative addresses landfill gas, contaminated soils, leachate, contaminated ground water in the shallow and primary aquifers adjacent to the landfill, and contaminated ground water in the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water.

Final cleanup levels for individual contaminants in each media are the same as discussed in Alternative 3.

Treatment components include landfill gas treatment via flare, leachate treatment, ground water treatment, and treatment of contaminated soils prior to consolidation under the landfill cap as discussed above in Alternative 5. This alternative includes the extraction of ground water from the primary aquifer south of the river (Eldorado Plat area). Ground water treatment for this alternative includes extraction of an estimated 1,150,000 gallons of ground water per day from extraction wells in the shallow and primary aquifers adjacent to the landfill, and extraction wells in the primary aquifer south of the river (Eldorado Plat area), on-site treatment and discharge of effluent to the river (in compliance with all NPDES requirements). Ground water extracted from the primary aquifer south of the river (Eldorado Plat area) will be piped across the river for on-site treatment.

The containment components are consolidation of treated soils on top of the landfill, and an improved landfill cap with liner as discussed above in Alternative 3.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives developed in the FS were evaluated on the basis of the nine evaluation criteria listed below. The advantages and disadvantages of each alternative were then compared to determine which alternative provides the best balance among these nine criteria. The nine evaluation criteria are set forth in the National Contingency Plan (NCP), 40 CFR Part 300.430.

THRESHOLD CRITERIA:

1. Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether a remedial action 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.

Alternative 1 does not meet this criteria because it does not take any action to protect human health and the environment and does not eliminate, reduce or control risks.

Alternative 2 does not eliminate, reduce or control risks associated with ground water contamination and leachate migration into ground water. Alternative 2 was determined not to be protective of human health and the environment and was screened out from the detailed analysis of alternatives. Alternative 2 will no longer be discussed in this document.

Alternatives 3, 4, 5, 6 and 7 utilize institutional controls to reduce risks posed to trespassers by fencing the Site and posting warning signs, and reduce the risks posed to potential future users of the Site by imposing deed restrictions on the landfill property.

Alternatives 3, 4, 5, 6, and 7 utilize numerous source controls: landfill cap; landfill gas collection and treatment; leachate collection and treatment; and consolidation of soils under landfill cap. The risks posed by inhalation of landfill gases are reduced by collecting and treating landfill gases. The risks posed by contaminated ground water will be reduced by extracting and treating leachate from the landfill, the source of ground water contamination. The landfill cap will reduce ground water risks by reducing infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. The risks posed by ingestion of fish are based on the potential migration of contaminated soils into surface water and sediment. These risks will be controlled and reduced by excavating and consolidating contaminated soils under the landfill cap. Alternatives 5, 6 and 7 also provide additional reduction of these risks by treating contaminated soils on-site to dewater, stabilize and solidify the soils prior to consolidation under the landfill cap.

Alternative 3 does not utilize treatment to actively reduce risks associated with existing ground water contamination. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate in the landfill and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill will address one of the primary sources of ground water contamination and risks associated with ground water contamination. Once the landfill cap is constructed and the landfill gas and leachate extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternatives 4, 5, 6 and 7 utilize ground water treatment technologies to further reduce risks posed by existing ground water contamination.

Alternative 4 reduces risks associated with ground water contamination by extracting and treating ground water from the shallow aquifer adjacent to the landfill. Existing ground water contamination in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area), will not be actively remediated. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternative 5 reduces risks associated with ground water contamination by extracting and treating ground water in the shallow and primary aquifers adjacent to the landfill. Existing ground water contamination in the primary aquifer south of the river (Eldorado Plat area) will not be actively remediated. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow and primary aquifers adjacent to the landfill will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternative 6 reduces risks associated with ground water contamination by extracting ground water from the primary aquifer south of the river (Eldorado Plat area) and treating ground water on-site. Existing ground water contamination adjacent to the landfill, in the shallow and primary aquifers, will not be actively remediated. Several components of this alternative, however, will interact to address and decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill will address the one of the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 8 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and in the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

Alternative 7 reduces risks associated with ground water contamination by extracting ground water, in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area), and treating ground water on-site. Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area) will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 8 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Applicable requirements are those cleanup standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental or facility siting law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental siting law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to this particular Site.

Compliance with ARARs addresses whether a remedial action will meet all requirements of federal and state environmental laws and regulations and/or provide a basis for a waiver from any of these laws. Federal and State ARARs are divided into three categories: chemical-specific, action-specific, and location-specific.

Chemical-Specific ARARs

Federal: Table 22 identifies the federal chemical-specific ARARs. The ground water cleanup levels for Alternatives 3, 4, 5, 6, and 7 will comply with the Safe Drinking Water Act (SDWA) (Note: only non-zero SDWA levels are potential ARARs) and RCRA ground water ARARs by treating leachate and/or ground water treatment. Ground water monitoring will continue until contamination decreases and cleanup levels are achieved. Alternative 3 will rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in ground water adjacent to the landfill (shallow and primary aquifers) and south of the river (Eldorado Plat area) (primary aquifer). Alternative 4 will treat ground water extracted from the shallow aquifer adjacent to the landfill and rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in ground water in the primary aquifer adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area). Alternative 5 will treat ground water extracted from the shallow and primary aquifers adjacent to the landfill and rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in the primary aquifer south of the river (Eldorado Plat area). Alternative 6 will treat ground water extracted from the primary aquifer south of the river (Eldorado Plat area) and rely on treatment/containment components of the remedy to decrease ground water contamination and achieve cleanup levels in the shallow and primary aquifers adjacent to the landfill. Alternative 7 will treat ground water extracted from the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area) to achieve ground water cleanup levels.

State of Ohio: Table 23 identifies the State of Ohio chemical-specific ARARs. Surface water standards will be met by Alternatives 3, 4, 5, 6, and 7 by consolidation of contaminated soils under the landfill cap (Alternatives 3 and 4) or treatment and consolidation of contaminated soils under the landfill cap (Alternatives 5, 6, and 7), thereby reducing the potential of migration of contaminated soils into surface water.

Location-Specific ARARs

Table 24 identifies the State of Ohio location-specific ARARs. Federal location-specific ARARs are discussed in Section X. All alternatives, except Alternative 1, will meet location-specific ARARs. Location-specific ARARs include RCRA requirements for a site in a 100-year floodplain, minimizing adverse impacts on a wetland, and minimizing potential harm to and restoration of the floodplain.

Action-Specific ARARs

Federal action-specific ARARs are discussed in Section X. State of Ohio action-specific ARARs are identified on Table 25. All the Alternatives will comply with the Federal and State of Ohio (Ohio Revised Code (ORC) and Ohio Administrative Code (OAC)) action-specific ARARs. These ARARs include: Clean Water Act, OAC, and ORC requirements for discharge of effluent to a river; Clean Air Act, OAC, and ORC requirements for excavation of soils on-site and gas collection and treatment; ORC and OAC requirements for leachate removal and treatment; and ORC and OAC requirements for ground water monitoring.

PRIMARY BALANCING CRITERIA:

3. Long-term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedial action to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

Alternative 1 does not reduce risks and will not provide long-term effectiveness or permanence.

Alternatives 3, 4, 5, 6, and 7 provide long-term effectiveness and permanence by utilizing source controls (landfill cap, consolidation of soils under landfill cap, landfill gas collection and treatment, leachate extraction and treatment) which will result in a minimal residual risk. The landfill cap is considered to be an effective long-term technology to reduce migration from the landfill, however long-term maintenance will be required. Alternatives 5, 6, and 7 provide a more permanent soils remedial action by treating soils prior to placement under the landfill cap.

Alternatives 3, 4, 5, and 6 rely, to a certain degree, on treatment/containment components of the alternatives to decrease ground water contamination and achieve cleanup levels in ground water. Long term ground water monitoring will be required for alternatives 3, 4, 5, and 6 to: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area)); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site. Long-term ground water monitoring will be required for alternative 7 to monitor for changes in ground water flow and potential migration of contaminated ground water from the Site.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to an assessment of the degree to which a remedial action utilizes treatment to address the principal threats to human health and the environment at the Site. Details of the treatment systems will be identified during the remedial design.

Alternative 1 provides no treatment and therefore no reduction in contaminant toxicity, mobility, or volume (TMV).

Landfill Gases
Alternatives 3, 4, 5, 6, and 7 reduce toxicity, mobility, and volume of contamination in landfill gases through treatment.

Leachate

Alternatives 3, 4, 5, 6, and 7 reduce toxicity, mobility, and volume of leachate contamination through treatment.

Soils

Alternatives 5, 6 and 7 reduce mobility, but not toxicity or volume, of soil contaminants through treatment prior to consolidation.

Ground Water

Alternative 3 does not utilize treatment to reduce TMV of ground water contamination. Alternatives 4, 5, 6, and 7 reduce TMV of ground water contamination through treatment, but each alternative treats different areas of ground water contamination (shallow and primary aquifers adjacent to the landfill and primary aquifer south of the river (Eldorado Plat area)). Alternative 4 utilizes treatment to reduce TMV of ground water contamination in the shallow aquifer adjacent to the landfill. Alternative 5 utilizes treatment to reduce TMV of ground water contamination in the shallow and primary aquifers adjacent to the landfill. Both Alternatives 4 and 5 will reduce TMV of ground water contamination in the primary aquifer south of the river (Eldorado Plat area). Alternative 6 utilizes treatment to reduce TMV of ground water contamination in the primary aquifer south of the river (Eldorado Plat area). Alternative 7 utilizes treatment to reduce TMV of ground water in the shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area).

5. Short-Term Effectiveness

Addresses the potential adverse effects that implementation of a remedial action may have on human health and the environment, i.e., effects to the community, workers and environment during construction and before cleanup levels are achieved. Time until protection is achieved is also evaluated.

Alternative 1 (the No Action Alternative) poses no potential adverse short-term effects to on-site workers. Alternatives 3, 4, 5, 6, and 7 may pose risks to workers installing landfill gas extraction wells and flares, workers excavating and consolidating contaminated soils, and workers installing the landfill cap. These risks will be negligible once gas extraction wells are installed and operating, contaminated soils are excavated and consolidated, and the cap is installed. Risks may be posed to workers involved with installing institutional controls, flood protection, and storm water controls. Workers involved with routine ground water monitoring may be exposed to contaminated ground water until cleanup levels are reached. Alternatives 5, 6 and 7 may pose risks to workers treating contaminated soils prior to their placement under the landfill cap. Alternatives 3, 4, 5, 6, and 7 may pose risks to workers through direct contact with leachate/ground water while installing leachate extraction wells, ground water extraction wells, and leachate and ground water treatment systems.

These potential adverse effects will be controlled by implementation of engineering controls, through the use of personal protective equipment, and by the implementation of a health and safety plan during construction.

Installation of the landfill gas wells may pose risks to the community. Risks will be minimized by installing the wells during suitable weather conditions.

Alternatives 6 and 7 may pose short-term risks to the residents of Eldorado Plat due to dust and noise generated during drilling and pipeline construction of the off-site ground water extraction well system.

Alternative 1, the No Action Alternative, has no timeframe to achieve protection. Alternatives 3, 4 and 5 should attain cleanup levels in approximately 6 years. Alternatives 6 and 7 should attain cleanup levels in approximately 8 years.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedial action, including the availability of services and materials.

All alternatives are expected to be technically feasible and administratively implementable. Alternatives 5, 6 and 7 are implementable; however, the soil treatment component to be implemented prior to consolidation under the landfill cap, common to these alternatives, is more complex to administer.

The leachate extraction and treatment system component of Alternatives 3, 4, 5, 6, and 7 is implementable. Alternatives 4, 5, 6 and 7 are more difficult to implement than Alternative 3 due to the installation and operation of the on-site ground water extraction and treatment system. Alternatives 6 and 7 are the most complex alternatives due to the construction of a pipeline crossing the river to transport ground water extracted from the primary aquifer south of the river (Eldorado Plat area), north to the on-site treatment system.

7. Cost

Cost includes estimated capital and operation and maintenance costs for a remedial action, and also is expressed as net present worth cost.

Alternative 1

No Cost

Alternative 3

Estimated Capital Cost:	$11,463,000
Estimated Annual O&M Costs:	$ 398,000
Estimated Present-Worth Costs:	$16,820,000
Estimated Implementation Timeframe:	6 years

Alternative 4

Estimated Capital Cost:	$12,911,000
Estimated Annual O&M Costs:	$ 544,000
Estimated Present-Worth Costs:	$20,510,000
Estimated Implementation Timeframe:	6 years

Alternative 5

Estimated Capital Cost:	$13,884,000
Estimated Annual O&M Costs:	$ 618,000
Estimated Present-Worth Costs:	$22,620,000
Estimated Implementation Timeframe:	6 years

Alternative 6

Estimated Capital Cost:	$12,600,000
Estimated Annual O&M Costs:	$ 519,000
Estimated Present-Worth Costs:	$19,810,000
Estimated Implementation Timeframe:	8 years

Alternative 7

Estimated Capital Cost:	$14,341,000
Estimated Annual O&M Costs:	$ 617,000
Estimated Present-Worth Costs:	$23,060,000
Estimated Implementation Timeframe:	8 years

Alternative 1 does not entail any cost at the present time, but may result in the need for costly remediation in the future. Alternative 7 is estimated to be the most expensive alternative, followed by (from most to least expensive) Alternatives 5, 4, 6, and 3.

MODIFYING CRITERIA:

8. State Acceptance

State acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, the State of Ohio concurs, opposes, or has no comment on the selected remedial action.

The State of Ohio concurs with the selected remedial action.

9. Community Acceptance

Community acceptance addresses the community's acceptance of the preferred alternative presented in the Proposed Plan based on comments received during the public comment period. The Responsiveness Summary, attached to this ROD, contains significant comments received during the public comment period and the Agencies' response to those comments.

IX. SELECTED REMEDIAL ACTION

The U.S. EPA has selected Alternative 4 for the final remediation of the Powell Road Landfill Superfund Site.

Alternative 4 includes:

- institutional controls
- improved landfill cap with liner
- excavation of contaminated soils
- consolidation of contaminated soils under landfill cap
- ground water monitoring
- flood protection
- storm water controls
- active landfill gas collection with flare
- leachate extraction
- on-site leachate treatment
- extraction of ground water from the shallow aquifer adjacent to the landfill
- on-site ground water treatment
- discharge of treated ground water and leachate to river

Estimated Capital Cost:	$12,911,000
Estimated Annual O&M Costs:	$ 544,000
Estimated Present-Worth Costs:	$20,510,000
Estimated Implementation Timeframe:	6 years

Contaminated soils will be consolidated on the landfill and a landfill cap with liner will contain the landfill and contaminated soils. The landfill cap will prevent migration of contaminated soils into surface water, reduce infiltration of precipitation into the landfill thereby reducing generation of leachate and also reducing the percolation of leachate from the landfill into ground water. Leachate will be extracted from the landfill and treated on-site. Ground water will be extracted from the shallow aquifer adjacent to the landfill and treated on-site.

The selected remedy will address the two source areas for ground water contamination at the Site; leachate in the landfill and ground water in the shallow aquifer adjacent to the landfill. The geology of the Site indicates that contamination in the shallow aquifer adjacent to the landfill could migrate under the Great Miami River and this aquifer is a possible source of contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). Adjacent to the landfill, the shallow aquifer is separated from the primary aquifer under the southern portion of the landfill and under the river, therefore, leachate in the landfill and ground water contamination in the shallow aquifer adjacent to the landfill are the probable sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). The selected remedy will not actively remediate ground water contamination identified in the primary aquifer adjacent to the landfill or ground water contamination identified south of the river (Eldorado Plat area). By extracting and treating leachate from the landfill and ground water from the shallow aquifer, the source of ground water contamination identified in the primary aquifer (adjacent to the landfill and south of the river (Eldorado Plat area) will be reduce and ground water contamination is expected to decrease and cleanup levels will be achieved. Ground water contamination should decrease and achieve cleanup levels in an estimated 6 years.

Ground water monitoring is an essential part of this remedy. A ground water monitoring network will be established on the Site (around the landfill and south of the river (Eldorado Plat area)). Ground water monitoring will serve two purposes: 1) evaluate the effectiveness of the treatment/containment components of the remedy to reduce risks in ground water (shallow and primary aquifers adjacent to the landfill and the primary aquifer south of the river (Eldorado Plat area); and, 2) monitor for changes in ground water flow and potential migration of contaminated ground water from the Site. If ground water monitoring identifies that ground water contamination is not decreasing and cleanup levels are not being achieved, the remedy will be reevaluated. The remedial design will develop the specific details of the ground water monitoring network, including the number and location of wells necessary to monitor ground water. The specifics of the ground water monitoring system, including frequency and duration, will be determined during the remedial design.

Off-site ground water contamination identified in the Needmore Road area during the RI, could not be connected to contamination found on the Site. However, if in the future a connection is found which identifies PRL as the source of contamination in the Needmore Road area, either a ROD amendment or an Explanation of Significant Differences will be prepared, as appropriate.

The remedial design will identify the appropriate number and location of wells to collect/extract landfill gas, leachate, and ground water.

Cleanup levels to be achieved by the selected remedial action will be chemical-specific ARARs (see Section X.B.1.). If multiple contaminants are present in the media (i.e. ground water), and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of 10^{-4} across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21). The point of compliance for ground water cleanup levels will be the boundary of the landfill. Ground water cleanup levels shall be achieved at and beyond the landfill. The point of compliance for cleanup levels of landfill gas emissions shall be the fence surrounding the landfill area.

The selected remedial action is expected to be the final response for the Site. Because this remedial action will result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of remedial action to insure that the remedial action continues to provide adequate protection of human health and the environment.

X. STATUTORY DETERMINATIONS

The U.S. EPA believes that Alternative 4 meets the threshold criteria and provides the best protection with respect to the criteria used to evaluate the alternatives (National Contingency Plan 40 CFR Part 300.430(f)(5)(ii)(A-F).

A. Protection of Human Health and the Environment

Alternative 4 utilizes institutional controls to reduce risks posed to trespassers by fencing the Site and posting warning signs, and reduces the risks posed to potential future users of the Site by imposing deed restrictions on the landfill property.

Numerous source controls are utilized by Alternative 4: landfill cap; landfill gas collection and treatment; leachate extraction and treatment; and excavation and consolidation of contaminated soils under the landfill cap. The risks posed by inhalation of landfill gases are reduced by collecting and treating landfill gases.

The interaction of several components of Alternative 4 will decrease ground water contamination and achieve cleanup levels. The landfill cap will reduce infiltration of precipitation into the landfill, thereby reducing generation of leachate, and also reducing the percolation of leachate from the landfill into ground water. Extraction and treatment of leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill will address the primary sources of ground water contamination and risks posed by ground water contamination in the shallow aquifer (adjacent to the landfill). Leachate and ground water in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer adjacent to the landfill and south of the river (Eldorado Plat area). Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, a minimum of 6 years will be required to decrease ground water contamination and achieve ground water cleanup levels in the shallow and primary aquifers adjacent to the landfill and in the primary aquifer south of the river (Eldorado Plat area).

The risks posed by ingestion of fish are based on the potential migration of contaminated soils into surface water and sediment. These risks will be controlled and reduced by excavating and consolidating contaminated soils under the landfill cap.

Cleanup levels to be achieved by the selected remedial action will be chemical-specific ARARs (Table 22). If multiple contaminants are present in the media (i.e. ground water), and cleanup of individual contaminants to ARARs result in a cumulative risk in excess of 10^{-4} across a media, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21). If chemical-specific ARARs do not exist for contaminants, cleanup levels of contaminants will be risk-based and cumulative across a media to $1x10^{-4}$ or less (Table 21).

Potential adverse short-term risks posed to on-site workers will be controlled by implementation of engineering controls. No cross-media impacts will be caused by implementation of Alternative 4.

B. Compliance with ARARs

Alternative 4 will meet or attain all applicable or relevant and appropriate Federal or State requirements (ARARs) and will be implemented in a manner consistent with those laws. It is important to note that on-site actions are required to comply with ARARs, but must comply only with the substantive parts of the applicable or relevant and appropriate requirement. Off-site actions must comply only with applicable requirements, but must comply fully with both substantive and administrative requirements. For example, at the Powell Road Landfill Site, the discharge to the Great Miami River of extracted ground water and extracted leachate which has been treated will be an off-site discharge, and will therefore be subject to both the substantive and administrative requirements of Federal and State law promulgated pursuant to the Clean Water Act National Pollutant Discharge Elimination System. The chemical-specific, location-specific and action-specific ARARs for the selected remedial action for the PRL are identified below.

1. Chemical-Specific ARARs

Chemical specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically determine the extent of clean-up at a Site. For the PRL site, these are:

a. Federal Chemical-Specific ARARs

Safe Drinking Water Act MCLs and MCLGs - Maximum Contaminant Levels (MCLs) and, to a certain extent, non-zero Maximum Contaminant Level Goals (MCLGs), the Federal Drinking Water Standards promulgated under the Safe Drinking Water Act (SDWA) are applicable to municipal drinking water supplies servicing 25 or more people. MCLGs are relevant and appropriate when the standard is set at a level greater than zero (for non-carcinogens); otherwise, MCLs are relevant and appropriate. At the Powell Road Landfill (PRL) site, MCLs and MCLGs are not applicable, but are relevant and appropriate since the aquifer in which the PRL site is located is a sole-source aquifer for drinking water for the City of Dayton. The point of compliance for the Federal drinking water standards is at the boundary of the landfilled waste and throughout the contaminated ground water plume associated with the PRL site.

Clean Air Act (40 CFR Part 50) - The Clean Air Act requirements include the TSP standard for air discharges. This requirement is applicable to the PRL site because the gas extraction and treatment, leachate treatment, excavation and consolidation of contaminated soils, and various other treatment methods which are part of this remedy are potential sources of fugitive dust, particulate, and/or VOCs.

See Table 22 for a list of additional Federal chemical-specific ARARs.

b. State Chemical-Specific ARARs

See Table 23 for a list of the State of Ohio Chemical-Specific

2. Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographic position of the Site. For the PRL site, these are:

a. Federal Location-Specific ARARs

The Clean Water Act Section 404 - This section of the Act regulates the discharge of dredge and fill materials at sites to waters of the United States. These regulations are applicable to the PRL site, since there are wetlands located on the site.

