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United States Environmental Protection Agency

Office of Emergency and Remedial Response

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EPA

Superfund Record of Decision:

Osborne Landfill, PA

50272-101

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Osborne Landfill, PA
First Remedial Action

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 15-acre Osborne Landfill site is an inactive abandoned coal strip mine in Pine Township, Mercer County, Pennsylvania. The site is in a semi-rural area with a large natural pond, woodlands, and wetlands bordering the site to the west. The shallow Clarion aquifer is present east of the strip mine highwall. The portion of the aquifer that formerly overlaid the site was excavated during stripping activities. After the mine was abandoned, the strip mine pit filled with ground water. From the late 1950s to 1978, contaminated spent foundry sand and other industrial and municipal wastes were disposed of into the pit. Other wastes including trash and drums containing solvents, wastewater, and coolants, were disposed of onsite, gradually filling the strip mine and displacing the water. The site holds an estimated 233,000 cubic yards of fill material. In 1983, Cooper Industries, an operator of the site, removed approximately 600 drums of waste and 45 cubic yards of soil from the site and installed a fence to restrict site access. EPA has divided the remedial action into five operable units. Operable Unit 2 (OU2), which addresses contaminated wetland sediment, and OU5, which addresses the contaminated Homewood aquifer will be implemented in a subsequent Record of Decision (ROD). This ROD addresses the remaining three operable units. OU1 addresses solid

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Osborne Landfill, PA
First Remedial Action
Contaminated Media: sediment, gw
Key Contaminants: VOCs (benzene, TCE), other organics (PCBs, PAHs), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 174
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

waste fill material including foundry sand and other onsite pond sediment, OU3 addresses leachate associated with the onsite water table, and OU4 addresses the Clarion aquifer. The primary contaminants of concern affecting the sediment and ground water are VOCs including benzene and TCE; other organics including PCBs and PAHs; and metals including arsenic, chromium, and lead.

The selected remedial action for this site is comprised of three operable units. The primary remedy for OU1 includes constructing a slurry wall barrier around the perimeter of the fill, constructing a clay cap over the fill material, ground water pumping and treatment using equalization, pH adjustment, chemical precipitation, clarification, sand filtration, and carbon adsorption, followed by injection into the onsite mine pit; offsite disposal of ground water treatment residues; ground water monitoring; and implementing institutional controls including deed restrictions. A contingency remedy for OU1 will be implemented if performance standards cannot be met during the pre-design stage of remedy implementation and includes regrading the site, excavating and placing solid waste in a RCRA Subtitle-C onsite landfill; long-term ground water monitoring; and implementing institutional controls. If the primary remedy for OU1 is implemented, no additional action, other than the primary OU3 remedy of ground water monitoring, is necessary for OU3. If the contingency remedy for OU1 is implemented, the contingency remedy for OU3 also must be implemented. The contingency remedy for OU3 includes dewatering the site during excavation; isolating the fill area from the onsite mine pools; treating the ground water using equalization, clarification, and sand filtration for solids removal, and carbon adsorption for organics removal, followed by onsite discharge; and ground water monitoring. The selected remedy for OU4 includes pumping and treatment of ground water in the Clarion Formation using air stripping, onsite air emissions treatment, onsite injection of treated ground water, and ground water monitoring. The estimated present worth cost for the primary remedies is $18,681,000 with an annual O&M cost of $904,000 for 30 years. If the contingency remedies are implemented, the estimated present worth cost is $17,811,000, which includes an annual O&M cost of $940,000 for 30 years.

PERFORMANCE STANDARDS OR GOALS: The selected source remedy will not reduce the current level of contamination in the fill area, but will maintain an average PCB concentration level of 23 mg/kg. EPA's PCB Spill Cleanup Policy for a reduced access area is met by this alternative. Ground water contaminants will be remediated to the following background levels: TCE 0.2 ug/l, benzene 0.2 ug/l, PCBs 1 ug/l, chromium 50 ug/l, lead 15 ug/l, and arsenic 22 ug/l. If any ground water contaminants exceed SDWA MCLs or MCLGs, the remedy will continue until these goals are met.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Osborne Landfill Site
Pine Township
Mercer County, Pennsylvania

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected Remedial Action for the Osborne Landfill Site in Pine Township, Mercer County, Pennsylvania. This Remedial Action was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decisions herein have been based on the Administrative Record for this site (index attached).

The Commonwealth of Pennsylvania concurs with the selected remedy.

ASSESSMENT OF THE SITE

Pursuant to duly delegated authority, and pursuant to Section 106 of CERCLA, 42 U.S.C. Section 9606, I hereby determine that actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

Five operable units were identified at the Osborne Landfill Site in the Feasibility Study. These operable units (OU) include:

- The solid waste fill material (OU1)
- Wetland sediments (OU2) - Decision deferred
- The onsite water table (OU3)
- The Clarion Formation (OU4)
- The Homewood Formation (OU5) - Decision deferred

EPA is deferring selection of a remedy for Operable Units Two and Five, and will address these operable units in a subsequent ROD.

In this ROD, EPA has selected a Primary Remedial Alternative and a Contingency Alternative for the operable units related to the fill material (fill) and the onsite water table (OU1 and OU3). This ROD contains performance standards that must be met before design, during design, and after construction of the primary Remedial Alternative for OU1. If the Primary Remedial Alternative for OU1 fails to meet these standards, the Contingency Alternatives for OU1 and OU3 will then be implemented.

The major components of each remedy are discussed below:

Operable Unit One - Fill Material

Primary Alternative
Slurry Wall/Pump and Treat Alternative (S12)

This alternative consists of construction of a slurry wall barrier around the perimeter of the fill. Water will be pumped out of this containment and treated to produce a negative pressure, effectively trapping the fill contaminants and removing the threat to ground water from foundry sands contaminated with polychlorinated biphenyls (PCBs), solvents, metals and polyaromatic hydrocarbons (PAHs). The major components of this alternative include:

- Run-on and run-off control systems including a clay cap, onsite drainage and erosion controls
- Grouting and bulkhead installation to seal openings or cracks linking the fill to the mine pool
- Construction of a slurry wall around the perimeter of the fill area and installation of a clay cap and revegetation
- Installation and operation of extraction wells, treatment of the extracted water and subsequent injection into the onsite mine pool
- Institutional controls and ground water monitoring.

Contingency Alternative
RCRA Subtitle C Landfill Alternative (S5)

Excavation and placement of the solid wastes in an onsite landfill will remove the threat to ground water from foundry sands contaminated with PCBs, solvents, metals, and carcinogenic PAHs. The major components of this alternative include:

- Runon controls and runoff control systems including a cap, on-site drainage and erosion controls
- Excavation of approximately 233,000 cubic yards of fill and placement of this waste in a RCRA Subtitle C onsite landfill
- Regrading and revegetation of the site area and
- Institutional Controls.

Operable Unit Three - Onsite Water Table

Primary Alternative

If the slurry wall implementation is effective, no additional action will be required for the Onsite Water Table.

Contingency Alternative

Collection and Treatment of Onsite Water Table Alternative (GO3)

This alternative must be selected if the Contingency Alternative for OU1(S5 - RCRA Subtitle C Landfill) is implemented. The major components of this alternative include:

- Collection (or dewatering of the fill) of the water removed during excavation activities
- Chemical and physical treatment of collected ground water and subsequent onsite injection into the mine pool
- Groundwater monitoring.

Operable Unit Four - Clarion Aquifer

Selected Alternative

Extraction, Physical Treatment, and Onsite Injection Alternative (GC3)

This alternative will reduce the level of vinyl chloride contamination in the Clarion Formation and reduce potential human health risks associated with the use of this aquifer. The major components of this alternative include:

- Construction of extraction wells in the Clarion Formation
- Pumping of ground water for onsite removal of contaminants by air stripping of volatile organic hydrocarbons
- Injection of treated ground water onsite into the mine pool
- Groundwater monitoring.

DECLARATION

The primary remedy and the contingency remedy selected for Operable Unit One (fill material) are protective of human health and the environment, comply with Federal and State requirements that are legally applicable or relevant and appropriate, and are cost- effective. These remedies utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. However, because treatment of the principal threats at the site was not practical, these remedies do not satisfy the statutory preference for treatment as a principal element of each remedy. Because the selected remedies for Operable Unit One will result in hazardous substances remaining on site above health-based cleanup levels, a review of the site will be conducted every five years after commencement of remedial action to ensure that the remedy implemented continues to provide adequate protection of human health and the environment.

The primary remedy and the contingency remedy for Operable Unit Three (Onsite Water Table) are protective of human health and the environment, comply with Federal and State requirements that are legally applicable or relevant and appropriate and are cost effective. These remedies utilize permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

The selected remedy for Operable Unit Four is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate for this remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technology 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.

SEP 28 1990

Edwin B. Erickson
Regional Administrator
Region III

Date

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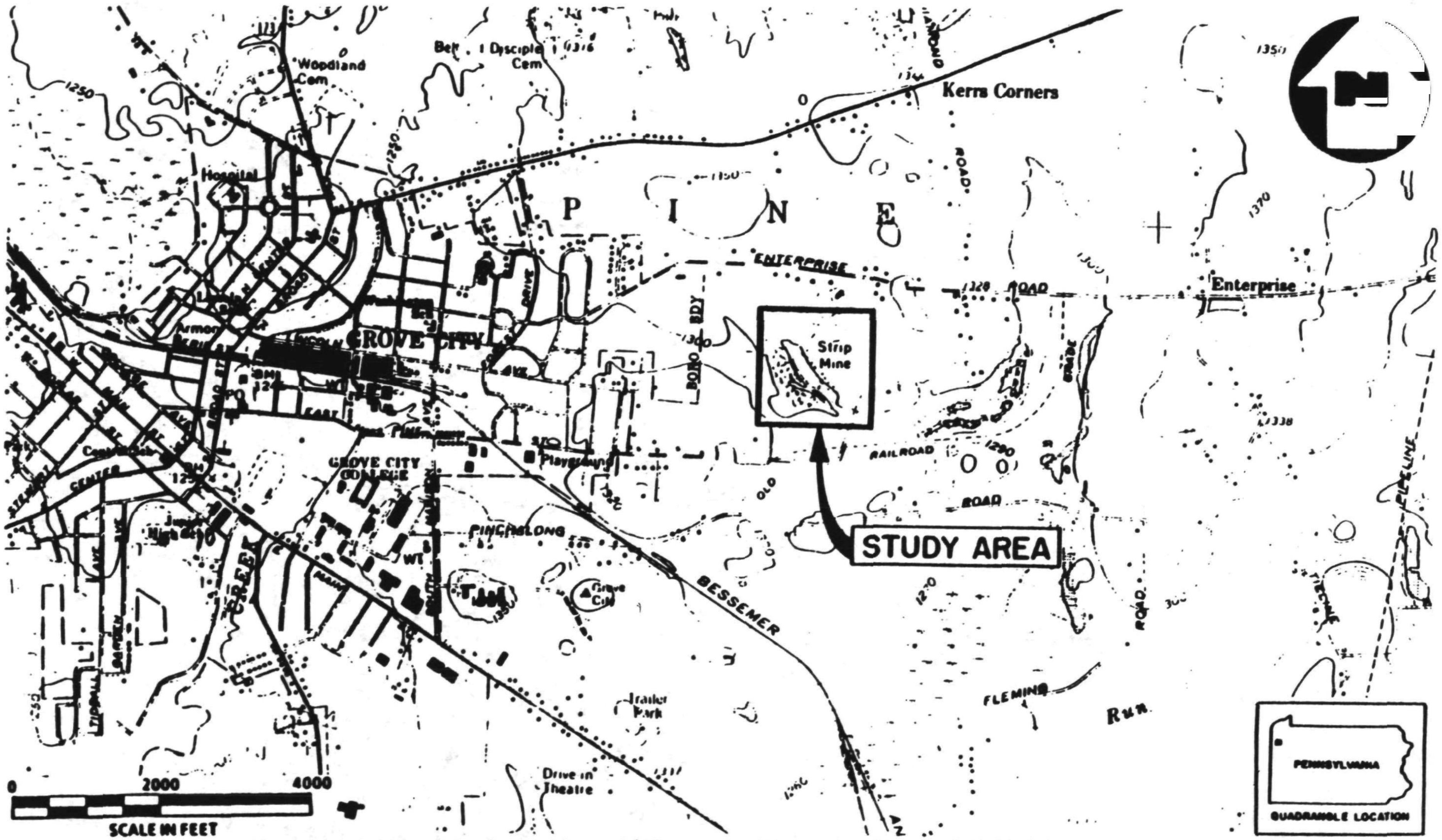
REMEDIAL ALTERNATIVE
RECORD OF DECISION SUMMARY
OSBORNE LANDFILL SITE

SITE LOCATION AND DESCRIPTION

The Osborne Landfill Site is located in Pine Township, Mercer County, Pennsylvania (see Figure 1). Located approximately 1 mile east of Grove City, Pennsylvania, the site is an abandoned coal strip mine that encompasses approximately 15 acres. Throughout the period late-1950s to 1978, contaminated spent foundry sand and other industrial and municipal wastes (wood, plastic, scrap metal, debris, etc.) were disposed at the site into a strip mine pool (figures 2 and 3) that was present at the base of the highwall. The highwall is undisturbed rock and earth that forms the uphill side of the strip mine pit. The earth and rock that was removed to reach the coal was piled up downhill and is known as "spoil". This spoil forms the downhill side of the mine pit. After the mine was abandoned, the pit filled with ground water. Wastes were disposed into this pit and gradually filled in the strip mine displacing the water. It is estimated that 233,000 cubic yards of fill material was taken to the former landfill during this period. In addition to the trash and foundry sand, drums containing various industrial wastes (solvents, coolants, wastewater, etc.) have been disposed at the site. The total number of drums taken to the site is unknown. Drums have been observed on the surface and within the fill material. Most of the drums that are buried are most likely crushed, based on the depth of the fill (42 feet maximum) and the age of the drums.

The site is located in a semi-rural area along East Pine Street Extension, which borders the site to the south. The closest residence is located approximately 1,000 feet west of the site. However, most of the residential homes in the area are located about 1/4 mile north of the site along Enterprise Road and east of the site along Diamond Road. Most of the homes along Diamond Road and Enterprise Road are dependent on groundwater as a source of potable water. Grove City, the largest municipality near the site, has a population of 8,162 based on U.S. Census Bureau records for 1980.

As shown on Figure 2, the site is bordered to the east and south by farmland. To the north is a wooded area which separates the site from residential homes along Enterprise Road. A large natural pond, woodlands, and wetlands border the site to the west. Mine spoil piles are situated between the pond and the actual disposal area. A 6-foot high security fence surrounds the site. The entrance gate is located along East Pine Street Extension.



BASE MAP IS A PORTION OF THE U.S.G.S. GROVE CITY, PA QUADRANGLE (7.5 MINUTE SERIES, 1961, PHOTOREVISED 1981). CONTOUR INTERVAL TEN FEET.

FIGURE 1

SITE LOCATION
OSBORNE LANDFILL SITE, GROVE CITY, PA

NUS CORPORATION

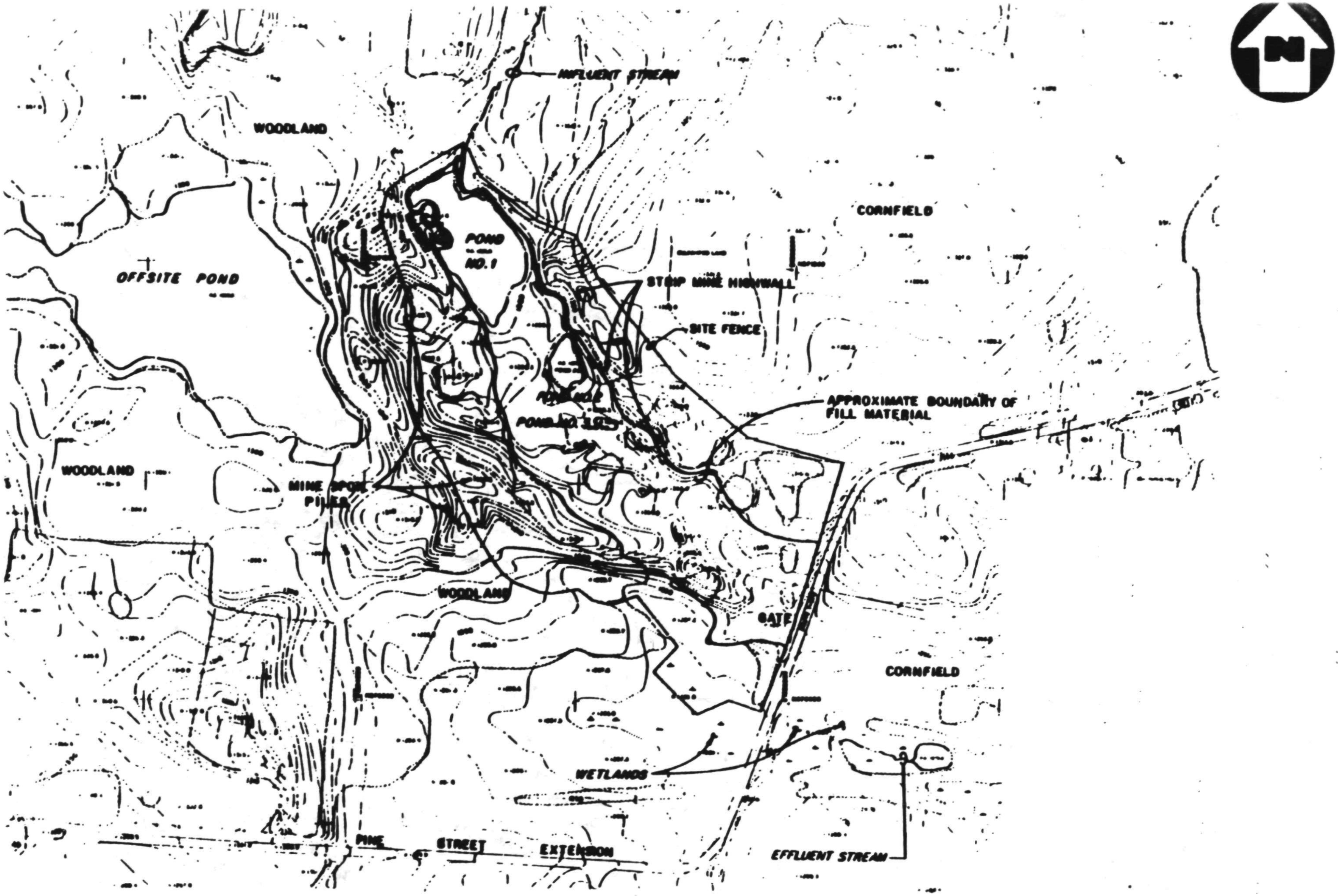


FIGURE 2

GENERAL ARRANGEMENT OF THE SITE AREA
OSBORNE LANDFILL SITE, GROVE CITY,

0 250 500
SCALE IN FEET

NUS CORPORATION

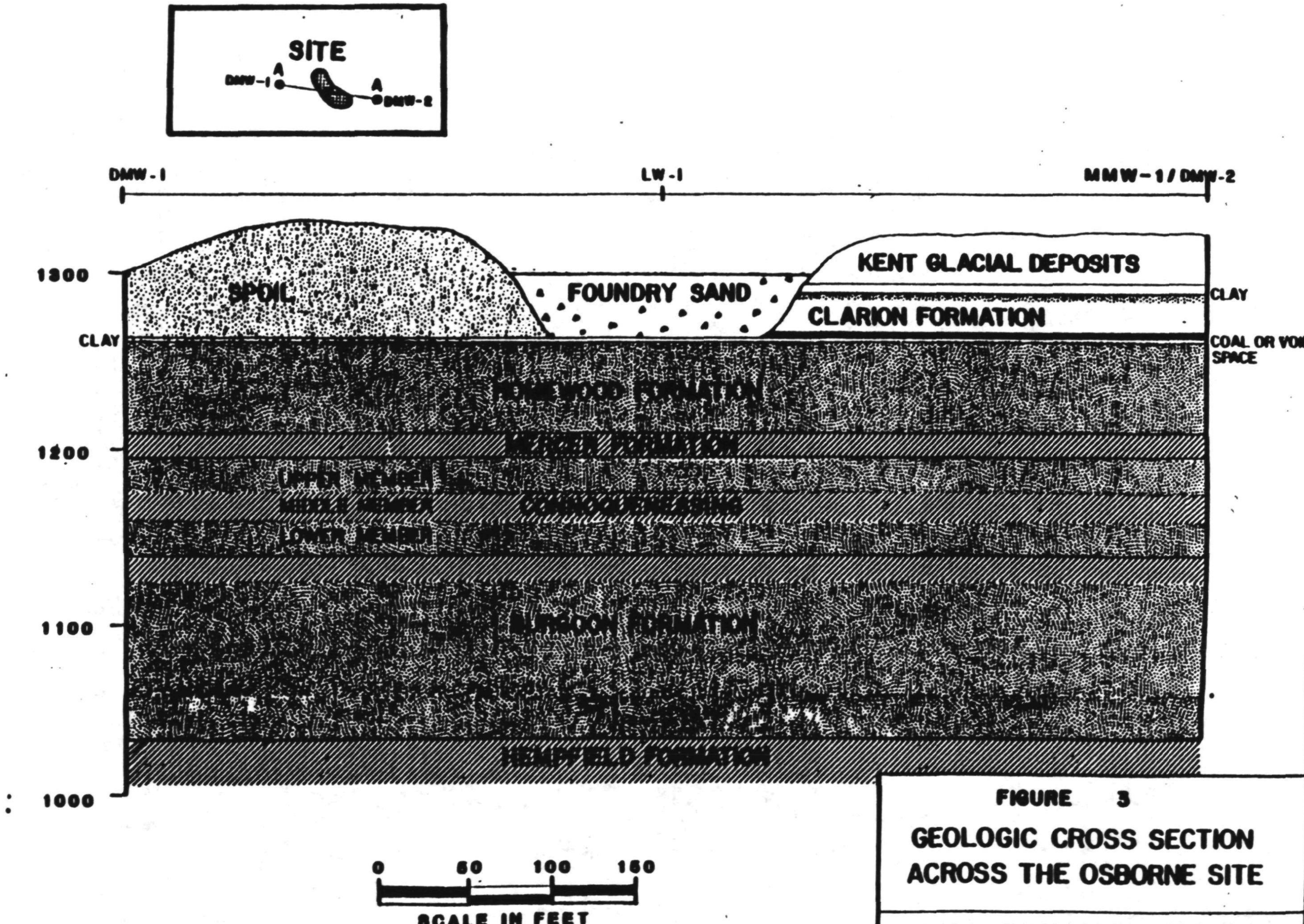


FIGURE 3

GEOLOGIC CROSS SECTION ACROSS THE OSBORNE SITE

FRED C. HART ASSOCIATES, INC.

The disposal area is situated between the strip mine highwall and the mine spoil piles. Three ponds (mine pools) are located in the center of the disposal area at the base of the highwall. These ponds were formed by the disposal practice of dumping foundry sand (and other materials) directly into the original strip mine pool. Because of this, most of the fill material is below the water table. The dumping of materials has filled the original 6-acre strip mine pool except for three small ponds, which are referred to as Ponds 1, 2, and 3. Numerous drum fragments are littered throughout the site and along the banks of these ponds. However, all of the drums appear to be empty. Miscellaneous foundry equipment and municipal refuse (washing machines, paint cans, etc.) are also present on the surface of the site.

The fill material consists primarily of spent foundry sand. The foundry sand that is currently generated by Cooper Industries is not a hazardous waste under the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 et seq.(RCRA), and can be disposed of in a residual waste landfill. Although not a hazardous waste, foundry sand does contain hazardous substances as defined by in Section 101(14) of CERCLA, 42 USC Section 9601(14) including polyaromatic hydrocarbons (PAHs) and low levels of metals. Based on boring logs, historical aerial photographs, and site mapping, it is estimated that the former disposal area contains approximately 233,000 cubic yards of solid waste. Drum fragments have been observed in the fill material, suggesting that drums were co-disposed with the spent foundry sand. Subsurface samples collected from the fill area indicated that the foundry sand is oily in appearance, which may be the result of liquid wastes disposed at the site or from the contents of leaking or crushed drums. Samples collected from the fill material contained polychlorinated biphenyls (PCBs), PAHs, and metals. Onsite pond sediment samples and offsite sediment samples (collected from a portion of the wetland) have also exhibited these contaminants. Volatile organics (vinyl chloride and trichloroethene) have been detected at levels above drinking water standards (i.e. Maximum Contaminant Levels(MCLs)), as set forth in 40 CFR 141.60-63 in the onsite ponds, the water table, and in the underlying flow systems.

The coal formation that was strip mined at the Osborne site was deep mined to the northeast of the site. EPA has been unable to determine the extent of the deep mines but general information indicates that they run for miles. The deep mines have filled with water, forming a very large underground reservoir that is connected with the fill area at the Osborne Site.

Five flow systems have been studied at the Osborne Landfill Site. These flow systems, in descending order, include: the water table; the Homewood Formation, which underlies the water table and the disposal area; the Clarion Formation, which is present east of the strip mine highwall and overlies the Homewood Formation (it does not overlie the site since it was excavated during the stripping activities); the Connoquenessing Formation, which underlies the Homewood Formation; and the Burgoon Formation, the deepest formation studied during the remedial investigation. EPA's Ground Water Protection Strategy (1984) classifies water sources according to vulnerability an usage. Class I aquifers are the sole source of water, for a community, and are very vulnerable to pollution. Class IIa aquifers have potable water currently used for drinking water. Class IIb aquifers could potentially be used for drinking water and class III aquifers contain water unsuitable for domestic uses. The Homewood Formation and Clarion Formation are used by some local residents as a source of potable water. These flow systems are classified as Class IIa because of this usage. The Connoquenessing and Burgoon Formations are also classified as Class IIa since they are used as a source of water by the Grove City Water Authority. The intake supply wells are located about 1 mile northwest of the site. The onsite water table surrounding the fill is classified as a Class IIb aquifer, since it is potentially available as a source of drinking water.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Brookville Coal seam had been mined extensively in the region since the beginning of the 20th century. During the 1940s, the coal was strip mined at the site to the limits of the remaining highwall, located along the eastern boundary of the site.

From the late-1950s until 1963, the site was operated as a waste disposal area by Mr. Samuel Mohney. Disposal activities continued under Mr. James Osborne, the owner of the site, from 1963 until 1978, when the site was closed by the Pennsylvania Department of Environmental Resources (PADER). The site property is now owned by Mr. Edwin McDougal. An April 7, 1978 letter from the PADER Division of Solid Waste Management to Mr. James Osborne stated that the dump was said to be in violation of "Act 241" (The Pennsylvania Solid Waste Management Act) and that no permit was on file which would permit waste disposal activities at the site. The letter also indicated that the site should immediately stop accepting wastes with the exception of the spent foundry sand, which was to be used to fill the mine pool. It is believed that foundry sand was landfilled for a short period after 1978 in an attempt to fill in the remaining mine pool.

The site was investigated by the EPA and the PADER following its closure as a non-permitted landfill. In July, 1982, the site was placed on the National Priorities List (NPL), 40 C.F.R. Part 300, App. B. Various site investigations were conducted between 1982 and 1989 by the PADER, EPA, and Cooper Industries Inc.. The major studies, including some initial cleanup efforts by Cooper Industries, are listed below in chronological order.

- 1983 - Installation of a security fence around the site and the removal of over 600 drums and 45 cubic yards of contaminated soil by Cooper Industries.

- 1983 - Cooper Industries conducted a remedial investigation at the site, in accordance with a Consent Order and Agreement between Cooper Industries and the PADER. The remedial investigation involved a study of groundwater and surface water at the site. Residential wells north of the site were sampled (these wells were not contaminated). The volume of waste material was also estimated to be 233,000 cubic yards.

- 1985 - EPA conducted an investigation of the disposal area to determine the contents of the fill material. Approximately 18 test pits were randomly excavated throughout the site area. Samples were collected for limited organic and inorganic analysis from selected test pits. Two intact drums and numerous drum remnants were encountered during the test pit operations. The intact drums were sampled and found to contain ethylbenzene and xylene.

- 1988 to 1989 - EPA conducted a Remedial Investigation (RI) to assess offsite groundwater contamination and to determine the extent of contamination in the fill material. A Feasibility Study (FS) was conducted concurrently with the remedial investigation. The feasibility study identified an array of alternatives for remediating the media of concern at the Osborne Landfill Site. (These alternatives are identified in this Record of Decision(ROD).)

- 1989 - EPA conducted an evaluation of the slurry wall alternative that was proposed by Cooper Industries. An addendum to the FS was prepared to document the evaluation of this alternative. EPA issued its proposed plan which indicated a preferred alternative (RCRA landfill) for the site and sent special notice letters to Potentially Responsible Parties (PRPs) in August. During the comment period and afterwards, EPA received and reviewed numerous comments from Cooper Industries, the public and elected representatives regarding the slurry wall alternative. The slurry wall was one of the alternatives discussed in the proposed plan.

- 1990 - EPA organized a slurry wall review group, composed of individuals with substantial knowledge of slurry wall technology.

A number of PRPs have been identified for this Superfund site. These PRPs include: Cooper Industries Inc, Castle Iron & Steel Co., Ashland Chemical Inc., and General Electric Co. Special notice letters were sent to these PRPs on September 13, 1989.

COMMUNITY RELATIONS HISTORY

A Community Relations Plan (CRP) was prepared in May 1983 to identify the concerns of local residents and government officials regarding the Osborne Landfill Site. The primary goals of the

CRP was to establish and maintain open communication among Federal, State, and local officials, and the residents of the Grove City area. EPA gained insight on community concerns from attendance at public meetings held in January and May of 1983, and from telephone discussions with persons interested in the site.

The primary issue of public interest is the potential for groundwater contamination. The public is also concerned with air and surface water contamination. Cooper Industries is a major employer in the area and the public is concerned about the company's role in the problems at the Osborne Landfill Site. Presently, this concern may be partially mitigated since Cooper Industries has spent a large sum of money to remove drums and contaminated soil from the site and has been involved with the RI/FS. The CRP was updated in August 1989, and interviews were conducted with local representatives, the municipal water authority and some residents.

The RI/FS and Proposed Plan for the Osborne Landfill Site were made available for public comment in August 1989. These documents were contained in the administrative record which was placed in an information repository maintained at the Grove City Community Library. The notice of availability for these documents was published in the Sharon Herald on August 25, 1989. A public comment period was held from August 25, 1989 through October 23, 1989. In addition, a public meeting was held on September 14, 1989. At this meeting, representatives from EPA answered questions about problems at the site and the remedial alternatives under consideration. Public comments favored allowing Cooper Industries to implement the slurry wall alternative. A response to the public comments received during this period is included in the Responsiveness Summary, which is part of this ROD. Because of the large volume of technical comments received from Cooper Industries and the resulting extensive EPA response to those comments, EPA has included these comments in the Administrative Record which is available for public review, but not in the Responsiveness Summary. This decision document presents the selected remedial actions for the Osborne Landfill Site in Mercer County, Pennsylvania, chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986(SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 55 Fed. Reg. 8666-8865(March 8, 1990)(to be codified at 40 C.F.R. Part 300).