Wetland Management Executive Order 11990 - This order requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands. This requirement is applicable to the PRL site since there are wetlands located on the Site.

RCRA location standards 40 CFR Part 264.18 - These standards specify that a facility located in a flood plain must be designed, constructed, operated, and maintained to prevent washout of hazardous wastes by a 100-year flood plain. This requirement is applicable to the PRL site if a hazardous waste management unit is created on-site as a result of air stripping or other on-site treatment, these standards are applicable to the PRL because the site is located in a 100-year flood plain.

Floodplain Management Executive Order 11988 - This order requires minimization of potential harm to or within flood plains and the avoidance of long- and short-term adverse impacts associated with the occupancy and modification of flood plains. This order is applicable to the PRL site since the PRL site is located within a flood plain.

b. State Location-Specific ARARs

See Table 24 for a list of the State of Ohio location-specific ARARs.

3. Action-Specific ARARs

Action-Specific ARARs are requirements that define acceptable treatment and disposal procedures for hazardous substances. For the PRL site, these are:

a. Federal Action-Specific ARARs

RCRA Subtitle C Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities (40 CFR Part 264)

- These requirements govern the owners and operators of hazardous waste treatment storage and disposal facilities. These requirements are applicable to the PRL site if a hazardous waste management unit is created on-site as a result of air stripping or other on-site treatment methods.

Clean Air Act Standards for the Approval and Promulgation of Implementation Plans (40 CFR Part 52) - These requirements govern the approval and promulgation of implementation plans. These requirements are applicable to the PRL site because of various aspects of the remedy for the PRL site including excavation and consolidation of contaminated soils, gas collection and treatment, and the use of several treatments methods at the site.

Toxic Substances Control Act Standards for Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce and Use Prohibitions (40 CFR Part 761) - These requirements govern the manufacturing, processing, distribution in commerce and use prohibitions for polychlorinated biphenyls (PCBs). These requirements will be applicable to the PRL site if additional testing is done of the contaminated soils to be excavated and consolidated as part of the PRL site remedy is done, and the soils are found to exceed a PCB level of 50 parts per million.

Clean Air Act Air Quality and Emission Limitations (Clean Air Act Section 110). These requirements relate to air quality and emission limitations. These requirements are applicable to the PRL site due to various aspects of the remedy for the PRL site including excavation and consolidation of contaminated soils, gas collection and treatment, and the use of several treatment methods at the Site.

b. State Action-Specific ARARs

See Table 25 for a list of the State of Ohio action-specific ARARs.

4. To Be Considered

a. Federal to be Considered

"Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites" (June 15, 1989) (OSWER Directive 9355.0-28) - This guidance indicates that sources that need controls are those with actual emissions rates in excess of 3 lbs/hr, or 15 lbs/day, or a calculated rate of 10 tons/year (T/yr) of total VOCs. This guidance should be considered at the PRL site if one of the treatment methods used as part of the remedy for the PRL site is a ground-water-pump-and-treat technique used together with air strippers, and if the emission rates at the PRL exceed these rates, and since the PRL is located in an ozone non-attainment area.

C. Cost-Effectiveness

The U.S. EPA believes that the selected remedial action is cost-effective in mitigating the risks posed by the Site contaminants within a reasonable period of time. Section 300.430(f)(ii)(D) of the NCP requires EPA to evaluate cost-effectiveness by comparing all the alternatives which meet the threshold criteria of protection of human health and the environment against three additional balancing criteria: long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness. The selected remedial action meets these three criteria and provides overall effectiveness in proportion to its cost. The estimated cost for the selected remedial action is $20.5 million, which is a reasonable value for the expected results to be achieved by the selected remedial action.

D. Utilization of permanent solutions and alternate treatment technologies to the maximum extent practicable

U.S. EPA believes that the selected remedial action represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner to address contamination and risks associated with the Site and potential migration of contaminants away from the Powell Road Landfill. The selected remedial action provides the best balance of tradeoffs in terms of long-term effectiveness or permanence; reduction in toxicity, mobility or volume; short-term effectiveness; implementability; cost; and State and community acceptance.

The criterion of overall protection of human health and the environment and long-term effectiveness and permanence were crucial in the decision to select Alternative 4. Overall protection of human health and the environment was best achieved by the selected remedial action because it provides protection of human health from risks through treatment of leachate and ground water in the shallow aquifer adjacent to the landfill. By treating contamination in leachate and ground water in the shallow aquifer adjacent to the landfill, ground water contamination will decrease, cleanup levels will be achieved, and the continued migration of leachate and contaminated ground water from the shallow aquifer adjacent to the landfill is reduced. Leachate and ground water contamination in the shallow aquifer adjacent to the landfill are the primary sources of ground water contamination identified in the primary aquifer, adjacent to the landfill and south of the river (Eldorado Plat area). Extraction and treatment of leachate from the landfill and ground water from the shallow aquifer adjacent to the landfill will address these sources of ground water contamination and associated risks. Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, contamination in the primary aquifer adjacent to the landfill and south of the river, will decrease and achieve cleanup levels.

Long-term effectiveness and permanence was best achieved by the selected remedial action due to leachate and ground water treatment components. Leachate in the landfill and ground water in the shallow aquifer adjacent to the landfill will be extracted and treated to reach cleanup levels and reduce residual risks in ground water. The ground water in the shallow aquifer adjacent to the landfill has the highest ground water risks, and during the breakdown and dispersion of ground water contamination, risks to downgradient well users could exist. Once the landfill cap is constructed and the landfill gas, leachate, and ground water extraction/treatment systems are operational, the source of ground water contamination in the primary aquifer south of the river (Eldorado Plat area) will no longer exist and ground water contamination in the primary aquifer (adjacent to the landfill and south of the river (Eldorado Plat area)) will reduce and achieve cleanup levels (estimated to occur in a minimum of 6 years).

Alternative 7 is the only alternative that actively addresses all areas of ground water contamination associated with the landfill and reduces risks posed by ground water contamination. Ground water contamination in the primary aquifer south of the river (Eldorado Plat area) is addressed in Alternative 7 by extracting ground water from the primary aquifer south of the river (Eldorado Plat area), transporting the extracted ground water across the river via a pipe, to the Site for on-site treatment. This ground water technology was considered too expensive and too complex to implement compared to the minimal reduction of ground water risks.

The State of Ohio concurs with the selected remedial action. The community's comments received during the public comment period are summarized in the Responsiveness Summary, attached to this ROD, along with the Agencies' response to comments.

The selected remedial action meets the statutory requirement to utilize permanent solutions and treatment technologies, to the maximum extent practicable.

E. Preference for Treatment

The selected remedial action satisfies the statutory preference for treatment as a principal element. Landfill gases and leachate will be collected/extracted and treated on-site. Ground water will be extracted from the shallow aquifer adjacent to the landfill and treated on-site. Leachate will be extracted from the landfill and treated on-site. The Powell Road Landfill, the source of contamination, will not be treated, but will be contained by a landfill cap.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES

The preferred alternative presented in the Proposed Plan was Alternative 5. The Record of Decision identifies the selected remedial action as Alternative 4. Because the selected remedial action was one of the alternatives presented in the Proposed Plan, the U.S. EPA was not required to seek additional public comment on a revised Proposed Plan (NCP 40 CFR Part 300.430(F)(3)(ii)(A)). The differences between these two alternatives are the following: 1) Alternative 4 does not include treatment of contaminated soils to dewater, stabilize and solidify the soils (prior to consolidation under the landfill cap), and 2) Alternative 4 does not include extraction of ground water from the primary aquifer adjacent to the landfill.

The preferred alternative presented in the Proposed Plan was modified as a result of comments received during the public comment period. Public comments caused the U.S. EPA and Ohio EPA (the Agencies) to reevaluate the preferred alternative. Several major comments were received during the public comment period which questioned various aspects of the leachate and ground water extraction and treatment components of the preferred alternative. Based on these comments the Agencies consulted technical experts for assistance with the issues. Below is a summary of the comments, followed by the actions the Agencies took to resolve the issues.

Comment 1.
A ground water extraction system could compromise the leachate extraction system, and pull contamination from the leachate/ground water adjacent to the landfill, deeper into the primary aquifer.

Action:
PRL documents were reviewed by the Agencies' technical staff and calculations of estimated drawdown of the ground water table which could be caused by a ground water extraction system were calculated. These calculations estimate conditions under which ground water extraction could have a negative effect on a leachate extraction system.

Drawdown calculations of a ground water extraction system in the shallow aquifer adjacent to the landfill identified minimal drawdown of the water table would occur (<1 foot). Since ground water extraction wells will be located between the southern boundary of the landfill and the river, any possible effects of ground water extraction would influence only the leachate extraction wells closest to the southern boundary of the landfill. Pumping rates of both extraction systems could be adjusted as necessary to prevent any negative interaction of the two extraction systems.

Drawdown calculations of a ground water extraction system in the primary aquifer adjacent to the landfill identified substantial drawdown of the water table may occur (possibly 4 feet). Therefore, extraction of ground water from the primary aquifer adjacent to the landfill could increase downward migration of contamination from the shallow aquifer adjacent to the landfill into the primary aquifer adjacent to the landfill, except where the confining till layer would limit vertical migration.

Therefore, the Agencies partially agree with the commenter. Extracting ground water from the primary aquifer may compromise the leachate extraction system. However, the Agencies believe that it remains necessary to extract and treat ground water from the shallow aquifer adjacent to the landfill to reduce the risks posed by ground water in this aquifer.

Comment 2.
The Proposed Plan's preferred alternative 5 was questioned. The rationale being questioned was that by extracting ground water from the primary aquifer adjacent to the landfill, contamination identified south of the river (Eldorado Plat area), would be reduced. The commenter states that there is no evidence that PRL is the source of contamination found south of the river (Eldorado Plat area).

Action:
This comment caused the Agencies to carefully review the geology of the Site, the ground water contaminants and the migration of ground water away from the Site.

The primary aquifer which underlies the landfill is separated by a confining till layer which is present under the south side of the landfill and under the river. This till layer separates the aquifer into a shallow and primary aquifer. Although the till layer is present south of the river (Eldorado Plat area), it is not continuous and therefore the aquifers are interconnected.

Ground water contamination is found adjacent to the landfill in the shallow aquifer and in the primary aquifer. However, south of the river (Eldorado Plat area), geologic cross-sections do not show a continuous till layer separating the aquifers in the vicinity of the monitoring wells. RI ground water data in the Eldorado Plat area identifies contamination in monitoring wells both above and below the discontinuous till layer.

Ground water sampling and analysis found VOCs in the shallow aquifer adjacent to the landfill (223 ug/L), in the primary aquifer adjacent to the landfill (150 ug/L), and in the primary aquifer south of the river (Eldorado Plat area) (13 ug/L).

VOC contamination identified in the aquifers adjacent to the landfill tend to primarily consist of "ethane" compounds and VOC contamination identified south of the river (Eldorado Plat area) tend to primarily consist of "ethene" compounds. This is the major argument used in the RI to discount the landfill as the source of ground water contamination identified south of the river (Eldorado Plat area). The Agencies disagree with the argument because "ethene" compounds were found in landfill gas vents (PCE, TCE), leachate (DCE), and in the shallow aquifer adjacent to the landfill (DCE). Ethene compounds were not detected in monitoring wells in the primary aquifer adjacent to the landfill.

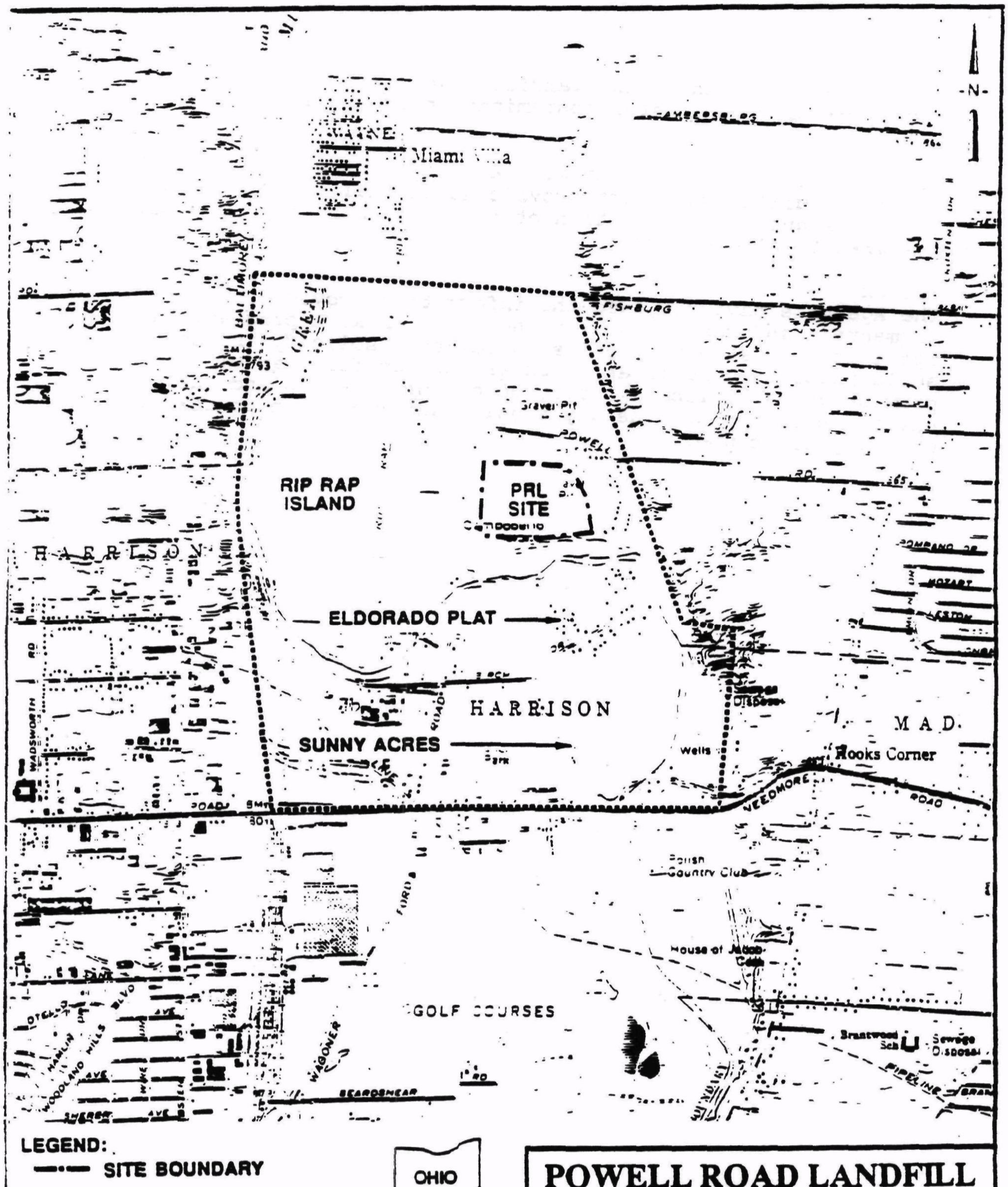
Migration of contaminants away from the landfill are based on the location of sources of contamination and the geology. The major source is the landfill, which generates leachate, which migrates into the ground water. Although the till layer does not exist directly under the landfill, ground water flow in the regional aquifer (GMR BVA) is horizontal from the north to south, and once leachate migrates into ground water, it migrates horizontally to the south. This is why the shallow aquifer adjacent to the landfill contained the highest levels of contaminants and exceeded MCLs during RI sampling. Some vertical migration of leachate/ground water also carries contamination into the primary aquifer (adjacent to the landfill), however, only 2 monitoring wells in the primary aquifer adjacent to the landfill showed contamination during RI sampling. Due to these area ground water flow patterns at the Site, migration of contaminants from the landfill to south of the river (Eldorado Plat area), must occur horizontally from either the shallow or primary aquifers adjacent to the Site (or possibly from both aquifers).

RI data suggested that the Great Miami River was a barrier to migration of ground water from adjacent to the landfill, under the river to the aquifer in the Eldorado Plat area. Thus, contamination identified in the Eldorado Plat area must have migrated from the primary aquifer adjacent to the landfill. However, in response to public comments the Agencies consulted ground water experts at Ohio EPA and were advised that the Great Miami River is not necessarily a barrier to ground water contaminant migration under the river.

In conclusion, the Agencies believe that the shallow aquifer adjacent to the landfill is one of the primary sources of contamination found in the Eldorado Plat area. As a primary source, remediation of the shallow aquifer adjacent to the landfill will significantly reduce migration of ground water contamination from the Site. This component of the remedial action, combined with leachate extraction and treatment as well as the construction of the landfill cap, is expected to eliminate migration of ground water contamination from the Site.

Comment 3.
Treatment of excavated contaminated soils, prior to consolidation on the landfill, would not provide additional protection nor provide significant reduction of toxicity, mobility or volume, compared to Alternative 4.

Action:
The Agencies have reviewed the information provided by the commenter, and consulted with the Ohio EPA RCRA program, and agree that treatment of soils to dewater, solidify and stabilize soils prior to consolidation under the landfill cap will not provide any additional protection of human health and the environment, nor provide any significant reduction of toxicity, mobility or volume.



LEGEND:

—·— SITE BOUNDARY

········ STUDY AREA BOUNDARY

0 2000 4000

SCALE IN FEET

Quadrangle Location

BASE MAP SOURCE: USGS 7 1/2 minute topographic quadrangle map, Dayton North, Ohio 1965, photorevised 1981.

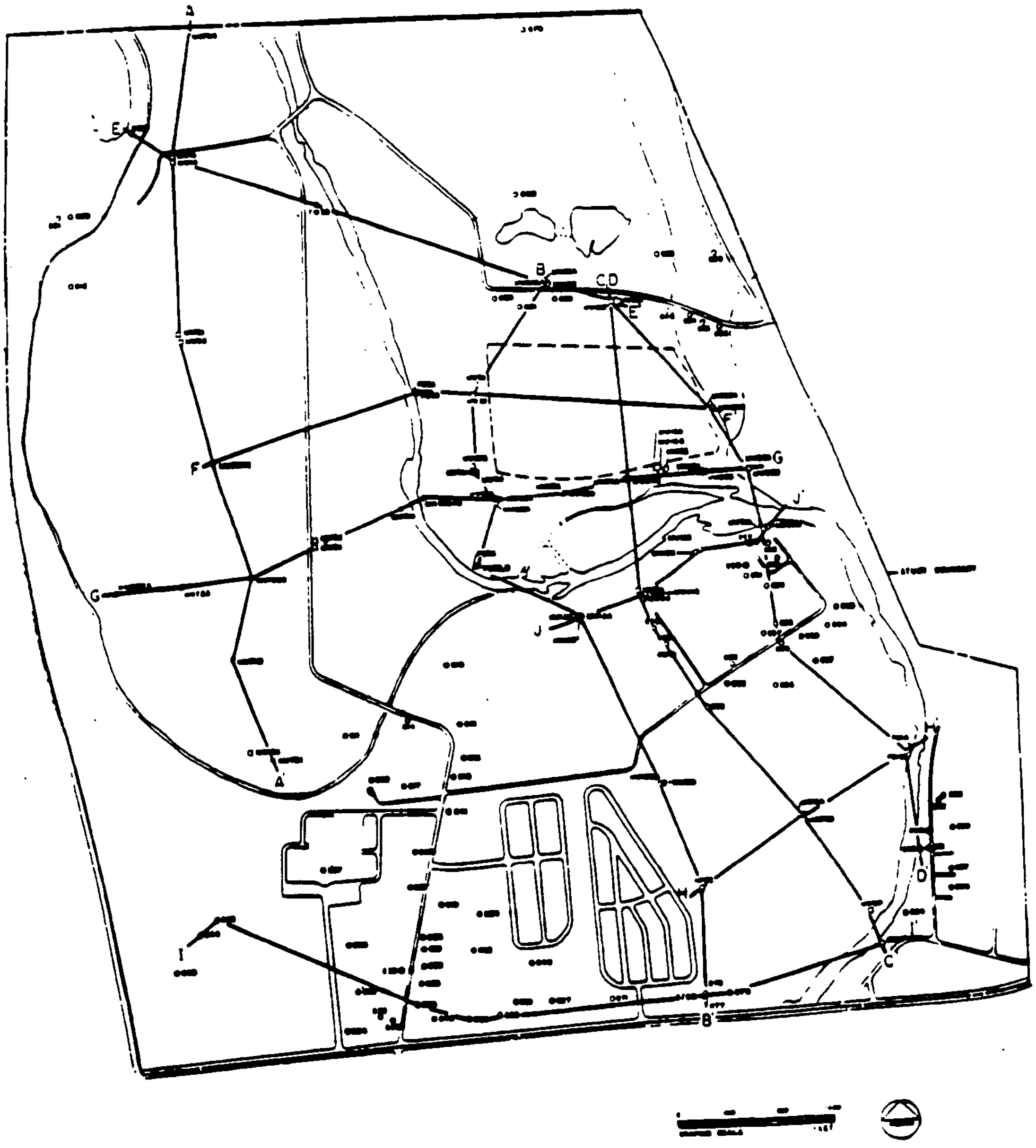
POWELL ROAD LANDFILL

SCA SERVICES OF OHIO, INC.