SCOPE AND ROLE OF RESPONSE ACTION

In 1983, Cooper Industries, under a Consent Order with the state of Pennsylvania, removed approximately 600 drums of waste that were stored on the surface of the Osborne site and installed a fence to restrict site access. These actions substantially reduced the risk of contact with concentrated wastes and prevented additional contamination of the ground water.

As with many Superfund sites, the problems at the Osborne Landfill site are complex. As a result, the EPA has divided the remediation efforts into five manageable components called "operable units." The FS developed remedial alternatives for each of these operable units. These operable units are as follows:

- Operable Unit 1 (OU1): The solid waste (includes the onsite pond sediments since they are essentially foundry sand).
- Operable Unit 2 (OU2): Wetland sediments.
- Operable Unit 3 (OU3): Onsite water table (leachate associated with fill).
- Operable Unit 4 (OU4): Clarion aquifer(excluding the mine pool)
- Operable Unit 5 (OU5): Homewood aquifer

Alternatives developed for the solid waste (OU1) focused on either containing, treating, or landfilling the solid waste. The role of this operable unit is to prevent contact with the relatively immobile PCBs and PAHs present in the waste and to prevent additional contamination of ground water from the metals and organic hydrocarbons present in the fill which are the principal threat at the site. The selected alternative for this unit must also prevent migration of the foundry sands to the wetlands from surface water runoff.

Selection of a remedial alternative for the wetlands (OU2) has been deferred for the following reasons:

a) The contamination of the wetlands is minimal.
b) Construction of the selected remedy for the fill will probably have an impact on the adjacent wetlands that will be defined during the design of the slurry wall alternative.
c) Additional biological tests are needed to assess whether wetlands biota have been effected by site contaminants.

The role of the operable unit for the onsite water table OU3 is to prevent the migration of contamination present in the ground water that is in contact with the fill from leaching into the aquifers that supply drinking water to area residents. The principal threats are dissolved PCBs, metals and chlorinated hydrocarbons.

The role of the operable unit for the Clarion Aquifer (OU4) is to prevent migration of the chlorinated solvents in this aquifer to nearby residential wells that use this aquifer as a domestic water supply. The principal threat is vinyl chloride present (6ppb) above the MCLs (2 ppb) allowed by the Safe Drinking Water Act.

Selection of alternatives for the Homewood Aquifer (OU5) has been deferred. Contamination has been detected at levels near the MCLs for vinyl chloride and TCE. A very large mine pool is located above the Homewood Aquifer to the north of the site and is contaminated with up to 47 ppb of vinyl chloride. If water from the mine pool is seeping into the Homewood formation, any remedy that does not address this source of contamination is likely to be unsuccessful. For this reason, EPA is deferring a decision on this operable unit until after completion of a subsequent Ground Water Verification Study as further explained in the Description of Alternatives section of the ROD.

SUMMARY OF SITE CHARACTERISTICS

Previous investigations conducted by either the PADER, Cooper Industries, or EPA have focused on determining the nature and extent of contamination at the Osborne Landfill Site. The various media investigated include:

- The solid waste fill material.
- The water table.
- The Clarion Formation (including the flooded deep mine which is present at the base of the Clarion Formation).
- The Homewood Formation.
- The Connoquenessing Formation.
- The Burgoon Formation.
- The surface waters and sediments (the onsite ponds, the offsite wetland pond, the wetlands to the southwest of the site, the offsite strip mine pond, and various intermittent streams).

The source of contamination is the solid waste fill material, which primarily consists of 233,000 cubic yards of contaminated foundry sand. The contaminants of concern in the fill material include: PCB-1254 (410 mg/kg, maximum, 23 mg/kg average); the PAHs benzo(a)pyrene (59 mg/kg, maximum, 13 mg/kg average), and dibenzo(a,h)anthracene (27 mg/kg, maximum, 4 mg/kg average); and the metals chromium (1,630 mg/kg, maximum, 258 mg/kg average), lead (223 mg/kg, maximum, 83 mg/kg average), and nickel (1,270 mg/kg, maximum, 134 mg/kg average). With the exception of a few highly-concentrated samples, the horizontal and vertical distribution of contamination is homogeneous in nature. Contamination has been detected within the entire disposal area where the characteristic black foundry sand was present. Table 1 summarizes the distribution of these contaminants of concern in soils, the mine spoil piles and the fill material. The level of contamination in the fill material is greater than the level of contamination in either the mine spoils or soils.

Sediment contamination was observed in all three of the onsite ponds and in the portion of the wetland that borders the site to the southwest. Because the sediments are essentially contaminated foundry sands, they are also contaminated with the same compounds that were detected in the fill material (i.e., PCB-1254, PAHs, and metals) but at lower levels. Generally, onsite pond sediments exhibited higher levels of contamination than the wetland sediment. Bioassay tests performed on the wetland sediment were inconclusive with respect to the potential impact on wetland biota. Table 2 provides a comparison of contaminant levels in the onsite ponds, the offsite pond, and in wetland sediments.

Because the fill material was deposited into the strip mine pool, most of the fill is now situated below the water table. Thus, the onsite water table is contaminated with the same contaminants that are present in the fill material (PCBs, PAHs, and metals). Additionally, low levels of vinyl chloride (2.6 μg/l, maximum, to below detection limits) and trichloroethene (3.3 μg/l, maximum, 0.6 average) have been detected in the water table during previous investigations. These volatile organics may have resulted from leaking drums of waste which were disposed on site. Table 3 provides a summary of contaminants that were detected in the various flow systems.

The leaking drums were removed and contaminated soils were excavated during a 1983 removal action. Thus, the presence of volatiles in the water table (and other flow systems) may only be reflective of residual soil contamination. Low levels of volatile contamination were detected in the solid waste fill material during the most recent investigation conducted by EPA. The RI suggests that most of the volatile contaminated soils may have been removed during the 1983 removal action.

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TABLE 1

COMPARISON OF CONTAMINANTS OF CONCERN IN SOILS, MINE SPOILS, AND FOUNDRY SANDS
OSBORNE LANDFILL SITE
GROVE CITY, PENNSYLVANIA

Contaminants	Soils		Mine Spoils		Foundry Sands	
	Maximum Concentration	Arithmetic Average Concentration	Maximum Concentration	Arithmetic Average Concentration	Maximum Concentration	Arithmetic Average Concentration
PCB-1254 (1)	ND	ND	ND	ND	410,000	23,330
Benzo(a)pyrene (1)	200	66	1,100	510	59,000	12,915
Dibenzo(a,h)anthracene (1)	110	22	470	192	27,000	4,431
Chromium (2)	31	20	25	17	1,630	259
Lead (2)	24	16	20	16	223	83
Nickel (2)	29	18	29	23	1,270	134

ND: Denotes not detected above laboratory instrument detection levels.

(1) Values are reported in ug/kg.

(2) Values are reported in mg/kg.

TABLE 2

COMPARISON OF CONTAMINANTS OF CONCERN IN ONSITE AND OFFSITE SEDIMENTS
OSBORNE LANDFILL SITE
GROVE CITY, PENNSYLVANIA

Contaminants	Influent Stream (Background)		Onsite Pond 1		Onsite Pond 2		Onsite Pond 3		Offsite Pond		Effluent Stream		Southwest Wetlands	
	Maximum Conc.	Arith. Average Conc.	Maximum Conc.	Arith. Average Conc.	Maximum Conc.	Arith. Average Conc.	Maximum Conc.	Arith. Average Conc.	Maximum Conc.	Arith. Average Conc.	Maximum Conc.	Arith. Average Conc.	Maximum Conc.	Arith. Average Conc.
PCB-1254(1)	ND	ND	900	330	ND	ND	820	410	ND	ND	350	175	240	40
Benzo(a)pyrene(1)	ND	ND	21,000	7,220	19,000	11,700	56,000	46,000	100	30	19,000	11,000	3,000	830
Dibenzo(a,h)anthracene (1)	90	45	5,000	1,820	8,300	3,000	17,000	15,000	ND	ND	6,000	3,470	810	200
Chromium(2)	13	11	64	32	26	20	112	100	20	13	29	19	37	15
Lead(2)	55	50	296	126	81	63	600	345	14	11	107	70	215	64
Nickel(2)	7	7	60	41	20	21	57	53	23	16	30	23	31	15

(1) Values are reported in µg/kg.
(2) Values are reported in mg/kg.
ND: Denotes not detected above laboratory instrument detection level.

The Clarion Formation has also been impacted by the site contaminants, as discussed above. The highest level of contamination, however, was detected in the flooded deep mine that forms the base of this formation. The deep mine acts as a migration pathway via the connection with the onsite water table. Vinyl chloride was detected in mine void wells as high as 47 micro grams per liter ($\mu g/l$) downgradient from the high wall area. Wells installed further offsite in this flooded mine (east and southeast of the site) exhibited vinyl chloride ranging from "none detectable" to 7 $\mu g/l$. Wells installed above the mine void (in the Clarion Formation) exhibited lower levels of vinyl chloride contamination. Additionally, contamination in the Clarion Formation above the mine void was limited to the area near the leaking drums that were taken offsite in the 1983 removal action. Groundwater flow is believed to be to the southeast. Residential wells located east of the site did not exhibit any contamination. These wells obtain potable water from either the Clarion Formation or the Homewood Formation.

Ground water from the Homewood aquifer contained low levels of TCE (5.8 $\mu g/l$, maximum, 0.4 average) and vinyl chloride (1 $\mu g/l$, maximum, 0.4 average). This contamination was limited to monitoring wells located near the boundary of the former disposal area (within the site security fence). The presence of volatile contamination in these wells may be due to vertical migration of contaminants in the fill material via the seepage of the water table, which is separated from the Homewood Formation by a semi-impermeable clay layer. The clay layer, however, may have been breached during previous strip mining activities. Therefore, it is possible that contaminants may migrate from the disposal area to the Homewood Formation. No offsite groundwater contamination was detected in this formation. Groundwater flow is from a mound located onsite and probably flows predominantly to the southeast. Residential wells located north and east of the site, which obtain potable water from the Homewood Formation, are not contaminated.

Contamination in the Connoquenessing Formation was limited to low levels of trichloroethene (1.2 $\mu g/l$) found in one monitoring well located in the area above the highwall. No other monitoring well in the Connoquenessing Formation exhibited contamination. Based on the location of the monitoring well, it appears that the vertical migration of contaminants in the Clarion and Homewood Formations may be the source of contamination in the Connoquenessing Formation. Groundwater in this aquifer flow is towards the northwest, probably due to the influence of the municipal wells.

TABLE 3

COMPARISON OF GROUNDWATER CONTAMINANTS OF CONCERN BY FORMATION
OSBORNE LANDFILL SITE
GROVE CITY, PENNSYLVANIA

Contaminants	Water Table		Mine Void		Clarion		Homewood		Connoquenessing		Burgoon	
	Maximum Conc.	Arithmetic Average Conc.	Maximum Conc.	Arithmetic Average Conc.	Maximum Conc.	Arithmetic Average Conc.	Maximum Conc.	Arithmetic Average Conc.	Maximum Conc.	Arithmetic Average Conc.	Maximum Conc.	Arithmetic Average Conc.
Vinyl chloride	ND	ND	47	24	6	2	1	.4	ND	ND	2	1
Trichloroethene	3	.6	.7	.4	.6	.2	6	4	1	1	ND	ND
cis-1,2-Dichloroethene	ND	ND	7	3.5	3	1	.1	.02	ND	ND	.56	.28
trans-1,2-Dichloroethene	1.7	.8	.8	.4	.2	.05	.1	.02	ND	ND	.48	.24
PCB-1254	48	8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)pyrene	37	4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	29	3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

All results are reported in μg/l.
ND: Denotes not detected above laboratory instrument detection levels.

TABLE 4

COMPARISON OF CONTAMINANTS OF CONCERN IN STUDY AREA SURFACE WATER BODIES
OSBORNE LANDFILL SITE
GROVE CITY, PENNSYLVANIA

Contaminant	Pond No. 1 Water		Pond No. 2 Water		Offsite Pond Water	
	Maximum Concentration	Arithmetic Average Concentration	Maximum Concentration	Arithmetic Average Concentration	Maximum Concentration	Arithmetic Average Concentration
Vinyl chloride	0.91	0.83	ND	ND	ND	ND
Trichloroethene	2.80	2.10	ND	ND	ND	ND
cis-1,2-Dichloroethene	2.40	2.10	ND	ND	ND	ND
trans-1,2-Dichloroethene	0.26	0.13	ND	ND	ND	ND
1,1-Dichloroethene	0.33	0.17	ND	ND	ND	ND
1,1-Dichloroethane	10.90	6.35	0.26	0.13	ND	ND
1,1,1-Trichloroethane	4.80	2.40	ND	ND	ND	ND

All results are reported in µg/l.
ND: Denotes not detected above laboratory instrument detection levels.

Contamination in the Burgoon Formation was also detected in only one monitoring well. Ground water from this well, contained 2.2 μg/l of vinyl chloride and it is located in the same well cluster that showed high levels of vinyl chloride in the flooded mine. Cooper Industries resampled this well in October 1989 and did not detect vinyl chloride at that time. No other Burgoon Formation monitoring well exhibited this contaminant. Groundwater in this aquifer flow is towards the northwest, probably due to the influence of the municipal wells.

The Grove City Water Authority's intake supply wells, which are located about 1 mile northwest of the site, obtain water from the Connoquenessing Formation and the Burgoon Formation. Samples were not collected from these supply wells, however, the Grove City Water Authority has its analytic testing program and has not detected site contaminants. A Groundwater Verification Study (GVS) will be conducted, as a separate focused Remedial Investigation, that will determine if the contamination detected in these formations is limited to the immediate site area and whether it could impact the Water Authority's supply wells.
A subsequent ROD will then be issued which addresses the contamination in the deeper aquifers.

Residents to the north and west of the site and the one resident to the south of the site use the public water supply, but residents to the east and northeast use the Homewood and Clarion aquifers. The GVS will also clarify any potential risks to these residential wells.

Surface water contamination is limited to the onsite ponds. Most of the contaminants were detected in the largest of the ponds (Pond 1), which is located at the northernmost point of the site. Contaminants include trichloroethene (2.8 μg/l, maximum, 2.1 average), vinyl chloride (1 μg/l, maximum and average), and 1,1-dichloro-ethane (11 μg/l, maximum, 6 ug/l average). The source of contamination in the onsite ponds could be from the onsite water table, which is hydraulically connected with the ponds. Table 4 provides a summary of the contaminant levels in onsite and offsite ponds.

SUMMARY OF RISKS

During the RI/FS, an evaluation of public health and environmental risks was performed. The purpose of this evaluation, which is referred to as a risk assessment, was to estimate the potential impacts to the public health and environment that the site presents without performing any further remedial action. In conducting this assessment, the focus was on the health and environmental effects that could result from exposure to site contaminants in the solid waste fill material, surface water, sediments, and groundwater.

Risk is a function of both contaminant toxicity and exposure. Therefore, when assessing risks, three aspects of chemical contamination and environmental fate and transport must be considered: (1) contaminants of some defined toxicity must be detected in environmental media, released by some natural or manmade processes; (2) pathways by which actual or potential exposure occur must be present and; (3) human or environmental receptors must be present to complete the exposure route.

The risk assessment estimates the potential for human health and environmental risks at the site by combining information on the toxicity of the compounds detected with the site specific exposure scenarios. The basis for the risk assessment is the validated chemical-analytical data base for environmental samples collected during the most recent remedial investigation.

HUMAN HEALTH RISKS

Contaminants such as trichloroethene, vinyl chloride, PCB-1254, and PAHs, which were all found at the site, are either suspected or known carcinogenic compounds. Other contaminants such as chromium, mercury, and lead, which were primarily detected in the fill material, are noncarcinogenic but could result in long-term adverse health effects if excessive exposure occurs. Risks to the public health from carcinogens are measured relative to an acceptability range. This acceptability range is 1×10^{-4} to 1×10^{-6} (See (NCP) at 40 C.F.R. 300.430). A 10^{-4} risk equates to 1 additional case of cancer per 10,000 people exposed to site-related, cancer-causing contaminants. A 10^{-6} risk equates to 1 additional case of cancer per 1,000,000 people exposed to the site contaminants. A "hazard index" is used to assess the impact of noncarcinogenic compounds such as lead and chromium. If the hazard index is less than 1.0, no long-term adverse health effects are anticipated via exposure to noncarcinogenic compounds. If the hazard index is greater than 1.0, then excessive exposure to noncarcinogenic site contaminants may cause adverse chronic health effects.

The exposure routes applicable to the Osborne Landfill Site include: direct contact with the contaminated fill material; residential use of contaminated groundwater including (ingestion and showering); direct contact with onsite surface waters; and direct contact with pond or wetland sediments. Remedial Alternatives that involve excavation pose the potential for inhalation of particulates. Table 5 summarizes these site-related exposure pathways and presents the estimated health risks for each of these pathways. A discussion of the more relevant risks follows.

The carcinogenic risk of direct contact with the fill material has been estimated to be 2.8×10^{-5}. This average-case risk

TABLE 5

POTENTIAL SITE-RELATED EXPOSURE PATHWAYS AND ASSOCIATED ESTIMATED HEALTH RISKS
OSBORNE LANDFILL SITE
GROVE CITY, PENNSYLVANIA

Media	Exposure Scenario	Average Case(1)		Worst-Case(2)	
		Hazard Index	Incremental Cancer Risk	Hazard Index	Incremental Cancer Risk
Solid Waste Fill Material	Direct contact (includes the total effect of dermal contact and accidental ingestion)	.81	2.8 x 10-5	4.12	2.6×10^{-4}
	Inhalation of fugitive dusts	<.01	1.08×10^{-7}	<.01	8.8×10^{-6}
Groundwater-Onsite Water Table(3)	Ingestion by an adult	0.22	4.0×10^{-3}	0.73	2.88×10^{-2}
	Ingestion by a child	0.45	8.23×10^{-3}	1.5	5.93×10^{-2}
	Inhalation of volatiles while showering	<0.01	1.12×10^{-3}	0.01	1.0×10^{-2}
Groundwater-Clarion Formation (3)	Ingestion by an adult	0.14	1.51×10^{-4}	0.30	4.06×10^{-4}
	Ingestion by a child	0.59	3.11×10^{-4}	.63	8.37×10^{-4}
	Inhalation of volatiles while showering	0.02	1.05×10^{-4}	0.05	3.16×10^{-4}
Groundwater-Homewood Formation(3)	Ingestion by an adult	0.15	2.79×10^{-5}	0.45	7.40×10^{-5}
	Ingestion by a child	0.30	5.75×10^{-5}	0.93	1.52×10^{-4}
	Inhalation of volatiles while showering	<0.01	3.00×10^{-5}	<0.01	6.60×10^{-5}
Onsite Ponds	Dermal contact by a child	0.012	2.76×10^{-9}	0.015	3.55×10^{-9}
Onsite Pond Sediments	Dermal contact by a child	0.36	4.03×10^{-5}	0.39	4.85×10^{-5}
Wetland Sediments	Dermal contact by a child	0.04	7.26×10^{-7}	0.14	2.75×10^{-6}

(1) Average-case risk calculations are based on the arithmetic average concentration level
(2) Worst-case risk calculations are based on the maximum concentration level
(3) Exposure scenario represents a future potential scenario since there are no groundwater users in the affected area.

estimate equates to almost 3 additional cases of cancer per 100,000 children directly exposed to the fill material. The hazard index was estimated to be less than 1.0 (0.8) but the worst case shows the potential for harm from systemic effects.

The carcinogenic risk of using contaminated groundwater varied depending on the source geologic formation. Use of the onsite water table may result in excessive carcinogenic risks (one additional cancer case per 100 people using this flow system as a potable water supply). However, since no one uses the onsite water table as a source of potable water, this risk reflects a future potential exposure scenario. Use of the Clarion Formation very close to the site area also results in an excessive carcinogenic risk upon exposure (ingestion by children) This risk has been calculated to be 0.84×10^{-3}, which equates to approximately 1 additional case of cancer per 1,000 people exposed. As with the onsite water table, there are no known users of this flow system in the area where this formation is contaminated. The average case risk from ingestion by children gives a risk of 3.1×10^{-4} or about three additional cases of cancer per 10,000 people exposed. The worst case of groundwater (ingestion by children) from the Homewood Formation may result in an estimated carcinogenic risk of 1.5×10^{-4} (approximately two additional cases of cancer per 10,000 individuals exposed). Because there are no known users of either the Clarion or Homewood flow systems adjacent to the site and since nearby residential wells in these formations were not contaminated, these risk estimates reflect a future potential exposure scenario.

Future residential development of land near the site (assuming wells are installed for each household) could result in excessive health impacts with long-term exposure to either the water table, Clarion Formation, or Homewood Formation.

Although it is unlikely that children would use the onsite ponds for recreational purposes, a risk assessment was performed to evaluate direct contact with the surface water and sediments. Because of low concentrations of contaminants in the ponds and because the exposure would be limited, the estimated carcinogenic risk for surface water equates to about three additional cases of cancer per 100,000,000 people exposed to the onsite ponds. Exposure to contaminated onsite pond sediments equates to about four additional cases of cancer per 100,000 people exposed. The hazard index associated with exposure to surface water was less than 0.02. Exposure to onsite pond sediments resulted in a slightly higher hazard index, but it was still less than the target level of 1.0.

In summary, moderate-to-low carcinogenic health risks exist for exposure to the contaminated fill material and onsite pond sediments. Additionally, the worst case for systemic effects indicates the potential for harm from noncarinogenic contaminants in the fill. Future use of the onsite water table or the Clarion Formation near the site could result in excessive carcinogenic health risks. Health risks associated with dermal exposure to onsite surface water are very low.

ENVIRONMENTAL RISKS

The Osborne Landfill Site is overgrown with grasses, shrubs, and trees. Woodlands are present directly north and due west of the site. These forested areas provide habitat for whitetail deer, grouse, and other wildlife. According to the U.S. Fish and Wildlife Service, endangered species do not inhabit the study area.

Properties surrounding the site are agricultural in nature but several wetland communities exist in the region including the wetland which borders the site to the southwest. A large offsite pond exists beyond the forested area to the west of the landfill. This offsite natural pond, and the wetland adjacent to the study area, provide suitable habitat for migratory waterfowl. The offsite pond is of sufficient size and consistency to support fish populations; however, only sunfish, turtles, and frogs have been observed. The depth of the offsite pond is only about 2 to 3 feet.

Terrestrial wildlife could be exposed via direct contact (dermal exposure and ingestion) or indirectly via the food chain. Biota could be exposed to both organic and inorganic constituents detected in surface soils (fill material), surface water, or sediments. Since quantitative environmental surveys were not conducted during the RI, limited conclusions regarding changes in the area ecosystem (species abundance or diversity) can be made.

Terrestrial biota may bioaccumulate PCBs, inorganics (e.g., lead), and to a lesser extent, PAHs. PCBs are of concern because of their presence in soils and sediments at the site. Any predator species that are exposed may be at risk because of their position in the food chain.

Aquatic biosystems potentially affected by site-associated contaminants include the onsite leachate ponds and the offsite natural pond. Aquatic biota are likely to be exposed via direct contact, ingestion of contaminants in sediments or surface waters, or through the food chain. Constituents that bioaccumulate in the food chain have the potential to affect aquatic receptors. Bioaccumulative substances such as PCBs and inorganic constituents (e.g., lead, copper) were detected in sediment samples. Biota at risk may include bottom-dwelling macroinvertebrates or bottom-feeding species. Terrestrial biota that frequent surface-water bodies may also be exposed.

To assess the environmental impacts associated with the Osborne Landfill Site, sediment samples were collected from Wetland Area 1 (the offsite pond), the influent stream (background), and Wetland Area 2, which borders the site to the southwest. The sediment samples were leached to produce an extract representative of potential wetland surface waters. These extracts were then used in Ceriodaphnia (a tiny aquatic animal) and Fathead Minnow toxicity tests. Surface water samples were also collected from these areas and subjected to bioassay testing (fathead minnow and ceriodaphnia). Based on the results, no conclusions can be made with any certainty as to whether site contaminants detected in Wetland Area 2 are impacting the biota.

In summary, aquatic and terrestrial biota could potentially be affected by contaminants in the onsite ponds, the fill material, or the wetland that is located southeast of the site. The level of the contaminant of concern (PCBs) in the southeast wetlands is; however, very low (less than 1 ppb). These areas have exhibited organic and inorganic contamination. Biota that inhabit the offsite pond are unlikely to be impacted, since no contamination was detected in the surface water or sediment in the pond.

DESCRIPTION OF ALTERNATIVES

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

Remedial alternatives were developed during the FS for each of the five operable units described previously. With the exception of the "no action" alternative, which is always considered as a baseline for comparison against other alternatives, the development of alternatives was based on the results of the risk assessment discussed previously. The alternatives that were proposed for each operable unit focused on (1) preventing exposure to site contaminants, (2) reducing the toxicity of the contaminants to acceptable levels, and/or (3) preventing the migration of contaminants. EPA has deferred making a decision on the Wetlands Sediments (OU2) and the Homewood aquifer (OU5). Additional chronic bioassay tests will be performed to determine if there is any bioaccumulation of PCBs occurring. This testing will be part of a focused RI/FS that will also include a Ground Water Verification Study of the deeper aquifers at the site. If there is not an impact on the wetlands biota it is not prudent to destroy this mature wetlands area to remediate the very low level of PCB contamination. The contamination in the Homewood, Connoquenessing and Burgoon aquifers is relatively low and has been detected sporadically. EPA believes additional testing is required to better characterize these flow systems prior to selection of a Remedial Alternative for these operable units. After completion of the focused RI/FS, a subsequent ROD will be issued for operable units OU2-Wetlands Sediments, OU5-Homewood aquifer, the mine pool, the Connoquenessing and Burgoon aquifers. Summarized below are the alternatives that were considered for operable units OU1 Solid Waste Fill Material, OU3 Onsite Water Table, and OU4 Clarion Aquifer.

Customarily, EPA selects one Remedial Alternative for each

operable unit, from the potential remedies listed in the FS. In this ROD, EPA has selected a Primary Remedial Alterative and a Contingency Alternative for the operable units related to the fill and its leachate (OU1 and OU3). A slurry wall containment or a RCRA subtitle C landfill would satisfy the threshold criteria for Overall Protection of Human Health and the Environment because of the low to moderate risks posed by the fill. EPA's Proposed Plan listed the RCRA landfill as the preferred alternative; however, during the comment period EPA received comments which strongly supported the slurry wall remedy. The public supported the slurry wall remedy because the community was concerned about the economic impact of the high capital costs on Cooper Industries, a PRP for this site, if Cooper was required to implement and finance the landfill alternative. Cooper is a major employer in the area. The public was also concerned about the potential for exposure of residents to PCBs during excavation if the landfill option was chosen.

In response to these comments, EPA organized a panel of experts to appraise this technology at the Osborne Site. The panel's review generally supported the viability of a slurry wall at the Osborne Site, but identified the need for measures to isolate the fill area from the deep mine pool and to prevent subsidence near the high wall. In response to these needs, a more detailed proposal for implementation of the slurry wall remedy was submitted to the panel of slurry wall experts. This panel included members from EPA's Office of Research and Development and the U.S. Army Corps of Engineers. The members of this panel agreed that if appropriate testing was performed prior to the design phase and if the detailed proposal submitted by Cooper Industries was implemented with proper quality control, the slurry wall remedy should be effective. This technical information and their review comments are included in the administrative record.

EPA has considered the modifying criteria of Community Acceptance, and the new technical information obtained during the slurry wall review to select the slurry wall alternative as the primary remedy for OU1. This is acceptable to the State of Pennsylvania if the landfill is included in the ROD as a contingency remedy.

A contingency remedy format is usually associated with the use of innovative technology that needs actual field application to assess its success. Although slurry wall installation is not "innovative technology", its successful application in the Osborne field setting requires the innovative application of mine bulkheading techniques related to slurry wall installation. These techniques cannot be judged in pilot studies and depend on the actual field conditions encountered. Therefore, the use of the contingency format related to the use of an innovative application of established technology is appropriate. EPA has included performance standards that must be met to consider the slurry wall remedy appropriate and successful. Some of the standards must be met prior to the design of the slurry wall and other specific standards will be developed during the design of the Remedial Action. The specific standards will be designed to make sure that the following goals are clearly met:

1) That the slurry wall installation is implementable at reasonable costs in this field setting.

2) That the water level inside the slurry wall containment can be lowered by reasonable pumping rates to a level that creates a negative average pressure in the containment of at least one foot of head (.4 psi) with respect to the adjacent Clarion and Homewood aquifers. This will be monitored by well pairs located in the fill and adjacent aquifers.

3) That future subsidence will not impact the integrity of the slurry wall.

If the performance standards cannot be met at the pre-design, design or implementation stages of the remedy, the landfill alternative will be implemented in place of the slurry wall alternative. If after implementation of the slurry wall alternative, the performance standards cannot be met, a maximum of three months (90 days) will be allowed to demonstrate that a minor modification of the alternative can correct the problem and a maximum of six months will be allowed to implement and assess the success of the modification. The performance standards for the slurry wall are given in greater detail under Alternative S12 below.

SOLID WASTE/FILL MATERIAL (OPERABLE UNIT 1)

Initially, eleven alternatives were identified during the feasibility study. Two of the eleven alternatives that were not cost effective were eliminated during the screening process (Alternatives S8 and S10). The details relating to S8 and S10 are given in the FS. Neither of these alternatives are presented below. Cooper Industries proposed an alternative for remediating the solid waste (OU1), and the onsite water table (OU3) before EPA issued the Proposed Plan and draft FS which was presented in the Proposed Plan. This alternative has been included and is referred to as Alternative S12. A description of the alternatives for Operable Unit 1 are provided below.

<u>Alternative S1: .No Action</u>

Estimated Construction Cost	$0
Annual O&M Costs	$0
Present Worth	$41,000
Estimated Time to Complete	None

The no action alternative provides a baseline for comparing other alternatives. Because no remedial activities would be implemented with the no action alternative, long-term human health and environmental risks for the site essentially would be the same as those identified in the baseline risk assessment (see Summary of Risks). Under the no action alternative, leaching of contaminants from the solid waste fill material to the water table would continue, since much of the fill material is below the water table. Overland transport of contaminants to the wetland area would also continue.

This alternative does not reduce the current level of contamination in the fill area. The average concentration of PCBs in the fill is 23 mg/kg. EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) for an unrestricted access site (maximum PCB concentration of 10 mg/kg) is not met by this alternative. EPA's PCB Spill Cleanup Policy for a reduced access area (maximum PCB concentration of 25 mg/kg) is met by this alternative.

Since the fill is not a hazardous waste by definition, RCRA closure regulations are not an ARAR. This alternative would not meet PADER municipal waste regulations.

This alternative does not meet one of the goals of CERCLA/SARA: to utilize treatment that permanently reduces the volume, toxicity, or mobility of the contaminants. This remedy is not protective of human health and the environment. As mandated by Section 121(c) of CERCLA for sites where the waste is left on site above health-based levels, a 5-year site review (for 30 years) would be performed to ensure that the alternative is protective of human health and the environment.

<u>Alternative S2: Soil Cover</u>

Estimated Construction Cost	$849,000
Annual O&M Costs	$30,000
Present Worth	$1,367,000
Estimated Time to Complete	2 months

This alternative would consist of regrading the site area to create a stable site configuration that would result in the elimination of the onsite ponds, and diverting most of the offsite run-on, which presently enters the site via the influent stream and discharges to Pond 1. This run-on is from the land which borders the north and northeast portions of the site. It is proposed that the influent stream would be diverted to discharge to the offsite pond, which is located to the west of the site. Other run-on that enters the site area is from the mine spoil piles and the highwall area. However, most of this run-on would be eliminated during site regrading since the spoil piles and unconsolidated soils above the highwall would be used to regrade the site.

Covering the site with six inches of soil would require that the three onsite ponds be eliminated. Initially, the volume of water in the ponds would be reduced by diverting the influent stream to the offsite pond. Following this action, the ponds would be completely covered with soil from the spoil piles. Water remaining in the ponds would be absorbed by the backfill material. Materials from the spoil piles could be used as a source of the borrow material to backfill the onsite ponds. Regrading the site would be necessary to prevent ponding of surface runoff and diversion of the influent stream. Following regrading, the site would be covered with sufficient soil to enable the establishment of a permanent vegetative cover that would be more resistant to water and wind erosion than at present. A chain-link fence would then be reconstructed to reduce onsite trespassing activities.

To monitor the effectiveness of this alternative, groundwater monitoring would be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells would collect samples biannually until the first five year review and on an annual basis afterwards. Samples would be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk would also be sampled at this time for VOCs.

Major items of work include:

- Rough grading, 35,500 cubic yards (cy)
- Soil cover, 15,600 cy
- Topsoils, 14,500 cy
- Seeding, 18 acres

Infiltration would be slightly reduced by the soil cover; however, because the fill material is below the water table, contaminants would continue to leach into the onsite water table. Volatile organics would most likely continue to migrate vertically (to the Homewood Formation) or horizontally to the Clarion Formation. However, PCBs and PAHs are not expected to migrate due to their high soil adsorption coefficients. Regrading would prevent offsite migration (i.e., overland transport) of contaminants to the wetland.

This alternative is easy to implement but is not a permanent solution to the problems at the site because the contaminated materials would remain. Covering and revegetating would reduce the transport of the soil contaminants, but the toxicity, mobility and volume would be unchanged.

The goal of regrading and covering the site with soil is to significantly reduce or eliminate the risks from dermal contact, accidental soil ingestion, and inhalation because the contaminant source would be covered. The cover proposed under this alternative would not be constructed in accordance with RCRA closure requirements of 25 PA Code Chapter 264, for closure by capping. The fill material is not a RCRA hazardous waste and since the purpose of the cover is to isolate the waste from dermal contact, capping regulations are not appropriate for this alternative. Since the fill is not a hazardous waste by definition, RCRA closure regulations are not applicable but some elements of RCRA closure will be relevant and appropriate.

This alternative does not reduce the current level of contamination in the fill area. The average concentration of PCBs in the fill is 23 mg/kg. EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) for an unrestricted access site (maximum PCB concentration of 10 mg/kg) is not met by this alternative. EPA's PCB Spill Cleanup Policy for a reduced access area (maximum PCB concentration of 25 mg/kg) is met by this alternative.

EPA does not consider this alternative to be protective of human health and the environment. This alternative does not meet one of the goals of CERCLA/SARA: to utilize treatment that permanently reduces the volume, toxicity, or mobility of the contaminants. As mandated by Section 121(c) of CERCLA for sites where the waste is left on site above health-based levels, a 5-year site review (for 30 years) would be performed to ensure that the alternative is protective of human health and the environment.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and to prevent contact with the waste. A security fence would be maintained around the site to reduce access.

Alternative S3: Clay Cap

Estimated Construction Cost	$1,926,000
Annual O&M Costs	$32,000
Present Worth	$2,468,000
Estimated Time to Complete	12 months

This alternative would consist of construction of a low permeability clay cap on the site that would significantly reduce surface water infiltration. This alternative would include similar site regrading, stream diversion and vegetation work as described previously in Alternative S2 (Soil Cover).

A drum staging area would be constructed in the event that newly-discovered drums are uncovered during the excavation activities. Any drums or concentrated wastes found during excavation must be tested to determine if the contain hazardous wastes that require treatment under the land disposal regulations would be sent offsite to an appropriate treatment or disposal facility. If the wastes are hazardous, the regulations contained in 25 PA Code Chapter 264, Subpart I, relating to the management of containers apply.

The only difference between the cap for this alternative and Alternative S2 is that a 2-foot thick clay cap would be included to reduce the amount of surface water infiltrating through the site. The clay would be obtained from an offsite borrow source.

To monitor the effectiveness of this alternative, groundwater monitoring would be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells would collect samples biannually until the first five year review and on an annual basis afterwards. Samples would be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk would also be sampled at this time for VOCs.

Major items of work include the following:

- Rough grading, 35,500 cy
- Clay, 15,000 cy
- Soil cover, 15,600 cy
- Topsoil, 14,500 cy
- Seeding, 18 acres

Capping would remove the risks from dermal contact, accidental ingestion, and inhalation of particulates because the contaminant source would be covered. Capping would also reduce infiltration through the disposal area and reduce the leaching of soil contaminants into groundwater. Capping would prevent the migration of contaminants via runoff and overland transport to the wetland area. However, shallow groundwater flows horizontally through the site from the offsite ponds to the mine pool. Therefore, capping alone is not completely effective in reducing leaching of the wastes, since a majority of the waste is already in contact with the water table.

The technologies proposed for this alternative are demonstrated and commercially available. The technologies are expected to be technically feasible and readily implementable. Periodic maintenance of the cap would be required.

The goal of regrading and covering the site with a clay cap is to significantly reduce or eliminate the risks from dermal contact, accidental soil ingestion, and inhalation because the contaminant source would be covered. The cover proposed under this alternative would not be constructed in accordance with RCRA closure requirements of 25 PA Code Chapter 264, to the extent that they are relevant and appropriate to capping. The fill material is not a RCRA hazardous waste and since the purpose of the cover is to isolate the waste from dermal contact, capping regulations are not appropriate for this alternative. Since the fill is not a hazardous waste by definition, RCRA closure regulations are not applicable ARARs, but some elements of RCRA closure will be implemented to the extent that they are relevant and appropriate.

This alternative does not reduce the current level of contamination in the fill area. The average concentration of PCBs in the fill is 23 mg/kg. EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) for an unrestricted access site (maximum PCB concentration of 10 mg/kg) is not met by this alternative. EPA's PCB Spill Cleanup Policy for a reduced access area (maximum PCB concentration of 25 mg/kg) is met by this alternative.

EPA does not consider this alternative protective of public health and the environment. Because wastes are left on site without treatment, this alternative does not meet the goals of CERCLA/SARA to utilize treatment that permanently reduces the volume, toxicity, or mobility of the site contaminants. As mandated by Section 121(c) of CERCLA for sites where the waste is left on site above health-based action levels, a 5-year review of the site would be required to assess the effectiveness of this alternative.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and contact with the fill. A security fence would be maintained around the site to reduce access.

<u>Alternative S4: Multimedia Cap</u>

Estimated Construction Cost	$1,741,000
Annual O&M Costs	$32,000
Present Worth	$2,282,000
Estimated Time to Complete	6 months

A multimedia cap consisting of soil, sand, and a synthetic membrane, such as high density polyethylene (HDPE) or polyvinyl chloride (PVC), would be constructed over the former disposal area. As with the soil cover and clay cap alternatives discussed previously, site regrading would be necessary, along with the construction of a drum staging area. Any drums or concentrated wastes found during excavation must be tested to determine if the contain hazardous wastes that require treatment under the land disposal regulations would be sent offsite to an appropriate treatment or disposal facility. If the wastes are hazardous, the regulations contained in 25 PA Code Chapter 264 relating to the management of containers apply. In summary, the only difference is that the cap design would allow for less infiltration than soil or clay. The cap design meets RCRA requirements 25 PA Code Chapter 264.110-119 and 310 for caps used in closure of a landfill.

The cap shall be designed and constructed according to the RCRA closure requirements of 25 PA Code Chapter 264.110 - 119, 228, 258, and 310. The cap design also meets RCRA requirements of 25 PA Code Chapter 264. Placement of a cap over waste requires a cover designed and constructed to accomplish the following:

- Provide long-term minimization of liquids through the capped area.
- Function with minimum maintenance.
- Promote drainage and minimize erosion and abrasion of the cover.
- Prevent run-on and runoff from damaging the cap.

- Accommodate settling and subsidence so that the cover's integrity is maintained.

- Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

To monitor the effectiveness of this alternative, groundwater monitoring would be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells would collect samples biannually until the first five year review and on an annual basis afterwards. Samples would be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk would also be sampled at this time for VOCs.

Major items of work include the following:

- Rough grading, 35,500 cy
- Soil covers, 23,080 cy
- Synthetic membrane, 200,000 sf
- Topsoil, 14,500 cy
- Seeding, 18 acres

A multimedia cap would result in no direct contact to the site wastes. Therefore, risks to human health are minimized. Capping would also eliminate surface runoff of site contaminants to the wetland area. A multimedia cap would significantly reduce the amount of infiltration through the fill material and leaching of contaminants would be reduced. However, as with the other two capping alternatives (S2 and S3), leaching of the fill may continue, since a majority of the waste is already in contact with the water table. Consequently, groundwater monitoring is required.

Technologies proposed for this alternative are demonstrated and commercially available. The technologies are expected to be technically feasible and are proven. This alternative should be implementable at the Osborne Landfill Site. It is anticipated that this alternative could be completed in one construction season.

As with the previous alternatives, offsite run-on entering the site would be diverted to the offsite pond. Additionally, consideration of mine reclamation requirements would be required.

The multimedia cap proposed under this alternative would be constructed in accordance with RCRA closure requirements or PADER requirements of 25 PA Code Chapter 264, for closure by capping. The fill material is not a RCRA hazardous waste and since the purpose of the cover is to isolate the waste from dermal contact, RCRA capping regulations are not applicable ARARs for this alternative. Since the fill is not a hazardous waste by definition, RCRA closure regulations are also not applicable ARARs, but some elements of RCRA closure regulations will be ARARs to the extent that they are relevant and appropriate.

Although not an ARAR, RCRA landfill closure capping regulations would be substantially met by this alternative.

This alternative does not reduce the current level of contamination in the fill area. The average concentration of PCBs in the fill is 23 mg/l. EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) for an unrestricted access site (maximum PCB concentration of 10 mg/kg) is not met by this alternative. EPA's PCB Spill Cleanup Policy for a reduced access area (maximum PCB concentration of 25 mg/kg) is met by this alternative.

Because wastes are left on site without treatment, this alternative does not meet one of the goals of CERCLA/SARA to utilize treatment that permanently reduces the volume, toxicity, or mobility of the contaminants. As mandated by Section 121(c) of CERCLA for sites where waste is left on site, a 5-year site review would be performed to ensure that capping is protective of human health and the environment.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and contact with the fill. The security fence would be maintained around the site to reduce access.

<u>Alternative S5: Excavation and Onsite Disposal</u>

Estimated Construction Cost	$10,418,000
Annual O&M Costs	$36,000
Present Worth	$10,785,000
Estimated Time to Complete	24 months

The construction of an onsite landfill would initially require the excavation of approximately 233,000 cubic yards of contaminated fill material and surficial debris (plastic, wood pallets, drum fragments, metal components from foundry operations, etc.). As mentioned previously, more than one half of the fill is below the water table. Consequently, dewatering of the fill would be required prior to placing it in an onsite landfill. Excavation of the fill material would also require the collection and treatment of the water table and onsite ponds as the site is excavated. Wastes would be excavated until the underclay, mine spoil or bedrock is encountered. The fill material is very distinctive in color and composition from the spoil material. Leachate generated during the dewatering process would be treated with the water table since they are basically the same. For purposes of simplicity, remediation of the water table and leachate are discussed separately (see Alternative GO3). Therefore, costs for groundwater remediation are not included under this alternative, but rather with Alternative GO3.

Excavated wastes would be placed in an onsite RCRA subtitle C landfill that meets Minimum Technology Requirements as defined in Section 3004(o) of RCRA, 42 U.S.C. §6924(o) and regulations thereunder at 40 CFR Part 264. This is relevant and appropriate for the PCB concentrations in the landfill and is protective of human health and the environment. In order to keep the wastes above the water table, borrow (soil) from the spoil piles and highwall area would be used to backfill the bottom of the excavated area. The onsite landfill would then be constructed on the original location and the site regraded to promote drainage off site.

The design of the onsite landfill would include a double liner, a low permeability cap, and a leachate collection system. The preliminary design is detailed in the FS. Leachate collected in the tank would be trucked off site for treatment at an appropriate treatment or disposal facility. A study to define the potential for subsidence would be conducted before the design of the landfill and would be reviewed by the PADER and the state Bureau of Mines. NPDES tank standards are relevant and appropriate for the leachate tank.

Design and construction of the onsite landfill shall comply with the minimum technology requirements of 25 PA Code 264.301 through 264.304 that are summarized as follows:

- Install two or more liners, a top liner that prevents infiltration and a bottom liner that prevents waste migration to the underlying flow system. The bottom liner must be 30 mil or greater in thickness to comply with PADER solid waste regulations.
- Install leachate collection systems above and between the liners.
- Construct run-on and runoff control systems capable of handling the peak discharge of a 25-year storm.
- Control wind dispersion of particulates.
- Operation and maintenance.

The landfill design should also comply with RCRA requirements in 25 PA Code chapter 264. The temporary waste stockpile(s) must have a liner and leachate collection system as specified in 25 PA Code 264.251. These requirements are relevant and appropriate.

A drum staging area would be constructed in the event that newly-discovered drums are uncovered during the excavation activities. Following the construction of the onsite landfill, any uncovered drums along with the two drums which are presently on site can be securely placed in the onsite landfill. Any drums or concentrated wastes found during excavation must be tested to determine if the contain hazardous wastes that require treatment under the land disposal regulations 40 C.F.R Part 268. If any required such treatment they would be sent offsite to an appropriate treatment or disposal facility .

Samples from the area that showed the highest level of PCBs (410 ppm) will be collected and tested for PCBs. The exact plan for sampling this area will be developed during the Remedial Design. Fill material that contains PCBs above 500 ppm will be sent off site for appropriate treatment. Additionally, since there is some uncertainty as to what may be uncovered during excavation, EPA may sample and analyze additional areas to determine if treatment of some areas is appropriate.

As described previously under Alternatives S2, S3, and S4, offsite runon from the stream would be diverted to the offsite pond and the site would be revegetated.

During Remedial Design of this alternative, an air monitoring program would be developed to detect releases of volatile organics or particulates during excavation. If substantial released are detected, the wastes that are the source of the release will be tested.

To monitor the effectiveness of this alternative, groundwater monitoring would be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells would collect samples biannually until the first five year review and on an annual basis afterwards. Samples would be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk would also be sampled at this time for VOCs.

Major items of work include:

- Waste excavation, 233,000 cy
- Soil backfill, 223,000 cy
- Synthetic membranes, 568,000 sf
- Sand monitoring zones, 21,200 cy
- Waste backfill, 233,000 cy
- Soil/sand covers, 50,750 cy
- Synthetic membrane, 390,000 sf
- Topsoil, 17,000 cy
- Seeding, 21 acres

Excavation, processing, and backfilling of the wastes require considerable stockpiling and rehandling of material. These activities, combined with the relatively restricted site area and the rate at which waste can be handled, would limit the rate of construction. This alternative would take two construction seasons to complete. Additional factors that would slow the progress of the work include the collection (i.e., lowering the water table) and treatment of the water table and stabilizing offsite groundwater flow to the excavated area. This flow would be from the deep mine. Grouting of the highwall area may be used to limit offsite groundwater flow into the fill area during excavation.

Securing the wastes in an onsite landfill would eliminate human exposure to the wastes and migration of the waste to the wetland area via overland transport. This alternative is also effective in that the source of groundwater contamination would be removed from the water table. By removing the source of groundwater contamination, no further leaching of contaminants to the water table is anticipated. This alternative, however, does not reduce the toxicity of the waste left in the landfill.

Several problems could be encountered if this remedy is implemented. The slurry wall review panel members indicated that it might be more difficult to de-water the site during excavation than anticipated in the FS. Because of the adjacent deep mine pool, dewatering might actually require the installation of a slurry wall before excavation of the fill, substantially increasing costs. The use of the mine spoil would have to be carefully controlled to avoid using material greater than about 6" to properly backfill the area. It could be difficult to find an adequate clay source close to the site at a reasonable cost. Part of the landfill would extend over the mined area with potential subsidence problems that could impact the liners and landfill cap. A pre-design study would be conducted to assess the potential for subsidence and the effect of implementation of this remedy on the mine pool. This study would be reviewed by EPA and the PADER.

This alternative would not meet the CERCLA/SARA goal of using treatment to permanently reduce the toxicity mobility or volume of the waste, but it would successfully contain the contaminants and is consistent with EPA's interim Guidance on Preparing Superfund Decision Documents (OSWER Directive 9355.3-02) for large sites that contain high volume low toxicity sites with contamination that is marginally above health based limits.

This remedy would meet EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) for soils contaminated with PCBs below 500 mg/l.

The landfill proposed under this alternative would be closed in accordance with PADER requirements of 25 PA Code Chapter 264. Since the fill is not a hazardous waste by definition, RCRA closure and post closure regulations are not an applicable ARAR but to the extent that they are relevant and appropriate would be met by this alternative.

EPA considers this alternative to be protective of public health and the environment. This alternative does not meet one of the goals of CERCLA/SARA: to utilize treatment that permanently reduces the volume, toxicity, or mobility of the contaminants. As mandated by CERCLA for sites where the waste is left on site above health-based levels, a 5-year site review (for 30 years) would be performed to ensure that the alternative is protective of human health and the environment.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and contact with the fill. Institutional controls such as deed restrictions and local ordinances would be used to help reduce exposure to the site. These restrictions, for the most part, would not allow the site area to be used for any purpose. The State of Pennsylvania requires a restriction on mining or mineral removal within one half mile of the site. A prohibition on new wells located within 1/2 mile of the site would prevent exposure to high levels of vinyl chloride present in the Clarion Formation. The existing site fence, which has been vandalized and repaired several times would be maintained. A fence will restrict access to the site. Additional warning signs near the entrance gate would also be posted. Post-closure use of the property must be restricted indefinitely.

Alternative S6: Excavation and Offsite Disposal

Estimated Construction Cost	$107,343,000
Annual O&M Costs	None
Present Worth	$104,770,000
Estimated Time to Complete	24 Months

This alternative would consist of excavation of the solid waste and onsite pond sediments. Excavated material would be disposed of in an offsite commercial hazardous waste landfill. Borrowed soil from the spoil piles and highwall area would be used to backfill the bottom of the excavated area. The final site configuration and the borrow area would be graded and the stream diverted to promote drainage, but would be lower than the existing grade. Both the regraded site and the borrow area would be vegetated to prevent erosion.

Dewatering of the fill would be required prior to offsite disposal. Excavation of the fill material would also require the collection and treatment of the water table and onsite ponds as the site is excavated. Leachate generated during the dewatering process would be treated with the water table groundwater since they are basically the same. For purposes of simplicity, remediation of the water table, leachate and onsite ponds is discussed separately (see Alternative GO3). Therefore, costs for groundwater remediation are not included under this alternative, but rather with Alternative GO3.

A drum staging area would be constructed in the event that newly-discovered drums are uncovered during the excavation activities. Following the construction of the onsite landfill, any uncovered drums along with the two drums which are presently on site can be securely placed in the onsite landfill. Any drums or concentrated wastes found during excavation must be tested to determine if the contain hazardous wastes that require treatment under the land disposal regulations would be sent offsite to an appropriate treatment or disposal facility.

Long term groundwater monitoring would not be necessary since this alternative would result in the complete removal of the source area and would meet RCRA clean closure requirements.

Major items of work include:

- Waste excavation, 233,000 cy
- Haul/dispose offsite, 233,000 cy
- Soil backfill, 223,000 cy
- Grading, 43,600 cy
- Topsoil, 17,000 cy
- Seeding, 21 acres

This alternative is effective in that all exposure and contaminant migration routes would be eliminated. Additionally, Federal and state guidance for allowable levels of PCBs would be met.

Excavation, processing, and disposal of the wastes would require considerable stockpiling and movement of material because a majority of the waste is below the water table. This alternative would be relatively easy to implement. The waste would have to be stored and drained prior to sending offsite. These activities along with the relatively restricted site area and the rate at which waste can be handled, would limit the construction rate. This alternative would take two construction seasons to complete. Additional factors such as collecting and treating the groundwater would slow the progress of the work. There is also a need to separate large pieces of slag, drums, and other debris from the waste. Also, offsite disposal would require a staging and loading area for trucks.

The waste would be transported to a commercial hazardous waste landfill in compliance with standards applicable to generators and transporters of hazardous waste promulgated under RCRA, delegated to the state of Pennsylvania and found in 25 PA Code §262 and §263 regulations governing the generation and transportation of hazardous materials, as appropriate and the U.S. and State Department of Transportation (DOT) regulations pertaining to transportation of hazardous materials. The facility receiving the waste will be in compliance with applicable state and Federal permit requirements relevant to hazardous waste disposal facilities.

During Remedial Design of this alternative, an air monitoring program would be developed to detect releases of volatile organics or particulates during excavation. This remedy will comply with PA Air Pollution Control regulations 25 PA Code 121-143.

This alternative does not meet the CERCLA/SARA goal of treatment to permanently and significantly reduce a waste's toxicity, mobility, or volume. However, offsite disposal would reduce the toxicity, mobility, and volume of the waste at the Osborne Landfill Site itself.

TSCA and State PCB regulations and closure requirements (25 PA

Code 264.310) would be met. Since all wastes would be removed the five year review of CERCLA Section 121(c) would not be necessary and site access would not need to be restricted.

Alternative S7: Excavation, Onsite Incineration, and Onsite Disposal

Estimated Construction Cost	$55,937,000
Annual O&M Costs	$36,000
Present Worth	$54,022,000
Estimated Time to Complete	36 months

This alternative would consist of excavating all of the solid waste, including the onsite pond sediments. Excavated material would be incinerated in a mobile type incinerator. The residue would be disposed in an onsite landfill as described in alternative S5. In order to keep the treated waste residue above the water table, borrow from the spoil piles at the west side of the site and the highwall area would be used to backfill the bottom of the excavated area. The final site configuration and the borrow area would be graded to promote drainage and the stream that drains into the site diverted to the adjacent wetlands. Both the regraded site and the borrow area would be vegetated to prevent erosion.

As mentioned previously in the other alternatives which involve excavation, the leachate generated during dewatering and the lowering and collection of the water table would require treatment (see Alternative GO3). Intact drums encountered during excavation would be placed in a drum staging area and would require sampling. Any drums found containing waste that fails the Toxicity Characteristic Leaching Procedure (TCLP) and any liquids that would be classed as California wastes or any other wastes that require treatment under the land disposal regulations other than incineration would be sent offsite to an appropriate treatment or disposal facility. If not sent offsite, wastes would be incinerated and treated onsite.

To monitor the effectiveness of this alternative, groundwater monitoring would be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells would collect samples biannually until the first five year review and on an annual basis afterwards. Samples would be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk would also be sampled at this time for VOCs.

Major items of work include the following:

- Waste excavation, 233,000 cy
- Soil backfill, 223,000 cy
- Waste incineration, 322,000 cy
- Synthetic membranes, 568,000 sf
- Sand monitoring zone, 21,200 cy
- Incineration ash backfill, 322,000 cy

- Soil/sand covers, 50,750 cy
- Synthetic membrane, 390,000 sf
- Topsoil, 17,000 cy
- Seeding, 21 acres

If excavation, material handling, and decontamination activities are performed in a controlled manner, air emissions can be minimized (PA Air regulations, supra). During Remedial Design of this alternative, an air monitoring program would be developed to detect releases of volatile organics or particulates during excavation. The use of incinerator air pollution control equipment would remove potential contaminants from the gaseous discharge. Air monitoring would be required during onsite remedial activities because of the onsite incinerator.

Excavation, processing, incineration, and backfilling of the wastes requires considerable stockpiling and rehandling of material. These activities, along with the relatively restricted site area and the rate at which waste can be treated, would limit the construction rate. It is estimated that this alternative would take three construction seasons to complete. Additional factors such as the need to separate large pieces of slag, drums, and other debris from the waste, would slow the progress of the work.

This alternative would reduce the risks from direct contact because most of the organic contaminants would be detoxified. The incineration ash would be secured in an onsite landfill, an action that would reduce remaining risks from inorganics and metals associated with the treated material. Offsite migration of contaminants to the wetland area and leaching of contaminants to the water table would also be eliminated by placing the ash in the landfill above the water table.

The state regulations for hazardous waste incineration at 25 PA Code Chapter 264, are relevant and appropriate. The state regulations are similar to the Federal requirements. The fill material will be analyzed in accordance with 25 PA Code Chapter 264.341. All residues from the incineration process will be disposed in an approved manner as stated at 25 PA Code 264.351.

This alternative would meet the CERCLA/SARA goal of using treatment to permanently reduce the toxicity, volume, or mobility of the waste.

EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) and State PCB guidance would be met by this alternative.

The landfill proposed under this alternative would be constructed and closed in accordance with PADER requirements of 25 PA Code Chapter 264. Since the fill is not a hazardous waste by definition, RCRA closure regulations are not an applicable ARAR but to the extent that they are relevant and appropriate, they would be met by this alternative.

This alternative does not meet one of the goals of CERCLA/SARA: to utilize treatment that permanently and significantly reduces the volume, toxicity, or mobility of the contaminants. As mandated by CERCLA Section 121 for sites where the waste is left on site above health-based levels, a 5-year site review (for 30 years) would be performed to ensure that the alternative is protective of human health and the environment.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and contact with the fill. A security fence would be maintained around the site to reduce access.

Alternative S9: Excavation, Soil Washing, and Onsite Disposal

Estimated Construction Cost	$62,140,000
Annual O&M Costs	$36,000
Present Worth	$59,859,000
Estimated Time to Complete	36 months

This alternative would consist of excavation of all of the solid waste including the onsite pond sediments. Excavated material would be treated by soil washing to reduce the toxicity of the waste. The treated waste would be disposed of in an onsite landfill as described in alternative S5 and would meet the same ARARs as S5. To keep the treated waste residue above the water table, borrow from the spoil piles at the west side of the site and from the highwall area would be used to backfill the bottom of the excavated area. The final site configuration and the borrow area would be graded and the stream diverted to promote drainage. Both the regraded site and the borrow area would be vegetated to prevent erosion.

The waste material would need to be screened to separate large materials such as slag boulders, wood, and possibly drum fragments or intact full drums. The solid waste would then be taken to the processing area for soil washing. It is estimated that 250 cy of waste can be washed per day. The washing fluid generated by this process must be treated to remove the contaminants. Based on the results of the treatability study, the contents of the wastewater would include the same contaminants that have been detected in the water table (i.e., PCBs, PAHs, and metals) and therefore, this wastewater could be treated along with the contaminated water table (see Alternative GO3). It is estimated that 750 gpm of contaminated fluids would be generated by the soil washing operation. Based on the amount of wastewater generated, it would be feasible to treat the wastewater on site with the contaminated water table rather than transporting it offsite for treatment.

Following the soil washing process, treated soil would be disposed onsite. Based on the results of the treatability study, only a 60 percent reduction in PCB concentration is expected. Therefore, the treated waste be contained in a secure onsite RCRA subtitle C onsite landfill that meets all ARARs listed in S5.

During Remedial Design of this alternative, an air monitoring program would be developed to detect releases of volatile organics or particulates during excavation.

To monitor the effectiveness of this alternative, groundwater monitoring would be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells would collect samples biannually until the first five year review and on an annual basis afterwards. Samples would be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk would also be sampled at this time for VOCs.

Major items of work include the following:

- Waste excavation, 233,000 cy
- Soil backfill, 223,000 cy
- Soil washing, 233,000 cy
- Synthetic membranes, 568,000 sf
- Sand monitoring zones, 21,200 cy
- Landfill treated soil, 233,000 cy
- Soil/sand covers, 50,750 cy
- Synthetic membrane, 390,000 sf
- Topsoil, 17,000 cy
- Seeding, 21 acres

This alternative would reduce the risks from direct contact and inhalation of particulates because most of the contaminants would be removed. It is anticipated that the toxicity of the waste would be reduced and the leaching of contaminants would be correspondingly reduced. Because the treated soil would be contained (via landfilling) overland transport of contamination would be eliminated.

This alternative satisfies the CERCLA/SARA goal of utilizing treatment to reduce the toxicity, mobility or volume of a waste.

Excavation, processing, and backfilling of the site requires considerable stockpiling and rehandling of material. These activities along with the relatively restricted site area and the rate at which waste can be treated, would limit the construction rate. This alternative would take approximately three construction seasons to complete. Additional factors such as the need to separate large pieces of slag, drums, and other debris from the waste would slow the progress of the work.

A drum staging area would be constructed in the event that newly-discovered drums are uncovered during the excavation activities. Following the construction of the onsite landfill, any uncovered drums along with the two drums which are presently on site can be securely placed in the onsite landfill. Any drums or concentrated wastes found during excavation must be tested to determine if they contain hazardous wastes that require treatment under the land disposal regulations would be sent offsite to an appropriate treatment or disposal facility.

The reduction in PCB concentration may meet EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) for allowable levels of PCBs at a site with unrestricted site access. The metals concentrations and PAH concentration would be only slightly reduced.

The landfill proposed under this alternative, to contain the remaining contaminants, would be constructed in accordance with RCRA closure requirements delegated to the state under PADER requirements of 25 PA Code Chapter 264. These requirements are relevant and appropriate. Since the fill is not a hazardous waste by definition, RCRA closure and post closure regulations are not applicable but to the extent that they are relevant and appropriate would be met by this alternative.