FIGURE 1

SITE VICINITY MAP

Dames & Moore JOB NO. 7722-277-017



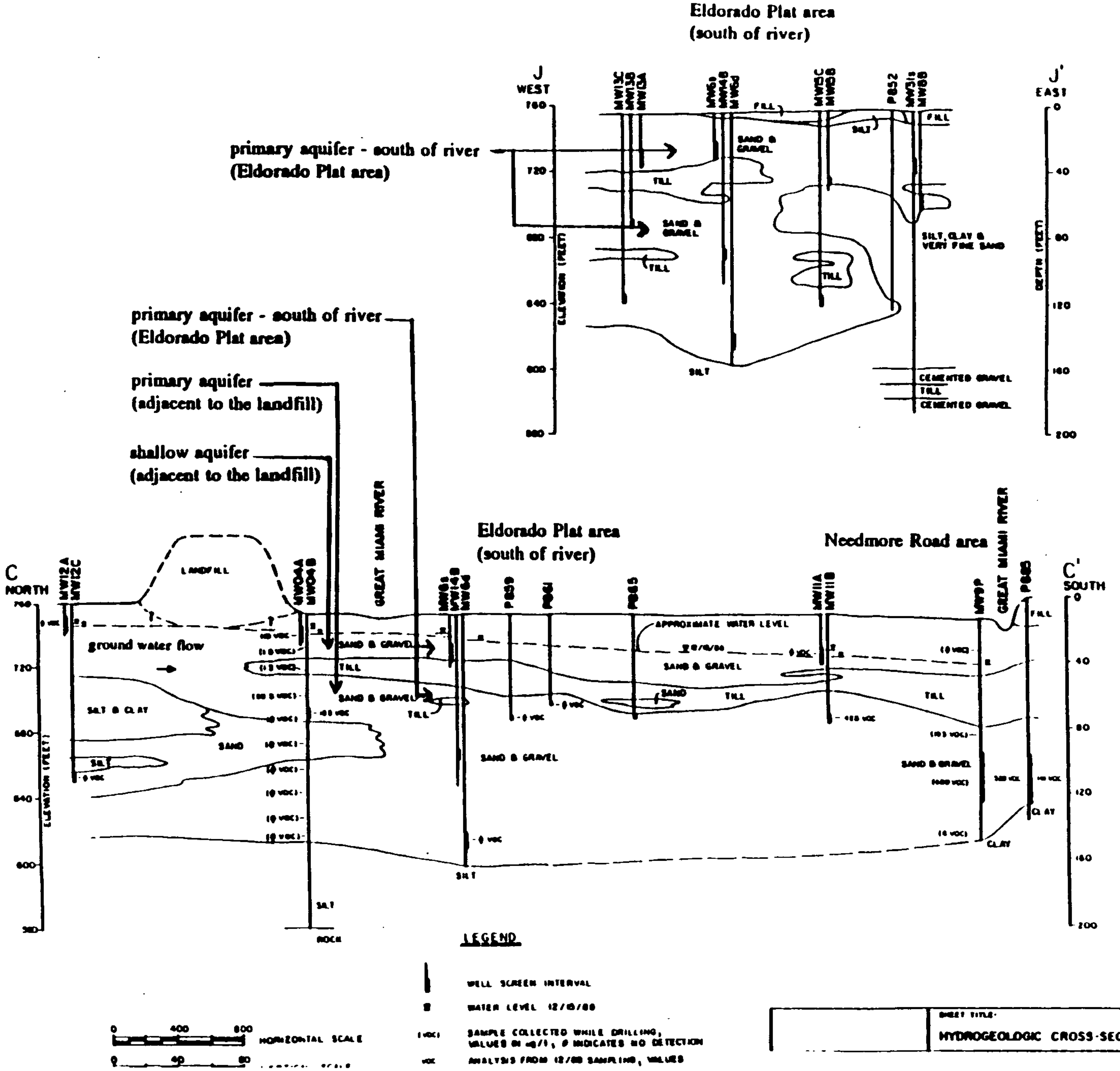
LEGEND:

- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]

POWELL ROAD LANDFILL REMEDIAL INVESTIGATION
HYDROGEOLOGIC CROSS-SECTION TRACES

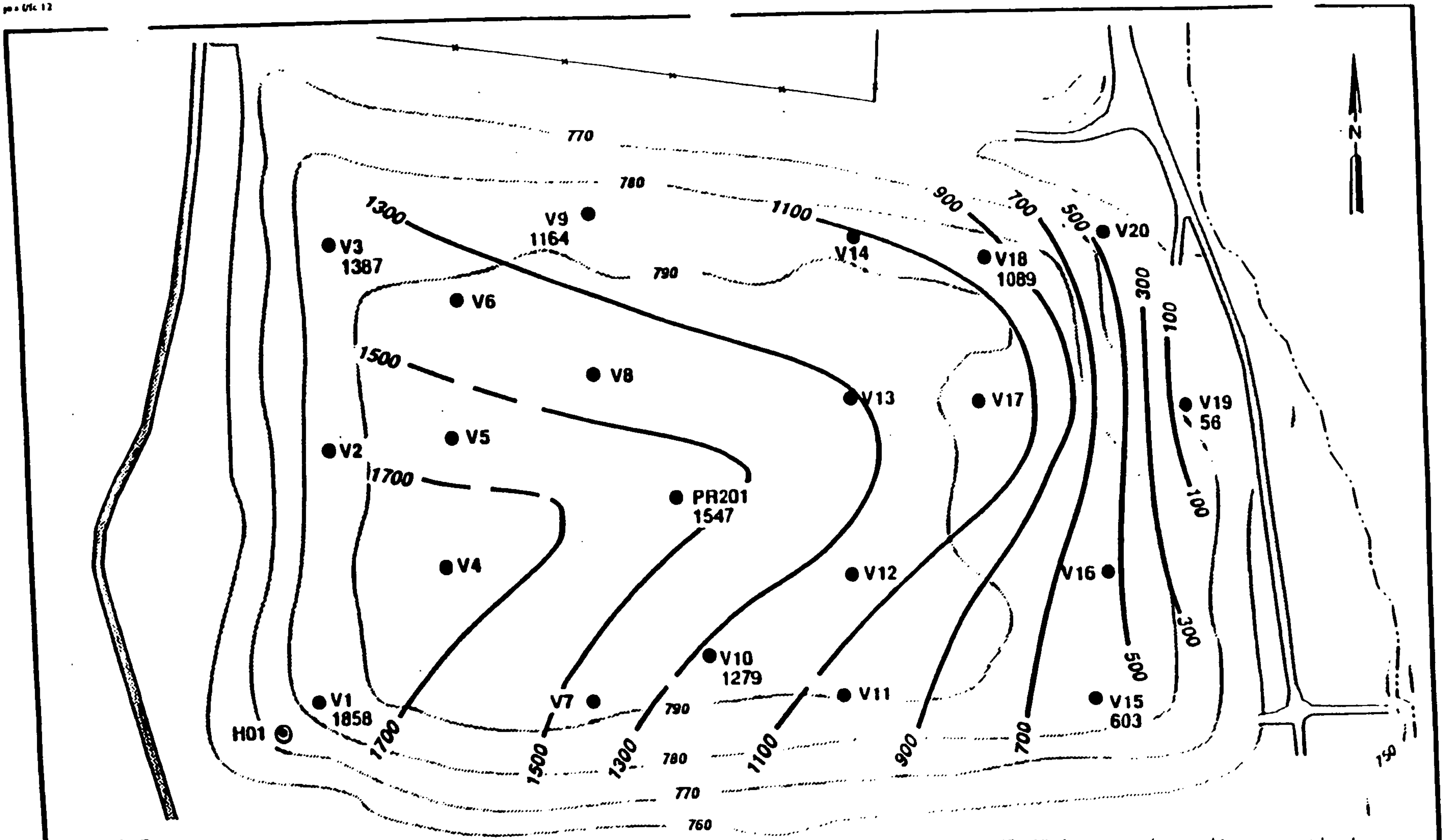
EAGON & ASSOCIATES, INC.
[illegible]
[illegible]

Figure
3



SHEET TITLE:

HYDROGEOLOGIC CROSS-SECTIONS



LEGEND:

—×—	Fence
—·-—	Intermittent Stream
— 790 —	Topographic Contour
V1 ●	Vent Location
◉ H01	Surface Leachate Sampling Location
1100 —	Total VOC concentration Contour, Contour Interval = 200 (dashed where inferred)
1858	Total VOC Concentration (milligrams/cubic meter)

0 200 400

SCALE IN FEET

NOTE: All elevations referenced to mean sea level

POWELL ROAD LANDFILL

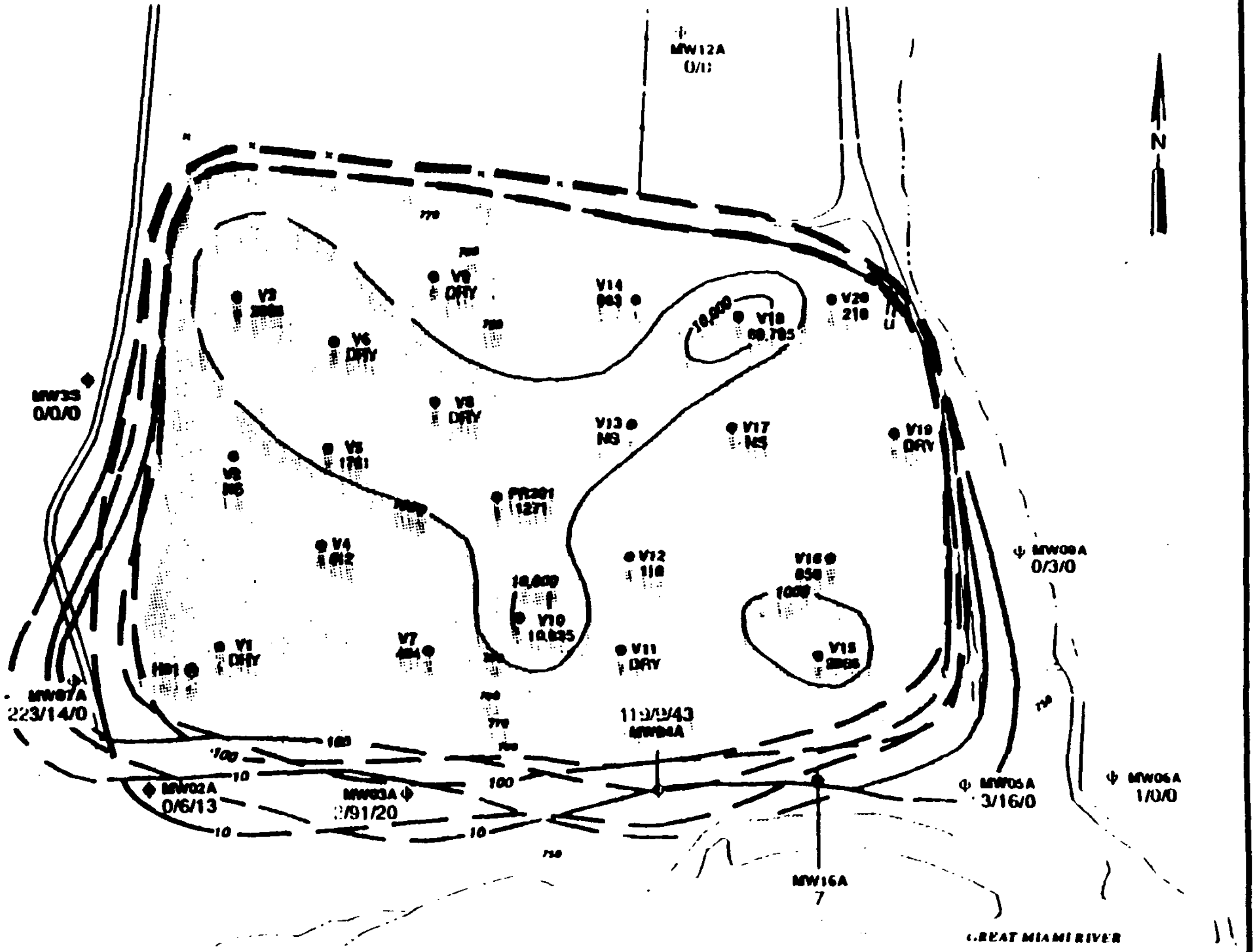
SCA SERVICES OF OHIO, INC.

FIGURE 4

GAS VENT VAPOR
TOTAL VOC CONCENTRATIONS

LEGEND:

×	Fence
— · · —	Intermittent Stream
770	Topographic Contour
● V8	Vent Location
⊕ H01	Surface Leachate Sampling Location
⊕ MW07A	Shallow Monitoring Well Location
494	Vent Liquid Total VOC Concentration (micrograms/liter) October - November 1988
NS	Not Sampled Due to Access Problems
— 1000 —	Vent Liquid Total VOC Contour, Logarithmic Contour Interval
223/14/0	Ground Water Total VOC Concentration (micrograms/liter) December 1988/ April 1989/February 1991
— 100 —	Total VOC Contour Reflecting December 1988 Ground Water Data
— 100 —	Total VOC Contour Reflecting April 1989 Ground Water Data
— 100 —	Total VOC Contour Reflecting February 1991 Ground Water Data
▨	Approximate Landfill Area



NOTE: All elevations referenced to mean sea level.

BASE MAP SOURCE: Topographic Survey of Powell Road Landfill, Collins-Sadder & Associates, January 16, 1988.

0 300 600

APPROXIMATE SCALE IN FEET

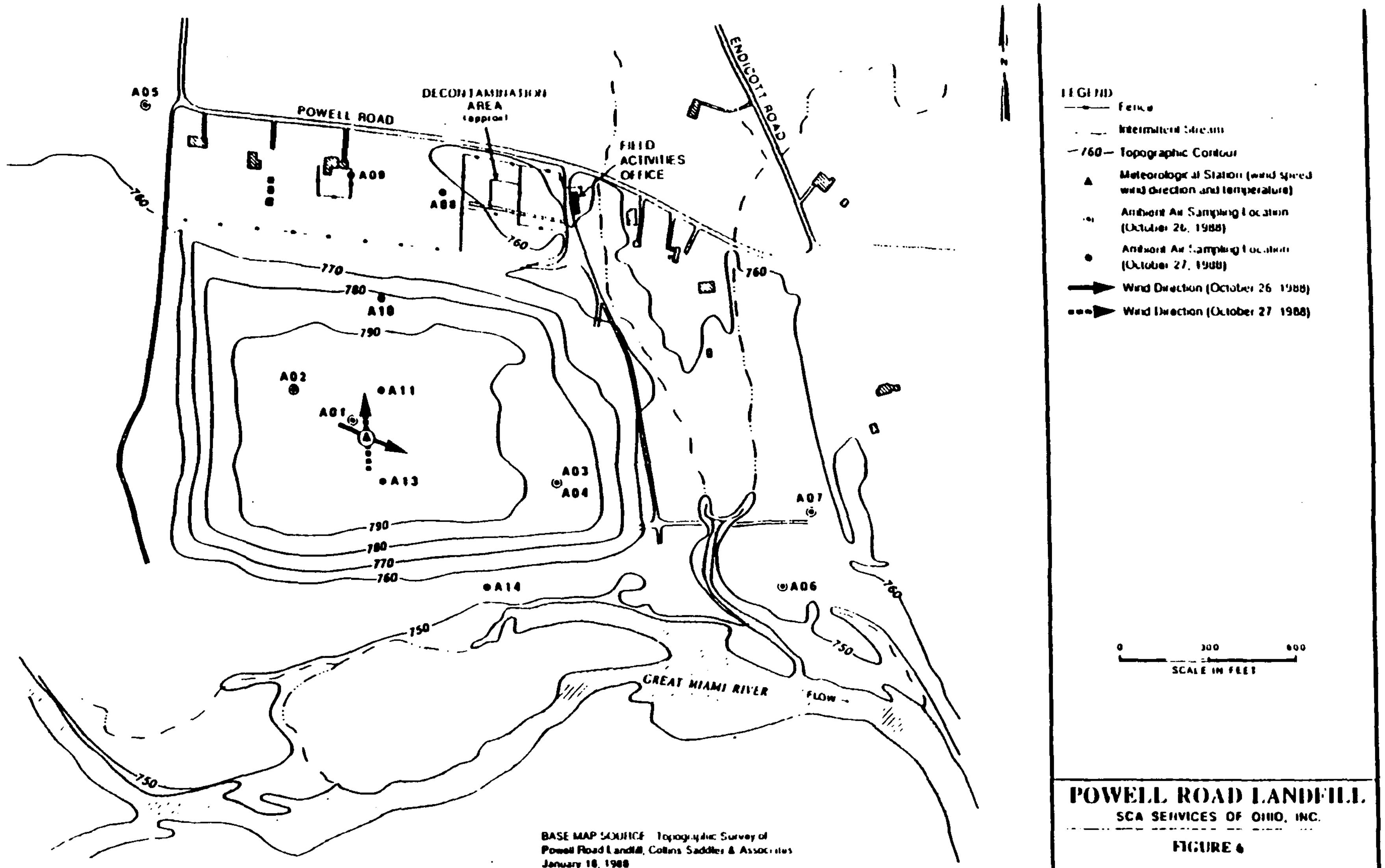
POWELL ROAD LANDFILL

SCA SERVICES OF OHIO, INC.

FIGURE 5

LANDFILL LIQUIDS/GROUND WATER TOTAL VOC CONCENTRATIONS

Dames & Moore JOB NO. 7722 267 121



BASE MAP SOURCE Topographic Survey of
Powell Road Landfill, Collins Saddler & Associates
January 18, 1988

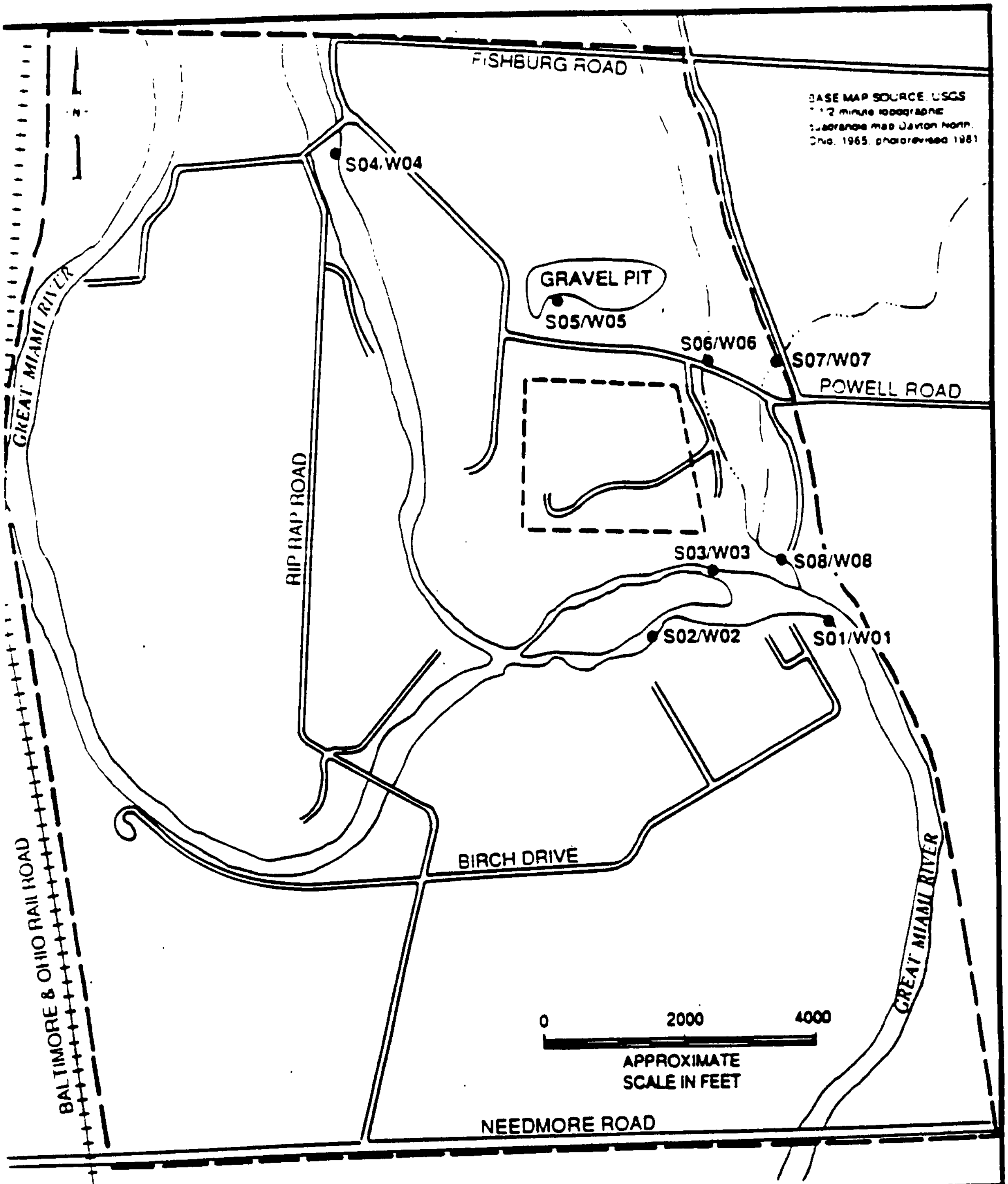
POWELL ROAD LANDFILL

SCA SERVICES OF OHIO, INC.

FIGURE 6

AMBIENT AIR QUALITY
SAMPLE LOCATIONS

DAMES & MOORE JOB NO. [illegible]



BASE MAP SOURCE: USGS 7 1/2 minute topographic quadrangle map Dayton North, Ohio, 1965, photorevised 1981

LEGEND:

- — — Approximate Limits of Study Area
- – – – Approximate Landfill Limits
- —·-— Intermittent Stream
- ● S02/W02 Sediment/Surface Water Sampling Location

POWELL ROAD LANDFILL

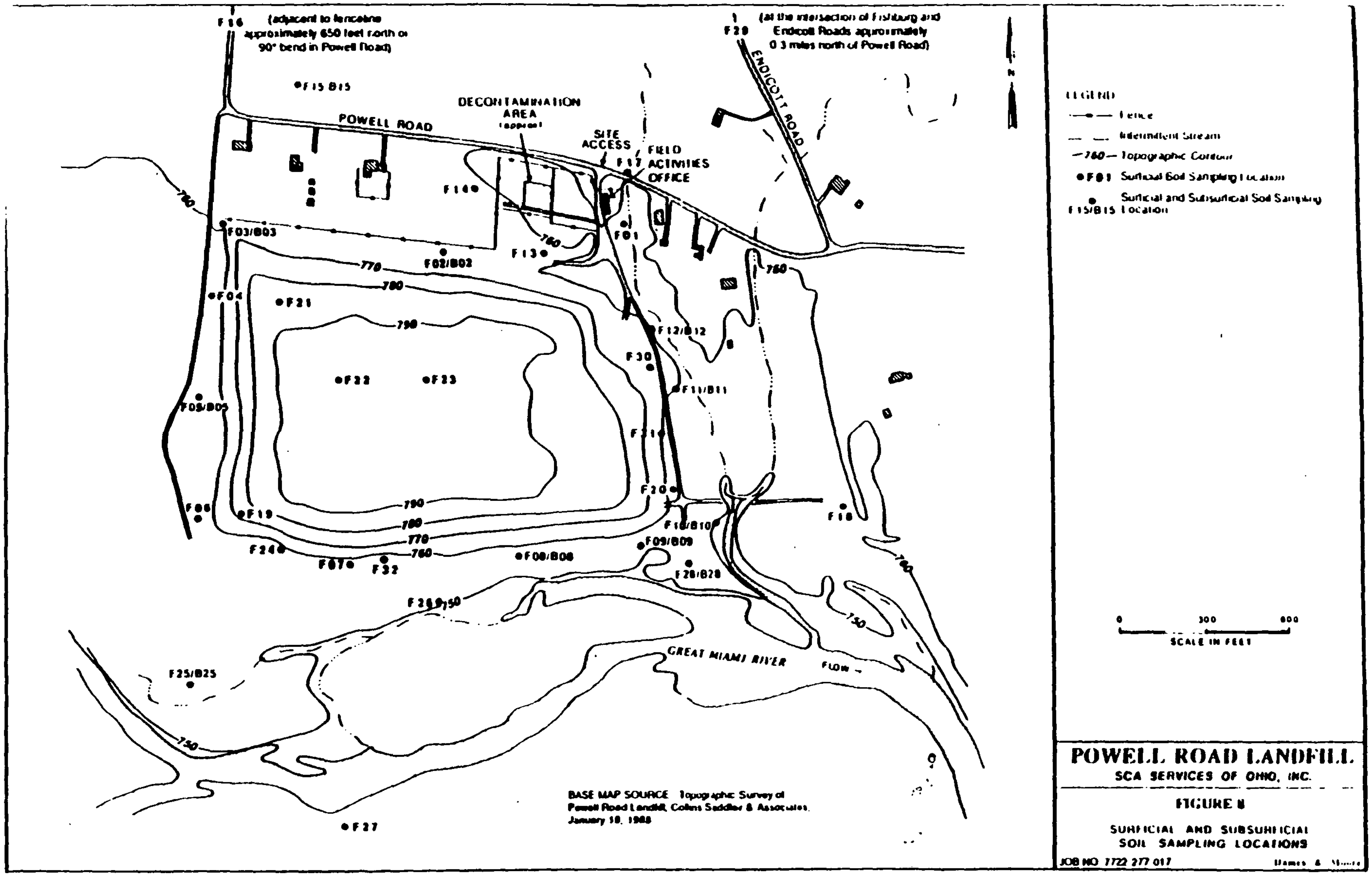
SCA SERVICES OF OHIO, INC.

FIGURE 7

SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS

DAMES & MOORE

JOB NO. 7722-277-017



(adjacent to fenceline approximately 650 feet north of 90° bend in Powell Road)

(at the intersection of Fishburg and Endicott Roads approximately 0.3 miles north of Powell Road)

BASE MAP SOURCE Topographic Survey of Powell Road Landfill, Collins Saddler & Associates, January 18, 1988

POWELL ROAD LANDFILL

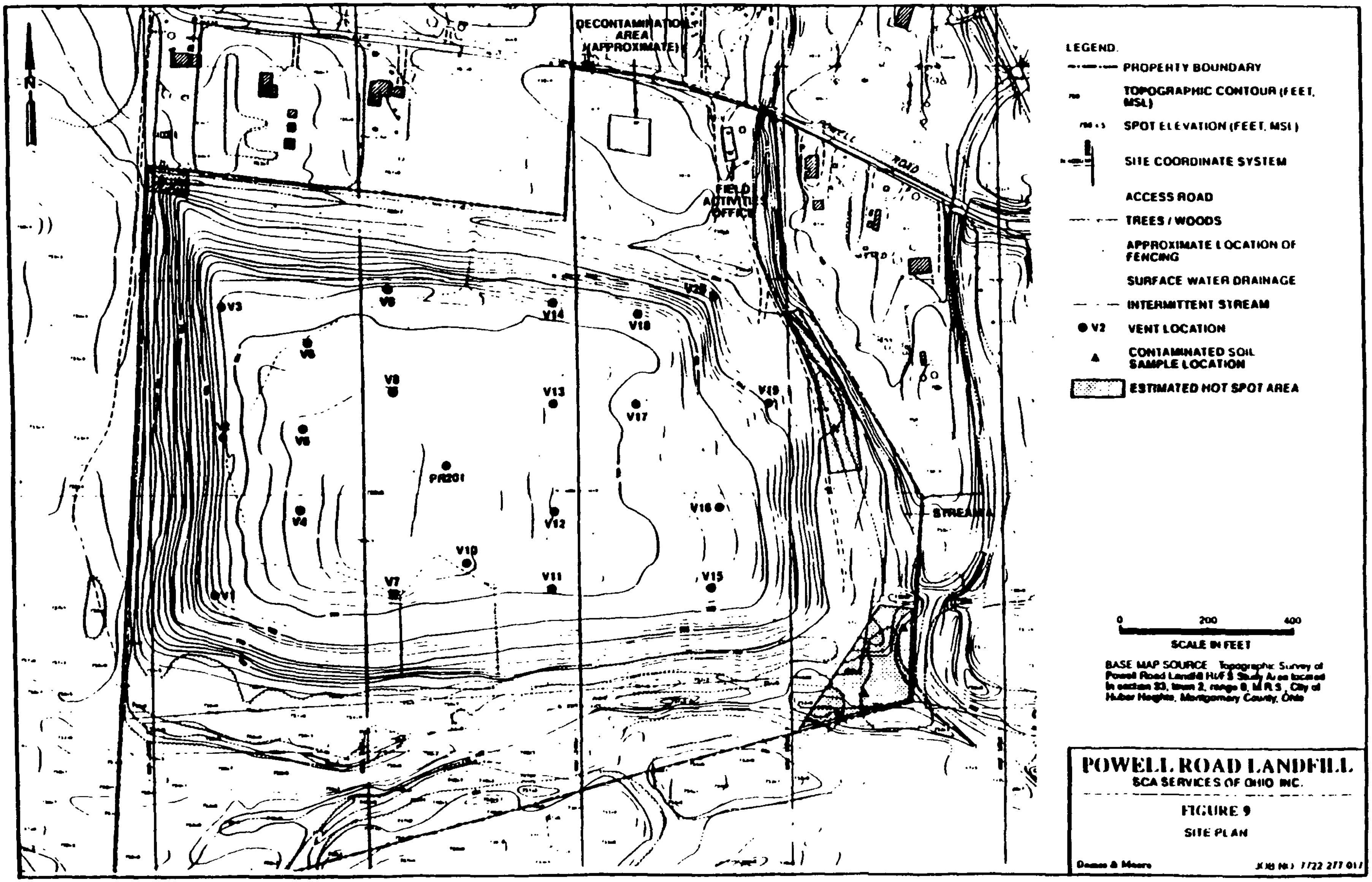
SCA SERVICES OF OHIO, INC.

FIGURE 8

SURFICIAL AND SUBSURFICIAL SOIL SAMPLING LOCATIONS

JOB NO 7722 277 017

Dames & Moore



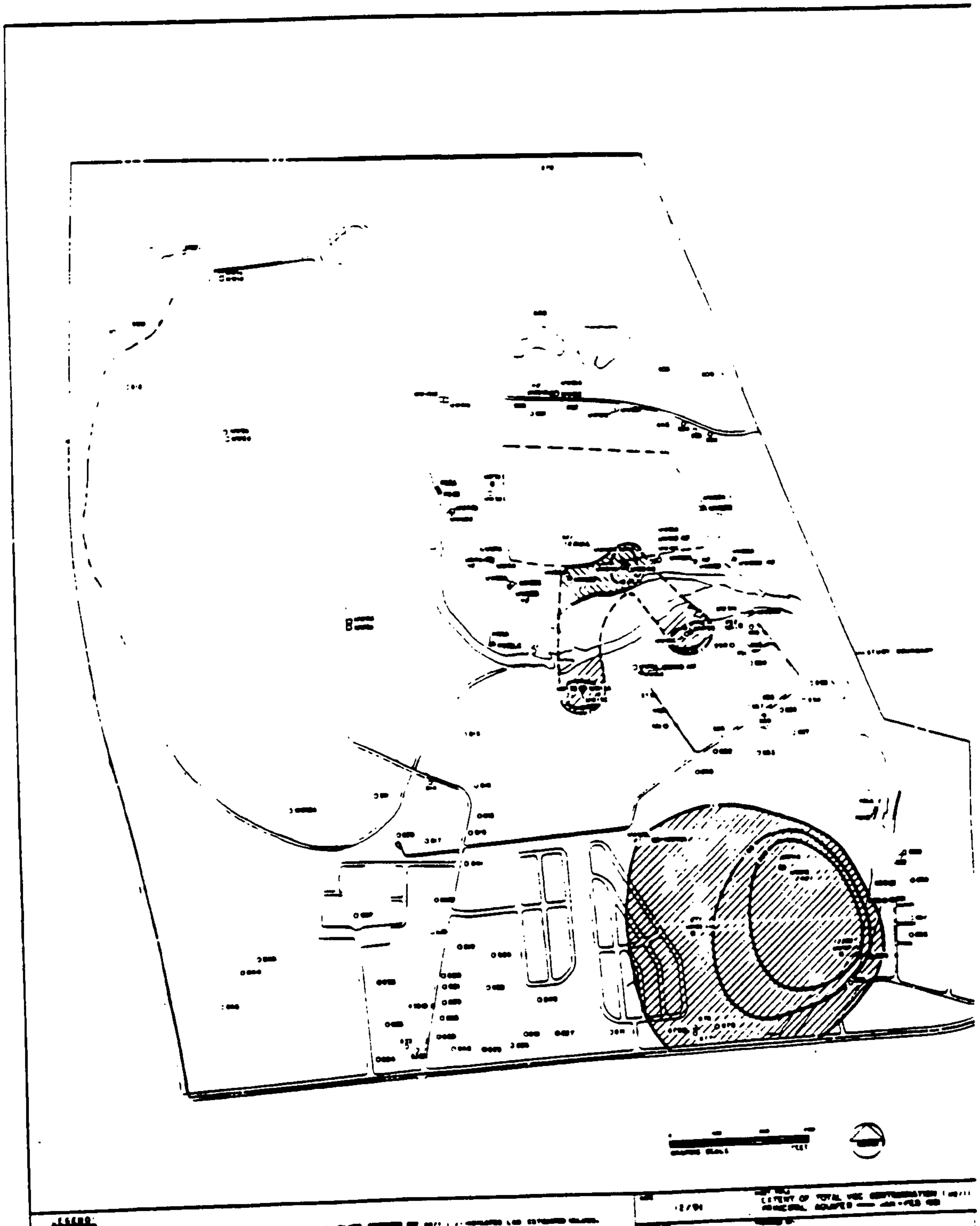
BASE MAP SOURCE Topographic Survey of Powell Road Landfill RI/FS Study Area located in section 33, town 2, range 8, M.R.S., City of Huber Heights, Montgomery County, Ohio

POWELL ROAD LANDFILL
SCA SERVICES OF OHIO INC.

FIGURE 9

SITE PLAN

Dames & Moore
JOB NO. 1722 277 017



LEGEND

▨

▨

12/91

EXTENT OF TOTAL VOC CONTAMINATION

PRINCIPAL AQUIFER

EAGON & ASSOCIATES, INC.

TABLE I

GAS VENT METHANE MEASUREMENTS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Vent No.	Date	Percent Methane[*]
V1	10/25/88	38
V2	10/25/88	60
V3	10/25/88	61
V4	11/08/88	62
V5	11/08/88	61
V6	10/28/88	12
V7	11/08/88	56
V8	11/08/88	58
V9	10/25/88	62
V10	10/28/88	11
V11	11/08/88 11/08/88	59 58
V12	11/08/88	30
V13	11/08/88	58
V14	10/25/88 10/28/88	61 19
V15	11/09/88	56
V16	11/09/88	42
V17	11/09/88	46
V18	11/09/88	24
V19	11/09/88 11/09/88	18 19
V20	11/09/88	16

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[*] Approximated from combustible gas content readings from an MSA Gascope Model 53 CGI

TABLE 2

FIELD ORGANIC ANALYSIS - GAS VENT VAPOR

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

	Vent Number														
	Round 1														
Parameter (mg/m3)	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
Benzene	-	0.2	38	1	-		-	2				3	0.3		1
Chlorobenzene	9	18	55	5	9	23	14	14	28	-	9	0.5	5	-	14
Chloroethane*	-	-	-	-	-	-	-		-	-	-		-		
1,1-Dichloroethane	4	0.2	-	-	-	-	48	32	1	-	36	-	4	12	12
1,2 Dichloroethane	-	-	-	-	-	-	8	8	-	-	2		-	-	
trans-1,2-Dichloroethene*	-	-	-	-	-	-	-	-		-	-	-			
Ethyl benzene*	-	9	65	13	39	30	38	34		-	39	9	22	13	26
Methylene chloride*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tetrachloroethene*	-	-	-	7	7	-	63	77	-	-	7	2	14		27
Toluene*	209	75	295	56	75	120	116	120	194	49	116	22	64	217	75
1,1,1-Trichloroethane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Trichloroethene*	-	1	16	-	-	-	-	-	-	-	-	-	2		
Vinyl chloride	26	23	26	31	36	20	44	26	23	8	36	31	26	33	18
Xylenes*	17	4	9	30	116	43	82	73	25	4	116	22	66	62	56

- = Parameter not detected

* = Mandatory performance standard parameter

TABLE 2 (continued)

	Vent Number													
	Round 1 (Continued)					Round 2								
Parameter (mg/m3)	V16	V17	V18	V19	V20	V1	V3	V9	V10 (11:00)	V15	V18	V19	PR201	V10 (17:00)
Benzene	0.3	0.3	-	-	0.3	4	11	11	3	7	7	0	11	1
Chlorobenzene	5	14	9	18	9									
Chloroethane*	-	-	-	-	-									
1,1-Dichloroethane	4	16	60	32	8									
1,2 Dichloroethane	-	-	-	-	-									
trans-1,2-Dichloroethene*	-	-	-	-	-									
Ethyl benzene*	13	39	22	17	2									
Methylene chloride*	-	-	-	-	-									
Tetrachloroethene*	7	55	14	3	3									
Toluene*	60	165	116	22	7	168	261	314	138	99	186		185	180
1,1,1-Trichloroethane	-	-	-	-	-									
Trichloroethene*	-	4	5	2	-									
Vinyl chloride	23	31	44	44	-	78	96	143	108	119	121	65	45	115
Xylenes*	-	121	43	22	17									

- = Parameter not detected

* = Mandatory performance standard parameter

Blank space = Not analyzed

TABLE 3

VOLATILE ORGANIC ANALYSIS - GAS VENT LIQUID

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

		Sample Number/(Vent Number)								
Parameters (µg/L)	**CRQL (µg/L)**	**L03Z01(a) (V3)**	**L04Z01(a) (V4)**	**L05Z01(b) (V5)**	**L0501D(a) (V5)**	**L07Z01(a) (V7)**	**L10Z01(c) (V10)**	**L12Z01(a) (V12)**	**L14Z01(d) (V14)**	**L1401D(d) (V14)**
Vinyl chloride	10	9 J	-	-	6 J	-	68 J	4 J	6 J	5 J
Chloroethane	10	-	-	-	-	-	-	2 J		
Methylene chloride	5	2 J	-	-	-	3 J	-	-	-	
Acetone	10	450 D	-	380 B	270 BD	-	3,900 BD	-	-	35
Carbon disulfide	5	-	-	-	-	1 J	-	20	-	3 J
1,1-Dichloroethane	5	-	-	5 J	-	-	-	-	-	
1,2-Dichloroethene (total)	5	4 J	-	3 J	-	-	11 J	2 J	-	-
Chloroform	5	-	-	-	-	-	-	-	-	-
2-Butanone	10	780 D	20	500	430 D	64	5,500 D	-	-	43
1,2-Dichloropropane	5	3 J	1 J	-	-	-	-	-	-	-
Trichloroethene	5	-	-	-	-	-	-	-	-	
Benzene	5	6	6	4 J	-	4 J	11 J	3 J	5 J	5 J
trans-1,3-Dichloropropene	5	-	-	-	-	2 J	-	-	-	
4-Methyl-2-pentanone	10	120	25	120 B	90 B	-	500	-	150	110
2-Hexanone	10	-	-	-	-	-	-	-	-	-
Tetrachloroethene	5	-	-	3 J	-	-	-	-	-	3 J
Toluene	5	320 D	27	270	66 B	7	390	13	38	37
Chlorobenzene	5	2 J	3 J	6 J	2 J	3 J	10 J	1 J	4 J	2 J
Ethylbenzene	5	110	140	110	26	100	100	41	110	120
Styrene	5	-	-	-	-	-	15 J	-	-	-
Total xylenes	5	260 D	290 E	360	82	310 E	330	32	530 E	490 BE
Total VOCs		**2,066**	**512**	**1,761**	**972**	**494**	**10,835**	**118**	**873**	**883**

CRQL = Contract-required quantitation limit
- = Parameter not detected
B = Compound detected in blank as well as sample
D = Concentration determined through dilution of sample
E = Concentration exceeds calibration range
J = Estimated value

(a) Detection levels consistent with CRQL.
(b) Detection levels 2.5x greater than CRQL.
(c) Detection levels 10x greater than CRQL.
(d) Detection levels 2x greater than CRQL.

TABLE 3 (continued)

		Sample Number/(Vent Number)							
Parameters (µg/L)	CRQL (µg/L)	L15Z01(e) (V15)	L16Z01(e) (V16)	L17Z01(a) (V17)	L18Z01(f) (V18)	L20Z01(a) (V20)	L20101 (PR201)	102Z01 (Field blank)	103Z01 (Field blank)
Vinyl chloride	10	-	8 J	-	17 J	1 J	5 J	-	
Chloroethane	10	-	-	2 J	-	18	-	-	-
Methylene chloride	5	24 BJ	-	-	-	-	10 J	2 J	14 B
Acetone	10	670 B	-	42	27,000 D	-	62	-	-
Carbon disulfide	5	-	13	6	6 J	-	-	-	-
1,1-Dichloroethane	5	-	6 J	13	-	1 J	-	-	-
1,2-Dichloroethene (total)	5	-	8	-	-	19	86	-	-
Chloroform	5	-	-	-	-	-	-	1 J	-
2-Butanone	10	1,500	20	75	39,000 D	99	53	-	-
1,2-Dichloropropane	5	-	-	-	-	-	-	-	-
Trichloroethene	5	-	2 J	-	-	2 J	-	-	-
Benzene	5	19 J	7	4 J	9 J	6	5 J	-	-
trans-1,3-Dichloropropene	5	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	10	54 J	29	14	2,600 D	4 J	230	-	-
2-Hexanone	10	-	-	-	300	-	-	-	-
Tetrachloroethene	5	-	2 J	-	-	-	-	-	-
Toluene	5	220	190	13	630	4 J	600	-	-
Chlorobenzene	5	-	3 J	1 J	-	10	-	-	-
Ethylbenzene	5	99	110	120	62	-	50	-	-
Styrene	5	-	-	-	11 J	-	-	-	
Total xylenes	5	280	260 E	290 E	160	54	170	-	
Total VOCs		2,866	658	580	69,795	218	1,271		

CRQL = Contract-required quantitation limit
- = Parameter not detected
B = Compound detected in blank as well as sample
D = Concentration determined through dilution of sample
E = Concentration exceeds calibration range
J = Estimated value

(a) Detection levels consistent with CRQL.
(c) Detection levels 10x greater than CRQL.
(e) Detection levels 1.3x greater than CRQL.
(f) Detection levels 5x greater than CRQL.