This alternative does not meet one of the goals of CERCLA/SARA: to utilize treatment that permanently and significantly reduces the volume, toxicity, or mobility of the contaminants. As mandated by CERCLA Section 121(c) for sites where the waste is left on site above health-based levels, a 5-year site review (for 30 years) would be performed to ensure that the alternative is protective of human health and the environment.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and contact with the fill. The security fence would be maintained around the site to reduce access.

Alternative S11: Excavation, Thermal Stripping, Solidification, and Onsite Disposal

Estimated Construction Cost	$91,000,000
Annual O&M Costs	$36,000
Present Worth	$87,392,000
Estimated Time to Complete	24 months

This alternative would consist of excavation of all of the solid waste including the onsite pond sediments. Excavated material would be treated by thermal processing (low-level thermal stripping) to reduce the concentration of volatile organics and oils, to facilitate the solidification process. The residual material would be fixated and the residue disposed in an onsite landfill as described in alternative S5 and will meet the ARARs described in S5. To keep the treated waste residue above the water table, borrow from the spoil piles at the west side of the site and the highwall area would be used to backfill the bottom of the excavated area. The final site configuration and the borrow area would be graded and the stream diverted to promote drainage. Both the regraded site and the borrow area would be vegetated to prevent erosion.

This alternative consists of the installation of volatilization equipment to treat the solid waste prior to solidification. Thermal treatment of the solid waste is recommended to volatilize or remove organics which may impede the solidification process. Volatile and semi-volatile organics would be collected and condensed in a separate vessel for subsequent treatment or disposal. The treated waste would then be fed to the onsite treatment plant, where stabilizing mixtures would be added. The treated waste would then be taken back to the former disposal area and allowed to cure or complete the solidification process. Backfilling of the site area prior to placement of the solidified waste would be necessary so that the waste is landfilled above the water table. The site would then be regraded, covered with soil, and revegetated.

Excavation of the entire disposal area would require the lowering, collection, and treatment of the onsite water table and ponds. Leachate collected during dewatering of the fill would also require treatment. For purposes of simplicity, groundwater and surface water treatment are discussed separately under Alternative GO3.

During Remedial Design of this alternative, an air monitoring program would be developed to detect releases of volatile organics or particulates during excavation.

To monitor the effectiveness of this alternative, groundwater monitoring would be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells would collect samples biannually until the first five year review and on an annual basis afterwards. Samples would be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk would also be sampled at this time for VOCs.

Major items of work include:

- Waste excavation, 233,000 cy
- Soil backfill, 223,000 cy
- Waste treatment, 233,000 cy
- Synthetic membranes, 568,000 sf
- Sand monitoring zones, 21,200 cy
- Landfill treated soil, 233,000 cy
- Soil/sand covers, 50,750 cy
- Synthetic membrane, 390,000 sf
- Topsoil, 17,000 cy
- Seeding, 21 acres

The effectiveness of this alternative would be verified by treatability studies. However, if thermal stripping is used to pretreat the solid waste, cement or lime-based solidification may be effective in stabilizing the contaminants in the waste. Weathering and aging of the solidified material may reduce the effectiveness of the process and leaching of contaminants would recur. This alternative would require monitoring of the groundwater to ensure that contaminants are not leaching from the waste material.

This alternative is not a permanent solution because some of the contaminants would remain at the site. However, the mobility of the contaminants would be reduced, since organics would be removed and contaminants remaining in the treated material would be stabilized and contained by the landfill. The increase in waste volume may be significant, which could make this alternative difficult to implement.

The technologies proposed for excavation and material handling are all demonstrated and commercially available. The volatilization and stabilization technologies are anticipated to be technically feasible; however, bench- and/or pilot-scale studies would need to be conducted.

Excavation, processing, and backfilling of the wastes requires considerable stockpiling and rehandling of material because of the constraints of the site. These activities, along with the relatively restricted site area and the rate at which waste can be treated, would limit the construction rate. This alternative would take three construction seasons to complete. Additional factors that would slow the progress of the work include the need to separate large pieces of slag, drums, and other debris from the waste prior to processing.

A drum staging area would be constructed in the event that newly-discovered drums are uncovered during the excavation activities. Following the construction of the onsite landfill, any uncovered drums along with the two drums which are presently on site can be securely placed in the onsite landfill. Any drums or concentrated wastes found during excavation must be tested to determine if the contain hazardous wastes that require treatment under the land disposal regulations would be sent offsite to an appropriate treatment or disposal facility.

EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) is met by this alternative.

The landfill proposed under this alternative would be constructed in accordance with RCRA closure requirements or PADER requirements of 25 PA Code Chapter 264. Since the fill is not a hazardous waste by definition, RCRA closure regulations are not an applicable ARAR but to the extent that they are relevant and appropriate they would be met by this alternative.

This alternative may not meet one of the goals of CERCLA/SARA: to utilize treatment that permanently reduces the volume, toxicity, or mobility of the contaminants. As mandated by CERCLA 121(c) for sites where the waste is left on site above health-based levels, a 5-year site review (for 30 years) would be performed to ensure that the alternative is protective of human health and the environment.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and contact with the fill. A security fence would be maintained around the site to reduce access.

Alternative S12: Slurry Wall, Clay Cap, and Groundwater Pumping

Estimated Construction Cost	$7,432,000
Annual O&M Costs	$817,000
Present Worth	$16,976,000
Estimated Time to Complete	30 years or more

This alternative involves the construction of a clay cap and slurry wall around the entire fill area of the site. This area is approximately six acres. The site would be regraded and the stream diverted to the offsite pond to promote drainage. Appropriate drainage and erosion controls will be developed during the remedial design of the alternative. The technical details of the scoping design of the slurry wall installation have been approved by a technical panel of slurry wall experts. The scoping design that was reviewed is contained in the memo "Response to EPA Comments, Proposed Remedial Action Plan, Osborne Landfill Site, CEC Project 89190", from Civil and Environmental Consultants, Inc.(CEC), addressed to Mr. Michael J. O'Brien, and dated May 22, 1990. The technical details and comments from the technical panel are contained in the Administrative Record. The eastern boundary of the site is especially critical since the Clarion Formation and the deep mine pool, which are present east of the site, provide a pathway for offsite migration of the contaminated water table. The slurry wall would be installed at an elevation of approximately 1,300 feet to 1,260 feet. This barrier would be keyed into the clay layer and sandstone beneath the deep mine.

The PADER cap requirements, 25 PA Code 271-285, for municipal waste landfills are relevant and appropriate and would be met by this Remedial Action. The cap would consist of two feet of clay with a permeability of less than 10-7, a twelve inch sand and geotextile drainage layer, and two feet of soil with a vegetative cover.

A drum staging area would be constructed in the event that newly-discovered drums are uncovered during the excavation activities. Any drums or concentrated wastes found during excavation must be tested to determine if they contain hazardous wastes that require treatment under the land disposal regulations would be sent offsite to an appropriate treatment or disposal facility. If drums, concentrated wastes or new fill areas are discovered during the slurry wall installation, it will be necessary to relocate the position of the wall so that all waste areas are encompassed.

Containment wells would be installed onsite to prevent vertical migration to the underlying Homewood Formation and horizontal migration to the Clarion Formation. The water level inside the containment would be lowered to an elevation of approximately 1272 feet above mean sea level. During this stage a high rate of pumping and treatment would be required. Then these wells would pump continuously at a rate of approximately 30 gallons per minute. The exact pumping rate will depend on the rate of infiltration of ground water.

At this rate, no horizontal or vertical migration of the water table is anticipated. The contaminated groundwater would be treated onsite and discharged to the deep mine (via injection wells).

Treatment of the water table would consist of equalization, pH adjustment/chemical precipitation, clarification, sand filtration, and carbon adsorption. This treatment would be able to reduce organic and inorganic contaminants to acceptable levels. The water injected into the mine pool must comply with PA Clean Streams Law for discharge limits and federal requirements regarding class IV well injection. This includes frequency of sampling and concentration limits for discharges. Contaminant levels will at least meet MCLs prior to injection. Additionally, the NPDES standards, 25 PA Code Chapter 92, for treatment systems are relevant and appropriate. Treatment residues and sludges will be sent offsite to an appropriate treatment or disposal facility in compliance with state and federal regulations for disposal and transportation.

One uncertainty regarding this alternative is the integrity of the clay underlayer beneath the fill material. If this clay layer has been breached or if a major hydrological connection exists between the mine pool and the fill area, it may not be possible to lower the water level enough to assure that all flow from adjacent aquifers is <u>into</u> the containment at a reasonable pumping rate and cost. The design must demonstrate that the fill can be compacted enough to avoid subsidence and damage to the cap. If subsidence of the fill occurs, the cap and any monitoring wells impacted by the subsidence must be repaired.

This remedy must meet the following performance standards at the following milestones:

Pre-Design - Borings would be performed every 100 feet along the perimeter of the planned location of the slurry wall to assess the thickness of the clay layer and other geologic conditions.The need for a pump test to help determine the integrity of the clay layer beneath the fill would be assessed. A study of the potential for subsidence to affect the integrity of the slurry wall must be conducted and approved by EPA and submitted to the PADER. The effect of this remedy on the mine pool would also be evaluated before the design. The pre-design study would address all of the items identified by the slurry wall review panel and outlined in the scoping study from CEC.

Design - Detailed performance standards would be developed to assure that the following broad goals are accomplished by the Remedial Action:

1) That the slurry wall installation is implementable at reasonable costs in this field setting.

2) That the water level inside the slurry wall containment can be lowered by reasonable pumping rates to a level that creates a negative pressure of at least one foot of head (0.4 psi) with respect to the adjacent Homewood and Clarion aquifers along the entire perimeter of the fill. The average target elevation for ground water level, in the fill, to achieve a pressure differential that prevents seepage from the containment has been proposed as 1272 feet MSL. The exact level to achieve this would be finalized during the design phase of this Remedial Action. Pairs of wells inside and outside the fill area would be installed around the perimeter of the site in each of the adjacent aquifers to verify that the performance standards are met. The exact number and placement would also be established during the design phase. The frequency of measuring the water level in the well pairs will also be established during the design. Quarterly monitoring of the wells outside the containment for TCL and TAL contaminants is required to detect an increase in contamination associated with leakage.

3) That future subsidence will not impact the integrity of the slurry wall or the clay cap.

Implementation of the Alternative - The alternative must meet the detailed performance standards established during the design.

If the performance standards cannot be met at the pre-design, design or implementation stages of the remedy, the landfill alternative must be implemented in place of the slurry wall alternative. If after implementation of the slurry wall alternative, the performance standards cannot be met, a maximum of three months (90 days) will be allowed to demonstrate that a minor modification of the alternative can correct the problem and a maximum of six months will be allowed to implement and assess the success of the modification. The performance standards for the slurry wall are given in greater detail under alternative S12 below.

To monitor the effectiveness of this alternative, groundwater monitoring will be required for the onsite water table, Clarion, and Homewood Formations. Ten monitoring wells in these formations will collect samples quarterly for the first year after completion of the remedy and biannually thereafter until the first five year review and on an annual basis afterwards. The locations of these wells will be finalized during the Remedial Design. Samples will be analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Three residential wells at highest risk, as determined by EPA will also be sampled at the same interval as the monitoring wells time for VOCs.

The regrading and capping technologies will prevent direct contact with the solid waste fill material and overland transport of foundry sand to the wetland area. Groundwater pumping/treatment will prevent the migration of the contaminated water table to the Homewood and Clarion Formations, which are used in the local area as a source of potable water. The slurry wall will virtually eliminate the horizontal flow of groundwater across the site and thereby reduce the pumping rate required to prevent offsite groundwater contamination.

This option will not reduce the toxicity mobility or volume of the waste. The intent of this option is to reduce the transport of contaminants, by containing the source and eliminating pathways of migration. Infiltration of surface water (rainfall) will be reduced, and ultimately recovered and treated. Overland transport of contaminated materials will be eliminated. With the implementation of an active water extraction system within the waste mass, flow will be into the containment and the potential for groundwater contamination and migration will be virtually eliminated.

This alternative does not reduce the current level of contamination in the fill area. The average concentration of PCBs in the fill is 23 mg/kg. EPA's PCB Spill Cleanup Policy (40 CFR Part 761.120) for an unrestricted access site (maximum PCB concentration of 10 mg/kg) is not met by this alternative. EPA's PCB Spill Cleanup Policy for a reduced access area (maximum PCB concentration of 25 mg/kg) is met by this alternative.

The clay cap proposed under this alternative would be constructed in accordance with RCRA requirements of 25 PA Code Chapter 264 for closure by capping. Since the fill is not a hazardous waste by definition, RCRA landfill closure regulations are not an applicable ARAR, but to the extent that they are relevant and appropriate, they will be met by this alternative. The groundwater monitoring of the fill area would fulfill the appropriate monitoring requirements of RCRA landfill closure.

This remedy does protect human health and the environment by containing site contaminants, but does not meet CERCLA/SARA goals for treatment to permanently and significantly reduce toxicity mobility or volume of the material. The CERCLA Section 121(c) 5 year review and assessment of the effectiveness of this alternative will be required since the wastes will remain on site.

The Pennsylvania ARAR for groundwater for hazardous substances states that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 Pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is also found in other legal authorities. Therefore, the negative pressure between the containment and the adjacent aquifer must be maintained until the contaminant levels in the ground water in contact with the fill are below the following levels that EPA considers background at the Osborne Site:

TCE - 0.2 ug/l
Vinyl Chloride - 0.2 ug/l
cis - 1,2 Dichloroethylene - 0.2 ug/l
Benzene - 0.2 ug/l

Benzo(a)Pyrene - 10 ug/l
PCBs - 1 ug/l

Arsenic - 22 ug/l
Berylium - 2 ug/l
Chrome - 50 ug/l
Lead - 15 ug/l
Nickel - 15 ug/l

The point of compliance is the influent to the treatment system. In addition to the specific goals listed above, if any other compound exceeds its MCL or non-zero MCLGs 40 CFR §141.50-52, the negative pressure must be maintained.

The mandated 5-year review and assessment of the effectiveness of this alternative will be required since the wastes will remain onsite.

Post-closure use of the property must be restricted, as necessary, to prevent damage to the cover and contact with the fill. The cap will be checked biannually for damage and the need for repairs.

Institutional controls such as deed restrictions and local ordinances would be used to help reduce exposure to the site. These restrictions, for the most part, would not allow the site area to be used for any purpose. The State of Pennsylvania requires a restriction on mining or mineral removal within one half mile of the site. A prohibition on new wells located within 1/2 mile of the site would prevent exposure to high levels of vinyl chloride present in the Clarion Formation. A fence will restrict access to the site and additional warning signs near the entrance gate would also be posted. Post-closure use of the property must be restricted indefinitely.

ONSITE WATER TABLE (OPERABLE UNIT 3)

The Onsite Water table is the water present in the fill material below the ground water level. The ground water alternatives presented below were developed separately from the alternatives for the fill material. For instance if a cap is chosen, either no action (G01) or containment of fill contaminants by pump and treatment (G02) could be chosen. G03, however, is only associated with excavation options since this alternative represents treatment of water collected during excavation. Contaminated water would be collected during excavation; Therefore, this alternative must be selected if any excavation option (S5,S6,S7,S9 or S11) is selected. The Alternative S12 for the fill material would collect and treat most of the ground water in contact with the fill and would continue to pump and treat the water table inside the slurry wall indefinitely. Therefore, if alternative S12 is chosen, the onsite water table will be treated as an integral part of this fill remedy and a separate OU3 remedy will not need to be selected.

Alternative G01: No Action

Estimated Construction Cost	$28,000
Annual O&M Costs	$12,000
Present Worth	$71,000
Estimated Time to Complete	1 month

The no action alternative is considered in the FS to provide a baseline to which other remedial alternatives can be compared. Groundwater monitoring would consist of sampling three wells biannually until the first five year review required by CERCLA Section 121(c) and annually afterward. The groundwater would be analyzed for TCL organics and TAL organics. The wells would be constructed to monitor the water table.

The no action alternative could be easily implemented. It may be possible to use existing monitoring wells unless remedial action is taken on the disposal area, which may result in the removal of a certain number of monitoring wells. Groundwater use restrictions could be implemented by state and local officials using state water pollution control regulations and requirements related to well drilling and groundwater use.

The no action alternative would not prevent future potential risks associated with groundwater consumption. It would not prevent offsite migration of contaminated groundwater.

Monitoring of the groundwater would act as a detection method to determine whether the concentration of soluble contaminants in groundwater were increasing or migrating over time. If concentrations were to significantly increase, then preventive methods could be implemented.

This alternative would not comply with either contaminant-specific ARARs, such as drinking water standards 40 C.F.R. Part 141, or location-specific ARARs, such as the EPA Groundwater Protection Strategy.

Alternative GO2: Containment of the Contaminant Plume by Pumping, Physical/Chemical Treatment, and Onsite Injection of Ground Water

Estimated Construction Cost	$2,627,000
Annual O&M Costs	$817,000
Present Worth	$17,894,000
Estimated Time to Complete	30 years or more

This alternative could not be employed with any excavation alternative (i.e., Alternatives S5 through S11) that is associated with the fill material, since the water table would be remediated during excavation. Therefore, this alternative is applicable only to those alternatives that do not involve excavation of the waste material (i.e., Alternatives S1 through S4).

This alternative would consist of methods that would contain the contaminated water table and prevent vertical and horizontal migration. Containment wells would be installed onsite to prevent groundwater migration. It is estimated that 15 wells, pumping at a combined rate approximating groundwater recharge in the affected area (270 gpm), would be required.

The contaminated groundwater would be treated on site using a combination of physical and chemical processes to treat the water table to acceptable levels. Following treatment, the water would be injected into the deep mine pool. Because the mine pool covers over 1 square mile in area and the effluent discharge would be approximately 270 gpm, no significant change in water levels is expected to occur in the mine pool.

Treatment of the water table would consist of equalization, pH adjustment/chemical precipitation, clarification, sand filtration, and carbon adsorption. This treatment would be able to reduce organic and inorganic contaminants to acceptable levels. The water injected into the mine pool must comply with PADER discharge and federal requirements regarding class IV well injection. Contaminant levels must be treated to below MCLs prior to injection. Additionally, the NPDES standards for treatment systems are relevant and appropriate. Treatment residues and sludges will be sent offsite to an appropriate treatment or disposal facility in compliance with state and federal regulations for disposal and transportation.

Groundwater monitoring would consist of sampling three wells biannually until the first five year review under CERCLA Section 121(c) and annually afterward. The groundwater would be analyzed for TCL organics and TAL organics. The wells would be constructed to monitor the water table including the compounds listed below as cleanup goals.

This alternative should be effective in preventing offsite migration of contaminants from the onsite water table. Additionally, the level of contamination in the onsite water table could potentially decrease over time. Since the waste would remain in place, it is difficult to estimate how long this alternative would need to be implemented.

The Pennsylvania ARAR for groundwater for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is found in other legal authorities. Pumping must continue until contaminant levels are below the following limits as measured in the three monitoring wells and the influent to the treatment system:

TCE - 0.2 ug/l
Vinyl Chloride - 0.2 ug/l
cis - 1,2 Dichloroethylene - 0.2 ug/l
Benzene - 0.2 ug/l

Benzo(a)Pyrene - 10 ug/l
PCBs - 1 ug/l

Arsenic - 22 ug/l
Berylium - 2 ug/l
Chrome - 50 ug/l
Lead - 15 ug/l
Nickel - 15 ug/l

The point of compliance is throughout the contaminated plume.

In addition to the specific goals listed above, if any other compound exceeds its MCL or non-zero MCLG, the remedy must continue.

The exact placement of the monitoring wells would be finalized during the Remedial Design. Groundwater monitoring of the water table would provide information to assess the effectiveness of this alternative. Because this alternative is designed to only contain the migration of contaminants, future use of the onsite water table would not be possible (because the source is not removed).

The technologies and process options associated with groundwater extraction, treatment, and discharge are demonstrated and commercially available. The proposed treatment scheme is capable of reducing contaminant levels to drinking water standards eventually. Operation and maintenance of the pumping system and treatment plant would be required for as long as the waste remains on site and background ground water levels are exceeded. An state permit not be required for discharging the treated groundwater since it would be injected onsite, but permit levels must be met.

Alternative GO3: Collection, Physical/Chemical Treatment, and Onsite Injection of Ground Water Generated During Excavation

Estimated Construction Cost	$2,627,000
Annual O&M Costs	$817,000
Present Worth	$5,321,000
Estimated Time to Complete	36 months maximum, depending on which solid waste alternative is chosen

This alternative would only be implemented if the source of contamination is excavated (see Alternatives S5 through S12). Because the source would be removed, remediation of the water table would be a permanent solution. Groundwater would be collected during excavation using extraction wells (most likely well points), trenches, or subsurface drains. The contaminated water would be pumped to an onsite treatment plant consisting of both physical and chemical processes for treating the water to drinking water standards. Treated groundwater would be injected into the mine void, since there are no other available discharge points and to maintain the hydrostatic pressure in the mine pool . The effluent would need to be monitored periodically to ensure that the treatment process was operating effectively. The technologies and process options associated with the treatment and disposal of the water table are demonstrated and commercially available. Treatment/disposal of the fill material is expected to take anywhere from 1 to 3 years, depending on the alternative selected for excavation and treatment/disposal of the solid waste. For example, excavation and onsite disposal (Alternative S5) would take approximately 2 years as opposed to excavation and soil washing (Alternative S9), which would take about 3 years. Consequently, the treatment plant would operate concurrent with the excavation activities. Once the source was completely removed the treatment of groundwater can be discontinued soon afterward.

This alternative should be effective in reducing contaminant levels to drinking water standards (MCLs) and eventually to background levels. Treatment will most likely be conducted in batch quantities as opposed to a constant flow, since the collection of groundwater would be performed concurrent with the excavation of solid waste. Monitoring of the effluent should be conducted to ensure that the treatment process is effective in reducing the level of contamination to acceptable levels. If the wastes are removed, long-term groundwater monitoring would not be required, however, since (1) the contaminated water table would be collected, permanently remediated, and discharged and (2) the source of contamination would be removed (and possibly treated) and disposed offsite. Therefore, additional flow of water across the remediated site area would not be in contact with the waste. If a secure landfill option is selected, monitoring wells in the onsite water table and Clarion formation would detect leaks into the shallow groundwater.

Treatment of the water table will consist of equalization, pH adjustment/chemical precipitation, clarification, sand filtration, and carbon adsorption. This treatment will be able to reduce organic and inorganic contaminants to acceptable levels. The water injected into the mine pool must comply with PADER discharge levels and federal requirements regarding class IV well injection. This includes frequency of sampling and concentration limits for discharges. Contaminant levels must be below MCLs prior to injection. Additionally, the NPDES standards (25 PA. Code Chapter 92) for treatment systems are relevant and appropriate. Treatment residues and sludges will be sent offsite to an appropriate treatment or disposal facility in compliance with state and federal regulations for disposal and transportation.

This alternative would comply with the EPA Groundwater Protection Strategy, since it will result in the complete treatment of the leachate in contact with the fill. Since significant contamination has not been detected in the overburden wells outside of the fill area, collection and treatment of the leachate and the containment of the excavated fill will protect the class II overburden aquifer adjacent to the fill. As previously stated, this aquifer is not currently used, but could be used in the future.

CLARION FORMATION EXCLUDING THE MINE POOL (OPERABLE UNIT 4)

Alternative GC1: No Action

Estimated Construction Cost $33,500
Annual O&M Costs $12,000
Present Worth $277,000
Estimated Time to Complete 1 month

The no action alternative is considered in the FS to provide a baseline to which other remedial alternatives can be compared. Groundwater monitoring would consist of sampling three wells biannually until the first five year review under CERCLA Section 121(c) and annually afterward. The wells would be placed at the boundary of the plume and the samples would be analyzed for TCL organics and TAL inorganics.

The no action alternative would not prevent future potential risks associated with the consumption of contaminated groundwater. Additionally, it would not prevent the migration of contaminants in the Clarion Formation. Monitoring of the Clarion Formation would act as a detection method to determine whether the concentration of soluble contaminants in groundwater were increasing and migrating over time. If the migration was such that downgradient wells would be impacted, then it might be necessary to implement preventive measures.

The no action alternative could be easily implemented.
In the event that residential wells are installed in the area of concern, this alternative would not meet those requirements for drinking water standards, since the level of vinyl chloride in

the groundwater exceeds the MCL of 2 $\mu g/l$. Because the Clarion Formation is considered a Class IIA aquifer, this alternative does not meet the policy of the EPA Groundwater Protection Strategy or Pennsylvania clean up levels for ground water.

Alternative GC2: Containment of the Contaminant Plume By Pumping, Physical Treatment, and Injection of Ground Water

Estimated Construction Cost $603,000
Annual O&M Costs $87,000
Present Worth approximately $1,992,000
Estimated Time to Complete 30 years or more

This alternative would consist of methods that would contain the contaminant plume at its current location and prevent further horizontal migration. Extraction wells would be employed to prevent groundwater migration. It is estimated that three wells, pumping at a rate approximating groundwater recharge in the affected area (36 gpm), would be required. These wells would be positioned near the boundary of the site. The number of wells, their position and pumping rates will be finalized during the Remedial Design.

The Pennsylvania ARAR for groundwater for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is found in other legal authorities. The contaminated groundwater would be treated on site using an air stripper to treat the contaminated plume to acceptable levels. The groundwater would be pumped and treated until the following cleanup levels are obtained (a Pennsylvania ARAR) as measured by the monitoring wells and the influent to the air stripper:

TCE - 0.2 ug/l
Vinyl Chloride - 0.2 ug/l
cis - 1,2 Dichloroethylene - 0.2 ug/l
Benzene - 0.2 ug/l

The point of compliance is throughout the contaminated plume.

In addition to the specific goals listed above, if any other compound exceeds its MCL or non-zero MCLG, the remedy must continue.

After these levels are attained, testing must be conducted annually for three years to detect groundwater rebound.

Following treatment, the water would be injected into the deep mine pool. This would help maintain the hydrostatic equilibrium in the Clarion formation to prevent subsidence. Because the mine pool covers over 1 square mile in area and the effluent discharge would be approximately 36 gpm, no significant change in water level is expected to occur in the mine pool. No other impacts to the deep mine are anticipated.

The water injected into the mine pool must comply with PADER Clean Streams Law regarding discharge levels and federal requirements regarding class IV well injection. This includes frequency of sampling and concentration limits for discharges. Contaminant levels must be at least below MCLs. Additionally, the NPDES standards (PA. Code Chapter 92) for treatment systems are relevant and appropriate.

Groundwater monitoring would consist of sampling three wells biannually until the first five year review and annually afterward. The wells would be placed at the boundary of the plume and in the area of highest contamination. The exact locations would be finalized during the Remedial Design. The samples would be analyzed for TCL organics and TAL inorganics.

This alternative should be effective in preventing further offsite migration in the Clarion Formation. Air stripping is expected to be effective in treating the vinyl chloride that is present in the Clarion Formation (6 μg/l maximum). Because this alternative is designed only to contain the migration of contaminants, future use of the Clarion Formation near the site would not be possible. The State of Pennsylvania has required the use of "Best Available Technology" to prevent the release of volatile organic hydrocarbons to the air. The rate of emission of vinyl chloride is expected to be extremely low (one millionth of a pound per hour). The most cost effective method to capture this emission would be evaluated during the design of the remedial action.

The technologies and process options associated with groundwater extraction, treatment, and discharge are demonstrated and commercially available. The proposed treatment scheme is capable of reducing contaminant levels to drinking water standards. Operation and maintenance of the pumping system and treatment plant would be required for as long as the waste remains onsite and continues to leach contaminants (this alternative is only employed to "contain" the plume). Additionally, an permit would not be required for discharging the treated groundwater since the water would be discharged within the site boundary. The contaminant levels in the discharged water would meet state requirements and federal standards for a class IV injection well.

Because this alternative is not a permanent solution, it does not meet the EPA Groundwater Protection Strategy for a Class IIA aquifer. Additionally, if someone were to construct a well within the zone of contamination, drinking water standards (i.e., MCLs) would be exceeded for vinyl chloride.

Alternative GC3: Extraction, Physical Treatment, Injection of Ground Water Collected during Excavation

Estimated Construction Cost $603,000
Annual O&M Costs $87,000
Present Worth approximately $2,500,000
Estimated Time to Complete 30 years or more

This alternative would only be achievable if the source (solid waste) of contamination is effectively removed or isolated from the water table. Because the source would be effectively contained remediation of the Clarion Formation would be a permanent solution.

Groundwater would be extracted using several wells within the plume. The contaminated groundwater would be treated onsite using an air stripper to treat the contaminant plume to acceptable levels (at least non zero MCLs) before discharge to the mine pool in the Clarion formation. The Pennsylvania ARAR for groundwater for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is found in other legal authorities. This remedy must continue until the following cleanup levels are obtained as measured in the monitoring wells and the influent to the air stripper:

TCE - 0.2 ug/l
Vinyl Chloride - 0.2 ug/l
cis - 1,2 Dichloroethylene - 0.2 ug/l

The point of compliance is throughout the contaminated plume.

In addition to the specific goals listed above, if any other compound exceeds its MCL or non-zero MCLG, the remedy must continue.

When these levels are obtained, annual testing for three years is required to detect groundwater contaminant rebound.

Groundwater monitoring would consist of sampling three wells quarterly during the first year, then biannually until the first five year review and annually afterward. The wells would be placed at the boundary of the plume and in the area of highest concentration. The exact placement of the monitoring wells will be determined during the Remedial Design. The samples would be analyzed for TCL organics and TAL inorganics.

Following treatment, the water will be injected into the deep mine pool. This will help maintain the hydrostatic equilibrium in the Clarion formation to prevent subsidence. Because the mine pool covers over 1 square mile in area and the effluent discharge would be approximately 92 gpm, no significant change in water level is expected to occur in the mine pool.

The water injected into the mine pool must comply with the PADER Clean Streams Law regarding discharge limits and federal requirements regarding class IV well injection. This includes frequency of sampling and concentration limits for discharges. Contaminant levels must be below MCLs prior to injection. Additionally, the NPDES standards for treatment systems are relevant and appropriate.

The State of Pennsylvania has required the use of "Best Available Technology" to prevent the release of volatile organic hydrocarbons to the air. The rate of emission of vinyl chloride is expected to be extremely low (less than one millionth of a pound per hour). The most cost effective method to capture this emission will be evaluated during the design of the remedial action.

This alternative should be effective in remediating the groundwater contamination in the Clarion Formation. Air stripping is expected to be effective in treating the vinyl chloride that is present in the Clarion Formation (47 µg/l maximum - mine pool). The technologies and process options associated with groundwater extraction, treatment, and discharge are demonstrated and commercially available. The proposed treatment scheme is capable of reducing contaminant levels to below drinking water standards. Operation and maintenance of the pumping system and treatment plant would be required. An permit will not be required for discharging the treated groundwater into the mine void, since the discharge point will be onsite. The discharged water will meet state standards and federal requirements for class IV injection wells.