TABLE 4

SEMIVOLATILE ORGANIC ANALYSIS - GAS VENT LIQUID

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

		Sample Number/(Vent Number)								
Parameters (µg/L)	**CRQL (µg/L)**	**L03Z01(a) (V3)**	**L04Z01(a) (V4)**	**L05Z01(a) (V5)**	**L0501D(a) (V5)**	**L07Z01(a) (V7)**	**L10Z01(b) (V10)**	**L12Z01(a) (V12)**	**L14Z01(a) (V14)**	**L1401D(a) (V14)**
Phenol	10	16	-	330	200 D	3 J	1,200	9 J		4 J
1,4-dichlorobenzene	10	9 J	28	-	14	35	17 J	8 J	3 J	3 J
Benzyl alcohol	10	-	-	-	-	-	32 J	-		
1,2-dichlorobenzene	10	-	5 J	-	-	-	-	-	-	-
2-Methylphenol	10	11	-	10 J	13	3 J	-	-	3 J	6 J
4-Methylphenol	10	26	-	340	1,600 D	10	190	-	-	7 J
Nitrobenzene	10	-	-	-	-	-	-	-	-	
Isophorone	10	-	-	-	2 J	-	-	-	-	
2,4-Dimethylphenol	10	10	-	4 J	8 J	9 J	-	-	-	-
Benzoic acid	50	-	-	180	310 D	-	110 J	-	-	-
Naphthalene	10	7 J	26	26	31	36	19 J	-	-	4 J
2-Methylnaphthalene	10	11	8 J	-	5 J	14	13 J	-	-	
Acenaphthene	10	-	-	-	-	7 J	-	-	-	-
Dibenzofuran	10	26	-	-	-	6 J	-	-	-	
Diethyl phthalate	10	86	-	12 J	25	4 J	-	-	3 J	3 J
Fluorene	10	-	-	-	-	7 J	-	2 J	-	
N-Nitrosodiphenylamine (1)	10	-	-	7 J	-	-	-	-	-	
Pentachlorophenol	50	-	-	-	-	-	-	-	-	-
Phenanthrene	10	-	-	-	-	44	-	6 J	-	-
Anthracene	10	-	-	-	-	6 J	-	2 J	-	
Di-n-butyl phthalate	10	-	-	-	5 J	-	-	-		
Fluoranthene	10	-	-	-	-	14	-	-	-	
Pyrene	10	-	-	-	-	9 J	-	-	-	
Butylbenzyl phthalate	10	-	-	-	-	-	-	-	-	
Benzo(a)anthracene	10	-	-	-	-	6 J	-	-	-	
Crysene	10	-	-	-	-	3 J	-	-		
bis(2-Ethylhexyl)phthalate	10	62	-	-	-	4 J	-	11	-	18
Di-n-octyl phthalate	10	3 J	-	-	2 J	-	-	-	9 J	29
Total Semivolatiles		**267**	**67**	**909**	**2,215**	**258**	**1,581**	**38**	**18**	**74**

CRQL = Contract-required quantitation limit
- = Parameter not detected
D = Concentration determined through dilution of sample
J = Estimated value

(a) Detection level consistent with CQRL
(b) Detection level 5x greater than CQRL

TABLE 4 (continued)

		Sample Number/(Vent Number)							
Parameters (µg/L)	CRQL (µg/L)	L15Z01(a) (V15)	L16Z01(a) (V16)	L17Z01(a) (V17)	L18Z01(b) (V18)	L20Z01(a) (V20)	L20101 (PR201)	102Z01 (Field blank)	103Z01 (Field blank)
Phenol	10	50	5 J	-	300	-	290		
1,4-dichlorobenzene	10	19	28	7 J	-	3 J	-	-	-
Benzyl alcohol	10	-	-	-	-	-	-	-	-
1,2-dichlorobenzene	10	-	-	-	-	-	-	-	-
2-Methylphenol	10	7 J	-	3 J	15 J	-	14 J	-	-
4-Methylphenol	10	130	-	-	2,600 D	-	470	-	-
Nitrobenzene	10	-	21 J	-	-	-	-	-	
Isophorone	10	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	10	-	-	-	-	-	-	-	-
Benzoic acid	50	-	-	-	5,600 D	-	-	-	-
Naphthalene	10	21	-	24	-	8 J	-	-	-
2-Methylnaphthalene	10	5 J	-	6 J	-	-	-	-	-
Acenaphthene	10	3 J	-	-	-	-	-	-	-
Dibenzofuran	10	3 J	-	-	-	-	-	-	-
Diethyl phthalate	10	27	10	6 J	84	-	-	-	-
Fluorene	10	-	-	-	-	-	-	-	-
N-Nitrosodiphenylamine (1)	10	-	-	-	-	-	-	-	-
Pentachlorophenol	50	-	21 J	-	-	-	-	-	-
Phenanthrene	10	5 J	-	-	-	7 J	-	-	-
Anthracene	10	-	-	-	-	-	-	-	-
Di-n-butyl phthalate	10	5 J	-	-	-	-	-	-	-
Fluoranthene	10	-	-	-	-	5 J	-	-	-
Pyrene	10	-	-	-	-	4 J	-	-	-
Butylbenzyl phthalate	10	-	-	-	23 J	-	-	-	-
Benzo(a)anthracene	10	-	-	-	-	-	-	-	-
Crysene	10	-	-	-	-	-	-	-	-
bis(2-Ethylhexyl)phthalate	10	-	-	12	130	-	34	-	-
Di-n-octyl phthalate	10	-	-	2 J	-	-	-	-	-
Total Semivolatiles		275	85	60	8,752	27	808		

CRQL = Contract-required quantitation limit
- = Parameter not detected
D = Concentration determined through dilution of sample
J = Estimated value

(a) Detection level consistent with CQRL.
(b) Detection level 5x greater than CQRL.

TABLE 5

INORGANIC ANALYSIS - GAS VENT LIQUID

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Parameters	CRDL	Sample Number/(Vent Number)								
		L03Z01 (V3)	L04Z01 (V4)	L05Z01 (V5)	L0501D (V5)	L07Z01 (V7)	L10Z01 (V10)	L12Z01 (V12)	L14Z01 (V14)	L1401D (V14)
Selected Metals (µg/L)										
Arsenic	10	10 SN	551 N	238 N	240 N	560 N	527 N	33 SN	[12] N	17 SN
Barium	200	[142]	2,010	1,060	968	3,200	2,560	427	412	327
Cadmium	5	-	9.6	[4.8]	-	8.6	-	-	-	-
Chromium	10	56	633	279	263	1,080		57	84	71
Lead	5	209	984	670	676	1,740	355	56	399	341
Mercury	0.2	-	5.6	1.5	2.6	6	37	0.5	0.7	0.5
Selenium	5	-	-	-	-	-	-	-		
Silver	10	-	-	[5.4]	-	-	-	-	-	
Other Inorganics (µg/L)										
Cyanide	10	16 N	18 N	17 N	21 N	89 N	172 N	-	-	
Strontium	-	1,060	3,820 N	2,110 N	2,050	4,570 N	5,140 N	600 N	834 N	693 N
Aluminum	200	501	398,000	117,000	104,000	664,000	2,680	38,900	4,450	3,510
Antimony	60	-	93 N	114 N	[54] N	-	-	[51] N	-	-
Beryllium	5	-	20	[2.8]	[1.4]	33	[17]	-	-	-
Calcium	5,000	209,000	2,390,000	1,590,000	1,540,000	4,820,000	6,200,000	395,000	542,000	381,000
Cobalt	50	[16]	360	177	155	697	67	[32]	[47]	54
Copper	25	29 E	1,040	343	295	1,510 E	-	86 E	58 E	53
Iron	100	19,500	1,160,000	923,000	858,000	2,160,000	720,000	78,200	42,000	35,900
Magnesium	500	221,000	1,270,000	596,000	570,000	1,980,000	2,750,000	180,000	456,000	420,000
Manganese	15	559	9,330 E	8,130 E	7,770 E	20,800	12,800 E	1,470	669	494
Nickel	40	108	995	553	486	1,710	87	119	261	274
Potassium	5,000	253,000	64,200	166,000	161,000	904,000	[2,840]	132,000	716,000	842,000
Sodium	5,000	350,000	45,600	107,000	106,000	992,000	21,000	183,000	762,000	905,000
Thallium	10	-	-	-	-	-	-	-	-	
Vanadium	50	[6.2]	749	254	227	1,440	[23]	90	[20]	[19]
Zinc	20	67,300	261,000	323,000	394,000	1,620,000	347,000	2,280	87,600	75,000

CRDL = Contract-required detection limit.
- = Parameter not detected.
E = Indicates a value estimated or not reported owing to the presence of interference.
N = Indicates spike sample recovery is not within control limits.
S = Indicates value determined by method of standard addition.
* = Indicates duplicate analysis is not within control limits.
[ ] = Value reported is less than CRDL.
+ = Indicates the correlation coefficient for method of standard addition is less than 0.995.

TABLE 5 (continued)

Parameters	CRDL	L15Z01 (V15)	L16Z01 (V16)	L17Z01 (V17)	L18Z01 (V18)	L20Z01 (V20)	L20101 (PR201)	I02Z01 (Field blank)	I03Z01 (Field blank)
Selected Metals (µg/L)									
Arsenic	10	433 N	166 N	32 SN	42 SN	295 N	27 S+	[2.9] N	
Barium	200	1,860	808	246	[114]	5,580	275	[20]	
Cadmium	5	29	12	-	130	-	11		
Chromium	10	414	137	25	112	-	156		
Lead	5	997	695	95	2,060	-	1,040	-	-
Mercury	0.2	1.2	0.7	0.4	7.4	1.6	13	0.24	
Selenium	5	-	-	-	-	-	-	-	-
Silver	10	-	-	-	-	-			
Other Inorganics (µg/L)									
Cyanide	10	254 N	82 N	-	114 N	26 N		-	
Strontium	-	5,720 N	4,700	1,110 N	727 N	6,710 N	892 N	1.6 N	
Aluminum	200	269,000	72,500	12,600	4,130	521	14,200 *		[32]
Antimony	60	93 N	98 N	-	-	81,000 N	71	-	
Beryllium	5	11	[3.6]	-	-	[1.2]		-	
Calcium	5,000	1,660,000	597,000	482,000	611,000	7,090,000	229,000	[221]	[111]
Cobalt	50	277	84	[17]	66	101	85	-	-
Copper	25	802	227 E	50	118	-	133	70 E	66
Iron	100	938,000	334,000	167,000	54,800	738,000	354,000 *	[59]	110
Magnesium	500	779,000	378,000	151,000	1,280,000	2,900,000	58,700	-	-
Manganese	15	8,830 E	2,260	3,550	528	35,800 E	1,500	[2.4]	[4.9] E
Nickel	40	713	318	82	382	77	843		-
Potassium	5,000	387,000	540,000	157,000	1,210,000	105,000	39,800	-	9,660
Sodium	5,000	562,000	797,000	234,000	2,150,000	119,000	141	[1,910]	-
Thallium	10	-	-	-	-	-	-	-	
Vanadium	50	498	166	[34]	[28]	[27]	[43]		
Zinc	20	22,600	11,100	6,610	284,000	2,350	4,500	[14]	[16]

CRDL = Contract-required detection limit.

- = Parameter not detected.

E = Indicates a value estimated or not reported owing to the presence of interference.

N = Indicates spike sample recovery is not within control limits.

S = Indicates value determined by method of standard addition.

* = Indicates duplicate analyses is not within control limits.

[ ] = Value reported is less than CRDL.

+ = Indicates the correlation coefficient for method of standard addition is less than 0.995.

TABLE 6

SURFACE LEACHATE ANALYSIS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

	CRDL	H01Z01
Selected Metals (µg/L)		
Arsenic	10	[9.5]
Barium	200	[151]
Cadmium	5	-
Chromium	10	49
Lead	5	21
Mercury	0.2	-
Selenium	5	-
Silver	10	-
Other Inorganics (µg/L)		
Cyanide	10	479 N*
Strontium	-	739
Aluminum	200	548*
Antimony	60	-
Beryllium	5	[1.1]
Calcium	5,000	76,000
Cobalt	50	51
Copper	25	85
Iron	100	2,310
Magnesium	500	225,000
Manganese	15	62 E
Nickel	40	328
Potassium	5,000	1,270,000
Sodium	5,000	1,280,000
Thallium	10	-
Vandium	50	[11]
Zinc	20	387

CRDL = Contract-required detection limit.
- = Parameter not detected
E = Indicates a value estimated or not reported owing to the presence of interference.
N = Indicates spike sample recovery is not within control limits.
S = Indicates value determined by method of standard addition.
* = Indicates duplicate analysis is not within control limits.
[ ] = Value reported is less than CRDL.

	CRQL	H01Z01
Volatile Organics (µg/L)		
Chloroethane	10	7 J
Methylene chloride	5	2 J
Benzene	5	7
Toluene	5	2 J
Chlorobenzene	5	9
Ethylbenzene	5	31
Total xylenes	5	81
Semivolatile Organics (µg/L)		
2-Methylphenol	10	2 J
Napthalene	10	17
4-Chloro-3-methylphenol	10	27
Diethyl phthalate	10	31
bis(2-Ethylhexyl)phthalate	10	88

CRQL = Contract required quantitation limit
J = Estimated value

TABLE 7

AMBIENT AIR TENAX TUBE ANALYSIS RESULTS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

		Sample I.D.												
		October 26, 1988							October 27, 1988					
	Approximate Detection	Upwind	Onsite				Downwind		Upwind	Onsite			Downwind	
Compound (mg/m3)	**Limit***	**A-05**	**A-02**	**A-01**	**A-03**	**A-04**	**A-06**	**A-07**	**A-14**	**A-13**	**A-11**	**A-10**	**A-09**	**A-08**
Benzene	0.0014	0.001 J	-	-	-	-	-	-	-	0.001 J	0.001 J	0.001 J		0.001 J
Carbon disulfide	0.0005	-	-	-	-	-	-	-	-	-		0.001		
Carbon tetrachloride	0.0004	0.001	0.001	-	-	-	-	-		0.001	0.001		0.001	0.001
Methylene chloride	0.0005	0.003	0.003	0.001	0.002	0.001	0.002	0.001	-	0.002	0.001	0.001	0.001	0.002
Tetrachloroethene	0.0005	-	-	-	-	-	-	-	-		-	0.001 J		
Toluene	0.0008	0.003	0.002	0.003	0.001	0.001 J	0.002	0.001	-	0.005	0.003	0.003	0.003	0.002
1,1,1-Trichloroethane	0.0004	0.003	0.002	0.001	0.002	0.001	0.001	0.001	-	0.002	0.002	0.002	0.003	0.003
Trichloroethene	0.0005	-	-	-	-	-	-	-	-	0.009				
Trichlorofluoromethane	0.0009	0.005	0.007	0.003	0.004	0.002	0.004	0.002	-		0.003	0.003	0.017	0.013
Xylenes	0.0012	0.005	0.002	0.002	-	0.001 J	0.002	0.001		0.004	0.004	0.003	0.005	0.002
Total VOCs		0.021	0.017	0.010	0.009	0.006	0.011	0.006	-	0.024	0.015	0.015	0.033	0.024

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* Detection limits vary with each sample according to volume sampled

J = Estimated value less than minimum detection limit

- = Not detected

Note: Trip blank A-12 was broken upon receipt by the lab and was not analyzed

Note: Values rounded to the nearest 0.001 mg/m3

TABLE 8

DETECTION SUMMARY *
SEDIMENT
(Concentrations reported in mg/kg)

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Sample with Detection	Parameters											
	Acetone	Benzo(k)-fluoranthene	4,6-Dinitro-2-methylphenol	Barium	Chromium	Lead	Calcium	Copper	Iron	Magnesium	Manganese	Nickel
S01Z01	-	-	-	52	4.3	13	107,000	6.9	7,490	49,200	187	11
S0101D(DUP)	-	-	-	-	6.4	8.2	106,000	-	5,570	39,600	160	10
S02Z01	-	0.54	-	79	17	33	78,000	17	13,100	28,800	303	18
S03Z01	0.024	-	-	-	9.1	13	132,000	12	10,700	36,600	183	14
S03Z02(DUP)	-	-	1.9	-	10	13	90,700	8.7	8,920	29,000	181	13
S04Z01	-	-	-	185	18	28	109,000	20	15,000	19,000	458	21
S05Z01	-	-	-	49	8.3	3.5	78,900	8.4	7,720	28,400	186	11
S06Z01	-	-	-	-	5.9	10	60,600	14	8,290	21,800	321	11
S07Z01	-	-	-	-	3.0	6.0	130,000	9.5	6,290	45,700	266	
S08Z01	-	-	-	54	-	7.9	130,000	6.1	3,520	50,600	183	

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* - Detected above contract-required quantitation limit (CRQL) or contract-required detection limit (CRDL)

"-" - Not detected above CRQL or CRDL or otherwise qualified.

TABLE 9

DETECTION SUMMARY *
SURFACE WATER
(Concentrations reported in µg/L)

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Sample with Detection	Sampling Event **	Parameters													
		Methylene Chloride	Chromium	Lead	Mercury	Cyanide	Strontium	Aluminum	Calcium	Iron	Magnesium	Manganese	Potassium	Sodium	Zinc
W01Z01	1	-	-	-	-	-	1,590	774	70,800	1,010	35,000	-	2,890		70
W01D1D(DUP)	1	-	-	-	-	-	1,580	646	70,100	856	34,700		-		21
W01Z02	2	-	19.1	10.2	-	-	454	13,600	56,800	20,800	20,900	253	5,580	8,800	157
W02Z01	1	-	-	-	-	-	1,570	870	71,700	1,200	34,600	-	-	-	55
W02Z02	2	-	10 8	10	0 2	-	433	13,400	48,500	18,000	19,200	214	-		106
W03Z01	1	4	-	-	-	-	1,520	605	67,200	913	34,300	-	5,730		88
W03Z02(DUP)	2	-	-	-	-	-	1,550	749	68,100	954	34,800	-	5,030	-	46
W03Z02	2	-	16 2	9 4	-	16 2	463	14,600	53,000	17,000	20,500	202	-		106
W04Z01	1	-	-	-	-	-	1,700	996	81,600	1,420	36,100	-	5,760		21
W04Z02	2	-	18 8	11 9	-	18 3	406	16,700	47,100	22,500	19,100	264	-		[illegible]
W05Z01	1	-	-	-	-	-	469	-	64,700	-	35,100	-			55
W05Z02	2	-	-	-	-	-	441	-	65,900	289	29,800	15 3	-	11,300	36 5
W06Z01	1	-	-	-	-	-	135	315	52,100	753	17,300	20	-	21,900	87
W06Z02	2	-	-	9 2	-	-	108	5,640	55,300	8400	20,400	168	-	12,900	89 1
W06Z02D(DUP)	2	-	-	9 2	-	-	110	5,120	57,000	8490	21,000	174	-	14,500	102
W07Z01	1	-	-	-	-	-	174	-	32,200	332	11,000	-	-	14,300	62
W07Z02	2	-	-	-	-	-	178	721	59,700	1430	18,700	36 4	-	21,300	52 6
W08Z01	1	-	-	13	-	-	137	476	54,300	1060	18,100	21	-	22,100	161
W08Z02	2	-	-	8	0 27	-	158	3,630	83,000	6300	31,100	192	-	15,700	68 3

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* - Detected above contract required quantitation limit (CRQL) or contract-required detection limit (CRDL)

"-" - Not detected above CRQL, CRDL, or otherwise qualified.

** Sampling Event 1 - Samples collected September/October 1988
Sampling Event 2 - Samples collected April 1989.

TABLE 10

DETECTION SUMMARY *
SURFICIAL SOILS
(Concentrations reported in mg/kg)

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Sample with Detection	Parameters														
	4,4'-DDT	Aroclor-1016	Aroclor-1254	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Aluminum	Calcium	Copper	Iron	Magnesium	Manganese
F01Z01	-	-	-	19	106	-	16	38		11,800		-			
F0101D(DUP)	-	-	-	-	108	-	16	35		12,400	-	-	-		
F02Z01	-	-	-	-	61	-	11	-	-	8,200	-	-	-	-	
F0201D(DUP)	-	-	-	-	74	-	12	-	-	9,580	-	-	-	-	
F03Z01	-	3.1	-	-	51	-	8.3	9.6	-	-	116,000	15	12,100	55,400	344
F04Z01	-	-	-	-	86	-	14	15	-	-	84,700	21	19,900	35,700	346
F05Z01	-	-	-	-	-	-	6.9	5.5	-	-	131,000	13	7,590	50,000	229
F06Z01	-	-	-	-	71	-	15	-	-	9,010	-	-	-	-	-
F07Z01	-	-	-	-	95	-	18	27	-	11,400	-	-	-		
F08Z01	-	-	-	-	78	-	13	-	-	8,840	-	-			341
F09Z01	-	-	-	19	122	-	32	32	-	12,900	-	-	-		-
F10Z01	-	-	1.2	-	86	-	15	35	-	10,600	-	-	-		
F11Z01	-	-	0.26	-	74	-	13	28	-	7,860	-	-	-	-	
F12Z01 (a)	0.044	-	-	-	58	-	14	39	0.13	6,820	-	-			
F13Z01	-	-	-	-	99	-	8.9	-	-	-	116,000	16	14,400	39,000	
F14Z01	-	-	-	-	108	-	15	24	0.12	12,700	-	-	-	-	
F15Z01	-	-	-	-	70	-	9.4	25	-	-	96,800	18	14,600	38,800	121
F16Z01	-	-	-	7	106	-	10	40	-	-	45,700	26	13,900	19,400	954
F17Z01	-	-	-	-	82	-	12	27	-		36,700	20	16,600	15,700	556
F18Z01	-	-	-	-	64	-	12	-	-	10,600	-	-	-		-
F19Z01	-	-	-	-	55	-	7.6	9.5	-	-	101,000	14	11,300	44,400	261
F1901D(DUP)	-	-	-	-	-	-	6.8	9.1	-	-	102,000	14	9,530	40,400	285
F20Z01	-	-	-	-		-	4.6	11	-	-	117,000	12	8,310	47,800	215
F21Z01	-	-	-	-	83	-	12	-	-	8,890	-	-	-	-	
F22Z01	-	-	-	-	78	-	7.8	-	-	6,160					
F23Z01	-	-	-	-	48	-	8.4	-	-	6,480	-	-			
F24Z01	-	-	-	-	54	-	5.5	12	-	-	112,000	10	10,800	43,900	293
F25Z01 (a)	-	-	-	-	109	1.2	24	34	-	10,400	62,200	-	-	-	-
F26Z01	-	-	-	-	121	1.4	31	41	-	-	62,300	28	18,300	20,800	457
F27Z01	-	-	-	20	100		20	25	-	12,000	-	-	-	-	-
F28Z01	-	-	0.32	-	114	-	20	39	-	-	62,400	14	21,900	22,500	452
F29Z01	-	-	-	-	81	-	13	63			61,500	25	18,000	32,900	336
F30Z01	-	-	-	-	-	-	6.8	23			118,000	20	9,740	48,700	249
F31Z01	-	-	-	-	47	-	7.4	8.9	-	-	98,500	15	11,900	45,400	257
F32Z01	-	-	-	-	-	-	5.5	5.6	-		119,000	6.8	7,500	49,200	206

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* - Detected above contract required quantitation limit (CRQL) or contract required detection limit (CRDL)

"-" - Not detected above CRQL, CRDL, or otherwise qualified

TABLE 10 (continued)

Sample with Detection	Parameters				
	Nickel	Potassium	Sodium	Vanadium	Zinc
F01Z01	18	1,800	-	26	-
F01O1D(DUP)	17	-	-	27	-
F02Z01	22	-	-	-	-
F0201D(DUP)	13	2,670	-	-	-
F03Z01	18	-	-	16	60
F04Z01	23	2,040	-	25	82
F05Z01	9	-	-	-	42
F06Z01	12	-	-	21	-
F07Z01	19	-	-	25	-
F08Z01	18	-	-	21	-
F09Z01	23	-	-	26	-
F10Z01	18	-	-	24	-
F11Z01	12	-	-	19	-
F12Z01 (a)	12	-	-	17	-
F13Z01	20	-	-	18	68
F14Z01	16	-	-	32	87
F15Z01	13	-	-	22	82
F16Z01	-	-	-	17	-
F17Z01	13	-	-	24	-
F18Z01	15	3,280	-	-	-
F19Z01	12	1,240	1,350	13	-
F19O1D(DUP)	10	1,700	1,370	-	-
F20Z01	-	-	-	11	-
F21Z01	14	2,440	-	-	-
F22Z01	13	-	-	-	-
F23Z01	12	1,550	-	-	-
F24Z01	14	-	-	-	40
F25Z01 (a)	17	2,470	-	-	-
F26Z01	18	-	-	27	-
F27Z01	18	3,540	-	29	-
F28Z01	27	-	-	28	-
F29Z01	16	-	-	28	-
F30Z01	13	-	-	12	-
F31Z01	15	-	-	15	-
F32Z01	12	-	-	-	28