This alternative is a permanent solution and therefore meets the EPA Groundwater Protection Strategy for a Class IIa aquifer.

<u>SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES</u>

The alternatives assembled for each of the five operable units were evaluated based on the following nine criteria:

- Overall protection of human health and the environment.
- Compliance with all Federal and state applicable or relevant and appropriate requirements (ARARs).
- Reduction of toxicity, mobility, or volume.
- Short-term effectiveness.
- Long-term effectiveness.
- Implementability.
- Cost.
- Community acceptance.
- State acceptance.

Table 1 describes the above criteria and a summary of the relative performance of the alternatives with respect to each of the nine criteria follows:

TABLE 1

GLOSSARY OF EVALUATION CRITERIA
OSBORNE LANDFILL SITE

- Overall Protection of Human Health and Environment addresses whether or not a remedy will: cleanup a site to within the risk range; result in any unacceptable impacts; control the inherent hazards (e.g., toxicity and mobility) associated with a site or operable unit; and minimize the short-term impacts associated with cleaning up the site.

- Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other environmental statutes and/or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies that may be employed in a remedy.

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

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

- Cost includes capital and operation and maintenance costs.

- State Acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

- Community Acceptance will be assessed in the Record of Decision following a review of the public comments received on the RI/FS report and the Proposed Plan.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Solid Waste (Operable Unit 1)

Alternative S6 (offsite disposal) provides the greatest protection to the public health and the environment at the site because all of the contaminated fill material would be excavated and taken offsite to a licensed hazardous waste disposal facility. Alternatives S7(onsite incineration/disposal), S9(soil washing/onsite disposal), and S11(thermal stripping, solidification and onsite disposal) would offer a very high level of protection also, since the wastes are treated to reduce the mobility and toxicity of the wastes with the final disposal of the treated fill material in an onsite RCRA landfill. S5(excavation and disposal in an onsite subtitle C RCRA landfill) provides more than adequate protection from the low toxicity fill material. With proper construction and maintenance of the landfill, the threat of contaminant migration to the underlying flow systems should be eliminated. Additionally, direct contact with the waste would be eliminated by implementing these alternatives since the wastes would be covered.

Alternative S12(slurry wall containment) also provides adequate protection from the high volume relatively low toxicity fill material. Alternative S12 will also eliminate any direct contact with the solid waste since the waste will be capped. This alternative leaves the waste in place (i.e., below the water table) but substantially reduces or eliminates the migration of contaminants by constructing an underground barrier around the entire site. Additionally, groundwater pumping of the onsite water table will create a lower pressure inside the containment than in the outside aquifer. Therefore, any leakage will be into the containment, virtually eliminating any migration from the containment to the adjacent aquifers. Most of the water initially in the containment would be removed and treated and the additional pumping and treatment of the groundwater will gradually lower the toxicity of the fill. This alternative is protective of human health and the environment considering the relatively low toxicity of the wastes.

Alternatives S2(soil cover), S3(clay cap), and S4(multimedia cap) would result in the elimination of any direct contact with the solid waste and would prevent migration of contaminants to the wetland area, as with the other alternatives. However, migration of contaminants from the disposal area to the underlying flow systems would continue because no barrier would be constructed. Containing the migration of contaminants to adjacent flow systems would be possible by groundwater pumping (discussed later), which would prevent the onsite water table from migrating either horizontally or vertically.

Alternative S1(no action) would result in no action at the site and the risks to human health and the environment would remain unchanged. This alternative is not protective of human health and the environment.

Onsite Water Table (Operable Unit 3)

Alternative GO3(treatment of ground water collected during excavation) provides the greatest protection to the public health and environment since it results in the total remediation of the onsite water table. Alternative GO3 can only be implemented if the wastes are excavated or contained since over one-half of the waste is below the water table (e.g., wastes will have to be removed or isolated from the water table in order to prevent contaminant leaching).

The S12(slurry wall containment) alternative will address the onsite water table as an integral part of the alternative. This remedy is protective of human health and the environment since most of the onsite water table will be removed and treated during the first year of implementation of this remedy. The thirty years of pump and treatment of ground water that leaks into the containment will gradually reduce the remaining fill contaminants and prevent seepage from the onsite water table to the adjacent aquifers.

Alternative GO2(plume containment by pump and treatment) provides protection to the public health and environment by containing the flow system from migrating vertically or horizontally. This alternative, however, would not result in the complete restoration of the Class IIB flow system since it could only be employed with alternatives that leave the waste in place (i.e., Alternatives S2(soil cover), S3(clay cap), and S4(multimedia cap)).

Alternative GO1(no action) does not provide adequate protection to the public health and environment since no action (other than groundwater monitoring) is performed. Under a no action alternative, contaminants could potentially migrate from the onsite water table to the Homewood and/or Clarion Formations.

Clarion Formation (Operable Unit 4)

Alternative GC3 (extraction and treatment of contaminated ground water) provides the greatest protection to the public health and environment because it will result in the complete restoration of the formation (the solid waste is removed or contained and the onsite water table is remediated). Alternative GC2 (plume containment-pump and treat) provides limited protection to the public health since it will contain the plume from migrating further offsite. Alternative GC2 would not restore the formation since it would only be selected with an alternative that leaves the waste in place. Thus, the waste would continue to leach to the underlying flow systems.

Alternative GC1(no action) provides no additional protection to the public health and environment since no action is performed. Risks to the public health and the environment would remain the same. This alternative is not protective of public health since vinyl chloride levels are above MCLs.

COMPLIANCE WITH ARARs

Solid Waste (Operable Unit 1)

All alternatives, with the exception of the no action alternative (Alternative S1 - no action), would meet risk-based action levels since the waste would either be capped or landfilled, and the exposure pathway would be subsequently eliminated. Additionally, TSCA guidance for allowable levels at a site with restricted site access would be met for all alternatives since the average concentration of PCB at the site is less than 25 mg/kg. TSCA guidance for a site with unrestricted site access (10 mg/kg) would only be met by Alternatives S6 and S7. The State's background cleanup level for ground water is an applicable ARAR, but the PCB's are immobile and have not been detected in the aquifers at the site. Additionally, EPA's Vertical/Horizontal spreading model predicts that the level of contamination in the fill presents a risk to the offsite Homewood aquifer at the facility boundary less than 10-6. The risk levels in the facility are high enough; however, to require corrective action.

Design of the landfill under Alternatives S5(onsite disposal), S7(incineration/onsite disposal), S9(soil washing/onsite disposal), and S11(stripping/solidification/onsite disposal) would substantially meet the RCRA and PADER requirements for landfilling hazardous wastes although the fill material is not hazardous by definition.

Alternative S12(slurry wall) includes a cap that meets PADER requirements for municipal landfill closure. Alternative S4(multimedia cap) would also meet these requirements that have been identified by the state as an ARAR. Alternative S2 would not meet this requirement.

Landfill closure where wastes are left in place requires a RCRA multimedia cap and ground water monitoring for thirty years. Capping Alternatives S2(soil cover), S3(clay cap) and S12(slurry wall/clay cap) do not meet RCRA requirements for closure of hazardous waste landfills. However, the primary purpose of these alternatives, at this site, is primarily to prevent dermal contact with the fill and not to prevent infiltration. Ground water flows laterally through the fill so that leaching would still occur with a cap in place. The PADER requirements for a cap are primarily designed to prevent infiltration and leaching of wastes that are capped. Since, the purpose is different, and the wastes are not RCRA hazardous wastes, this requirement is not an applicable ARAR and is not relevant and appropriate. Alternative S4(multimedia cap) does meet the site closure requirements for capping RCRA wastes.

Onsite Water Table (Operable Unit 3)

The Onsite water table would be removed and treated during the implementation of the slurry wall alternative, but is considered as an integral part of S12 and was not evaluated separately under this operable unit. The slurry wall alternative will remediate the ground water inside the containment as an integral part of the Remedial Action. The pump and treatment of ground water inside the containment will continue until the ground water meets EPA's ground water protection standards for a Class IIb aquifer and the state of Pennsylvania's ground water cleanup standard (background).

Alternative GO3 will result in the reduction of groundwater contaminants to Federal and State standards. Alternative GO2 could not meet these ARARs since this alternative does not involve total remediation of the flow system, but rather containment of the plume. Alternative GO3 will also meet the intent of the EPA Groundwater Protection Strategy for a Class IIb aquifer.

If GO2 or GO3 is implemented, the treated water will be injected into the mine pool. This will meet the requirements of a Class IV injection well under the Safe Drinking Water Act. The level of contaminants will meet PADER and EPA requirements.

Clarion Formation (Operable Unit 4)

Alternative GC3 will result in the reduction of groundwater contaminants to Federal and State drinking water standards. Alternative GC3 will also meet the intent of the EPA Groundwater Protection Strategy for a Class IIA aquifer. Alternative GC2 could not meet these ARARs since this alternative does not involve total remediation, but rather containment of site contaminants.

If GC2 or GC3 is implemented, the treated water will be injected into the mine pool. This will meet the requirements of a Class IV injection well under the Safe Drinking Water Act. The air stream from the stripper will use "Best Available Technology" to reduce emissions from the stripper.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME
THROUGH TREATMENT

Solid Waste (Operable Unit 1)

Alternatives that propose treating the solid waste (Alternatives S7-incineration, S9-soil washing and S11-solidification) would result in some degree of toxicity reduction.

Alternative S7 provides the greatest degree of toxicity reduction since incinerating the solid waste could potentially remove over 99 percent of the organic contaminant level of toxicity, but would not destroy the metal and inorganics present. The principal threats at the site are PCBs, and halogenated hydrocarbons. The volume of waste would not be reduced and the mobility of the metals would not be reduced.

Soil washing pilot studies only reduced PCB levels by about sixty percent and produced large volumes of contaminated water increasing the volume of waste that would need to be treated. The mobility of the remaining contaminants would be the same and the volume of solid waste would not be reduced.

The solidification alternative S11 is not very effective for organics and would require pilot or field tests for the large volume of heterogeneous material present. The volume of waste would increase but the mobility of the hazardous constituents would be reduced. Pilot tests or field tests would be needed to determine the effectiveness of this alternative.

S12 - The slurry wall pump and treat alternative has a component of soil washing since the water in contact with the fill will be removed and treated and since water will slowly seep into the containment, absorb contaminants in the fill and will be subsequently removed and treated. The speed of treatment, however, is very slow and the primary goal of this alternative is containment, not treatment.

The other alternatives do not involve treatment.

<u>Onsite Water Table (Operable Unit 3)</u>

Alternative GO3 (collection and treatment) will result in a reduction of toxicity, volume, and mobility of the groundwater contaminants by physical and chemical treatment. Alternative GO2 (plume containment) would result in some contaminant reduction, but would not be capable of complete reduction since this alternative would be employed if the solid waste is left in place (below the water table). Alternative GO2 would reduce the transport of the contaminants through containment wells and would treat the contaminants captured, but the volume of groundwater contamination would essentially remain the same.

<u>Clarion Formation (Operable Unit 4)</u>

Alternative GC3 (extraction and treatment) will result in a reduction of toxicity, volume, and mobility of the groundwater contaminants. Alternative GC2 (plume containment) would result in some contaminant reduction, but would not be capable of complete reduction since this alternative would be employed if the solid waste is left in place (below the water table). Alternative GC2 would reduce the transport of the contaminants through containment wells and would treat the contaminant captured, but the volume of groundwater contamination would essentially remain the same.

SHORT-TERM EFFECTIVENESS

Solid Waste (Operable Unit 1)

Potential risks to the local residents and to the onsite workers include exposure to site particulates generated during the construction activities. Alternatives that result in the waste remaining in place provide less of a short term risk than those alternatives that result in excavating the solid waste. Excavation of the solid waste could potentially result in the generation of more particulates. However, engineering measures to reduce the amount of dusts generated during remedial activities can be easily employed. Air monitoring will also be employed during remedial action regardless of the alternative selected (except the no action alternative).

Construction workers will be required to wear proper dermal protection during site activities. Respiratory protection may also be required for those alternatives that involve excavating the solid waste.

Alternatives that leave the waste in place can generally be completed in less time than those alternatives that involve excavation and treatment of the wastes. Some damage to the local roadway (East Pine Street Extension) will probably result with any of the alternatives (except no action) because of heavy vehicular traffic.

The waterfowl observed in the wetland pond may or may not be effected by the onsite activities. Although no construction activity will directly involve workers or construction equipment in the wetland area, the nearby activity itself (noise, movement, etc.) may cause the waterfowl to temporarily find another habitat. On the other hand, in some cases construction activities have caused no impact to wetland habitat during construction. Specific measures to prevent impacts on the wetlands will be developed during Remedial Design.

Onsite Water Table (Operable Unit 3),
Clarion Formation (Operable Unit 4)

These operable units were combined for this evaluation criterion since the short-term effectiveness of the proposed alternatives do not differ much between each operable unit. Regardless of the alternative employed, there should be no unacceptable risk to the local residents, based on the level of contamination detected to date. Risks to the onsite workers would include direct contact with groundwater during installation of monitoring, extraction, of containment wells, and sampling of monitoring wells and treated effluents. Proper selection of protective clothing should eliminate or reduce exposure to contaminated groundwater. A health and safety plan will be prepared to identify potential contaminants as well as construction risks associated with the groundwater remedial alternatives. The health and safety plan will also identify the required protective clothing for the various remedial activities. Alternatives that employ an air stripper would employ "Best Available Technology" to capture contaminants leaving the stripper in the air stream.

LONG-TERM EFFECTIVENESS

Solid Waste (Operable Unit 1)

Alternative S6 provides the greatest amount of long-term effectiveness, since the waste would be completely removed from the site and potential contamination of the underlying flow systems would no longer be a problem. Alternatives S7 and S11 would also provide long-term effectiveness since the level of organic contamination would be significantly reduced and the treated waste would be secured in an onsite landfill. Alternatives that employ landfilling of the treated or untreated waste (S5, S7, S9 and S11) would provide long-term effectiveness if the landfill is properly designed, constructed and maintained. Maintenance of the onsite landfill would be required, but this should be minimal.

Containment alternatives (S2-Soil Cover, S3-Clay Cap, S4-Multimedia Cap, and S12-Slurry Wall/Clay Cap) would provide a good degree of long-term effectiveness with proper construction and maintenance, to prevent dermal contact with the fill. The long-term effectiveness of containment option S12 is not much different from the long-term effectiveness of the landfill option. The landfill construction is designed to last for 30 years and provides positive containment of wastes, but is subject to liner failure if subsidence occurs. It would be difficult and expensive to repair this problem if it occurs. Successful installation of a slurry wall containment is more difficult to verify but can be maintained or repaired by grouting if defects are detected. The construction methods that will be employed by the slurry wall installation will reinforce the supporting structures in the adjacent mine making subsidence problems much less likely. The pump and treatment of the water in the slurry wall containment will prevent leaching as long a the pumping continues.

However, alternatives that involve only capping the waste are less reliable with respect to the migration of wastes from the solid waste to the underlying flow systems, since about half of the fill is in the water table.

Containment options must employ a groundwater containment option to prevent migration of contaminants from the water table to the adjacent flow systems. The long-term effectiveness is a function of the maintenance of these systems. Alternative S12, proposed employs groundwater containment to prevent offsite migration of contaminants. Additionally, Alternative S12 includes a subsurface barrier (slurry wall) to reduce the migration of contaminants offsite.

With the exception of Alternative S6 (Offsite Disposal), groundwater monitoring would be employed to evaluate the effectiveness of the solid waste alternatives. The monitoring wells would be installed in the water table, Clarion Formation, and Homewood Formation.

Onsite Water Table (Operable Unit 3), Clarion Formation (Operable Unit 4)

Two operable units have been combined for this evaluation criterion since the long-term effectiveness of the proposed alternatives do not differ much between each operable unit. Groundwater alternatives that result in total remediation of the flow system (GO3 and GC3-extraction and treatment) provide the greatest degree of long-term effectiveness. Following the implementation of these alternatives (and the removal of waste from the water table), the flow systems could be used as a source of potable water. The treatment scheme proposed for the onsite water table and Clarion flow systems would be effective in reducing contaminants to acceptable drinking water standards. Groundwater monitoring would be required to ensure that the treatment is effective.

Groundwater containment alternatives (GO2 and GC2) provide long-term effectiveness to some degree because they would prevent further migration of the plume. However, they must be operated indefinitely. The long-term effectiveness of these alternatives is dependent on maintaining the containment wells and treatment plant.

IMPLEMENTABILITY

Solid Waste (Operable Unit 1)

Implementation of Alternative S1 would be the easiest since it only requires repairing the site fence and posting warning signs along the fence and other institutional controls. Capping Alternatives S2, S3, and S4 are about equal with respect to their implementability. These alternatives should not be difficult to implement at the site since they only require regrading and capping. Alternative S12, which also employs containment, will be somewhat more difficult to implement effectively because of the construction of the slurry wall around the site. The major difficulty anticipated with the installation of the slurry wall will be along the eastern boundary of the site, where the slurry wall will have to be constructed through 40 feet of shale and sandstone next to a large mine pool. EPA convened a panel of slurry wall experts to evaluate the implementability of this alternative. Although the installation will require extensive measures to isolate the mine pool, the panel believes that this alternative is implementable.

Alternatives which involve excavation of the solid waste (S5, S6, S7, S9, and S11) would be difficult to implement.

Although these alternatives may be more difficult compared to the simple containment alternatives, they can be implemented using standard construction methods. The lowering of the water table during excavation and the sealing of the deep mine would be the most difficult tasks. The latter can be performed since dewatering is a common practice in excavation practices. Sealing of the flooded deep mine is also implementable and has been done at other construction projects involving flooded deep mines. Storage of fill during construction would pose some problems that can be overcome by the proper engineering methods.

Alternatives S6, S9 and S11 may be the most difficult to implement because they involve treatment of the waste prior to placing the treated waste in an onsite landfill. Incineration (employed in S6), soil washing (employed in Alternative S9) and solidification (employed in Alternative S11) would be the most difficulty since they require considerable handling of the heterogeneous fill material. This fill is composed of foundry sand "boulders", iron bars, wood, wire, miscellaneous scrap and fine foundry sand. The foundry sand varied in composition from soil consistency to boulder several feet in diameter. These "boulder would have to be broken up by some method before treatment. Substantial quantities of metal and trash would need to be separated from the sand and soils and cleaned. This material could not be treated and would probably be disposed of onsite. Small pieces of debris left in the fill could pose processing problems to whatever treatment process was selected. The limited site area would also impact the implementability of these two alternatives since a considerable area would be needed for the separation operations concurrent with draining the excavated fill.

Onsite Water Table (Operable Unit 3)

Alternative GO2 can be easily implemented. The technologies proposed for treating the contaminated water table are commercially available and proven. Alternative GO3 will be more difficult to implement since it involves lowering the water table (and onsite ponds) during the excavation activities. The treatment portion of this alternative is identical to Alternative GO2, and therefore can be easily implemented. Lowering the groundwater will be implemented by using a combination of subsurface drains, well points, and trenches. These technologies, however, will be effective and have been proven.

Clarion Formation (Operable Unit 4)

Alternative GC2 involves the following: containment of the plume via pumping wells; the treatment of contaminated groundwater via air stripping; and injection of treated groundwater to the deep mine. Technologies proposed for these two alternatives are demonstrated and commercially available. Discharging the treated groundwater into the flooded deep mine should not present a problem due to the size of deep mine, which is approximately

1 square mile in total area. Therefore, this alternative should not be difficult to implement.

Alternative GC3 should also be easy to implement. The only difference between this alternative and the "containment" alternative (GC2) is the rate of pumping and the fact that GC2 is associated with leaving the fill in place and GC3 is associated with alternatives that remove or isolate the fill from the water table

All of the alternatives proposed for these two operable units are implementable.

COST

Solid Waste (Operable Unit 1)

Table 2 summarizes the capital, annual, and present worth costs for each of the alternatives. The present worth costs for the capping alternatives (Alternatives S2, S3, and S4) range from approximately 1.3 million to 2.5 million dollars. The Slurry Wall Alternative S12 is considered a containment alternative. The present worth cost estimate for this alternative is 17 million dollars. The cost estimate for Alternative S12 also includes the cost to remediate the onsite water table whereas the other containment alternatives only consider the solid waste operable unit. The capping alternatives were generally lower in cost when compared to the onsite disposal alternative (Alternative S5, 10.8 million dollars) and much less expensive than those alternatives that involve treatment as a component.

The present worth costs for the treatment alternatives ranged from approximately 54 million to 87 million. The high cost of the treatment alternatives which is based on the large volume of material for which treatment is required(approximately 233,000 cubic yards).

The most expensive alternative is Alternative S6 (offsite disposal) at over $100 million. This cost is high because the solid waste would be transported to a licensed hazardous waste landfill in New York. The cost of landfilling waste at such a facility is approximately $200 per ton of material. This cost could escalate drastically if a large number of intact drums were encountered. The transportation cost is also responsible for the high cost of this alternative.

Onsite Water Table (Operable Unit 3)

Alternative GO3 has an estimated present worth cost of approximately 5.3 million dollars. Although the capital and annual operating costs for Alternatives GO2 and GO3 are the same, Alternative GO2 has a higher Present Worth cost because the duration of the remedial action for Alternative GO2 is 30 years. Alternative GO3 can be completed in approximately 3 years, which makes it less expensive.

TABLE 2

SUMMARY OF ALTERNATIVES AND COSTS
OSBORNE LANDFILL SITE
GROVE CITY, PENNSYLVANIA

Alternative Number and Description(1)	Capital Cost ($)	Annual Cost ($)	Present Worth Cost ($)
S1 - No Action	0	0	41,000
S2 - Soil Cover	849,000	30,000*	1,367,000
S3 - Clay Cap	1,926,000	32,000*	2,468,000
S4 - Multimedia Cap	1,741,000	32,000*	2,282,000
S5 - Onsite Disposal	10,418,000	36,000*	10,785,000
S6 - Offsite Disposal	107,343,000	0	104,770,000
S7 - Onsite Incineration	55,937,000	36,000*	54,022,000
S9 - Soil Washing	62,140,000	36,000*	59,859,000
S11 - Solidification	91,000,000	36,000*	87,392,000
S12 - Clay Cap/Slurry Wall/Groundwater pump and treat	$6,758,000	$670,000*	$16,976,000
W1 - No Action	0	0*	56,000
W2 - Onsite Disposal	342,000	0	342,000
W3 - Offsite Disposal	1,159,000	0	1,159,000
GO1 - No Action	28,000	12,000*	71,000
GO2 - Containment/ Treatment	2,627,000	817,000	17,894,000
GO3 - Collection/ Treatment	2,627,000	817,000	5,321,000
GC1 - No Action	33,500	12,000*	277,000
GC2 - Containment/ Treatment	603,000	87,000*	1,992,000
GC3 - Extraction/ Treatment	603,000	87,000	1,705,000

* An additional $20,000 to years 5, 10, 15, 20, 25, and 30 to perform a 5-year review of the alternative (per requirements of SARA) is not reflected in the annual costs. Present worth costs, however, take into account this cost.

Clarion Formation (Operable Unit 4)

The no action alternative is the least expensive remedial action to implement because it only involves groundwater monitoring. As shown on Table 2, Alternative GC3 has a slightly lower Present Worth cost than Alternative GC2. The reason for this has to do with the total duration of the project. Alternative GC2 would be operating for 30 years compared to only 20 years (or less) for Alternative GC3.

COMMUNITY ACCEPTANCE

The majority of comments received by EPA at the public meeting and during the comment period strongly favored the slurry wall alternative (S12). The community is very concerned about the financial impact of the remedy identified in the Proposed Plan (S5-RCRA landfill) as stated in the proposed plan, on Cooper Industries, a party who will be responsible for performing or financing the remedy. This company is one of the largest employers in the area. Residents adjacent to the site also favored the slurry wall remedy because it would involve much less excavation and the resulting potential exposure to wastes that accompanies an excavation remedy.

STATE ACCEPTANCE

The State's comments were limited to the slurry wall remedy S12, the RCRA landfill, the contamination of the aquifers and the pump and treat remedial actions. The state's comments on the Proposed Plan, dated October 12, 1989, expressed concerns about the contamination of the deep aquifers. EPA's Groundwater Verification Study will address those concerns in a separate ROD that will be issued after a focused RI/FS has been completed. The letter also expressed a major concern about the lack of treatment of the fill material if the landfill or the slurry wall alternative was implemented. EPA's Interim Final ROD guidance (June 1989 - OSWER Directive 9355.3-02) indicates that containment remedies are appropriate for large sites that have contamination marginally above health based limits or large sites with widely dispersed contaminants mixed with debris. The Osborne landfill has both of these characteristics. The state was concerned about technical problems related to implementation of the RCRA landfill including subsidence, discharge to the mine pool, disposal of drums of concentrated wastes and the permanence of the alternative. This ROD addresses the State's major concerns listed in their letter.
The State also sent EPA a letter, dated December 7, 1989, that identified State ARARs. This letter listed technical requirements for the landfill alternative and requested more detailed study and state review of issues such as subsidence discussed in the state's previous letter to EPA. EPA has addressed these concerns in the ARARS section of this ROD and in the modified description of each affected alternative. One new condition for instance, is a limitation on mining within 1/2 mile

of the site. The State also requested that "Best Available Technology" be utilized on any air strippers. EPA will comply with this ARAR. The State also identified ground water to background levels as an ARAR. EPA considers cleanup of groundwater to background to be an applicable ARAR.

Since a long period of time passed since the Proposed Plan was issued, EPA requested an ARARs update from the State. The ARAR that was emphasized by the State was the cleanup of ground water to background level. The Pennsylvania ARAR for groundwater for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is found in other legal authorities.

The goal of this remedial action is to restore ground water to its beneficial use, which is, at this site, used as a drinking water source. Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, EPA believes that the selected remedy will achieve this goal. It may become apparent, during implementation or operation of the ground water extraction system and its modifications, that contaminant levels have ceased to decline and are remaining constant at levels higher that the remediation goal over some portion of the contaminated plume. In such a case the system performance standards and / or the remedy may be reevaluated.

The Commonwealth of Pennsylvania has reviewed the RI/FS and this ROD and concurs with the Selected Alternative.

<u>SELECTED REMEDY</u>

<u>Rationale for Selection of Remedy</u>

A slurry wall containment <u>(S12) or</u> a RCRA subtitle C landfill (S5) would satisfy the threshold criteria for Overall Protection of Human Health and the Environment because of the low to moderate risks posed by the fill. <u>EPA's Proposed Plan listed the RCRA landfill as the preferred alternative; however, EPA received comments from the public which strongly supported the slurry wall remedy.</u> Additionally, EPA convened a panel of slurry wall experts to review Alternative S12, and their review supported the selection of the slurry wall alternative and identified additional problems regarding successful installation of the landfill alternative (S5). This is discussed in more detail in the Description of Alternatives section above.

EPA has considered the modifying criteria of Community Acceptance, and the new technical information obtained during the slurry wall review to change its preference and select the slurry wall alternative. This is acceptable to the State of Pennsylvania <u>if</u> the landfill is included in the ROD as a

contingency remedy.

Five operable units have been identified at the Osborne Landfill Site in the Feasibility Study. These operable units (OU) include:

- The solid waste fill material (OU1)
- Wetland sediments (OU2)
- The onsite water table (OU3)
- The Clarion Formation (OU4)
- The Homewood Formation (OU5)

Remedial alternatives have been selected for the above operable units with the exception of the Wetlands Sediments(OU2) and Homewood Formation(OU5). Because the extent and degree of contamination in the Homewood Formation is not clearly defined, and it is a source of potable water in the local area, a Groundwater Verification Study (GVS) will be conducted subsequent to this Record of Decision (ROD). Two other flow systems, the Connoquenessing and Burgoon Formations, will also be investigated as part of the GVS since they are a source of water for the Grove City Borough Water Authority. These two flow systems exhibited low levels of vinyl chloride at or slightly below the Maximum Contaminant Level (MCL) of 2 ppb within the study area. The GVS will include re-sampling of selected existing monitoring and residential wells, the installation of one or more wells between the Osborne Landfill Site and the Water Authority's pumping wells and possibly strategically placed wells between the site and potential areas of development in the Homewood aquifer. The GVS will also require additional wells to define the vinyl chloride plume in the mine pool associated with the Clarion Formation. This is a potentially severe threat to public health at the site. After completion of the GVS which will serve as a focused RI/FS, EPA will issue a ROD for these operable units.

The selected remedial alternatives for the remaining operable units are:

- Operable Unit 1 (The Solid Waste Fill Material):

  Primary - Alternative S12 (Slurry Wall/Pump and Treat Onsite Water Table)

  Contingency - Alternative S5 (Excavation and Onsite Disposal)

- Operable Unit 3 (The Onsite Water Table):

  Primary - No additional action necessary

  Contingency - Alternative GO3 (Collection, Physical/Chemical Treatment, and Onsite Injection)

- Operable Unit 4 (The Clarion Formation):

Alternative GC3 (Extraction, Physical Treatment, and Onsite Injection)

Operable Unit 1 Solid Waste Fill Material

Primary Remedy
Slurry Wall/Pump and Treat Alternative

Alternative S12 - This alternative consists of construction of a slurry wall barrier around the perimeter of the fill and construction of a clay cap. At the bottom of this containment is a naturally occurring clay layer. Water will be pumped out until a negative pressure is obtained, effectively containing the fill contaminants and removing the threat to groundwater from leaching of the fill material contaminated with PCBs, VOCs, metals and PAHs.

The two foot thick clay cap will prevent dermal contact with PCB contaminated foundry sand. The purpose of the cap is not to prevent leaching through the waste but to prevent dermal contact and to limit the amount of water that must be removed and treated to maintain the proper negative containment pressure. Overland transport of foundry sand to the wetlands area will also be eliminated by the clay cap.

The major components of this alternative include:

- Runon controls (the intermittent influent stream will be diverted to a 3-acre offsite pond).
- Grouting and bulkheading techniques will be used to seal openings or cracks linking the fill to the mine pool.
- Construction of a slurry wall around the perimeter of the fill area and installation of a clay cap and revegetation.
- Installation and operation of extraction wells to lower the water table with treatment of the extracted water and subsequent injection into the onsite mine pool.
- Institutional controls
- Groundwater monitoring

Contingency Remedy
Alternative S5 (Excavation and Onsite Disposal)

This alternative would prevent human exposure to site contaminants because the solid waste would be excavated and secured in an onsite landfill. The design of the landfill would meet both the PADER and RCRA criteria for construction and site closure. Because the waste would no longer be in contact with the water table flow system, no further leaching or migration of site contaminants to the water table or other flow systems are expected to occur. Additionally, overland transport of contaminants to the adjacent wetland would be eliminated because the wastes would no longer be exposed to surface runoff. The major components of this alternative include:

- Elimination of onsite ponds via regrading.
- Runon controls (the intermittent influent stream would be diverted to the 3-acre offsite pond).
- Excavation of approximately 233,000 cubic yards of solid waste.
- Placement of solid waste in a RCRA Subtitle C onsite landfill.
- Regrading and revegetation of the site area.
- Institutional Controls.
- Long-term groundwater monitoring.

Operable Unit 3 - Onsite Water Table

Primary Remedy

No additional action is necessary since S12 (Slurry Wall/Clay Cap/Pump and Treat) will extract and treat most of the water in contact with the fill and will continue to treat the water that infiltrates the containment.

Contingency Remedy

Alternative GO3 (Collection, Physical/Chemical Treatment, and Onsite Injection)

This alternative would eliminate a source of contamination (the contaminated water table) because the site would have to be de-watered during the excavation of the solid waste (see Alternative S5). Dewatering of the site would be required to excavate the waste since over one-half of the waste is situated below the water table. By collecting, treating, and discharging the water table flow system, future potential migration of groundwater contaminants would be eliminated. Additionally, this alternative is a permanent remedy and would satisfy the Groundwater Protection Strategy for a Class IIB aquifer. Once the site is de-watered and the waste is placed in an onsite landfill, the water table would be allowed to retain equilibrium. Since the intent of this alternative is to construct the landfill above the natural water table, no contaminant leaching into this flow system would occur with proper maintenance and design/construction of the onsite landfill. The major components of this alternative include:

- Collection of the water table (or dewatering of the site) during excavation activities via well points, subsurface drains, and trenches.
- Isolation of the fill area from the onsite mine pools (the mine pools and the onsite water table are hydraulically connected).
- Groundwater treatment (solids removal via equalization, clarification, and sand filtration, and organics removal via carbon adsorption).
- Onsite discharge (injection) into a flooded deep mine to maintain the existing hydrostatic pressure in the mine.
- Groundwater monitoring.

<u>Operable Unit 4 - Clarion Aquifer excluding the deep mine pool</u>

Alternative GC3 (Extraction, Physical Treatment, and Onsite Injection) will reduce the level of contamination in the Clarion Formation and reduce human health risks associated with the future potential use of this flow system. (At the present time, no residential wells are impacted by contamination in this formation due to their location.) Because the source of contamination will be eliminated by implementing Alternative S12 , this alternative can be considered a permanent remedy upon cc·lete restoration of the Clarion Formation. This alternative wi.. also meet the objectives of the Groundwater Protection Strategy for a Class IIa aquifer. The major components of this alternative include:

- Construction of extraction wells in the Clarion Formation downgradient from the disposal area where the highest levels of contamination have been detected.
- Pumping of groundwater to an onsite treatment plant for treatment via air stripping and treatment of the air discharge with Best Available Technology.
- Injection of treated groundwater onsite to a flooded deep mine, which is part of the Clarion Formation.
- Groundwater monitoring to evaluate the effectiveness of this alternative.

If implementation of the selected remedy demonstrates, in corroboration with hydrogeological and chemical evidence that it will be technically impracticable to achieve and maintain the remediation goals throughout the area of attainment, the EPA, in consultation with the Commonwealth of Pennsylvania, intends to amend the ROD or issue an Explanation of Significant Differences to inform the Public of alternative groundwater goals.

STATUTORY DETERMINATION

Section 121 of SARA requires that the selected remedy:

- be protective of human health and the environment;
- attain ARARs (or explain rationale for invoking a waiver);
- be cost-effective;
- utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
- address whether the preference for treatment that reduces toxicity, mobility, or volume as a principal element is satisfied.

A description of how the selected remedies satisfy each of the above statutory requirements is provided below.

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative S12(Slurry Wall - Primary Alternative) will eliminate the known human health exposure pathways that exist at present. No unacceptable short-term risks to the community or onsite workers exist that could not be controlled by engineering practices during the remedial action. This alternative will virtually eliminate the ongoing leaching of contaminants from the fill material to the underlying flow systems, since a negative pressure will be maintained inside the slurry wall containment. EPA uses the Vertical and Horizontal Spreading (VHS) model to estimate how contamination concentrations decrease with distance from an area of contamination. The risks at the site are relatively low and the VHS model predicts, at the facility border, a less that 10-6 risk from ground water contaminated by the uncontained fill material. The VHS model cannot, however, consider the very complex hydrogeology at the site. The clay cap will prevent dermal contact with contaminated foundry sands.

Alternative S5 (RCRA landfill contingency alternative) would eliminate any human health exposure pathways that exist at present. No unacceptable short-term risks to the community or onsite workers exist that could not be controlled by engineering practices during the remedial action. Alternative S5 would also eliminate the ongoing leaching of contaminants from the fill material to the underlying flow systems, since the wastes would be excavated from the water table and secured in an onsite landfill.

Alternative GO3 (required by contingency alternative - landfill) would result in the complete restoration of the onsite water table. Although the onsite water table is not used as a source of potable water in the local area, it is hydrologically connected with the Clarion and Homewood Formations which are used by some residents in the local area. Once this flow system is remediated, the water table in the local area could potentially be used for other purposes such as irrigation. Also, the water table discharges to the wetland area, and implementation of Alternative GO3 will be protective of the environment.

Alternative GC3(extraction and treatment) will result in the complete restoration of the Clarion Formation, which is used in the local area by residents as a source of potable water. Although no residential wells in this formation have indicated contamination, future development of land near the site is probable. Several homes are under construction in the area. Therefore, this alternative is protective of public health for future potential scenarios. Additionally, remediation of the Clarion Formation via Alternative GC3 will prevent potential migration of contaminants to unaffected residential wells.

No unacceptable short-term risks or cross-media impacts will be caused by implementation of the remedy.

ATTAINMENT OF ARARs

RCRA Land Disposal Restriction - The Osborne Landfill accepted many different wastes during the long time period of its operation. The landfill closed in 1978, before the effective date of the RCRA regulatory program (November 19, 1980). Wastes disposed prior to such date are not regulated under RCRA unless they are excavated and subsequently treated, stored or disposed of. Since the slurry wall remedy will not involve any placement of wastes, the RCRA land ban requirements do not apply to the primary remedy, S12 - slurry wall containment.

The material placed in the landfill was primarily foundry sand that is not regulated as a subtitle C waste under RCRA. This material can be disposed of in a residual waste landfill in Pennsylvania. The material consists of primarily sand with a light coating of "soot like" polyaromatic hydrocarbons similar to those found in the asphalt used in roads and found in coal. The coating contains low levels of metals from the foundry operations. EPA considers this material to be "soil like". This material is also mixed with steel scrap wire and other debris. Many other industrial wastes were disposed of in the landfill by Cooper Industries. Although definitive proof of disposal of listed wastes has not been identified, it is possible that some of these "pre - RCRA" wastes would be considered listed wastes if more information were available. Undefined solvent wastes, acids, lubricating oils and plating wastes were all disposed of prior to the effective date of the RCRA. Current solvent contamination levels are very low and the volume of wastes very large (233,000 cu. yds). EPA does not consider the land ban applicable to the fill material.

The Agency is undertaking a rulemaking that will specifically apply to soil and debris. Since that rulemaking is not yet complete, EPA does not consider LDR to be relevant and appropriate at this site to the soil and debris (fill) that does not contain RCRA restricted wastes. This is discussed in detail in the following memo: "Land Disposal Restrictions as Relevant and Appropriate Requirements for CERCLA contaminated Soil and Debris.", from Henry L. Longest to Directors of Hazardous Waste Management Divisions, and dated June 5, 1989.

EPA also does not consider the Land Disposal Regulations to be relevant and appropriate for the treated ground water that will be injected into the deep mine pool. The basis for this decision is contained in Oswer Directive # 9334.1-06. This memo from Don R. Clay and dated Dec. 27, 1989 states that MCLs or risk based levels should govern treated ground water and that the RCRA Land Ban regulations are not relevant and appropriate for Remedial Actions under CERCLA.

<u>Operable Unit 1 - Fill Material</u>

<u>Primary Alternative</u> S12(Slurry Wall/Pump and Treat) will attain the following ARARs:

<u>ARARs identified by the Pennsylvania Department of Environmental Resources</u>

A. Chapter 269, Sections 269.13 and 269.41 - 269.50 of the Pennsylvania Hazardous Waste Management Regulations-Hazardous Waste Siting Criteria. Although the wastes at the site are not hazardous by definition, EPA considers the following specific regulations from this section to be relevant and appropriate: These criteria provide for DER review of pre-design and remedial design information to assess the probability and degree of possible subsidence. Additionally, removal of minerals providing structural support at the site is prohibited.

B. If containers of hazardous waste or excavated hazardous wastes are managed onsite, during construction activities, Chapter 264, Subchapters I and L would be applicable.

C. If any hazardous waste discovered or generated on-site and transported off-site for treatment, storage or disposal should be managed pursuant to Chapters 262(generators), 263(transporters), and 264(hazardous waste management facilities, if those facilities are located in the state) or if not, managed pursuant the regulations of the state receiving this waste. Waste excavated for offsite management should be identified as required in chapter 261, subchapter C or D as appropriate. This ARAR is applicable.

D. Section 273.29 of the DER Municipal Waste Regulations are applicable. This section relates to coal removal, mine discharges and subsidence.

E. Pennsylvania NPDES requirements (Chapter 92 of the Pennsylvania DER Rules and regulations; Toxics Management Strategy). These requirements regulate surface water discharges.

F. Chapter 127 of the Air Quality Regulations requires the use of Best Available Technology for control of new emissions sources.

G. The Pennsylvania Clean Streams Law, PA Code Title 25, and the Solid Waste Management Act, 25 PA Code 260, have been cited as the basis for cleanup levels to background levels for ground water. The Pennsylvania ARAR for groundwater for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 Pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is found in other legal authorities. EPA considers the cleanup level of ground water to be applicable at this site.

H. Chapter 105 of the Dam Safety and Waterway Management Rules and Regulations. This applies to stream relocation and any other stream encroachments during site remediation.

I. 25 PA Code, Chapter 89 of the PADER rules and regulations as it applies to subsidence and hydrogeologic balance.

<u>ARARs Identified by EPA</u>

- RCRA Subtitle C, Hazardous Waste Management Requirements, 25 PA Code 264, which govern the transportation, treatment, storage, and disposal of hazardous wastes (this is a relevant and appropriate ARAR since by definition, the solid waste is not hazardous).

- Toxic Substances and Control Act (TSCA) of 1976, 40 CFR Part 761, which establishes regulations for disposal and storage of PCB-contaminated materials (this is an relevant and appropriate ARAR since the solid waste is contaminated with PCBs from an unknown source).

- Underground Injection Control Program 40 C.F.R. 144-148

- Pennsylvania Solid Waste Disposal Regulations, PA Code, Title 25, Chapters 260 -264), which govern the generation, transportation, storage, and disposal of hazardous waste (this is an applicable ARAR).

- Pennsylvania Storm Water Management Act, Act 167, which requires measures to control storm-water runoff during development or alterations of land. This ARAR will be applicable to the site remediation activities.

- Pennsylvania Erosion Control Regulations, PA Code, Title 25, Chapter 102, which govern erosion and sedimentation control resulting from remedial actions that may involve earth-moving activities. This ARAR is applicable to the regrading and excavation activities associated with this alternative.

- The Occupational Health and Safety Act (OSHA), (29 CFR, Parts 1904, 1910, and 1926, which provide occupational safety and health requirements for workers engaged in onsite field construction or operation and maintenance activities. This ARAR is applicable to this alternative.

Contingency Alternative: S5 (RCRA subtitle C landfill)

ARARs Identified by the Pennsylvania Department of Environmental Resources

A. Chapter 269, Sections 269.13 and 269.41-269.50 of the Pennsylvania Hazardous Waste Management Regulations-Hazardous Waste Siting Criteria. Although the wastes at the site are not hazardous by definition (RCRA), EPA considers the following specific regulations from this section to be relevant and appropriate: These criteria provide for DER review of pre-design and remedial design information to assess the probability and degree of possible subsidence. Additionally, removal of minerals providing structural support at the site is prohibited to the extent that this could affect the remedy.

EPA considers the siting criteria for new hazardous waste landfills to be relevant and appropriate. If the slurry wall alternative is not successful, EPA will apply for a waiver of the Pennsylvania exclusionary siting criteria for landfills at that time.

B. The state requirements for design, construction, operation and maintenance, ground water monitoring, preparedness and prevention, closure, post-closure, reporting and other criteria set forth in Chapter 264, Subchapters A through G for new hazardous waste disposal facilities are relevant and appropriate. If containers of hazardous waste or excavated hazardous wastes discovered during excavation and are managed onsite, during construction activities, Subchapters I and L would be applicable. The design criteria for PA Municipal Waste Regulations (Chapter 75, sections 273.251-264) that are more stringent than PA hazardous waste regulations are applicable. A 30 mil bottom liner would be required to meet this regulation. The following municipal waste regulations would also be applicable at the site: Section 273.242 (erosion and sedimentation control), Sections 273.281-288 (Water quality monitoring) and Section 273.259 (construction criteria).

C. Any hazardous waste generated on-site and transported off-site for treatment, storage or disposal should be managed pursuant to Chapter 262(generators), 263(transporters), and 264(hazardous waste management facilities;if those facilities are located in the state). Waste excavated for offsite management should be identified as required in Chapter 261, Subchapter C and D as appropriate. This ARAR is applicable.

D. Section 273.29 of the DER Municipal Waste Regulations is applicable. This section relates to coal removal, mine discharges and subsidence. Section 273.120 is applicable and requires a subsurface survey to determine the impact of subsidence.

E. Pennsylvania NPDES requirements (Chapters 91 of the Pennsylvania DER Rules and regulations; Toxics Management Strategy).

F. Chapter 127 of the Air Quality Regulations requires the use of Best Available Technology for control of new emissions sources.

G. The Pennsylvania Clean Streams Law,supra, and the Solid Waste Management Act,supra, have been cited as the basis for cleanup levels to background levels ground water. The Pennsylvania ARAR for groundwater for remediation of hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 Pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is found in other legal authorities. EPA considers the cleanup level of ground water to be relevant and appropriate at this site.

H. Chapter 105 of the Dam Safety and Waterway Management Rules and Regulations. This applies to stream relocation and any other stream encroachments during site remediation.

I. 25 PA Code Chapter 89 of the PADER rules and regulations as it applies to subsidence and hydrogeologic balance.

ARARs Identified by EPA

- RCRA Subtitle C, Hazardous Waste Management Requirements, 40 CFR 264, which govern the transportation, treatment, storage, and disposal of hazardous wastes (this is a relevant and appropriate ARAR since by definition, the solid waste is not hazardous).

- Toxic Substances and Control Act (TSCA) of 1976, 40 CFR Part 761, which establishes regulations for disposal and storage of PCB-contaminated materials (this is relevant and appropriate ARAR since the solid waste is contaminated with

PCBs from an unknown source).

- Pennsylvania Solid Waste Disposal Regulations, PA Code, Title 25, Chapters 260 - 264), which govern the generation, transportation, storage, and disposal of hazardous waste (this is a Relevant and Appropriate ARAR).

- Pennsylvania Storm Water Management Act, Act 167, which requires measures to control storm-water runoff during development or alterations of land. This ARAR would be applicable to the site remediation activities.

- Pennsylvania Erosion Control Regulations, PA Code, Title 25, Chapter 102, which govern erosion and sedimentation control resulting from remedial actions that may involve earth-moving activities. This ARAR is applicable to the regrading and excavation activities associated with this alternative.

- Underground Injection Control Program 40 CFR 144-148

- The Occupational Health and Safety Act (OSHA), (29 CFR, Parts 1904, 1910, and 1926, which provide occupational safety and health requirements for workers engaged in onsite field construction or operation and maintenance activities. This ARAR is applicable to this alternative.

EPA considers ground water cleanup levels of background to be an ARAR; however, it should be noted that PCBs have not migrated into the aquifers and therefore are already at background levels outside of the fill.

Operable Units 3 and 4

The following ARARs have been identified for Alternatives GO3 (collection and treatment of the onsite water table), GC3 (extraction and treatment of the Clarion aquifer) and the groundwater treated as an integral part of S12 (the slurry wall/pump and treat alternative).

<u>ARARs identified by the Pennsylvania Department of Environmental Resources</u>

A. Pennsylvania NPDES requirements (Chapters 91 of the Pennsylvania DER Rules and regulations; Toxics Management Strategy). These requirements regulate surface water discharges.

B. Chapter 127 of the Air Quality Regulations requires the use of Best Available Technology for control of new emissions sources.

C. The Pennsylvania Clean Streams Law,supra, and the Solid Waste Management Act,supra, have been cited as the basis for cleanup levels to background levels for ground water. The Pennsylvania

ARAR for groundwater for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code Sections 264.90 - 264.100, and in particular, by 25 pa. Code Sections 264.97(i), (j) and 264.100(a)(9). The Commonwealth of Pennsylvania also maintains that the requirement to remediate to background is found in other legal authorities. EPA considers the background cleanup level of ground water to be applicable at this site.

ARARs Identified by EPA

- The Safe Drinking Water Act, 40 CFR Part 141 and Part 143, which identify enforceable standards (MCLs) and nonenforceable standards (secondary MCLs) for contaminants in a public drinking water supply system. This ARAR is applicable since these flow systems (near the site) can be used as a source of potable water.

- EPA Ambient Water Quality Criteria (AWQC), which are nonenforceable standards for protection of human health from exposure to contaminants in drinking water as well as the consumption of aquatic biota. This ARAR is relevant and appropriate since treated groundwater will be injected back into the formation.

- Pennsylvania Wastewater Treatment Regulations, PA Code, Title 25, Chapter 95, which regulate water quality and include treatment requirements and effluent limitations based on the best practical control technologies. This ARAR is "applicable" to the treatment of wastewater proposed under Alternative GO3 and GC3 and S12.

- The Clean Water Act (CWA) 33 U.S.C. 1251, as amended, governs point-source discharges through the National Pollutant Discharge Elimination System (NPDES). This ARAR is applicable.

- Underground Injection Control Program 40 C.F.R. 144-148

- The Occupational Health and Safety Act (OSHA 29 U.S.C. 651), (29 CFR, Parts 1904, 1910, and 1926, which provide occupational safety and health requirements for workers engaged in onsite field construction or operation and maintenance activities. This ARAR is "applicable" to both groundwater alternatives.

To Be Considered

- EPA Health Advisories, which are nonenforceable guidelines that may be encountered in public water supply systems. Health advisories cover those contaminants that are not regulated by the SDWA (some PAH compounds are not regulated by the SDWA). This ARAR is " to be considered" since these flow systems (near the site) can be used as a source of potable water.

- EPA's Groundwater Protection Strategy. This policy was formed to protect groundwater for its highest present or potential beneficial use.

COST-EFFECTIVENESS

The alternatives selected for the three operable units afford a high degree of overall effectiveness in not only protecting human health, but also the protection of the environment (wetlands and groundwater). The EPA has determined that the costs of the selected remedies are proportional to the overall effectiveness it affords to protecting the public health and environment.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected alternatives for the fill material, Alternative S12 (Slurry Wall/Pump and Treat) and Alternative S5 (RCRA landfill), are containment remedies that do not involve significant treatment of wastes. The extremely high costs of the treatment alternatives for the large volume of wastes that pose relatively low risks to the public are inappropriate. The primary alternative, the slurry wall/pump and treat remedy, will contain fill contaminants as long as necessary. Over a very long time period (30 years or more) the most mobile contaminants will be removed and treated. The concentration of PCBs will also decline eventually to levels that do not pose a threat to human health and the environment. The RCRA double lined landfill also offers a high degree of long term effectiveness for the low level of contamination in the fill material. EPA has determined that the selected remedies represent the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost effective manner OU1 (fill) at the Osborne Site.
These alternatives are protective, implementable, and cost effective. They are also consistent with current EPA's Interim Final ROD Guidance (OSWER Directive 9355.3-02) which recommends containment remedies for sites with large volumes of waste that is contaminated marginally above health based limits or large sites with heterogeneous wastes. The Osborne Landfill exhibits all of these characteristics.

Alternatives GO3 (Collection and Treatment of the Onsite Water Table) and GC3 (Collection and Treatment of the Contaminant Plume in the Clarion Aquifer) are permanent solutions that involve treatment of the principal threats present in the ground water at the site.

PREFERENCE FOR TREATMENT THAT REDUCES
TOXICITY, MOBILITY, OR VOLUME

Alternatives S12 and S5 do not satisfy this statutory preference. Treatment technologies were not determined to be practicable/and or cost effective, based on the large volume of waste material and the moderate risks posed by the site. Several treatment technologies were considered, but were not selected.

If cost effectiveness, as related to risk reduction, was not a consideration, the following remedy might be appropriate:
a) incineration would destroy the organics in the fill at a cost of about 49 million dollars; stabilization would immobilize the metals in the fill at a cost of about 11 million dollars and placement in a RCRA landfill at a cost of 11 million dollars to satisfy state requirements. The average baseline risk of contact with the fill is within EPA's acceptable risk range and the Remedial Action at this site is taken primarily to protect offsite ground water. The total cost of this hypothetical remedy of 71 million dollars is not justified by the risk posed by the fill.

Every treatment technology would require significant material handling , pre-treatment, and post-treatment of wastes. The fill at the Osborne site contains drum fragments, municipal debris and foundry sand boulders. Pre-treatment such as screening, segregation and removal of larger objects would be necessary.

Soil Washing: A treatability study was performed that reduced PCB levels by approximately 62% and PAHs by about 29-40 %. Even after treatment, the levels would still be high enough to require subsequent containment of the washed fill and would generate large amounts of water and some sludge that would need to be stored,treated and discharged. The consistency of the fill would make processing difficult. The cost of this alternative is about 66 million dollars.

Incineration: This has the potential to reduce all organic contaminants to acceptable health based levels for carcinogens but would not address the inorganic contamination in the fill. The consistency of the fill would make processing difficult and the volume of waste would not be reduced. The residual material remaining after incineration would have to be contained or treated because of its hazard index. The metals content of the fill was relatively high and most of the metals would remain in the fill after treatment. The cost of this alternative would be about 60 million dollars.

Bioremediation: This technology was screened out early by the Feasibility Study. The biological treatment would not address inorganic contamination in the fill which produced the relatively high hazard index (0.8 average, 4.0 maximum). Bioremediation may address the PAHs but not the PCBs. Under good conditions, PAHs have been degraded in land treatment units. Bioremediation techniques are still in the early stages of development. Therefore, the use of bioremediation in the extremely complex field environment is inappropriate.

Stabilization: This technology was evaluated in conjunction with a thermal treatment step to remove organics that could interfere with the solidification reaction. This alternative would cost approximately 90 million dollars to implement, and involves several sequential treatment steps that would have to be evaluated with pilot or field testing.

Alternatives GO3 and GC3 are permanent solutions and employ treatment technologies. These two alternatives satisfy this statutory preference.

Explanation of Significant Changes From the Proposed Plan

As discussed previously in the ROD, the selected remedy is different from the preferred remedy in the Proposed Plan. The following additional changes have also been made subsequent to issuance of the Proposed Plan:

The State of Pennsylvania subsequent to issuance of the Proposed Plan identified the need for "Best Available Technology" emissions control from any air stripper used at the site.

The State of Pennsylvania also requires a 30 mil bottom liner for the RCRA landfill alternative to satisfy the requirements of the municipal landfill regulations. These regulations also require a modification of the cap design to be installed as an element of S12, the selected remedy for the fill.

The State of Pennsylvania also requires an institutional control on mineral removal near the site.

OSBORNE LANDFILL

RESPONSIVENESS SUMMARY

Responsiveness Summary
Public Meeting Response Cards
and Letters Received During
Public Comment Period

Summary: In general, the comments received during the public comment period questioned whether the risk at the site justified the cost of EPA's preferred alternative. In general, the public comments received supported allowing Cooper Industries to implement their proposed alternative (slurry wall). The comments also reflected concern about the economic impact on Cooper Industries and consequently on the local economy.

Issue: Several residents asserted that they had experienced significant contact with the landfill with no ill effects and that no unusual health problems were observed in the community. One resident mentioned that he and his family had used a well near the landfill for many years as proof of the low risk.

EPA Response: Some exposures to chemicals do not produce immediate effects but are still of concern to EPA. Toxicologists are experts that study the effects of chemicals on the human body. Their studies regarding cancer causing chemicals have shown that there is often a 20 to 30 year delay between exposure to a chemical and the incidence of cancer. Additionally, EPA has taken a very protective stance regarding public health risks form cancer causing chemicals. In general, EPA sets risk levels so low, that if one million people were exposed routinely (used well water with low levels of chemicals) for their entire life, no more than one person could contract cancer from this source without EPA taking action to reduce this risk. EPA would therefore not expect to to see the effects from exposure in a small number of residents unless the risk from the site was disastrously high, which it is not.

Issue: Several comments were received that asked if EPA is attempting to have other Potentially Responsible Parties pay a fair share of the cost.

EPA Response: EPA has investigated the sources of wastes at the Osborne landfill since placement on the National Priorities List. The Osborne landfill unfortunately was not managed as a modern landfill and records and invoices are not in EPA's posession. It is very clear; however, that Cooper Industries was the major source of the wastes at the landfill. Records indicate that at one point in time Cooper Industries considered buying the landfill and had a study done on feasibility of upgrading the landfill to meet DER standards. The Cooper Industries records also show that they sent large volumes of various wastes to the landfill in addition to foundry sand, including solvents, plating sludges and cutting oils.

EPA tentatively identified three Potentially Responsible Parties in addition to Cooper Industries that were sent Special Notice Letters that stated EPA's belief that they may have liability for the site and offered them the opportunity to conduct the cleanup under EPA's supervision. Those PRPs are General Electric Co., Ashland Chemical Co., and Castle Iron and Metals Co..

In summary, although Cooper Industries may obtain some assistance from other Responsible Parties, Cooper Industries was responsible for a large portion of the problem at the site. If other viable Potentially Responsible Parties are identified, EPA may pursue them for recovery of costs and Cooper Industries can sue these parties for a share of the monies they expend in conducting the cleanup.

Issue: Several commenters were concerned about the economic impact of the Superfund cleanup on Cooper Industries and the local economy.

EPA Response: The liability for the Osborne site is the responsibility of the Cooper Industries Corporation, not just the Grove City plant. Cooper Industries had revenues of over four billion dollars in 1988 and a net income of about 250 million dollars. The EPA's preferred remedy is estimated to cost about tweny million dollars or about ten percent of one years net income. This cost would be incurred over several years. Closing the Grove City plant would not remove this Superfund liability from the corporation or improve Cooper's financial situation unless the plant were losing money. Congress has created a Superfund law that mandates pursuing responsible parties to pay cleanup costs rather than passing the costs on to the public.

Issue: One commenter didn't think that EPA should hold Cooper Industries liable for practices that were not illegal at the time of disposal. This commenter was also concerned that EPA let the costs accumulate interest over the years.

EPA Response: Under Superfund, liability is apprortioned regardless of illegal practices or fault. The Superfund law requires EPA to pursue responsible parties at Superfund sites for recovery of costs. The cost in real dollars of the remedy is not greater due to inflation.

Issue: One commenter thought that it was unfair for "EPA to take 11 years to make a decision" and then charge Cooper industries for the the accumulated costs(inflation).

EPA Response: EPA has not taken eleven years to make a decision at the Osborne site. The site was listed on the National Priorities List in 1982, eight years ago. Cooper Industries did not complete their investigation of the Osborne site until 1985, five years ago. This investigation did not contain all of the elements required prior to making a decision. This made it necessary for EPA to conduct further studies at the Osborne site and to perform a Feasibility Study of remedial alternatives. This study was completed in July, 1989 and a tentative decision made in one month after EPA received all of the required information. Cooper has requested and received an extension of the comment period and the negotiation moratorium. EPA has delayed its decision on the site to address several issues raised by Cooper Industries and to further appraise their proposed alternative (slurry wall). The cost in real dollars of the remedy is not greater due to inflation.

Issue: One commentor thought 2 parts per billion was insignificant. They asked "what was the tolerance for the data presented in the study".

EPA Response: The tolerance is different for different chemicals, but EPA's central lab checks all data for accuracy. When the tolerance becomes large enough to make the value questionable, the data is footnoted with a "j" qualifier. The 2 parts per billion probably refers to the vinyl chloride detected in the deep aquifer. Vinyl Chloride is such a potent human carcinogen that EPA set an enforceable Maximum Contamination Limit of 2 parts per billion for this contaminant.

Issue: Several reviewers were concerned that EPA could increase the hazard to the public by digging up the fill to implement the landfill option.

EPA Response: This was one of the factors in EPA's decision to select the Slurry Wall remedy as the primary remedy in the Record of Decision and use the Landfill Option as a contingency remedy. If it is necessary to implement the Landfill Option because the Slurry Wall remedy is not successful, EPA will take adequate precautions to protect the public during implementation of the remedy.

OSBORNE LANDFILL

PROPOSED PLAN

PUBLIC MEETING SUMMARY

OSBORNE LANDFILL SUPERFUND SITE

MEETING SUMMARY
FOR THE
PROPOSED REMEDIAL ACTION PLAN

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Osborne Landfill Superfund Site
Meeting Summary Regarding the Proposed Remedial Action Plan

I. Overview

This Meeting Summary has been prepared by the U.S. Environmental Protection Agency, Region III, in order to document the Agency's response to public comments regarding the Osborne Landfill Superfund site (Osborne) in Grove City, Pennsylvania. Comments discussed in this summary are those received during two meetings hosted by EPA on September 14, 1989: a meeting with local officials and a public meeting with community residents and other interested parties. The comments are organized into relevant topics and similar comments are summarized together to facilitate Agency response.

II. Site Background

The Osborne site is a 15-acre abandoned waste disposal area located on the East Pine Street Extension in Pine Township, Mercer County, Pennsylvania. The site lies approximately one-half mile east of the Borough of Grove City. Several intermittent streams flow through the site. A 1,500-foot long pit that was excavated during strip mining operations begins near Diamond Road and extends in a southeast-to-northwest direction. Three small ponds are also located on site.

The Osborne site originally was developed as an underground coal mine during the 1800s, and then as a strip mine in the 1940s. From the 1950s through the early 1960s, the site was operated as a waste disposal area. Beginning in 1963, the site was used as a landfill. Throughout the remainder of the 1960s and most of the 1970s, the Osborne site received industrial, hazardous, and municipal wastes, largely from the Cooper-Bessemer Company, a division of Cooper Industries Inc. (Cooper), Grove City plant but also from other local manufacturing facilities. Wastes accepted during this period included paints, asbestos, solvents, waste coolants, spent foundry sand, acid, scrap metal, cooling system sludge, slag, and waste oils.