(a) Semivolatiles were found in the following samples (µg/kg)

	F12Z01	F25Z01
Phenanthrene	4,700	-
Anthracene	1,200	-
Fluoranthene	5,000	480
Pyrene	3,900	440
BenZO(a)anthracene	2,400	-
Crysene	2,400	-
BenZO(b)fluoranthene	1,200	-
BenZO(k)fluoranthene	2,200	-
BenZO(a)pyrene	1,200	-
Indeno(1,2,3-c,d)pyrene	1,100	-
BenZO(g,h,i)perylene	1,200	-

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* - Detected above contract required quantitation limit (CRQL) or contract required detection limit (CRDL)

"-" - Not detected above CRQL, CRDL, or otherwise qualified

TABLE 11

DETECTION SUMMARY *
SUBSURFACE SOIL
(Concentrations reported in mg/kg)

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Sample with Detection	Parameters									
	Aroclor-1254	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Strontium	Aluminum	Calcium
B02Z01	-	4.8	51	-	8.6	7	-	108	6,560	127,000
B03Z01	-	6.7	91	-	17	22		63	11,800	62,800
B05Z01	-	-	243	-	29	151	-	89	16,100	54,200
B08Z01	-	-	154	2.1	51	47	0.15	269	16,400	64,500
B09Z10	-	-	136	-	37	30	-	141	16,400	50,700
B10Z01	2	5.4	88	-	23	91	0.18	90	7,910	87,800
B11Z01	-	-	96	-	17	21	-	28	14,300	19,500
B12Z01	0.25	-	-	-	10	152	-	77	4,390	117,000
B15Z01	-	-	80	-	17	16	-	30	14,800	37,700
B25Z01	-	3.8	-	-	10	9.6	-	120	3,880	82,700
B25O1D(DUP)	-	-	-	-	5.3	5.3	-	4.2	3,140	
B28Z01	-	4.4	62	-	11	14	-	102	6,940	88,100
B28O1D(DUP)	-	4.3	55	-	9.9	9.1		84	5,770	88,200
B29Z01	-	-	116	-	19	80		30	17,100	27,100

Sample with Detection	Parameters										
	Copper	Iron	Magnesium	Manganese	Nickel	Potassium	Vanadium	Zinc	Fluoranthene	Pyrene	Bis(2 Ethylhexyl) Phthalate
B02Z01	5.6	11,300	52,800	234	14	-	17	44			
B03Z01	13	18,500	25,500	467	18	1,470	28	94	-		
B05Z01	36	23,700	21,000	279	23	1,580	37	318	-	-	
B08Z01	29	21,800	22,200	527	32	-	35	157		-	
B09Z10	21	21,500	19,000	501	30	-	36	119	-		
B10Z01	53	14,600	33,700	333	18	-	22	139	-		
B11Z01	12	20,600	9,480	658	18	-	35	89	0.64	0.6	
B12Z01	23	9,220	50,700	308	12	-	14	112	0.38	0.38	2
B15Z01	10	19,600	19,300	693	20	-	33	75	-	-	-
B25Z01	-	7,710	27,000	232	11	-	12	36	-		
B25O1D(DUP)	-	7,580	1,120	258	-	-		32			
B28Z01	9.4	11,100	27,000	343	9.3	-	19	61	-	-	
B28O1D(DUP)	9.2	9,990	36,400	380	12	-	17	51	-		
B29Z01	21	22,600	15,700	525	21	-	38	177	-		

---

* - Detected aBOve contract required quantitation limit (CRQL) or contract required detection limit (CRDL.)

* * - Not detected aBOve CRQL, CRDL, or otherwise qualified.

TABLE 12

DETECTION SUMMARY *
VOCs AND ARSENIC IN GROUND WATER
(Concentrations reported in μg/L)

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Wells With Detection	Sampling Event **	Parameters Vinyl Chloride	Acetone	Chloroethane	Chlorobenzene	1,1-Dichloroethane	1,2-Dichloroethene (total)	Methylene Chloride	1,1,1-Trichloroethane	Trichloroethene	Arsenic
Onsite											
Upper Aquifer											
2A	4	-	-	-	-	7	6	-			
3A	1	-	-	-	-	-		-			15
	2	28	-	-	-	-	48	-	-		16.4
	4	-	12	-	-	-	-	-	-		-
4A	1	-	-	98	-	7		-	-		16.2
	2	-	-	-	-	-	-	-	-	-	84
	4	-	-	27	6	8	-	-	-	-	
5A	2	16	-	-	-	-		-			
7A	1	12 (16 dup)	-	23 (31 dup)	-	28 (29 dup)	110 (120 dup)	-	48 (49 dup)		
	2	-	-	-	-	-	-	-	10 (7 dup)		
Primary Aquifer											
1B	2	-	-	-	-	-		6			
4B	1	-	-	-	-	150		-			
	2	-	-	-	-	120		-	-		10.9
	4	-	-	-	-	42	-	-	-		
4BR	4	-	-	13	-	41 (130 duplicate)					
12C	1	-	-	-	-	-					12
	2	-	-	-	-	-		-	-		13.5
Offsite											
Primary Aquifer											
13B	4	-	-	-	-	-	5			8	
15B	4	-	-	-	-	-				7 ([illegible] dup)	

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* - Detected above contract-required quantitation limit (CRQL) or contract required detection limit (CRDL)

" - " - Not detected above CRQL, CRDL, or otherwise qualified

** - Sample collection dates:

Sample Event 1 - samples collected 12/1/1988
Sample Event 2 - Seamples collected 4/1/1989
Sample Event 4 - Samples collected Jan/Feb-91

TABLE 13

SUMMARY OF CHEMICALS DETECTED IN THE ELDORADO PLAT AREA GROUND WATER MONITORING WELLS

(Concentrations reported in ug/L)

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Chemical	Frequency of Detection(a)	Arithmetic Mean(b)	Range of Detected Concentrations	RME Exposure Point Concentration (all wells)	USEPA Region V Exposure Point Concentration(c)
Organics					
1,2-Dichloroethene (total)*	2 / 10	2.7	3.3 - 3.8	2.9	3.8
bis(2-Ethylhexyl)phthalate*	1 / 6	3	3	3(d)	ND
Trichloroethene*	2 / 10	3	4.8 - 5.3	3.6	5.3
Inorganics					
Aluminum*	1 / 6	24	23.7	23.7(d)	2.8(d)
Arsenic	5 / 6	4.3	2 - 9.1	8.2	ND
Barium	6 / 6	240	126 - 340	340(d)	246(d)
Calcium	6 / 6	89.000	78.800 - 103.000	97.000	103.000(d)
Cobalt	5 / 6	5.7	3.4 - 8.8	8.8(d)	8.3(d)
Copper	3 / 6	6.8	5.1 - 7.6	7.6(d)	7.6(d)
Cyanide	1 / 6	5.6	8.5	6.8	ND
Iron	5 / 6	1.200	52 - 3.220	3.220(d)	3.220(d)
Lead*	2 / 6	2.4	2 - 2.7	2.7(d)	ND
Magnesium	6 / 6	35.000	30.600 - 39.700	39.000	39,700(d)
Manganese	5 / 6	64	26.6 - 148	148(d)	65.6(d)
Mercury	3 / 6	0.2	0.2	0.2(d)	ND
Potassium	5 / 6	3.900	2.500 - 5.580	5.580(d)	5.530(d)
Selenium	1 / 6	4.2	13	11	13(d)
Sodium	6 / 6	26.000	7,340 - 40,350	40,350(d)	19,400(d)
Strontium	6 / 6	1,000	301 - 1,495	1,495(d)	301(d)
Vanadium	6 / 6	5.6	2.7 - 8.5	8.5(d)	8.5(d)
Zinc	6 / 6	6.8	4.7 - 10.3	9.3	7.6(d)

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* = Chemical of potential concern.

ND = Not detected in sample.

(a) The number of samples in which the contaminant was detected divided by the total number of samples analyzed.

(b) The arithmetic mean is calculated using the detected values and one-half of the quantitation limit for non-detected values.

(c) Grouping contains only wells MW13B and MW15B. These wells were considered to represent the "center of the plume" for the Eldorado Plat area as per U.S. EPA Region V Guidance (U.S. EPA/OEPA, 1991).

(d) Maximum detected value used according to U.S.EPA guidance since the 95% UCL on the population mean exceeded the listed maximum value.

Source: Section 6 of the Remedial Investigation.

TABLE 14

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN FOR THE POWELL ROAD LANDFILL, OHIO (ORGANICS)

CHEMICAL	GAS VENT VAPORS	LANDFILL LIQUIDS	SURFACE SOILS	SUBSURFACE SOILS	G.M.R. SEDIMENT	ON-SITE GROUNDWATER	ELDORADO PLAT GROUNDWATER	NEEDMORE GROUNDWATER
ACENAPHTHENE	na	X	X	-	-	-	-	-
ACETONE	X	X	-	-	X	X	X	-
ANTHRACENE	na	X	X	-	X	-	-	-
AROCLOR 1016	-	-	X	-	-	-	-	-
AROCLOR 1254	-	-	X	X	-	-	-	-
BENZENE	X	X	-	-	-	X	-	-
BENZOIC ACID	na	X	X	-	-	X	-	-
BENZO(a)ANTHRACENE	na	X	X	X	O	-	-	-
BENZO(a)PYRENE	na	-	X	X	X	-	-	-
BENZO(b)FLUORANTHENE	na	-	X	X	X	-	-	-
BENZO(g,h,i)PERYLENE	na	-	X	X	X	-	-	-
BENZO(k)FLUORANTHENE	na	-	X	X	O	-	-	-
BENZYL ALCOHOL	na	X	-	-	-	-	-	-
BUTANONE (2-)	X	X	-	-	-	X	-	-
BUTYLBENZYL PHTHALATE	na	X	X	X	-	-	-	-
CARBON DISULFIDE	-	X	-	-	-	X	-	-
CHLORO (4-) METHYLPHENOL (3-)	na	X	-	-	-	-	-	-
CHLOROBENZENE	X	X	-	-	-	X	-	-
CHLOROETHANE	X	X	-	-	-	X	-	X
CHLOROFORM	-	-	X	-	-	-	-	-
CHRYSENE	na	X	X	X	O	-	-	-
DDT (4,4'-)	-	-	X	-	-	-	-	-
DIBENZOFURAN	na	X	X	-	-	-	-	-
DIBENZO(a,h)ANTHRACENE	na	-	X	X	-	-	-	-
DICHLOROBENZENE (1,2-)	na	X	-	-	-	-	-	-
DICHLOROBENZENE (1,4-)	na	X	-	-	-	-	-	-
DICHLOROBENZIDINE (3,3'-)	na	-	-	X	-	-	-	-
DICHLOROETHANE (1,1-)	X	X	-	-	-	X	-	-
DICHLOROETHENE (1,2-)	X	X	-	-	-	X	X	X
DICHLOROPROANE (1,2-)	na	X	-	-	-	-	-	-
DICHLOROPROPENE (TRANS-1,3-)	na	X	-	-	-	-	-	-
DIETHYL PHTHALATE	na	X	-	-	-	-	-	-
DIMETHYLPHENOL (2,4-)	na	X	-	-	-	-	-	-
DINITRO(4,6-)METHYLPHENOL (2-)	na	-	-	-	X	-	-	-
DI-N-BUTYL PHTHALATE	na	X	X	-	-	-	-	-
DI-N-OCTYL PHTHALATE	na	X	-	-	-	-	-	-
ETHYLBENZENE	X	X	-	-	-	-	-	-
BIS(2-ETHYLHEXYL)PHTHALATE	na	X	X	X	X	X	X	X
FLUORANTHENE	na	X	X	X	X	-	-	-
FLUORENE	na	X	X	-	-	-	-	-
HEXANONE (2-)	na	X	-	-	-	-	-	-
INDENO(1,2,3-c,d)PYRENE	na	-	X	X	O	-	-	-
ISOPHORONE	na	X	-	-	-	-	-	-
METHYL (4-) PENTANONE (2-)	na	X	-	-	-	-	-	-
METHYLNAPHTHALENE (2-)	na	X	X	-	-	-	-	-
METHYLPHENOL (2-)	na	X	-	-	-	-	-	-
METHYLPHENOL (4-)	na	X	X	-	-	-	-	-
NAPHTHALENE	na	X	X	-	-	-	-	-
NITROBENZENE	na	X	-	-	-	-	-	-
N-NITROSODIPHENYLAMINE	na	X	X	-	-	-	-	-
PENTACHLOROPHENOL	na	X	-	-	-	-	-	-
PHENANTHRENE	na	X	X	X	X	-	-	-
PHENOL	na	X	-	-	-	-	-	X
PYRENE	na	X	X	X	O	-	-	-
STYRENE	X	X	-	-	-	-	-	-
TETRACHLOROETHENE	X	X	-	-	-	X	-	-
TOLUENE	X	X	-	-	-	-	-	-
TRICHLOROETHANE (1,1,1-)	X	-	-	-	-	X	-	-
TRICHLOROETHENE	X	X	-	-	-	-	X	X
VINYL CHLORIDE	X	X	-	-	-	X	-	X
XYLENES (TOTAL)	X	X	-	-	-	X	-	-

X = Selected as a chemical of potential concern.
O = Not selected; within background levels.
- = Not detected
na = Not analyzed for.

G.M.R. = Great Miami River

TABLE 15

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN FOR THE
POWELL ROAD LANDFILL, OHIO
(INORGANICS)

CHEMICAL	LANDFILL LIQUIDS	SURFACE SOILS	SUBSURFACE SOILS	G.M.R. SEDIMENT	STREAM SEDIMENT	G.M.R. SURFACE WATER	STREAM SURFACE WATER	ON-SITE GROUNDWATER	ELDORADO PLAT AREA	NEEDMORE AREA
ALUMINUM	X	O	O	O	O	O	O	X	X	X
ANTIMONY	X	X	-	-	-	-	-	-	-	-
ARSENIC	X	O	O	O	O	X	X	O	O	O
BARIUM	X	O	X	O	X	O	X	O	O	O
BERYLLIUM	X	O	b	O	O	X	X	X	-	b
CADMIUM	X	X	X	-	-	-	-	-	-	-
CALCIUM	E	E	E	E	E	E	E	E	E	E
CHROMIUM	X	O	X	O	O	O	-	X	O	O
COBALT	E	E	E	E	E	E	E	E	E	E
COPPER	E	E	E	E	E	E	E	E	E	E
CYANIDE	X	O	-	-	-	O	-	O	O	O
IRON	E	E	E	E	E	E	E	E	E	E
LEAD	X	O	X	O	O	O	X	X	X	b
MAGNESIUM	E	E	E	E	E	E	E	E	E	E
MANGANESE	E	E	E	E	E	E	E	E	E	E
MERCURY	X	O	b	-	-	-	X	O	O	-
NICKEL	E	E	E	E	-	E	-	E	-	-
POTASSIUM	E	E	E	-	-	E	E	E	E	E
SELENIUM	-	-	-	-	-	-	-	E	E	E
SILVER	X	-	-	-	-	-	-	X	-	-
SODIUM	E	E	E	E	E	E	E	E	E	E
STRONTIUM	X	X	X	O	X	X	O	O	O	O
THALLIUM	-	X	-	-	-	-	-	-	-	-
VANADIUM	X	O	O	O	O	O	O	O	O	b
ZINC	E	E	E	E	E	E	E	E	E	E

X = Selected as chemical of potential concern.
O = Not selected; within background levels.
b = Not selected; blank contaminant.
- = Not detected.
E = Essential nutrient used as basis for removal in accordance with USEPA Region V specifications (USEPA 1991e).
G.M.R. = Great Miami River

TABLE 16

ORAL TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Slope Factor (SF) (mg/kg-day)-1	Weight-of-Evidence Classification	Slope Factor Source	Chronic RfD (mg/kg-day)	Target Organ	RfD Source	Uncertainty Factor
ORAL							
Organic Chemicals:							
Acenaphthene	---	D	IRIS	6.00E-02	liver	IRIS	3,000
Acetone	---	D	IRIS	1.00E-01	kidney/liv	IRIS	1,000
Anthracene	---	D	IRIS	3.00E-01	none obser	IRIS	3,000
Benzo(a)anthracene	--- (a)	B2	IRIS	---	---	---	---
Benzene	2.90E-02	A	IRIS	---	---	IRIS	---
Benzo(a)pyrene	1.15E+01	B2	HEAST	---	---	---	---
Benzo(b)fluoranthene	--- (a)	B2	IRIS	---	---	---	---
Benzo(g,h,i)perylene	---	D	IRIS	--- (a)	---	---	---
Benzo(k)fluoranthene	--- (a)	B2	IRIS	---	---	---	---
Benzoic acid	---	D	IRIS	4.00E+00	malaise	IRIS	1
Benzyl alcohol	---	---	---	3.00E-01	forestomac	HEAST	1,000
2-Butanone (methyl ethyl ketone)	---	D	IRIS	5.00E-02 (b,c)	fetotox	IRIS	1,000
Butylbenzylphthalate	---	C	IRIS	2.00E-01	livr/brain	IRIS	1,000
Carbon Disulfide	---	---	---	1.00E-01 (c)	fetotox	IRIS	100
4-Chloro-3-methylphenol (4-Chloro-m-cresol)	---	---	---	---	---	HEAST	--- ---
Chlorobenzene	---	D	IRIS	2.00E-02	liver	IRIS	1,000
Chloroethane	---	---	---	---	---	---	---
Chloroform	6.10E-03	B2	IRIS	1.00E-02	Liver	IRIS	1,000
Chrysene	--- (a)	B2	IRIS	---	---	HEAST	---
DDT	3.40E-01	B2	IRIS	5.00E-04 (d)	liver les	IRIS	100
Di-n-butylphthalate	---	---	---	1.00E-01	mortality	IRIS	1,000
Di-n-octyl phthalate	---	---	---	2.00E-02 (e)	liver,kidn	HEAST	1,000
Dibenzo(a,h)anthracene	--- (a)	B2	IRIS	---	---	---	---
Dibenzofuran	---	D	IRIS	--- (a)	---	HEAST	---
1,2-Dichlorobenzene	---	D	IRIS	9.00E-02	liver	IRIS	1,000
1,4-Dichlorobenzene	2.40E-02 (f)	C	HEAST	1.00E-01	kidney	HA	1,000
3,3'-Dichlorobenzidine	4.50E-01	B2	IRIS	---	---	---	---
1,1-Dichloroethane	---	C	IRIS	1.00E-01 (e)	kidney	HEAST	1,000
cis-1,2-Dichloroethene	---	D	IRIS	1.00E-02	hematol	HEAST	3,000
trans-1,2-Dichloroethene	---	---	---	2.00E-02	liver	IRIS	1,000
Dichloropropanes (1,1-, 1,2-, 1,3-, 2,2-)	---	---	---	---	---	HEAST	---
1,2-Dichloropropane	6.80E-02 (f)	B2	HEAST	---	---	HEAST	---
1,3-Dichloropropene	1.80E-01	B2	HEAST	---	---	---	---
trans-1,3-Dichloropropene	---	---	---	3.00E-04	kidney	IRIS	10,000
Diethylphthalate	---	D	IRIS	8.00E-01	Body wt	IRIS	1,000
2,4-Dimethylphenol	---	---	---	2.00E-02	neuro/hema	IRIS	3,000
Ethylbenzene	---	D	IRIS	1.00E-01	liver,kidn	IRIS	1,000
bis(2-Ethylhexyl)phthalate	1.40E-02	B2	IRIS	2.00E-02	liver	IRIS	1,000
Fluoranthene	---	---	---	4.00E-02	kidn/liver	IRIS	3,000
Fluorene	---	D	IRIS	4.00E-02	hematol	IRIS	3,000
2-Hexanone	---	---	---	---	---	HEAST	---
Indeno(1,2,3-c,d)pyrene	--- (a)	B2	IRIS	---	---	---	---
Isophorone	4.10E-03	C	IRIS	2.00E-01	kidney	IRIS	1,000
4-Methyl,2-pentanone (MIBK)	---	---	---	5.00E-02	liver/kidney	HEAST	1,000
2-Methylnaphthalene	---	---	---	--- (a)	---	---	---
2-Methylphenol (o-cresol)	---	---	---	5.00E-02	neurotox	IRIS	1,000
4-Methylphenol (p-cresol)	---	---	---	5.00E-02	neurotox	IRIS	1,000
N-Nitrosodiphenylamine	4.90E-03	B2	IRIS	---	---	---	---
Naphthalene	---	D	IRIS	4.00E-03 (f)	<body wt	HEAST	10,000
Nitrobenzene	---	---	---	5.00E-04 (b,c)	liver/kidn	IRIS	10,000
PCBs (total)	7.70E+00 (l)	B2	IRIS	1.00E-04 (m)	fetotox	Clement	100
Pentachlorophenol	1.20E-01	B2	IRIS	3.00E-02	liv/kid	IRIS	100
Phenanthrene	---	D	IRIS	--- (a)	---	HEAST	---
Phenol	---	D	IRIS	6.00E-01	fetal wt	IRIS	100

TABLE 16 (continued)

ORAL TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Slope Factor (SF) (mg/kg-day)-1	Weight-of-Evidence Classification	Slope Factor Source	Chronic RfD (mg/kg-day)	Target Organ	RfD Source	Uncertainty Factor
Pyrene	---	D	IRIS	3.00E-02	kidney	IRIS	3,000
Styrene	3.00E-02 (f)	B2	HEAST	2.00E-01	RBC/liver	IRIS	1,000
Tetrachloroethene (perchloroethylene)	5.10E-02 (g)	B2	HEAST	1.00E-02	liver	IRIS	1,000
Toluene	---	D	IRIS	2.00E-01	Liver,kidn	IRIS	1,000
1,1,1-Trichloroethane	---	D	IRIS	9.00E-02 (b,c)	Liver	IRIS	1,000
Trichloroethene	1.10E-02	B2	HEAST	7.35E-03	liver	HA	1,000
Vinyl Chloride	1.90E+00	A	HEAST	---	---	---	---
Xylenes (total)	---	D	IRIS	2.00E+00	CNS,mortal	IRIS	100
Inorganic Chemicals:							
Aluminum	---	---	---	---	---	HEAST	---
Antimony	---	---	---	4.00E-04	blood chem.	HEAST	1,000
Arsenic	2.00E+00 (h)	A	IRIS	1.00E-03 (e)	skin	HEAST	1
Barium	---	---	---	7.00E-02	inc BP	IRIS	3
Beryllium	4.30E+00	B2	IRIS	5.00E-03	totaltumor	IRIS	100
Cadmium (water)	(j)	---	IRIS	5.00E-04	kidney	IRIS	10
Cadmium (food)	---	---	---	1.00E-03	kidney	IRIS	10
Chromium III and Compounds	---	---	---	1.00E+00	Liver	IRIS	1,000
Chromium VI and Compounds	(j)	---	IRIS	5.00E-03	CNS	IRIS	500
Cyanide	---	---	---	2.00E-02	myelin deg	IRIS	500
Lead	---	B2	IRIS	---	CNS	IRIS	---
Mercury	---	D	IRIS	3.00E-04	Kidney	HEAST	1,000
Silver	---	---	---	3.00E-03	argyria	IRIS	2
Strontium	---	---	---	---	---	---	---
Thallium and compounds	---	D	IRIS	7.00E-05 (k)	Serum,Bald	HEAST	3,000
Vanadium	---	---	---	7.00E-03 (e)	livr,kidne	HEAST	100

-- = No data available.
* = mg/L

(a) No oral toxicity data are available for these PAH's. However, a surrogate value (for carcinogens equal to that of benzo(a)pyrene; for noncarcinogens equal to that of naphthalene) has been assigned.
(b) Based on route to route extrapolation.
(c) Being reconsidered by oral RfD workgroup.
(d) Value is for 4,4'-DDT.
(e) Under review by RfD/RfC workgroup.
(f) Under review by CRAVE Workgroup.
(g) Quantitative estimates were not calculated by CRAVE Workgroup.
(h) A unit risk of 5E-05 (ug/L)-1 has been proposed by the risk assessment forum and this recommendation has been scheduled for SAB review. This is equivalent to 1.75 (mg/kg-day)-1 assuming a 70 kg individual ingest 2 L of water per day. This is rounded to two significant figures due to uncertainty.
(i) Value is derived from current drinking water standard of 1.3 mg/L; drinking water document concluded toxicity information were inadequate for calculation of an RfD for copper. This is equivalent to 3.71E-02 mg/kg-day assuming a 70 kg individual drinks 2 L/day. This rounds to 4.0E-02 due to uncertainty.
(j) There is inadequate evidence for carcinogenicity of this compound by the oral route.
(k) Value is thallium in soluble salts.
(l) Based on Aroclor 1260.
(m) Derived by Clement. Based on Aroclor 1016.