The Pennsylvania Department of Environmental Resources (PADER) inspected the landfill operations on several occasions during the site's active period. Samples collected from the mine ponds and surface water runoff contained iron in all three pools and phenols in the strip mine pool. PADER closed the site in 1978 for accepting hazardous wastes for disposal without an appropriate permit. At the time of closure, the site contained numerous drums, most of which were empty and crushed, while others contained liquids and solids. The site also had areas of contaminated soil.

As a result of later investigations by PADER, the site was added to EPA's Interim Priorities List, the Agency's initial listing of sites eligible to receive Federal cleanup funds, and was eventually added to the National Priorities List in November 1982.

Sampling conducted by PADER and EPA subsequent to site closure showed the presence of contamination. Samples were taken from the two larger ponds and from the stream off site; these were tested for phenyls, cyanides, and heavy metals. Test resulsts from surface water samples showed elevated levels of managanese and iron as well as selenium. PADER also tested the water in seven nearby private, residential wells. Analyses on these samples did not detect the presence of priority pollutants and residents were informed that the water was safe to drink.

In response to an EPA recommendation, in May 1983, Cooper initiated construction of a security fence, installation of warning signs, and removal and disposal of 45 cubic yards of contaminated soils and 603 drums on site. These actions were completed in the summer of that year. Cooper, PADER, and EPA also negotiated a settlement concerning the Osborne Landfill site and executed a Consent Order and Agreement on September 20, 1983. In the Order, Cooper agreed to quantify wastes it had sent to the site, complete the initial actions it had begun, and conduct a Remedial Investigation and Feasibility Study (RI/FS) and follow-up remedial activities to characterize the nature and extent of contamination at the site.

Cooper began RI site sampling work in Fall 1983 and installed monitoring and test wells in late 1983 and early 1984 to determine the extent of contamination. Cooper submitted its Draft RI Report to PADER and EPA in June 1984. Findings indicated low-level ground- and surface-water contamination and concluded that the site posed little environmental risks. A final report was submitted in September 1984.

Because of remaining concerns, in September 1985 PADER and EPA collected additional environmental samples from the site ponds, adjacent stream, neighboring property, and swamp. Soils also were sampled. Samples were analyzed for polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), and heavy metals. In April 1987, EPA completed a technical review of Cooper's RI Report, which found that the existing information should be supplemented by additional environmental sampling and characterization of the underlying groundwater.

EPA conducted its RI/FS from Spring 1988 through Summer 1989.

III. Background on Resident Involvement and Concerns

Interest in the Osborne site began in Summer 1982, when the site was ranked the third most hazardous site in Pennsylvania. Media, residents', and local officials' concerns began at this time. The announcement brought the site to the attention of local residents and several community groups began to form to consider the site. Most notable among these groups are the Western Pennsylvania Residents for Safe Communities and Pennsylvanians United to Rescue the Environment.

In 1983, EPA and the PADER held two public meetings to inform the public about activities at the Osborne site. Cooper Industries, the site operator, conducted several activities to mitigate an immediate threat from the site. In 1985, EPA entered into negotiations with Cooper to conduct further studies. Concern about the site remained high during this time.

Recently, concern appears to have subsided. In the last two years, residents have been concerned primarily with the possibility of contamination in the drinking water and the effect of the remedy on neighboring properties.

IV. Summary of Major Comments Received During the Public Meeting and EPA Responses to Those Comments

A. Health Risks

- Several attendees inquired about the potential health effects of the groundwater contamination. Specifically, residents wanted to know what the current health risks are, given that the landfill was closed in 1978.

  EPA Response: The extent of groundwater contamination that has been discovered through well sampling is generally at very low levels. Higher levels of contamination have been detected in groundwater located on site, away from water supply sources. The low levels of vinyl chloride, a known carcinogen, will not produce excessive instances of cancer; however, the Agency is taking precautions to limit exposure.

- An attendee asked if this site was considered one of the "nation's worst toxic waste dumps" as he read in the local newspaper; information about the Hazardous Ranking System ranking for the site was also requested.

  EPA Response: Since the completion of the removal action and based on sampling results, this is not one of the worst hazardous waste sites. Many of the problems at the site have been resolved by the removal and the current level of contamination is not a cause for alarm.

B. The Proposed Remedy

1. Cost

- Both residents and officials expressed concern because if the Osborne site is considered to present a low risk, it is not serious enough to warrant the cost of the remedy.

  EPA Response: The remedy selection process always takes into consideration the costs and the benefits of each possible remedy; selection is based, in part, on the best remedy for the cost. EPA establishes maximum contaminant levels for groundwater based on the cost of a response relative to the potential risk to human health or the environment. In this case, the presence of vinyl chloride, one of the few proven human carcinogens, is a factor in determining the potential risk. It was noted that EPA tends to be conservative in determining the level of risk, preferring to err on the side of public health.

- A local official asked what the cost of both the initial and the long-term groundwater treatment systems will be. He also asked who was responsible for paying for the systems.

  EPA Response: The cost of the initial treatment is estimated to be $6 million and the long-term system will cost approximately $1.5 million. Whoever undertakes the cleanup will be responsible for these costs. If EPA undertakes the cleanup with public funds, they will seek recovery of cleanup costs from the responsible parties.

2. Reliability/Suitability

- A local official asked for EPA's assessment of the overall reliability of Cooper's proposed remedy, the use of a slurry wall around the site in combination with pumping and treating the groundwater inside the wall. One resident questioned whether a slurry wall that is only 42 feet deep will be effective. The resident also asked whether it will always need be necessary to pump groundwater from the site.

EPA Response: The remedy proposed by Cooper is to encompass the contamination by the slurry and pump out contaminated groundwater from within that slurry wall. Under their plan, groundwater will be pumped as long as necessary. It was noted that PADER prefers incineration as an alternative to the slurry wall.

- A resident asked whether remedial actions similar to EPA's proposed preferred alternatives for Osborne had been recommended at other sites.

  EPA Response: A similar remedy involving on-site solidification of the contaminated material and construction of a landfill was selected for the Craig Farms site, which is also in western Pennsylvania.

3. Implementation Effects

- Several people asked whether the pumping of groundwater planned during the remedy would affect the environment. Specific concerns included the possibility of spreading contamination by disturbing the groundwater and the possibility that the water-filled mines underlying the site might cave in if the groundwater is disturbed.

  EPA Response: During the pumping and treatment of groundwater, contaminated water will be replaced with treated water as it is extracted. Therefore, changes in the hydrologic balance in the area are not anticipated.

- One resident asked what the effect of the remedy would be on the landowners of the area.

  EPA Response: EPA will do whatever is possible to minimize the effect of the remedy on landowners; however, the construction necessary to implement the proposed remedy may require some temporary inconvenience. It will also be necessary to take some of the land adjacent to the site for implementation of the proposed remedy. EPA has procedures to compensate landowners for their property.

- A resident noted that some of the possible remedies made more land unusable than others. He wanted to be certain that all landowners would be advised of how the remedy would affect their land.

  EPA Response: The landfill option would use more land than the slurry wall. Landowners can refer to site documents, such as the Feasibility Study, for further information about the effects of proposed alternatives.

4. Payment Responsibilities

- Attendees at the public meeting and local officials wanted to know who is ultimately responsible for paying the cost of implementing the remedy. Specifically, a resident asked whether the public would pay if Cooper was unable to complete its cleanup.

  EPA Response: EPA is currently negotiating with Cooper to reach an agreement about the company's liability in this cleanup. If an agreement cannot be reached, or if Cooper becomes unable to pay, Superfund money will be used to pay for the cleanup. In no case will the residents or the municipality be held financially responsible for implementing the remedy.

- A Cooper employee asked whether Cooper could be held responsible for treble damages (three times actual costs) if the site is shown to be dangerous to public health.

  EPA Response: Treble damages are assessed where: a) EPA finds that the level of contamination at the site presents an imminent danger to human health and b) the responsible party refuses to obey a cleanup order from EPA. EPA has not made a finding of imminent and substantial endangerment at the Osborne site. [However, EPA could make this determination in the future.]

  If there is not an imminent and substantial endangerment to human health and the environment, EPA [usually] cleans up the site and later attempts to recover the costs from the responsible parties. [A finding of imminent and substantial endangerment is not absolutely necessary to collect treble damages. EPA is empowered, under section 107(c) of CERCLA, to collect treble damages for failure to obey an order to provide remedial action under section 104 of CERCLA, if a person is liable for a release or threatened release of a hazardous substance.]

5. Timing

- Residents asked for more information about the Agency's overall timeframe for implementation of the remedy.

  EPA Response: EPA will send letters to potentially responsible parties (PRPs) to initiate negotiations for cleanup liability. The PRPs must negotiate a consent order by the end of January 1990 or EPA will begin the design work with public funds. The design for the construction will take approximately one year to finalize. Actual construction should begin in Spring 1991.

- A local official asked whether the site would become a long-term groundwater treatment facility.

  EPA Response: There will be a long-term treatment system to strip volatile organics from the Clarion aquifer. The initial groundwater treatment system will be more intensive than this long-term system and will also remove metals and PCBs.

C. Nature and Extent of Contamination

1. Mines

- A resident asked whether sampling has shown contamination in the mine pool.

  EPA Response: Contamination has not been found in [residential wells that use the shallow aquifers connected with] the mine pool. Sampling has shown high levels of contamination in one area of the mine pool; the aquifers are insulated by [clay or] shale. This "insulation" inhibits drainage from the mine pool.

- An attendee stated that he had heard that the mines were six or seven miles deep and wondered if that was correct.

  EPA Response: The extent of the mine system is not currently known. The groundwater verification study will help to determine the extent of the mine system.

- A resident expressed concern that the contamination may be able to move long distances underground through the Burgoon aquifer.

  EPA Response: The contamination found in the Burgoon aquifer is localized. The area around the aquifer is being monitored; wells placed to intercept the groundwater flow are showing diluted levels of contamination. Based on these test results, the Agency thinks that there is some hydrogeologic linkage between the Osborne Landfill and the Burgoon aquifer, but that it is not a major linkage.

2. Wetlands

- A local official asked what will happen to the wetlands during implementation of the remedy. A resident also expressed concern that the remedy be implemented so that this area can be preserved.

EPA Response: Any remedy that may affect the wetlands will be reviewed carefully by the Agency. For example, the regrading will be conducted in such a way as to not extend to the wetlands; the area to the south of the wetlands is more likely to be affected. While the remedy is being designed, EPA will be attentive to the existence of the wetlands and a game preserve.

3. Groundwater/Drinking Water

- A resident expressed concern that Grove City will draw contaminated water from the Burgoon aquifer.

EPA Response: Samples of the Burgoon aquifer have not shown it to contain a significant level of contamination. A well pumping water from the Burgoon Aquifer showed very low levels of one constituent of vinyl chloride; that level is not enough to characterize the Burgoon as contaminated. Based on sampling, it will be necessary to continue monitoring this aquifer.

- One attendee asked when and why the test wells were installed and how often they were monitored.

EPA Response: Cooper installed some test wells after the site became a Superfund site in 1982. EPA installed additional monitoring wells to support the Remedial Investigation and Feasibility Study.

- A local official asked whether the deeper aquifers, under the contaminated aquifers, also are contaminated.

EPA Response: No significant levels of contamination exist at that deeper level. EPA will continue to test the deeper aquifers using the monitoring wells in the area.

D. Public Involvement/Dissemination of Information

- Several attendees asked how EPA plans to notify persons owning property adjacent to the site regarding the effect of the remedy.

EPA Response: Some of the key community leaders have been contacted to discuss potential effects. The Remedial Project Manager for the site has personally contacted the resident whose land will be most affected by the proposed remedy. The diagrams shown at the public meeting indicate boundaries of the property that will be affected; copies of these diagrams will be available at the information repository. Prior to implementing the remedy, EPA will discuss with landowners procedures for obtaining compensation for any land taken.

- An attendee asked whether EPA is coordinating with the local government.

  EPA Response: The Remedial Project Manager and Community Relations Coordinator have met with local government officials to hear their concerns and keep them informed about ongoing and planned site activity.

- A resident expressed concern that more communication with EPA is necessary and that there had been little contact from EPA in the past year.

  EPA Response: EPA is making a concerted effort to involve and inform the members of the site community. A new Remedial Project Manager and Community Relations Coordinator have been assigned to the site and have met with local officials and talked on an individual basis with several interested parties regarding proposed activity at the site.

E. Miscellaneous

1. The Superfund Program

- An attendee noted that an article in New week magazine criticized the success of the Superfund program. The attendee requested EPA to respond to this criticism.

  EPA Response: Any program as large as Superfund will be criticized. A recent "90-day study" of the effectiveness of Superfund made recommendations such as keeping the public informed, using new technologies, and extending public comment periods on proposed activities. These recommendations have begun to be implemented at the Osborne site, through efforts such as the meeting with local officials and by community relations activities.

2. Land Use

- An attendee asked how the land can be used after the remedy is complete.

  EPA Response: The land will continue to be part of the Osborne Superfund site. None of the options under consideration will clean up the site to the point where th landowner can use it for other purposes. Access to the area around the cap (a proposed remedy outlined in the RI/FS) will be restricted.

3. New Information

- A resident informed EPA of a system of old mines in the area that may be affected by the remedy or may affect its implementation.

V. Remaining Concerns

Response cards received during and immediately following the public meeting reflect residents' concern about the following issues:

- Whether EPA will purchase the properties adjacent to the site that will be affected by implementation of the remedy. A resident expressed concern that he was paying taxes on land to which he did not have access.

- Cooper's ability to pay for the EPA remedy; several residents want EPA to reconsider allowing Cooper to implement Cooper's alternative in order to minimize costs to the company. Residents are concerned that Cooper, a key employer in the area, will close local operations if remedial costs are too high.

- Whether EPA will ask other responsible parties to pay part of cleanup costs; residents do not feel that Cooper is the only PRP and that EPA should consider requiring those other firms pay for the remedy.

- The significance of the level of contaminant found in the area compared to the cost of the remedy; this continues to be a concern in the community, partly based on the low level of contamination and the concern about Cooper bearing the cost of the remedy.

- A local official expressed his concern that EPA will be creating another landfill and not solving the problem.

- Several residents did not receive a copy of the handout materials; EPA will send this packet to the information repository to facilitate getting the information to the community in an efficient manner.

OSBORNE LANDFILL

EPA RESPONSE TO

COMMENTS SUBMITTED BY

COOPER INDUSTRIES AND THEIR CONTRACTORS

INTRODUCTION

This Responsiveness Summary was prepared in response to comments submitted by Cooper Industries, Incorporated and their subcontractors, Fred C. Hart Associates, Incorporated (Hart) and International Technology Corporation (IT) during the public comment period. Comments submitted by Cooper Industries pertain to the Osborne Landfill Site Final Remedial Investigation Report (August 1989) and the Draft Feasibility Study Report (September 1989) prepared by the REM III Team for EPA Region III.

Because there was no numbering system to identify the comments, and because many of the comments were repetitive in nature, the EPA and REM III Team agreed to focus on responding to major issues that were identified by Cooper Industries through their comments. A total of 13 major issues have been identified by the REM III Team and addressed in this report.

Various comments which pertain to each of the major issues have been either individually identified or a summary of comments was provided and subsequently addressed. Thus, the format of this Responsiveness Summary identifies the major issue, provides a narrative summary of the comments or lists the individual comments which reflect to the major issue, and provides the subsequent response.

Issue No. 1: The risks are overstated because of erroneous use of data and erroneous assumptions.

Numerous comments were submitted by the PRP and their consultants with respect to the risk assessment. The most frequent and significant comments relating to the above issue (No. 1) are given below along with the response.

Comment:

There should be an evaluation of the data regarding its accuracy, quality and validity (particularly PAHs). Data validation qualifiers do not appear on data tables or in the text of the main narrative report. In one of the comments, the commenter specifically cites the following table and states that all data presented should be qualified with a "J." The commenter also specifically comments on the validity and accuracy of all foundry sand chemical analyses.

Constituent	RI Report (µg/L)	RI Report Appendix F (µg/L)	RI Report Table G-11 (µg/L)
Chloroethane	7.1	1.6	1.5
1,1-Dichloroethane	6.3	10.9	10.9
1,1,1-Trichloroethane	1.0	4.8	4.8
Trichloroethene	1.0	1.4	2.8
Lead	10.0	(3.7)B	Not Reported
Nickel	10.0	Not Reported	Not Reported

Response:

The data presented in the RI report and used in the risk assessment have been reviewed and validated according to EPA protocol, therefore, the quality of the data is known. (Data validation reports are available). All appropriate qualifiers have been assigned to the data as presented in Appendix F of the RI Report. Although qualifiers are not carried through to the summary tables and main narrative, it should be noted that only data considered acceptable for risk assessment through the validation process (i.e., unqualified, J, K, L data) are included in the summary tables and narrative and used in risk assessment calculations.

Regarding the table specifically cited by the commenter, the RI values should not be "J." The data in question was provided (and validated) by the U.S. EPA Central Regional Laboratory (CRL). A review of their data package indicates the values are not qualified. The first column of data presented in the table is taken from a previous investigation report; we can not comment on the qualifiers. (Note that one can not directly compare data presented in column 1 to columns 2 and 3; the data are from two different investigations.)

Regarding the validity and accuracy of all of the foundry sand chemical analyses, the data used in the risk assessment may not always show J, K, or L qualifiers; however, none of the data used were rejected data. Finally, although the commenter states that the QA/QC of the initial RI data (previous investigation data) were in accordance with U.S. EPA guidelines and CLP protocol. The level of the QA/QC is not known with any certainty. Only recent data of <u>known</u> <u>quality</u> were used in the risk analysis.

Comment:

Cancer risks should not be calculated for PAHs that are classified as Class C and Class D carcinogens. Modification of the comparative CPFs based on Thorslund (Thorslund, 1988) while still continuing the use of the original CPF of 11.5 for benzo(a)pyrene in place of the value of 3.22 developed in the evaluation may not be a proper use of the comparative potencies. Pyrene, a Class D carcinogen, and anthracene, an unclassified compound, should not be used in quantifying risk at this time.

Response:

The following guidance is provided by the U.S. EPA (51 FR 185, page 33996): "Agents that are judged to be in the EPA weight-of-evidence stratification Groups A and B would be regarded as suitable for quantitative risk assessments. Agents that are judged to be in Group C will generally be regarded as suitable for quantitative risk assessment, but judgments in this regard may be made on a case-by-case basis. Agents that are judged to be in Groups D and E would not have quantitative risk assessments." Contrary to the commenter's statement, cancer risks may be calculated for Class C carcinogens on a case-by-case basis. However, the commenter is correct in stating that anthracene is an unclassified compound and should not have been included in the risk analysis. Pyrene, a Class D compound, was included in the risk analysis since it was reviewed in the ICF-Clement Associates report and assigned a relative potency factor. A review of the risk analysis results presented in Appendix I of the RI Report indicates that the inclusion/exclusion of either compound in the risk analysis does not substantially affect the final risk analysis results.

Conservatively and at the suggestion of the EPA Region III toxicologist, cancer risks were calculated using the Clement Associates proposed relative potency estimates and the existing benzo(a)pyrene potency slope factor of 11.5. Carcinogenic potency factors and relative potency factors for PAHs are currently under review internally by the EPA. The use of the proposed 2.33 q* for benzo(a)pyrene instead of the existing 11.5 q* was considered premature.

The commenter also states that "the comparative potencies (i.e., relative potency estimates [RPE] presented in Clement Associates, 1988) are based on animal studies in which the PAH was administered in every mode other than ingestion. Consequently, the premise that all toxicity parameters are based on intake, thus justifying the use of 100 percent absorption, may not be supportable." The RI <u>does</u> <u>not</u> <u>assume</u> that all toxicity parameters are based on intake. The 100 percent absorption factor is used as a conservative upper-bound value. Additionally, the statement that the RPEs are based on animal studies in which the PAH was administered in every mode other than ingestion is similar to a discussion presented in Clement Associates (April 1988): "This chapter (Chapter II, page III-I) describes eleven experiments in which B[a]P and other PAHs were tested concomitantly for carcinogenesis using several animal species and different methods of administration, as well as two experiments in which the levels of these chemicals that interact with cellular DNA were determined. Unlike the experiments using

B[a]P described in Section II, most of these studies used methods of administration that cannot be quantitatively compared to those by which humans would be expected to be exposed. As a result, dose response relationships for these PAHs cannot be described mathematically in a manner that is useful for the prediction of human risk unless they are expressed relative to B[a]P. Cancer potencies relative to B[a]P are derived for each PAH from each experiment in the following section and are summarized at the end."

Comment:

Correct risk assessment protocol dictates that chemical analytical data in which the highest observed concentration is below the Contract Detection Limit (CDL) not be used in the quantification of risk. Additionally, a worst case scenario that assumes a uniform distribution of infrequently detected contaminants is highly conservative. The evaluation of all chemicals regardless of the detection frequency and the use of data that is below the Contract Required Detection Limit (CRDL) is an extreme worst case.

Response:

The commenter states that "postulating a worst case scenario that assumes uniform distribution of an unverified constituent (unverified, in that it was detected only once in the media) is overly conservative and will greatly exaggerate the health risks." We believe the term "unverified" is misleading as used by the commenter. Unless a contaminant identification/ quantification is rejected through the validation process, the risk assessor must evaluate the detection as real. The frequency of detection certainly influences the interpretation of the risk analysis results. Additionally, as sampling and analysis programs for Superfund sites are often restricted by time and budget constraints, the investigator's ability to define (without question) the vertical and horizontal extent of contamination is limited. Consequently, infrequently detected contaminants should not be dismissed automatically as insignificant. The evaluation of infrequently detected data for the Osborne Landfill Site does not impact the bottom line risk analysis results. The major risks at Osborne are attributable to PAH and PCB contamination in the onsite groundwater (the overburden aquifer) and volatile organics in the onsite and offsite groundwater. Surface media (soil, fill, and mine spoils) contamination is also a concern. PAHs were frequently detected in surface and subsurface media. PCBs were frequently detected in subsurface media. Low level volatile organic contamination was detected in samples collected from various onsite/offsite aquifers at the site.

The commenter's statement that "correct risk assessment protocol dictates that chemical analytical data in which the highest observed concentration is below the CDL not be used in the quantification of health risks" is not in accordance with EPA

Region III guidance. Although designated as a quantitative estimate, "J" data (estimated data) may be used in risk assessment (EPA Region III policy). The "J" qualifier designates an estimation in quantification and not a contaminant identification problem. Regarding the surface water data specifically cited by the commenter, the significance of finding volatile organic contamination in the onsite pond is that the detections are evidence of contaminant migration. The risk analysis, although conservative, does not overestimate risk and in the case of the onsite surface waters indicates that surface water contamination does not present significant carcinogenic or noncarcinogenic risks.

Regarding the surface water data, the commenter states that "selecting the chemical maximum observed concentration (particularly for "J" data), assuming that the maximum concentration is uniformly described over the entire site environmental medium is a too conservative and unrealistic approach in quantifying risks in an evaluation . . ." As stated earlier, the maximum and average contaminant concentrations are evaluated in the risk assessment. The evaluation of the maximum concentration defines the worst case scenario as typically considered in a Superfund risk assessment.

Comment:

The exposure scenarios involving children swimming or fishing in the onsite/offsite ponds are not plausible.

Response:

The RI (page 183, 4th paragraph) agrees that "it is extremely unlikely that the onsite ponds will ever be used for recreational activities." However, the opportunistic use of the ponds for swimming or wading (a more likely scenario) by adolescents hiking in the area or trespassing across the site is certainly within the realm of possibility. Consequently, dermal contact with and accidental ingestion of (hand to mouth contact) surface water contaminants is possible even under a wading scenario (however contaminant intake rates are predicted to be less for a wading scenario than for a swimming scenario). The results of the risk analysis indicate to all interested parties that even under the <u>conservative</u> conditions specified in the risk assessment, adverse health effects are not anticipated. This conclusion can be drawn with a great deal of certainty and is useful to anyone responsible for making health or remediation decisions for the site.

Comment:

Carcinogenic and noncarcinogenic exposure doses should be time weighted in terms of days/year exposed or years/lifetime exposed as appropriate. The cancer risk calculations for a 17 kg child ingesting affected groundwater should prorate the exposure over a lifetime. Inorganics account for a large percentage of the chronic toxicity risk, however, they may all be at background concentrations.

Response:

The risk analyses results presented in the RI are based on exposure dose expressions that, conservatively, do not time-weight exposures that occur on a less than daily basis. The following exposure scenarios are potentially impacted by the time weighting issue:

- <u>Dermal contact with contaminated onsite/offsite sediments</u>

  The risk analysis results for this scenario are presented on Table 6-6 of the RI. The cancer exposure dose calculations were time weighted; the noncancer exposure dose calculations were not time weighted. However, as the maximum Hazard Index presented is 0.39, time weighting would not alter the conclusion of the risk analysis results . . . significant adverse noncarcinogenic health effects are not predicted by this exposure scenario.

- <u>Dermal contact and accidental ingestion exposures to contaminated foundry sands, mine spoils, and soils</u>.

  See Comment/Response on page 11.

- <u>Accidental ingestion of or dermal contact with onsite or offsite surface waters (Onsite Pond No. 1, Onsite Pond No. 2, Offsite Pond)</u>.

  The risk analysis results for this scenario are presented on Table 6-12 of the RI. The cancer exposure dose calculations were time weighted; the noncancer exposure dose calculations were not time weighted. However, as the maximum Hazard Index presented is 0.1, time weighting would not alter the conclusion of the risk analysis results . . . significant adverse noncarcinogenic health effects are not predicted by this exposure scenario.

The commenter's statement that acute exposures should be evaluated using acute toxicity criteria is correct. The RI statement cited by the commenter (page 178, fourth paragraph) does not state otherwise; however, the phrase "Doses can be calculated . . . for single exposures (for noncarcinogens) . . . ." may be interpreted by the readers as meaning that "time weighting" is not necessary. It is agreed that time weighting of exposure doses for noncarcinogenic risk assessment is technically correct.

The commenter's statement that the cancer risk calculation for the 17 kg child ingesting groundwater should prorate the exposure over a lifetime is correct. Consequently, the cancer risks presented for a child (Tables 6-9 and 6-10), should be reduced by a factor of 6/70.

Comment:

The following comments were received on the statistical treatment of the data:

- "Use of a statistical analyses applied to the chemical analytical data to determine the most appropriate distribution was inappropriate."
- "In the final analysis, the site was evaluated on a 'worst-case' basis only, using the maximum observed concentrations in the risk assessment."
- "Since the data did not exhibit a random distribution, it is unclear why the use of an arithmetic average was chosen when it is widely understood that arithmetic averages are only applicable when the distribution is random."
- "The result of this statistical methodology error (i.e., use of the arithmetic mean versus geometric mean) is an estimated arithmetic average concentration of PCBs, within the fill, which is 50 times greater than the more representative geometric average. This ultimately affects the risk assessment and the selected alternatives within the final FS report."
- "The general practice in the field of risk assessment has been to use geometric means for the 'most probable case.'"

Response:

Statistical analyses were applied to the data in an effort to determine which distribution (normal, lognormal) was most representative of the site data and thus most useful in the risk assessment. The analyses were conducted by the contractor at EPA's request.

A "worst case" AND a plausible case scenario were evaluated for all exposure scenarios presented for the Osborne Landfill Site. Maximum and average contaminant levels defined the worst case and plausible case scenarios. This is common practice in EPA superfund risk assessments and is required by at least one EPA Region (Region I). Because worst case and plausible case scenarios are presented in the risk assessment, it is incorrect to state that the site was evaluated on a "worst-case" basis only.

The arithmetic mean was utilized in the risk assessment for the following reasons:

- Statistical analyses (W-test) on the analytical results for 20 foundry sand samples indicate that PCB-1254 data may be drawn from an underlying lognormal distribution. PAH data had characteristics of both normal and lognormal distributions and could be assessed using either a geometric mean or an arithmetic average. In summary, the statistical analyses did not conclusively indicate either a normal or lognormal distribution.

- The EPA (53 FR 196, [page 39722]) retains the assumption of normality in the groundwater data distribution (rule {ss264.97 [i] [1]}) because many statistical procedures reviewed were "not robust for data that, while not normally distributed, do not significantly violate the normal distribution assumption."

- The use of the arithmetic mean versus the geometric mean avoids the need to identify the sample specific detection limits for each analyte in each sample which substantially increases the time allowed for RI database preparation.

- The use of zero for nondetect values serves to reduce or eliminate any bias toward unreasonably large average concentrations.

- The use of either arithmetic averages or geometric means often has little effect on risk estimates that are essentially order-of-magnitude indications of public health and environmental threats.

The use of the geometric mean would indeed decrease the risk attributed to the average PCB levels detected within the fill. However, Feasibility Study decisions were also based on TSCA regulations which specify the PCB levels not also exceed 10 ppm and 25 ppm for nonrestricted and restricted access sites, respectively, as well as risk analysis results. A few onsite detections (hot spots) exceeded the TSCA criteria. Additionally, the state of Pennsylvania (PADER) recommendation for the site is that PCB contamination should be reduced to background concentrations (i.e., nondetect).

The commenter states that the general practice in the field of risk assessment has been to use geometric means for the "most probable case." The most recent guidance from EPA Region III is that the statistical distribution of the data be considered when calculating most probable exposure and plausible upper bound exposure. The guidance does not state or assume that the geometric mean be used for the most probable case.

Comment:

This risk assessment quantified the absolute health risks rather than the incremental health risks since background was not subtracted from the concentrations used to calculate cancer risks and hazard indices. The metals concentration, which account for the majority of the risk in many scenarios, are typically background levels.

Response:

The purpose of the risk assessment is to calculate the total risk to a receptor from exposure to site constituents. The percentage of that risk that can be attributed to background levels is certainly not important to the receptor. However, background levels should be considered in the indicator chemical selection process and in the determination of whether or not remediation is necessary at the site. Traditionally, constituents that are present in site media at background levels are not included as indicator chemicals. In addition, background levels are usually taken into consideration in the decision on whether or not remediation is necessary at a site. Although some of the metal concentrations used in risk calculations for some of the exposure scenarios may not have been greater than background levels, the calculated hazard indices for all exposure scenarios except for one (exposure to groundwater from the onsite overburden aquifer) were less than unity. In addition, the inorganics did not contribute significantly to any of the cancer risks.

For the exposure scenario in which the hazard index was greater than 1.0, it is the metals which account for the majority of the noncarcinogenic risks. However, it is not the metal concentrations in this aquifer that are of greatest concern at the site. The elevated concentrations of PAHs and PCB-1254 detected in the onsite water table were major factors in the determination that remediation is warranted at this site.

Comment:

The use of analytical data from unfiltered samples is not proper when calculating drinking water health risks, because drinking water wells that experience high sediment loads would be fitted with particle filters that remove suspended colloidal particles.

Response:

Unfiltered inorganic sample results were not used in the risk assessment calculations. On page 118, paragraph 2 of the RI report, it clearly states that dissolved inorganic results would be used in the risk assessment calculations to simulate conditions "at the tap." However, in accordance with EPA Region III policy, unfiltered organic analyses were used in the risk assessment.