NOTE: IRIS = Integrated Risk Information System - March 1, 1991.
HEAST = Health Effects Assessment Summary Tables - 1991.
HA = Health Advisory - March 1987.

TABLE 17

INHALATION TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Unit Risk (UR) (ug/m3)-1	Weight-of-Evidence Classification	Unit Risk Source	Chronic RfC (mg/m3)	Target Organ	RfC Source	Uncertainty Factor
INHALATION							
Organic Chemicals:							
Acenaphthene	---	D	IRIS	---	---	IRIS	---
Acetone	---	D	IRIS	---	---	IRIS	---
Anthracene	---	D	IRIS	---	---	IRIS	---
Benzene	8.30E-06	A	IRIS	---	---	IRIS	---
Benzo(a)anthracene	---	B2	IRIS	---	---	---	---
Benzo(a)pyrene	1.70E-03	B2	HEAST	---	---	---	---
Benzo(b)fluoranthene	---	B2	IRIS	---	---	---	---
Benzo(g,h,i)perylene	---	D	IRIS	---	---	---	---
Benzo(k)fluoranthene	---	B2	IRIS	---	---	---	---
Benzoic acid	---	D	IRIS	---	---	IRIS	---
Benzyl alcohol	---	---	---	---	---	HEAST	---
2-Butanone (methyl ethyl ketone)	---	---	---	3.00E-01	CNS	HEAST	1,000
Butylbenzylphthalate	---	---	IRIS	---	---	IRIS	---
Carbon Disulfide	---	---	---	1.00E-02	fetotox	HEAST	1,000
4-Chloro-3-methylphenol	---	---	---	---	---	---	---
Chlorobenzene	---	D	IRIS	2.00E-02	kid/liver	HEAST	10,000
Chloroethane	---	---	---	---	---	---	---
Chloroform	2.30E-05	B2	IRIS	---	---	IRIS	---
Chrysene	---	B2	IRIS	---	---	HEAST	---
DDT	9.70E-05	B2	IRIS	--- (a)	---	IRIS	---
Di-n-octyl phthalate	---	---	---	---	---	HEAST	---
Dibenzo(a,h)anthracene	---	B2	IRIS	---	---	---	---
Dibenzofuran	---	D	IRIS	---	---	HEAST	---
1,2-Dichlorobenzene	---	D	IRIS	2.00E-01	body wt	HEAST	1,000
1,4-Dichlorobenzene	---	C	HEAST	7.00E-01	liv/kid	HEAST	100
3,3'-Dichlorobenzidine	---	B2	IRIS	---	---	---	---
1,1-Dichloroethane	---	C	IRIS	5.00E-01	kidney	HEAST	1,000
cis-1,2-Dichloroethene	---	D	IRIS	---	---	HEAST	---
trans-1,2-Dichloroethene	---	---	---	---	---	IRIS	---
Dichloropropanes (1,1-, 1,2-, 1,3-, 2,2-)	---	---	---	---	---	HEAST	---
1,2-Dichloropropene	---	B2	HEAST	---	---	---	---
1,3-Dichloropropene	3.70E-05	B2	HEAST	---	---	---	---
trans-1,3-Dichloropropene	---	---	---	2.00E-02	nasal muco	IRIS	30
Diethylphthalate	---	D	IRIS	---	---	IRIS	---
2,4-Dimethylphenol	---	---	---	---	---	IRIS	---
Ethylbenzene	---	D	IRIS	1.00E+00	development	IRIS	300
bis(2-Ethylhexyl)phthalate	---	B2	IRIS	---	---	IRIS	---
Fluoranthene	---	---	---	---	---	IRIS	---
Fluorene	---	D	IRIS	---	---	IRIS	---
2-Hexanone	---	---	---	---	---	HEAST	---
Indeno(1,2,3-c,d)pyrene	---	B2	IRIS	---	---	---	---
Isophorone	---	C	IRIS	---	---	IRIS	---
4-Methyl,2-pentanone (MIBK)	---	---	---	8.00E-02	liv/kid	HEAST	1,000
2-Methylnaphthalene	---	---	---	---	---	---	---
2-Methylphenol (o-cresol)	---	---	---	---	---	IRIS	---
4-Methylphenol (p-cresol)	---	---	---	---	---	IRIS	---
Methyl Ethyl Ketone (2-butanone)	---	D	IRIS	---	---	---	---
N-Nitrosodiphenylamine	---	B2	IRIS	---	---	---	---
Naphthalene	---	D	IRIS	---	---	HEAST	---
Nitrobenzene	---	---	---	2.00E-03	liver/kidn	HEAST	3,000
PCBs (total)	---	---	---	---	---	IRIS	---
Pentachlorophenol	---	B2	HEAST	---	---	IRIS	---
Phenanthrene	---	D	IRIS	---	---	HEAST	---
Phenol	---	D	IRIS	---	---	IRIS	---
Pyrene	---	D	IRIS	---	---	IRIS	---
Styrene	5.70E-07 (b)	B2	HEAST	---	---	IRIS	---
Tetrachloroethene (perchloroethylene)	5.20E-07 (c)	B2	HEAST	---	---	IRIS	---
Toluene	---	D	IRIS	2.00E+00	CNS,Irrit	HEAST	100
1,1,1-Trichloroethane	---	D	IRIS	1.00E+00	liver	HEAST	1,000
Trichloroethene	1.70E-06 (d)	B2	HEAST	---	---	IRIS	---
Vinyl Chloride	8.40E-05	A	HEAST	---	---	---	---
Xylene (total)	---	D	IRIS	3.00E-01	CNS, resp	HEAST	100

TABLE 17 (continued)

INHALATION TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Chemical	Unit Risk (UR) (ug/m3)-1	Weight-of-Evidence Classification	Unit Risk Source	Chronic RfC (mg/m3)	Target Organ	RfC Source	Uncertainty Factor
Inorganic Chemicals:							
Aluminum	---	---	---	---	---	HEAST	---
Antimony	---	---	---	---	Cancer	IRIS	---
Arsenic	4.30E-03 (e)	A	IRIS	---	cancer	IRIS	---
Barium	---	---	---	5.00E-04	Fetotox	HEAST	1,000
Beryllium	2.40E-03	B2	IRIS	---	---	IRIS	---
Cadmium	1.80E-03	B1	IRIS	---	---	IRIS	---
Chromium III and Compounds	---	---	---	2.00E-06	nasal muco	HEAST	300
Chromium VI and Compounds	1.20E-02	A	IRIS	2.00E-06	nasal muco	HEAST	300
Cyanide	---	---	---	---	---	IRIS	---
Lead	---	B2	IRIS	---	CNS	IRIS	---
Mercury, Inorganic	---	---	---	3.00E-04	neurotox	HEAST	30
Silver	---	---	---	---	---	IRIS	---
Strontium	---	---	---	---	---	---	---
Thallium and compounds	---	D	IRIS	--- (f)	---	HEAST	---
Vanadium	---	---	---	---	---	HEAST	---

--- = No data available.
* = mg/L

(a) Based on 4,4-DDT.
(b) Under review by CRAVE Workgroup.
(c) Quantitative estimates were not calculated by CRAVE Workgroup.
(d) Based on metabolized dose.
(e) An absorption factor of 30% is used to calculate the unit risk from the slope factor.
(f) Based on thallium in soluble salts.

'E: IRIS = Integrated Risk Information System - March 1, 1991.
HEAST = Health Effects Assessment Summary Tables - 1991.

TABLE 18

COMPARISON OF CHEMICAL CONCENTRATIONS FOR CHEMICALS OF POTENTIAL CONCERN DETECTED AT THE POWELL ROAD LANDFILL
TO FEDERAL MAXIMUM CONTAMINANT LEVELS
(Concentrations reported in µg/l)

	Eldorado Plat Monitoring Wells		On-Site Monitoring Wells		
Chemical	Arithmetic Mean	Maximum Detected Concentrations	Arithmetic Mean	Maximum Detected Concentrations	Federal Maximum Contaminant Levels
Organics:					
Acetone	ND	ND	5	8.5	--
Benzene	ND	ND	2.5	2.7	5 (a)
Benzoic acid	ND	ND	24	[illegible]	--
2-Butanone	ND	ND	1.5	2.5	--
Carbon Disulfide	ND	ND	2.5	2.7	--
Chlorobenzene	ND	ND	2.5	4	100 (b)
Chloroethane	ND	ND	7.3	43.3	--
1,1-Dichloroethane	ND	ND	12	104	--
1,2-Dichloroethene (total)	2.7	3.8	5	47.8	70 (b) (cis)
bis(2-Ethylhexyl)phthalate	3	3	4.2	3.5	4 (P,c)
Tetrachloroethene	ND	ND	2.4	2.2	5 (b)
1,1,1-Trichloroethane	ND	ND	3.4	33.3	200 (a)
Vinyl Chloride	ND	ND	5.4	10.8	2 (a)
Xylenes (total)	ND	ND	3.7	[illegible]	10,000 (b)
Trichloroethene	3	5.3	ND	ND	5 (a)
Inorganics					
Aluminum	24	23.7	50	73	50 - 200 (b,d)
Beryllium	--	--	1.8	2.4	1 (P,c)
Chromium	--	--	6.8	11.5	100 (b)
Lead	2.4	2.7	3.5	24.3	50 (a,e) 15 (AL,f)
Silver	--	--	4.6	4.6	100 (b,d)

-- = Not available.
ND = Not detected in samples.
(P) Proposed.
AL = Action Level.

(a) 40 CFR, Part 141-National Primary Drinking Water Regulations. 559-563, 620-621.
(b) Environmental Protection Agency (EPA). 1991. National Primary Drinking Water Regulations; Final Rule. Federal Register. Vol. 56, No. 20, Wednesday, January 30, 1991. 3526-3597.
(c) Environmental Protection Agency (EPA) 1990. National Primary and Secondary Drinking Water Regulations; Synthetic Organic Chemicals and Inorganic Chemicals. Proposed Rule. Federal Register. Vol. 53, No. 143, Wed. July 25, 1990.
(d) Secondary MCL.
(e) The MCL for lead is in effect until December 7, 1992 when the Action Level will take its place.
(f) Environmental Protection Agency (EPA). 1991. Drinking Water Regulations; Maximum Contaminant Level Goals and National Primary Drinking Water Regulations for Lead and Copper; Final Rule. Federal Register; Vol. 56, No. 110, 26460-26564, Friday, June 7, 1991. Standards will go into effect December 7, 1992.

TABLE 19

SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH CURRENT LAND USE CONDITIONS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Receptor Population/Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk (a)	Hazard Index for Noncarcinogenic Effects (b)	
Child/Teenager (Trespasser/Resident):			
Incidental Ingestion of Onsite Surface Soil	3E 07	<1	3E 03
Dermal Contact with Onsite Surface Soil	2E 09	<1	1E 04
Inhalation of Landfill VOC Emissions (c)	2E 07	<1	1E 03
Incidental Ingestion of Stream A Sediment	NC	<1	8E 05
Incidental Ingestion of Great Miami River Sediment	7E-08	<1	1E 05
Dermal Contact with Stream A Surface Water	9E 07	<1	8E 04
Incidental Ingestion of Great Miami River Surface Water	4E 07	<1	4E 04
Dermal Contact with Great Miami River Surface Water (d)	2E 05	<1	2E 01
Total Exposure Through All Pathways Above (e)	2E 05	<1	2E 01
Adult (Trespasser/Resident)			
Incidental Ingestion of Onsite Surface Soil	3E 07	<1	8E 04
Dermal Contact with Onsite Surface Soil	5E-09	<1	7E 05
Inhalation of Landfill VOC Emissions (while trespassing)	3E 07	<1	5E 04
Incidental Ingestion of Stream A Sediment	NC	<1	2E 05
Incidental Ingestion of Great Miami River Sediment	6E-08	<1	3E 06
Dermal Contact with Stream A Surface Water	1E 06	<1	4E 04
Incidental Ingestion of Great Miami River Surface Water	3E 07	<1	1E 04
Dermal Contact with Great Miami River Surface Water (d)	3E 05	<1	1E 01
Total Exposure Through All Pathways Above (e)	4E-05	<1	1E 01

TABLE 19 (continued)

SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH CURRENT LAND USE CONDITIONS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Receptor Population/Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk (a)	Hazard Index for Noncarcinogenic Effects (b)	
Nearby Resident (Eldorado Plat)			
Ingestion of Ground Water from Residential Wells	NC	<1	4E-04
Ingestion of Ground Water from Monitoring Wells	7E-07	<1	3E-02
Inhalation of VOCs While Showering Using Monitoring Wells	2E-05	NC	NC
Dermal Contact with Ground Water While Showering Using Residential Wells	NC	<1	4E-06
Dermal Contact with Ground Water While Showering Using Monitoring Wells	2E-08	<1	7E-04
Ingestion of Fish from Great Miami River Backwater Area (d)	2E-03	>1	6E+00
Inhalation of Landfill VOC Emissions (c)	7E-06	<1	1E-02
Total Exposure From All Residential Well Pathways Above (e)	2E-03	>1	6E+00
Total Exposure From All Monitoring Well Pathways Above (e)	2E-03	>1	6E+00

(a) The upper bound individual excess lifetime cancer risk represents the additional probability that an individual may develop cancer over a 70 year lifetime as a result of exposure conditions evaluated.

(b) The hazard index indicated whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that human health effects are unlikely to occur

(c) The listed risk is an upper bound, particularly due to the conservative landfill emissions model used; it may be overestimated by as much as four orders of magnitude.

(d) The cancer risk is primarily due to Aroclors 1016 and 1254 (PCBs), and, although both Aroclors are likely to be far less carcinogenic than Aroclor 1260, if at all, both were evaluated using the slope factor for Aroclor 1260.

(e) It is highly unlikely that a single individual would be simultaneously exposed through all of these pathways. In fact, there are numerous possible combinations of potential exposure pathways that could be considered for the site. However, cumulative risks across pathways were presented as shown above in accordance with USEPA Region V/OEPA (1991) comments on the Draft Baseline Risk Assessment (Clement 1991b).

NC - Not Calculated. Chemicals associated with either carcinogenic or noncarcinogenic effects were not selected for evaluation through the listed pathway, or were not detected.

Source - Section 6 of the Remedial Investigation

TABLE 20

SUMMARY OF POTENTIAL HEALTH RISKS ASSOCIATED WITH FUTURE LAND USE CONDITIONS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Receptor Population/Exposure Pathway	Upper Bound Excess Lifetime Cancer Risk (a)	Hazard Index for Noncarcinogenic Effects (b)	
Hypothetical Onsite Resident			
Incidental Ingestion of Onsite Surface Soil (c)	2E 05	<1	5E 02
Dermal Contact with Onsite SUrface Soil	4E-08	<1	5E 04
Inhalation of Landfill VOC Emissions (d)	2E 05	<1	4E 02
Ingestion of Onsite Ground Water	7E 05	>1	3E+00
Inhalation of VOCs While Showering Using Onsite Ground Water	2E 07	<1	2E-02
Dermal Contact with Onsite Ground Water While Showering	3E 06	<1	5E 02
Total Exposure Through All Pathways Above (e)	1E 04	>1	3E+00

(a) The upper bound individual excess lifetime cancer risk represents the additional probability that an individual may develop cancer over a 70 year lifetime as a result of exposure conditions evaluated.

(b) The hazard index indicates whether or not exposure to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that human health effects are unlikely to occur

(c) The cancer risk is due primarily to carcinogenic PAHs, which were conservatively evaluated using only the slope factor for benzo(a)pyrene, one of the most potent PAHs.

(d) The listed risk is an upper bound, particularly due to the conservative landfill emissions model used; it may be overestimated by as much as four orders of magnitude.

(e) It is highly unlikely that a single individual would be simultaneously exposed through all of these pathways In fact, there are numerous possible combinations of potential exposure pathways that could be considered for the site. However, cumulative risks across pathways were presented as shown above in accordance with USEPA Region V/OEPA (1991) comments on the Draft Baseline Risk Assessment (Clement 1991b).

Source · Section 6 of the Remedial Investigation

TABLE 21

SUMMARY OF RISK-BASED CLEANUP LEVELS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Remedial Action Objective	Reference Calculation Table	Chemical of Concern	Water (mg/L)			Soil (mg/kg)		Air (µg/L)	
			HI=1	10-6 Risk	10-4 Risk	10-6 Risk	10-4 Risk	10-6 Risk	10-4 Risk
Current Land Use Conditions									
• Nearby residents from inhalation of of landfill gas emission	Exhibit 1	Vinyl chloride						0.0012	1.2
• Nearby residents from dermal contact with the backwaters of the Great Miami River*	Exhibit 2	Beryllium				0.1	10		
		4,4'-DDT				2	200		
		Aroclor 1016				0.3-0.6	35 61		
		Aroclor 1254				0.1-0.4	36 59		
• Nearby residents from dermal contact to Stream A surface water*	Exhibit 2	Beryllium				0.1	10		
		4,4'-DDT				2	200		
		Aroclor 1016				0.3-0.6	35 61		
		Aroclor 1254				0.1-0.4	36 59		
• Nearby residents from ingestion of fish caught from the backwater area of the Great Miami River*	Exhibit 2	Beryllium				0.1	10		
		4,4'-DDT				2	200		
		Aroclor 1016				0.3-0.6	35 61		
		Aroclor 1254				0.1-0.4	36 59		
• Nearby residents from inhalation of volatiles from ground water	Exhibit 3	Trichloroethene		0.25	25				
Future Land Use Conditions									
• Onsite residents from ingestion of soil	Exhibit 4	Benzo(a)pyrene				0.05	5		
		Benzo(1)anthracene				0.05	5		
		Benzo(b)fluoranthene				0.05	5		
		Benzo(k)fluoranthene				0.05	5		
		Chrysene				0.05	5		
		Dibenzo(a,h)anthracene				0.05	5		
		Indeno(1,2,3-cd)pyrene				0.05	5		
• Onsite residents from inhalation of landfill gas emissions	Exhibit 5	Vinyl chloride						0.0012	1.2
		Benzene						0.12	12

TABLE 21 (continued)

SUMMARY OF RISK-BASED CLEANUP LEVELS
(Continued)

Remedial Action Objective	Reference Calculation Table	Chemical of Concern	Water (mg/L)			Soil (mg/kg)*		Air (µg/L)	
			HI=1	10-6 Risk	10-4 Risk	10-6 Risk	10-4 Risk	10-6 Risk	10-4 Risk
• Onsite residents from ingestion of ground water**	Exhibit 6	Antimony	0.015						
		Benzo(a)anthracene		0.000007	0.0007				
		Chrysene		0.000007	0.0007				
		Vinyl chloride		0.00004	0.004				
		Arsenic		0.00004	0.004				
		Beryllium		0.00002	0.002				
• Onsite residents from dermal contact with ground water**	***	Chrysene							

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* Soil cleanup levels provided due to potential surface water contaminant sources being isolated areas of soils and no current use surface water contamination having been detected during the RI sampling.

**Future land use risks from ground water based on exposure to leachate constituents

***Cleanup levels specific for this pathway are not calculated because (1) dermal exposure guidance is not yet available from the U.S. EPA and (2) ground water will be remediated based on risks associated with ingestion of ground water.

TABLE 22

CHEMICAL-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

	Water		
	SDWA		RCRA
	MCL (mg/L)	MCLG (mg/L)	MCL (mg/L)
Organic Chemical			
Aroclor 1016	0.0005	0	NA
Aroclor 1254	0.0005	0	NA
Benzene	0.005	0	0.005
Benzo(a)anthracene	0.0001	0	NA
Benzo(b)fluoranthene	0.0002	0	NA
Benzo(k)fluoranthene	0.0002	0	NA
Benzo(a)pyrene	0.0002	0	NA
Chrysene	0.0002	0	NA
4,4'-DDT	NA	NA	NA
Dibenzo(a,h)anthracene	0.0003	0	NA
Indeno(1,2,3-cd)pyrene	0.0004	0	NA
Trichloroethene	0.005	0	0.005
Vinyl chloride	0.002	0	0.002
Inorganic Chemical			
Antimony	0.01/0.005	0.003(b)	NA
Arsenic	0.05	0	0.05
Beryllium	0.001	0	NA
Mercury	0.002	0	0.002

Only non zeros MCLGs under the SDWA are potentially ARAR.

TABLE 23

STATE OF OHIO: SURFACE WATER STANDARDS

FOR THE POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

	Use Designations					
	Aquatic Life Habitat (Warm Water Habitat) (ug/L)				Water Supply (ug/L)	
	Outside Mixing Zone		Human Health	Inside Mixing	Public	Agricultural
		30-Day	30-Day	Zone	Water	Water
Chemical	Maximum	Average	Average	Maximum	Supply[a]	Supply[b]
Organic Chemical						
Aroclor 1016	NA	0.001	0.00079	NA	0	NA
Aroclor 1254	NA	0.001	0.00079	NA	0	NA
Benzene	1,100	560	710	2,100	5	NA
Benzo(a)anthracene	NA	NA	0.31	NA	0.028	NA
Benzo(b)fluoranthene	NA	NA	0.31	NA	0.028	NA
Benzo(k))fluoranthene	NA	NA	0.31	NA	0.028	NA
Benzo(a)pyrene	NA	NA	0.31	NA	0.028	NA
Chrysene	NA	NA	0.31	NA	0.028	NA
4,4'-DDT	NA	0.001	0.00024	NA	0.00024	NA
Dibenzo(a,h)anthracene	NA	NA	0.31	NA	0.028	NA
Indeno(1,2,3-cd)pyrene	NA	NA	0.31	NA	0.028	NA
Trichloroethene	1,700	75	807	3,400	5.0	NA
Vinyl chloride	NA	NA	5,250	NA	2.0	NA
Inorganic Chemical						
Antimony	650	190	4,300	1,300	14	NA
Arsenic	360	190	NA	720	50	100
Beryllium	c	c	1.17	c	0.068	100

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[a] Values presented are based on human health 30-day average.

[b] Values presented are based on 30-day average.

[c] Values can be estimated based on water hardness and Tables 7-10, 7-11, and 7-12 of Water Quality Standards, Ohio EPA Regulations OAC 3745-1-22.

TABLE 24

STATE OF OHIO
LOCATION-SPECIFIC ARARs

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Location	Requirement	Citation
Restricted areas for open burning	Open burning prohibited without OEPA permission.	OAC 3745-19-03 A, B, C, D
Floodplains, sand or gravel pits, wetlands, areas above sole source aquifers	New solid waste landfills or expansion of existing solid waste landfills prevented in areas noted.	OAC 3745-27-07 A, B
Putrescible waste disposal sites	Explosion gas monitoring plan.	OAC 3745-27-12 B, E
Areas of seismic activity and floodplains	Restricted siting of hazardous waste TSDF.	OAC 3745-54-18 A, B, C
Location, siting of new ground water wells	New wells must be located and maintained to prevent contaminants from entering and be accessible for cleaning and maintenance.	OAC 3745-9-04 A, B

TABLE 25

STATE OF OHIO
ACTION-SPECIFIC ARARs

POWELL ROAD LANDFILL
HUBER HEIGHTS, OHIO

Actions	Requirement	Citation
Air Stripping	Malfunction and maintenance, air pollution control equipment.	OAC 3745-15-06
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	Good engineering stack height required.	OAC 3745-16-02, B, C
	Organic matter emission control from stationary sources (best available control technology).	OAC 3745-21-07, A, B, J
	Air and water permit criteria ambient air quality standard and best available technology.	OAC 3745-31-05
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C(a)
	Design and operation of hazardous waste facilities.	OAC 3745-54-31(a)
	Emergency equipment; communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-37, A OAC 3745-54-52, A - F OAC 3745-54-55 OAC 3745-54-56, A - F(a)
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-17-02.	OAC 3745-17-05
	Visible emissions and nuisance	OAC 3745-17-07
	Restrictions on particulate emissions from fuel burning equipment.	OAC 3745-17-10
	Ambient air quality standards for particulates.	OAC 3745-17-02
	Ambient air quality standards for sulfur dioxide.	OAC 3745-18-02

TABLE 25 (continued)

Actions	Requirement	Citation
Air Stripping (Cont'd)	Methods for determining compliance with allowable sulfur dioxide emissions.	OAC 3745-18-04
	Sulfur dioxide ambient monitoring requirements.	OAC 3745-18-05, A
	Sulfur dioxide emission limit provisions.	OAC 3745-18-06, A - G
	Open burning standards in non-restricted areas.	OAC 3745-19-04, A - D
	Ambient air quality standards and guidelines for carbon monoxide, ozone, and non-methane hydrocarbons.	OAC 3745-21-02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-21-02.	OAC 3745-21-05
	Control of emissions of carbon monoxide from stationary sources.	OAC 3745-21-08
	Ambient air quality standards for nitrogen dioxides.	OAC 3745-23-01
	Methods for *measurement of nitrogen* dioxides.	OAC 3745-23-02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-23-01.	OAC 3745-23-04
	Nitrogen dioxide emission control: stationary source.	OAC 3745-23-06
	Emission control program if emit 0.25 ton per day or more of air contaminants for which air quality standards had been adopted.	OAC 3745-25-03
Leachate Removal	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Conservancy district rules and regulations pertaining to channels, ditches, pipes, sewers, etc.	ORC 6101.19
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	VOC emission control, stationary sources.	OAC 3745-21-09 OAC 3745-21-02

TABLE 25 (continued)

Actions	Requirement	Citation
Leachate Removal (Cont'd)	Additional permit information and hazardous waste storage in tanks.	OAC 3745-50-44, A, C2[a]
	Emergency equipment; communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, and plan amendments.	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-37, A OAC 3745-54-52, A-F OAC 3745-54-55 OAC 3745-54-56, A-J[a]
	Design of tank systems, components, containment, leak detection, operating requirements, inspections, response to spills or leaks, closure and post-closure.	OAC 3745-55-92, A-F OAC 3745-55-93, A-G, I OAC 3745-55-94, A, B, C OAC 3745-55-95, A-D OAC 3745-55-96, A, B, C, D, E, F OAC 3745-55-97, A, B[a]
	Disposal/decontamination of equipment, structures, and soils.	OAC 3745-55-14[a]
	Requirements for leachate management in safe manner.	OAC 3745-27-14
Closure with Waste in Place (Capping)	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734.20[a]
	Noxious smells and obstruction/pollution of waterway prohibited.	ORC 3767.13
	Explosive gas monitoring plan and inspection requirement.	ORC 3734.041
	Conditions for disposal of acute hazardous waste listed in 40 C.F.R. 261.33 (e).	ORC 3734.141[a]
	Air pollution nuisance prohibited	OAC 3745-15-07, A
	Emission controls for fugitive dust.	OAC 3745-17-08, A1, A2, B, D
	Allowable methods of solid waste disposal.	OAC 3745-27-05, A, B, C

TABLE 25 (continued)

Actions	Requirement	Citation
Closure with Waste In Place (Capping)	Technical information and sanitary landfills.	OAC 3745-27-06, B, C
	Construction specifications and sanitary landfills.	OAC 3745-27-08, C, D-H OAC 3745-27-11, A, B, G
	Sanitary landfill operational requirements.	OAC 3745-27-06, B, C OAC 3745-27-08, D-H OAC 3745-27-09, N, O OAC 3745-27-11, A, B, G, OAC 3745-27-14, A
	Sanitary landfill and ground water monitoring	OAC 3745-27-10, B, C, D
	Final closure and sanitary landfill.	OAC 3745-27-11, A, B, G
	Post-closure care, sanitary landfill.	OAC 3745-27-14, A
	Permit information and all hazardous waste facilities.	OAC 3745-50-44(a)
	Permit information for all hazardous land disposal facilities.	OAC 3745-50-44, A(a)
	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44, B, C7(a)
	General analysis of hazardous waste.	OAC 3745-54-13, A(a)
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C(a)
	Location standards for hazardous waste T/S/D facilities.	OAC 3745-54-17, A - C(a)
	Design and operation of hazardous waste facilities.	OAC 3745-54-31(a)
	Emergency equipment, communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-35 OAC 3745-54-37, A OAC 3745-54-52, A-F OAC 3745-54-54, A OAC 3745-54-55 OAC 3745-54-56, A-J(a)

TABLE 25 (continued)

Actions	Requirement	Citation
Closure with Waste In Place (Capping)	General closure performance standard and hazardous waste facility.	OAC 3745-55-11, A, B, C(a)
	Contents of closure plan and hazardous waste facility.	OAC 3745-55-12, B(a)
	Disposal/decontamination of equipment, structures and soils.	OAC 3745-55-14(a)
	Submission of survey plat following closure including notation to restrict disturbance.	OAC 3745-55-16(a)
	Post-closure care and use of property.	OAC 3745-55-17, B(a)
	Post-closure plan information.	OAC 3745-55-18, B(a)
	Notice to Local Land Authority.	OAC 3745-55-19, B(a)
	Environmental performance standards, landfill design and operating requirements, monitoring and inspecting landfills, closure and post-closure care.	OAC 3745-57-01, A-D OAC 3745-57-03, A-I OAC 3745-57-05, A, B OAC 3745-57-10, A, B)(a)
	Landfill requirements for ignitable/reactive wastes.	OAC 3745-57-12, A, B(a)
	Landfill construction inspections.	OAC 3745-57-17, A(a)
Consolidation	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Approval of plans for disposal of wastes.	ORC 6111.45 ORC 3734.02 OAC 3745-52-11 through OAC 3745-52-44 OAC 3745-59
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	Emission controls for fugitive dust.	OAC 3745-17-08, A1, A2, B, D
	Allowable methods of solid waste disposal.	OAC 3745-27-05, A, B, C

TABLE 25 (continued)

Actions	Requirement	Citation
Consolidation (Cont'd)	Sanitary landfill operational requirements.	OAC 3745-27-06, B, C OAC 3745-27-08, C, D - H OAC 3745-27-09, C, F, H, I, L, N, O OAC 3745-27-12, A, B, D, E, M, N
	Operating requirements and sanitary landfill.	OAC 3745-27-19, A-L, N-Q
Direct Discharge of Treatment System Effluent	Acts of water pollution prohibited.	ORC 6111.04
	Compliance with national effluent standards required.	ORC 6111.042
	Surface water analytical and collection procedures.	OAC 3745-1-03
	Surface waters shall meet "five" freedoms, anti-degradation policy, mixing zones.	OAC 3745-01-04 OAC 3745-01-05 OAC 3745-01-06
	Water use designations, Great Miami River basin.	OAC 3745-01-21 OAC 3745-01-17
	Ohio NPDES permit requirement.	OAC 3745-33
	Discharge permit for POTW and pre-treatment rules.	OAC 3745-03-01 to 09
	Conservancy district rules and regulations pertaining to channels, ditches, pipes, sewers, etc.	ORC 6101.19
	Water Quality Criteria for decision by director.	OAC 3745-32-05
	Air and water permit criteria ambient air quality standard and best available technology.	OAC 3745-31-05
	Maximum contaminant levels for inorganic chemicals.	OAC 3745-81-11, A, B
	Maximum contaminant levels for organic chemicals	OAC 3745-81-12, A - C
	Inorganic contaminant monitoring requirements.	OAC 3745-81-23, A
	Organic contaminant monitoring requirements.	OAC 3745-81-24, A - E

TABLE 25 (continued)

Actions	Requirement	Citation
Direct Discharge of Treatment System Effluent (Cont.)	Analytical techniques for MCLs.	OAC 3745-81-27, A - C
Excavation	Approval of digging where solid waste landfill was located.	ORC 3734.02 OAC 3745-27-13
	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Air pollution nuisance prohibited	OAC 3745-15-07, A
	Emission controls for fugitive dust.	OAC 3745-17-08, A1, A2, B, D
	Sanitary landfill operational requirements.	OAC 3745-27-06, B, C OAC 3745-27-07, A, B, C - H OAC 3745-27-08, C, D - H OAC 3745-27-09, C, F, H, I, L, N, O OAC 3745-27-12, A, B, D, E, H, I, J, N
Gas Collection and Treatment	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734.20[a]
	Malfunction and maintenance air pollution control equipment.	OAC 3745-15-06, A1, A2
	Good engineering stack height required.	OAC 3745-16-02, B, C
	Organic matter emission control from stationary sources (best available control technology).	OAC 3745-21-07, A, B, J
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-17.02.	OAC 3745-17-05
	Visible emissions and nuisance	OAC 3745-17-07
	Restrictions on particulate emissions from fuel burning equipment.	OAC 3745-17-10
	Ambient air quality standards for particulates.	OAC 3745-17-02
	Ambient air quality standards for sulfur dioxide.	OAC 3745-18-02

TABLE 25 (continued)

Actions	Requirement	Citation
Gas Collection and Treatment (Cont.)	Methods for determining compliance with allowable sulfur dioxide emissions.	OAC 3745 18 04
	Sulfur dioxide ambient monitoring requirements.	OAC 3745-18-05, A
	Sulfur dioxide emission limit provisions.	OAC 3745-18-06, A - G
	Open burning standards in non-restricted areas.	OAC 3745-19 04, A - D
	Ambient air quality standards and guidelines for carbon monoxide, ozone, and non-methane hydrocarbons.	OAC 3745-21-02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-21-02.	OAC 3745-21-05
	Control of emissions of carbon monoxide from stationary sources.	OAC 3745-21-08
	Ambient air quality standards for nitrogen dioxide.	OAC 3745 21-01
	Methods for measurements of nitrogen dioxide.	OAC 3745 23 02
	Cannot degrade air quality where existing quality is equal to or greater than specified in OAC 3745-23-01.	OAC 3745-23-04
	Nitrogen dioxide emission control: stationary source.	OAC 3745-23-06
	Emission control program if emit 0 25 tons per day or more of air contaminants for which air quality standards had been adopted.	OAC 3745 25 03
	Operating requirements and sanitary landfill.	OAC 3745-27-08, C, D - H OAC 3745 27 19, A-L, N-Q OAC 3745 27-12, A, B, D, E, I, J, L, M, N
	Air and water permit criteria-ambient air quality standard and best available technology.	OAC 3745 31 05

TABLE 25 (continued)

Actions	Requirement*	Citation
Gas Collection and Treatment (Cont.)	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44, B, C7(a)
	Identifies maximum time periods that a generator may accumulate hazardous waste without being considered an operator of a storage facility.	OAC 3745-52-34(a)
	General analysis of hazardous waste.	OAC 3745-54-13, A(a)
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C(a)
	Location standards for hazardous waste T/S/D facilities.	OAC 3745-54-17, A - C(a)
	Design and operation of hazardous waste facilities.	OAC 3745-54-31(a)
	Emergency equipment, communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D(a) OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-35 OAC 3745-54-37, A OAC 3745-54-52, A-F OAC 3745-54-54, A OAC 3745-54-55 OAC 3745-54-56, A-I
	Disposal/decontamination of equipment, structures and soils.	OAC 3745-55-14(a)
O&M	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734.20(a)
	Allowable methods of solid waste disposal.	OAC 3745-27-05, A, B, C
	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44, B, C7(a)

TABLE 25 (continued)

Actions	Requirement	Citation
O&M (Cont'd)	Identifies maximum time periods that a generator may accumulate hazardous waste without being considered an operator of a storage facility.	OAC 3745-52-34(a)
	Hazardous waste facility permit conditions	OAC 3745-50-58(a)
	General analysis of hazardous waste.	OAC 3745-54-13, A(a)
	Security for hazardous waste facilities.	OAC 3745-54-14, A, B, C(a)
	Inspection requirements for hazardous waste facilities.	OAC 3754-15, A-D(a)
	Design and operation of hazardous waste facilities.	OAC 3745-54-31(a)
	Disposal/decontamination of equipment, structures and soils.	OAC 3745-55-14(a)
	Abandonment of test holes and ground water wells.	OAC 3745-9-10, A-C
Treatment	Provides authority to prosecute for violations of any section of Chapter 3734.	ORC 3734.10
	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734.20(a)
	Approval of plans for disposal of wastes.	ORC 6111.45
	Air pollution nuisance prohibited.	OAC 3745-15-07, A
	Organic matter emission control from stationary sources (best available control technology).	OAC 3745-21-07, A, B, J
	Emission control program if emit 0.25 tons per day or more of air contaminants for which air quality standards had been adopted.	OAC 3745-25-03
	Air and water permit criteria-ambient air quality standard and best available technology.	OAC 3745-31-05

TABLE 25 (continued)

Actions	Requirement	Citation
Treatment (Cont.)	Establish substantive requirements for hazardous waste treatment and disposal permits.	OAC 3745-50-44 B, C7(a)
	Additional permit information and hazardous waste storage in tanks.	OAC 3745-50-44, C2(a)
	Identifies maximum time periods that a generator may accumulate hazardous waste without being considered an operator of a storage facility.	OAC 3745-52-34(a)
	General analysis of hazardous waste.	OAC 3745-54-13 A(a)
	Hazardous waste facility permit conditions.	OAC 3745-50-58(a)
	Inspection requirements for hazardous waste facilities.	OAC 3745-54-15, A - C(a)
	Design and operation of hazardous waste facilities.	OAC 3745-54-31(a)
	Emergency equipment, communication, alarm, local authority arrangements, contingency plan contents, emergency coordinator, emergency procedures, plan amendments.	OAC 3745-54-32, A, B, C, D OAC 3745-54-33 OAC 3745-54-34 OAC 3745-54-35 OAC 3745-54-37, A OAC 3745-54-52, A F OAC 3745-54-54, A OAC 3745-54-55 OAC 3745-54-56, A F(a)
	Disposal/decontamination of equipment, structures and soils.	OAC 3745-55-14(a)
	Design of tank systems, components, containment, leak detection, operating requirements, inspections, response to spills or leaks, closure and post-closure.	OAC 3745-55-92, A, B OAC 3745-55-93, A B, I OAC 3745-55-94, A, B, C OAC 3745-55-95, A D OAC 3745-55-96, A, B, C, E OAC 3745-55-97, A, B(a)
	Landfill requirements for ignitable/reactive wastes.	OAC 3745-57-12 A, B(a)
	Environmental performance standard, monitoring analyzing, inspections, and miscellaneous units.	OAC 3745-57-91, A, B, C OAC 3745-57-92(a)

TABLE 25 (continued)

Actions	Requirement	Citation
Ground Water Monitoring	Provides authority to investigate conditions at any site where the treatment, storage or disposal of hazardous waste may constitute a threat to public health or safety, or threaten contamination of the environment.	ORC 3734.20(a)
	Ground water monitoring and hazardous waste facility.	OAC 3745-54-90 through 96 OAC 3745-54-97, A-H OAC 3745-54-98, A-I OAC 3745-54-99, A-J OAC 3745-55-11, A-C(a)
	Post-closure care and use of property.	OAC 3745-55-17, B(a)
	Construction design startup and operation, and ground water wells.	OAC 3745-9-05, A1, D - F, H OAC 3745-9-06, A, B, D, E OAC 3745-9-07, A-F OAC 3745-9-08, A-C OAC 3745-9-09, A - C, E-G
	Abandonment of test holes and ground water wells.	OAC 3745-9-10, A-C

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Governor
Schregardus
Director

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To Jan Bartlett	From C. Stroup
Co. U.S. EPA	Co. OEPA
Dept.	Phone # (614) 644-3037
Fax # (312) 353-5541	Fax #

September 30, 1993

RE: POWELL ROAD LANDFILL
MONTGOMERY COUNTY, OHIO
RECORD OF DECISION

Val

Mr. Valdus V. Adamkus
Regional Administrator
U.S. EPA, Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

Dear Mr. Adamkus:

The Ohio EPA has received and reviewed the Record of Decision (ROD) for the Powell Road Landfill (PRL) Superfund Site in Montgomery County, Ohio. Ohio EPA concurs with the selection of Alternative 4 for remedial action at this site. The selected remedial action presented in the ROD differs from the preferred remedial alternative outlined in the proposed plan. The selected remedial action, Alternative 4, includes the following components:

- institutional controls;
- improved landfill cap with liner;
- excavation of contaminated soils;
- consolidation of excavated soils under landfill cap;
- ground water monitoring;
- flood protection;
- storm water controls;
- active landfill gas collection with flare;
- leachate extraction;
- on-site leachate treatment;
- extraction of ground water from the shallow aquifer adjacent to the landfill;
- on-site ground water treatment;
- discharge of treated ground water and leachate to the river.

Estimated present worth cost of this remedial action is $20.51 million. Estimated cost of operation and maintenance for this remedial action is $44,000 per year.

Specifics of the remedial action such as the exact number and location of ground water extraction and monitoring wells, leachate extraction wells, and gas extraction wells, as well as the amounts of media to be extracted and treated will be determined in the remedial design. The leachate extraction system will be designed to create a slight influx of ground water into the landfill.

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Language in the ROD also indicates that, should a connection ever be found between PRL and the area of contamination known as the Needmore Road plume, either a ROD amendment or an Explanation of Significant Differences will be prepared as appropriate.

Ohio EPA believes that the selected remedial action for Powell Road Landfill provides the best balance among the alternatives when evaluated against the nine criteria set forth in the National Contingency Plan, 40 CFR, Part 300.430.

Sincerely,

Gerry [illegible]
for

Donald R. Schregardus
Director

AFG

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