Comment:

Missing from the dose-response evaluation is the explanation of the rationale that presumes 100 percent absorption of all constituents, ostensibly based on the premise that all of the toxicity parameters (reference doses, cancer potency factors) are intake derived. Not all of the intake parameters for all of the compounds are based on uptake. Also missing from the dose-response evaluation is the justification for the assumptions made regarding the dermal absorption rates for the various constituents.

Response:

It is recognized that an explanation of the rationale that presumes 100 percent ingestion absorption for all constituents was not included in the dose-response evaluation section of the RI report. The rationale behind this assumption is that the reference doses are developed based on the dose to which the study animal was exposed and not on the amount that the study animal absorbed. In the risk assessment, the dose to which a receptor could be exposed under various scenarios is calculated. Therefore, the determination of the hazard index is based on a comparison of a calculated exposure dose with an acceptable exposure dose (reference dose). Consequently, it is valid to assume 100 percent ingestion absorption. In addition, the use of 100 percent absorption is in keeping with EPA Region III guidance on this issue.

Most toxicity parameters used in the risk assessment are based on intake. However, even if they were not intake derived, this is taken into consideration in the development of the reference doses and cancer potency factors. Therefore, for this reason also, it is acceptable to assume 100 percent ingestion absorption.

It is recognized that the justification for the assumptions regarding the values of the dermal absorption rates for the various constituents was not included in the RI report. Absorption rate values of 10 percent for volatiles, 5 percent for PAHs and PCBs and 0.5 percent for inorganics were utilized in the risk assessment because these are typical values used in risk calculations. There is no formal EPA policy regarding absorption rate values. There is not a consensus in the literature on the best dermal absorption rates. The absorption rate values used in this risk assessment are acceptable to EPA. Therefore, it is justified to use the dermal absorption values given above.

Comment:

The RI recognizes that there is a soil matrix effect but does not apply any reduction factor when calculating risks from dermal contact with and accidental ingestion of soil.

- The 5 percent dermal absorption rate for PAHs and PCBs is too high. A dermal absorption range of 0.3 and 3 percent has been suggested by Clement (Clement, 1987).

- PAHs in the foundry sands are not bioavailable due to the process (in the metal pouring) that transferred them to the foundry sand.

- Both PCBs and PAHs behave similarly to dioxin in the environment (with regard to soil adsorption). Umbrient (Umbrient, 1986) reports ingestion absorption rates for dioxin in soil as low as 0.5 percent.

- PAHs must be dissolved in a carrier in order to be absorbed by the study animal. The carrier changes their absorption character.

Response:

A more conservative approach was taken in the risk assessment and assumes a 5 percent dermal absorption rate for both PCBs and PAHs. This is a typical value used in risk calculations. Presently there is no formal EPA policy regarding absorption rate values; however, EPA has approved the use of a 5 percent dermal absorption rate for the risk assessment for this site. Even if the dermal absorption rates of 0.3 and 3 percent (for PCBs and PAHs) were used in the risk assessment, the decrease in the risk for the worst case scenario would not be significant. For the more plausible case scenario, the calculated risks would decrease by a factor of approximately 16.

There is no data available to confirm that PAHs in foundry sand are not bioavailable; therefore, it is assumed that the PAHs in the foundry sand are bioavailable.

A reduction factor has not been applied in the risk calculations to account for possible soil matrix effects because there is no widely accepted method provided in the literature to account for soil matrix effects in risk assessment calculations. Therefore, a 100 percent absorption rate for PCBs and PAHs was assumed in ingested soils.

It is agreed that by dissolving a PAH in a carrier (in order that it can be absorbed by the study animal), the absorption character of the PAH is changed. However, by assuming a dermal absorption rate of 5 percent, this is accounted for in the risk calculations and in the development of the reference doses and potency factors.

Comment:

It is erroneous to use analytical results from subsurface soil to characterize the risks associated with direct contact with and accidental ingestion of site soils. Deep foundry sands (below 4 feet from the surface) are not available for direct contact unless excavation takes place. Only the surface soil is subject to direct contact with subsequent ingestion and dermal absorption.

Response:

The risks associated with dermal absorption and accidental ingestion of surface materials (soil, mine spoils, and foundry sands) have been recalculated using surface media concentrations rather than the subsurface concentrations that were used in the original calculations. The sample results listed in Appendix G (Tables G-1 and G-2) were used to calculate the risks for both the "worst case" and "more plausible case" (average) scenarios. These tables do not provide the sample results for each of the specific surface media but rather they provide a single value for each specific contaminant detected in the site surface material as a whole. The risks have been recalculated.

Comment:

The assumptions regarding the bioavailability of inorganics (100 percent ingestion absorption, 0.5 percent dermal) are more than conservative.

- Toxicity parameters are unique to the particular compound administered in the study. Soil or foundry sand was not evaluated.
- The inorganics are present in the soils and residues mainly as part of the mineral context of the sand or soil particles and are not absorbed.

Response:

It is agreed that toxicity parameters are unique to the particular compound administered in the study. However, since specific toxicity parameters are not available for foundry sand and soil, the toxicity parameters available in the toxicological data base IRIS were utilized. The toxicity parameters found in IRIS have been approved by EPA for use in risk calculations. These toxicity parameters are presently the best available and most widely used toxicity parameters.

It is possible that the inorganics in the soils and residues are present mainly as a part of the mineral content of the sand or soil and are therefore not absorbed. However, there are no site-specific data available to confirm that this is the case. The absorption values used in the risk assessment (100 percent ingestion absorption, 0.5 percent dermal absorption) are typical values used for risk calculations. EPA confirmed that these absorption values were acceptable to use in risk calculations. When these values were used in the risk assessment for the site, the results revealed that all the hazard indices (for the accidental ingestion and dermal absorption of site surface media exposure scenarios) were less than one and the contribution of metals to the total cancer risk was insignificant.

TABLE 1

HAZARD INDICES AND INCREMENTAL CANCER RISKS FOR
DERMAL CONTACT AND ACCIDENTAL INGESTION EXPOSURES TO SITE SURFACE MATERIAL
OSBORNE LANDFILL SITE
GROVE CITY, PENNSYLVANIA

Exposure Scenario	Hazard Index		Incremental Cancer Risk	
	Worst Case	Average Case	Worst Case	Average Case
Dermal Contact with Site Surface Media by a Child	9.79×10^{-3}	1.83×10^{-3}	9.43×10^{-6}	1.67×10^{-6}
Dermal Contact with Site Surface Media by an Adult	6.29×10^{-3}	1.17×10^{-3}	6.06×10^{-6}	1.07×10^{-6}
Accidental Ingestion of Site Surface Media by a Child	5.17×10^{-2}	9.65×10^{-3}	5.50×10^{-6}	1.20×10^{-6}
Accidental Ingestion of Site Surface Media by an Adult	3.32×10^{-2}	6.21×10^{-3}	3.53×10^{-6}	7.74×10^{-7}
Total - Child	6.15×10^{-2}	1.15×10^{-2}	1.49×10^{-5}	2.87×10^{-6}
Total - Adult	3.95×10^{-2}	7.38×10^{-3}	9.59×10^{-6}	1.84×10^{-6}

Comment:

The calculated risks from arsenic associated with exposure to groundwater from the overburden aquifer are overstated.

- It is questionable whether arsenic is present at levels above background.
- Arsenic levels are below the Primary Drinking Water Standard Maximum Contaminant Level (PDWS-MCL), the only enforceable Applicable or Relevant and Appropriate Requirement (ARAR).
- The EPA Risk Assessment Forum has recommended reducing the calculated risks associated with arsenic by one order of magnitude due to the nonlethal nature of the cancer caused by exposure to arsenic in drinking water.
- The estimated cancer risk from arsenic is based on analytical data of questionable quality, since only a single groundwater sample revealed the presence of arsenic above the Contract Detection Limit (CDL).
- The only positive result for arsenic above the CDL is questionable because a duplicate sample from the same monitoring well showed no detectable arsenic.

Response:

Because of the nature of the site (a former strip mine), it is difficult to accurately determine background conditions in the water table aquifer. Therefore it is possible that the arsenic detected in samples from this aquifer may not be present at levels that exceed background levels. However the spreadsheets in Appendix I for the onsite groundwater ingestion scenarios (pp. 27-30) demonstrate that the contribution of arsenic to the total risk is insignificant compared to the contribution of polycyclic aromatic hydrocarbons (PAHs). A decision about the need for remediation at the site was not based solely on the presence of arsenic in the water table aquifer at a maximum concentration (14.2 µg/L), which is below the currently enforceable MCL.

It is not the policy of the REM III Team to reduce the calculated cancer risks associated with arsenic by one order of magnitude due to the nonlethal nature of the cancer caused by exposure to arsenic in drinking water. Presently, there are some data available that suggest a link between human ingestion of arsenic and the occurrence of internal cancers; therefore, we believe it is not prudent to reduce the risks from arsenic by an order of magnitude. A list of relevant studies and references that suggest this link between arsenic and internal cancer can be found in the following EPA document (pages C-1 and C-2):

EPA, 1988. <u>Special Report on Ingested Inorganic Arsenic - Skin Cancer; Nutritional Essentiality</u>. EPA/625/3-87/013, July [illegible]

In addition, it should be noted that as previously stated, the contribution of arsenic to the total cancer risk is insignificant.

It is our policy to utilize sample results that are below the CDL in the risk assessment. For a more detailed explanation of the reason for utilizing such data, see the response on page 4.

It was incorrect of the reviewer to state that a duplicate sample from the same monitoring well showed no detectable arsenic. The duplicate groundwater samples from monitoring well MWLW1-1 revealed the presence of arsenic at 14.2 µg/L and 12.2 µg/L. These sample results can be found in Appendix F of the RI Report.

Comment:

The calculated risks associated with PCBs and PAHs from exposure (via ingestion and inhalation) to groundwater from the site are overstated.

- The low solubility of the carcinogenic PAHs could be a strong indicator that they are not present in dissolved form.
- PAHs in groundwater were probably adsorbed onto colloidal particles that were able to get through the monitoring well screen.
- PCBs and PAHs detected in groundwater from the Overburden Aquifer would not be present in the water delivered to the tap because the sand filter pack installed on every drinking water well (to reduce turbidity) would remove them.
- The chemical analytical results from unfiltered turbid samples should not be used in quantifying risks.
- All of the PAHs were found in groundwater taken from a single monitoring well (MWLW1).
- PCB-1254 was detected at concentrations below CDLs.

Response:

PAHs have a low water solubility and therefore, it is possible that PAHs could be adsorbed to colloidal particles; however, there is presently no conclusive site-specific information available to determine the percentage of the PAHs that are dissolved in the overburden aquifer versus the percentage of PAHs that are adsorbed to particulate matter. The RI (page 4) recognizes the possibility that PCBs and PAHs may be adsorbed to suspended particulate matter and that the use of the onsite overburden aquifer as a domestic water supply source may be an unlikely exposure scenario. Additionally, the modeling effort presented in Sections 5 and 6 of the RI do not predict significant offsite migration of PCBs/PAHs. The risk analysis appropriately and conservatively evaluates the use of the onsite overburden aquifer.

In addition, even if PAHs were adsorbed onto colloidal particles, there is no site evidence available to suggest that such particles would not be delivered to the tap of a consumer utilizing the onsite overburden aquifer as a domestic water supply source. A sand filter installed on the well may reduce the amount of PAHs that reach the tap, however there is no guarantee that PAHs would be completely or sufficiently removed from the "at tap" water so as to reduce the risks to more acceptable levels. Also, it is incorrect to assume that every drinking water well would be installed with a sand filter pack. Therefore, the more conservative approach has been taken by assuming that the PAHs in the groundwater may be delivered to the tap and therefore could pose a health risk.

It is typically not EPA policy to filter organic samples. Even if the PAHs were found not to be dissolved in the groundwater, PAHs would still be included in the risk assessment calculations for the previously stated reasons.

PAHs were not only found in monitoring well MWLW1, as stated by the commenter, but were also detected in monitoring well MWLW2.

It is EPA Region III policy to use sample results that are below CDLs in the risk assessment. For a more detailed explanation of the reasons for utilizing such data, see the response on page 4.

Comment:

Exposure to airborne particulates migrating from the site is implausible. Consequently, the use of the Cowherd model is highly conservative. Input variables and the evaluation of the contaminants (e.g., chromium) are also highly conservative.

Response:

This is an irrelevant comment. The RI report states that cancer risks are below 1×10^{-7} and hazard indices are less than unity, even under the conservative scenarios used.

Comment:

There is a basic flaw in the use of extremely non-volatile constituents like the carcinogenic PAHs to calculate exposure using the shower model. Divergences were noted in input parameters used in the calculations.

Response:

PAHs are not extremely non-volatile; they are semi-volatile compounds with intermediate vapor pressures and Henry's Law constants. While the model does not specifically state that the use of semi-volatile compounds is appropriate, neither does it prohibit the application or state that such an application is inappropriate. Estimation of contaminant release into the air is based on the two-film gas-liquid mass transfer theory that is the basis for an overall mass transfer coefficient. The mass transfer may be limited by both liquid- and gas-phase resistances, but mass transfer of volatile organics with Henry's Law constants greater than 10^{-3} atm-m^3/mol-K is limited by only liquid-phase resistance. Nothing in the equations makes them inappropriate for use with semi-volatile compounds.

Several shower scenarios have been re-examined using the Foster and Chrostowski model with more appropriate input parameters. It was found that variations in shower room volume were most significant in the final calculations. Revised calculations have been prepared an incorporated in the FS. EPA comment: [Subsequent to development of this document, EPA's toxicologist Mr. Roy Smith found an numerical error in NUS's showering model. The corrected numbers are shown in table 5 of the ROD were used in EPA's decision for the Osborne Site. This change in the numbers did not substantially affect EPA's decision since contamination in the Clarion aquifer is above MCLs and the fill contamination requires remediation for PCBs, PAHs and metals]

Comment:

The whole section (Section 6.4 of the RI) does not provide a clear exposition of the uncertainties (and limitation) that are inherent in the Risk Assessment. There are uncertainties associated with: the chemical analytical data (there was no evaluation of its quality); toxicological parameters; pharmacokinetics; and extrapolation to human health.

Response:

The uncertainty section of the RI (Section 6.4) included a discussion pertaining to the following sources of uncertainty:

- The potential error in the estimations (e.g., contaminant intake levels, exposure time frames) used to calculate exposure doses for the worst-case and plausible-case scenarios.

- Reliance upon models used to predict contaminant levels and exposure doses.

- Limitations of the toxicological data base used to derive a Cancer Potency Factor or Reference Dose.

Contrary to the commenter's statement, the chemical analytical data were evaluated through the EPA required validation process. Only data accepted through the validation process (unqualified data, J, K, L, or [ ] data) were used in the risk analysis. Additionally, sampling and analytical uncertainties were discussed in Section 6.4.1.

To the extent possible, toxicity criteria available on IRIS or the Health Effects Assessment Summary Tables (third quarter FY1989) were used in the Risk Assessment. As these values are peer reviewed and take into account the uncertainty in the available toxicological data base, a detailed contaminant specific discussion of the basis of the toxicological parameters, pharmacokinetics, etc., is unwarranted and beyond the scope and purpose of the Risk Assessment.

Comment:

The use of the OLM to predict the leachate concentration using fill material chemical analytical concentrations is not appropriate for determining source loading. Consequently, the resultant OLM and VHS modeling results are highly uncertain.

- The OLM was not developed using field lysimeter measurements and TCLP data as stated in the RI report.
- For very low solubility compounds the OLM model will over-predict the leachate concentrations by 2 to 3 orders of magnitude.
- Use of the OLM to predict the leachate concentration using fill material chemical analytical concentrations is not appropriate for determining source loading.
- Comparison of risks generated using a theoretical leaching and groundwater model and those estimated for the average observed concentrations is meaningless.
- Use of the OLM concentrations in this model (VHS) would be subject to the same objections as listed above.

Response:

The original OLM used a factor of 0.00211, while the revised version used a factor of 0.00221 in the regression analysis. This different value incorporates the revised leaching data base, which includes data developed during lysimeter tests and during the development of the Toxicity Characteristics Leachate Procedure (TCLP) (51 FR 41088). This slight variation will make no significant difference in the final leachate concentrations predicted by this model.

The commenter indicates that the OLM will overpredict leachate concentrations for low solubility compounds by 2 to 3 orders of magnitude. The EPA states that (51 FR 41089) "the observed low (coefficient for multiple correlation) R^2 for the very insoluble compounds is probably due to the inherent inaccuracies and variabilities of analytical results at very low concentrations rather than an inaccuracy in the empirical equation."

The commenter also states that the model is conservative for the purpose for which it was intended, i.e., to evaluate leachate concentrations from waste. While it is true that the OLM was developed for actual waste delisting activity, the EPA also must assess the hazards due to disposal of the waste in a non-Subtitle C setting where no regulation occurs or has occurred. There is no guarantee, as the commenter implies, that waste materials become strongly adsorbed to a solid matrix material over time. It is possible that as the wastes age, that they become more soluble. At any rate, EPA is charged with protecting human health and the environment, and preferentially errs on the conservative side.

Actual contaminant concentrations are useful in predicting health effects resulting from existing groundwater contamination. The data generated from the leaching/groundwater modeling are used in predicting future risks in a scenario where the groundwater may be remediated while the source material remains on site. The risks are not directly comparable and actually serve two distinct purposes in the RI/FS process.

The VHS model is used to estimate the ability of an aquifer to dilute the toxicants from a specific volume of waste. The entire model is based on contaminant concentrations in leachate.

Comment:

This position (the inclusion of the majority of site contaminants as indicators) is an extreme "worst case" where maximum observed concentrations are presumed to be uniformly distributed over the site. Prevalence should be considered in the inclusion or exclusion of data. A single positive detection is not a verified finding. This "worst case" position is further exaggerated by inclusion of constituents that were found below the CDLs at the maximum observed concentration. We believe that an adequately conservative "worst case" evaluation is one that: uses maximum observed concentration above the CDLs; maximum reported (in the toxicological literature) absorption factors, both dermal and ingestion; for an upper bound exposure scenario where the exposure parameters are higher than those postulated for the most probable case. This would result in a conservative estimation of health risks that is still overstated because upper bound parameters are used for water and soil ingestion rates, carcinogenic potency and the uncertainty factors integrated into the RfDs.

Response:

The conservative worst case exposure scenario may certainly be defined by manipulating exposure parameters such as ingestion rates, absorption factors as well as by the evaluation of maximum contaminant levels. The RI evaluated the worst case scenario by using maximum contaminant levels, which is a well accepted methodology for Superfund risk assessments. The evaluation of maximum contaminant levels errs on the side of safety by focusing on "hot spots" of contamination to which receptors may be exposed.

The statement that upper bound parameters are used for water and soil ingestion rates that are typically cited in EPA references and the scientific literature is not necessarily true. For example, the 2 liter per day water ingestion rate is generally described as an average water ingestion rate.

Comment:

The PCBs found in the onsite surface and subsurface soil should be separated into those two potential exposure classes. In addition, the data are not further characterized by prevalence, i.e., number of positive detections above CDLs per number of samples analyzed, as a measure of the probability of exposure. This is especially important in presenting a balanced evaluation when employing such conservative protocols as assuming uniform distribution of a toxic constituent over the entire media at the maximum observed concentrations. It is our understanding that the constituent values cited in this statement originated in the data obtained in previous RIs. The report should clearly state this fact and its meaning in the context of present day exposure.

Response:

It is agreed that analytical data found in surface and subsurface soil be separated. However, the data presented and discussed in this section of the RI (1.2) are from previous investigations as clearly stated on page 18 of the RI. It is presented as "site background information." A detailed presentation (including statistics) was never the intent of this section.

Comment:

The following remedial investigation/risk assessment terms, phrases, or concepts were unclear or improperly defined or utilized in the RI report:

- Weight of evidence
- Fingerprint
- Risk characterization
- The basic cancer risk equation
- The use of standards/criteria in risk assessment/risk characterization

Response:

The "weight of evidence" phrase presented on page 158 of the RI Report, second paragraph, is descriptive of the toxicity profiles in that the profiles briefly summarize available toxicity data from the literature for an indicated compound. Given that the weight of evidence term is most commonly used in the context of classifying carcinogens, alternative wording may eliminate any confusion for the reader.

The term "fingerprint" as used in the RI is a reference to the compounds most representative of contamination at or migrating from the site. The term is not indicative of a particular product such as gasoline or diesel fuel.

As discussed in SPHEM (EPA, 1986), risk characterization estimates potential noncarcinogenic and carcinogenic health risks associated with contaminant exposures. It is agreed that risk characterization (formally) does not compare actual or predicted toxicant concentrations to standards/criteria although such comparisons are frequently made (e.g., regulators use such comparison to determine compliance/noncompliance) as a less formal indication of the potential for adverse effects.

The statement presented on page 155, third paragraph, indicating that the comparison of predicted doses to reference doses provides a semiquantitative indication of the likelihood of threshold effects is a reference to the fact that the predicted dose/reference dose ratio is not a mathematical prediction of the severity or probability of toxic effects, it is simply a numerical indicator of the potential for adverse effects.

Regarding the cancer risk equation presented on page 186, second paragraph, SPHEM (EPA, 1986) indicates that "for relatively low intakes it can be assumed that the dose-response relationship will be in the linear portion of the dose response curve. Under this assumption, the slope of the dose-response curve is equivalent to the carcinogenic potency factor and risk will be directly related to intake at low levels of exposure." The carcinogenic risk equation is as presented on page 185 of the RI and page 77 of SPHEM (EPA, 1986). This expression will produce incremental cancer risk in excess of unity when large doses are evaluated.

The equation (RI, page 195) is valid only at low risk levels. For sites where chemical intakes may be large, an alternative model should be considered. For example, the one hit equation which is consistent with linear low dose model may be useful. The carcinogenic risk equation is as presented on page 186 of the RI and page 77 of SPHEM (EPA, 1986). The wording presented in SPHEM (EPA, 1986) agrees with wording presented in the RI page 185 and 1986.

Comment:

The following inconsistencies exist between the text, tables and/or spreadsheets:

- Tables ES-2 and 6-9 are identical and purport to tabulate the cancer risks and chronic toxicity health risks associated with future domestic use of groundwater under the site (for the Overburden Aquifer). The text in Section 6 indicates that the detailed calculations are presented in Appendix I; however, the Lotus spreadsheets do not agree with the values shown in Tables ES-2 and 6-9.

- Bis(2-ethylhexyl)phthalate was not listed in the chemical analytical data base as a contaminant in the Homewood Aquifer yet it was used in the risk calculations associated with domestic use of on-site groundwater from this aquifer.

- Di-n-butyl phthalate was not detected in the Overburden Aquifer.

- Pentachlorophenol was erroneously ascribed to the Overburden Aquifer; it was found in the Mine Spoils Aquifer.

- Benzene was not detected in the samples obtained during this RI.

- The Mine Void is not part of the Clarion Formation. Consequently, the values reported for vinyl chloride and TCE on page 20 of the text do not agree with Table G-13.

- The concentrations of several contaminants detected in site groundwater, soils, surface water, etc. are summarized on pages 19-21. In several cases, some of the sample results do not agree with the value result given in Appendix F and/or tables found in Appendix G.

Responses:

It is recognized that there are some discrepancies between the spreadsheets in Appendix J and Tables ES-2 and 6-9. A new table has been developed for the final FS. The risk calculations that were originally summarized in Tables ES-2 and 6-9 have been recalculated to incorporate changes in some of the input parameters for the shower model. The following changes were made to this model, which resulted in a lower risk estimate.

Parameter	Original Value	Corrected Value
Calibration water temperature, Tl	298 K	293 K
Shower water temperature, Ts	323 K	318 K
Water viscosity at Tl	1.002 cp	0.982
Water viscosity at Ts	0.5996 cp	0.616 cp
Shower water droplet diameter	0.25 mm	1.0 mm
Shower droplet drop time	0.5 sec	2 sec
Shower water flow rate	0.3 L/min	10 L/min
Shower room air volume	1 m^3	10 m^3
Air exchange rate	0.011 min^{-1}	0.0083 min^{-1}
Shower duration	20	15
Total duration in shower room	50	20

In addition, the cancer risks from exposure to anthracene and pyrene have been subtracted from the total risks listed on the spreadsheets. These values have been listed in the new summary tables.

Bis(2-ethylhexyl)phthalate is listed in the chemical analytical data base as a contaminant in the Homewood Aquifer. This compound can be found on pages 48 and 52 of Appendix F.

Di-n-butyl phthalate was detected in the Overburden Aquifer. The sample data can be found on page 40 of Appendix F.

The Mine Spoils Aquifer and the Overburden Aquifer are the same aquifer. Therefore, pentachlorophenol can be ascribed to the Overburden Aquifer even though it was listed in the chemical analytical data base as a contaminant detected in the Mine Spoils Aquifer.

Benzene was detected in samples that were obtained during the previous and most recent RI. Positive results for benzene can be found in Appendix F, page 35. Benzene was detected in monitoring well MWLW1 at concentrations of 3.2 µg/L and 3.5 µg/L.

The REM III Team considers the Mine Void to be part of the Clarion Formation based on the geologic conditions at the site.

It is recognized that some sample results summarized on pages 19-21 do not agree with the sample results given in Appendix F and tables found in Appendix G. The reason that they do not agree is because these pages summarize sample results from previous studies, specifically the initial RI and the EPA FIT investigation. On page 19, paragraph five, it clearly states that the findings from these two (previous) investigations are summarized in the following sections.

Issue No. 2: There is no evidence that vinyl chloride detected in the Clarion Formation comes from the Osborne Landfill Site.

Comment:

Numerous comments were submitted by the PRP's and their consultants regarding statements made in the RI and FS reports that the source of vinyl chloride is believed to be the Osborne Landfill Site. Commenters indicated that little (i.e., below detectable levels or below the Contract Detection Limit) vinyl chloride contamination was detected either along the perimeter of the landfill or within the landfill itself and that higher levels of vinyl chloride were detected offsite. The commenters also believed that offsite sources of groundwater contamination could be responsible for the vinyl chloride contamination in the mine void and Clarion Formation. Commenters stated that there was no significant vinyl chloride contamination (or its parent product such as trichloroethene or related constituents) detected in soil samples collected from the fill area, which would not support statements that the site is the source of the vinyl chloride contamination. Additionally, one comment indicated that chemical data do not support statements in the RI and FS that drums atop the highwall may be responsible for the vinyl chloride contamination.

Response:

The fact that vinyl chloride was detected at the maximum observed levels in a well location (MWV2) on the eastern property boundary of the site is one possible indication that the site may be the source of the vinyl chloride contamination. This conclusion is further supported by the fact that vinyl chloride was not detected or was found in only trace amounts in the Clarion or mine void wells located at greater distances from the site. The absence of vinyl chloride in onsite monitoring wells does not necessarily mean that vinyl chloride is not present onsite (vinyl chloride <u>was</u> detected onsite during the PRPs 1984 RI and was detected in onsite surface water samples). This absence may easily be accounted for by taking into account the size of the site versus the number of monitoring points. A single discrete release area of vinyl chloride may easily have been missed by the network of monitoring wells, which was intended to characterize general groundwater quality rather than provide blanket coverage of the entire site. If for example vinyl chloride had been disposed of in the southeastern corner of the site or atop the highwall, none of the monitoring wells other than the ones that did show significant levels of contamination (MWV2, MWV5) would be expected to detect the release.

Another indication that the site may be the source of vinyl chloride contamination is the past history of materials taken to the site. These materials include large quantities of spent "spirits" which could potentially be the parent product of the vinyl chloride contamination. It is possible that a reservoir of volatiles does exist at the site, but was not detected during the RI (low levels of TCE were detected in a limited amount of soil samples). Another possibility is that the reservoir of volatile contamination was previously remediated during the 1983 removal action. (No analytical data could be found for the 45 cubic yards of soil that were excavated during this removal action.) It is believed that these soils were excavated as a result of leaking drums that were present above the highwall, contrary to comments indicating that the chemical data do not support this possibility.

Issue No. 3: The information within the RI Report fails to provide an accurate and consistent assessment of groundwater flow associated with the overburden and underlying aquifers. Inaccuracies in the interpretation of vertical flow into the underlying aquifers affects the evaluation of potential contamination migration from the site.

Comment:

Various comments on the RI Report indicated that the hydrogeologic assessment was based on incorrect assumptions and interpretations of data, and that potential receptors or migration pathways could not be properly identified. Comments submitted by Fred C Hart & Associates stated that the RI report had numerous contradictions within the report with respect to the Clarion and Mine Void flow systems. The most significant comment pertained to whether there was a clear understanding of the relationship (groundwater flow) between the onsite water table, the mine void, and the Clarion Formation. Similar comments were submitted that questioned the interpretation of data for the Homewood Formation and whether the doming (mounding) characteristic of this formation was due to leakage along the well bore rather than leakage through the underlying clay layer. Commenters also questioned whether there was a clear understanding of the site geology, based on inconsistencies, deficiencies, and inaccuracies within the RI Report.

Response:

The interrelationships among aquifers in the site vicinity have been well established through the remedial investigation. Intervening confining units have been identified and characterized to the extent required to evaluate the site impacts. The findings of the RI represent a significant advance in understanding site conditions relative to the pre-investigation extent of understanding, which was presented by Cooper Industries and their consultant (Fred C. Hart, Inc.) as being adequate.

It is unclear how the commenter determined that the report implies that groundwater may flow preferentially into the mine void (specific page references would facilitate response) when the commenter later quotes the RI report as saying "the large head difference between the overburden and Clarion/mine void flow system suggests that the hydraulic connection and leakage rate across the highwall are limited." It is clear from this text of the report that preferential flow into the mine is not implied. The commenter's conclusion relative to limited flow from overburden into the mine void is the same as is presented in the report. The commenter perceives an incorrect implication where there is none.

Overall flow directions within the mine void are ultimately controlled by the location(s) of groundwater discharge points. As the strip mine pond east-southeast of the site is the nearest obvious discharge point for the mine void, interpreting groundwater flow within the mine to migrate towards this pond is appropriate. This is verified by the slightly lower water elevation in the pond than in the mine void, and the observed distribution of vinyl chloride. The suggestion for determining flow directions by using electronic water level indicators would be extremely costly, may not provide any conclusive definition to flow directions, and ignores the use of the simpler, more straightforward evidence available.

With respect to comments pertaining to the spoil material acting as an impermeable or low permeability barrier, the mine spoil and fill materials that comprise the overburden aquifer throughout the site can both be expected to have overall moderately high permeabilities. Along the southwest edge of the site, however, the overburden thickness is greater due to the ridge of mine spoil. This greater thickness of overburden above the water table results in greater lithostatic pressure on the aquifer, which would serve to decrease porosity and hence permeability to some degree. This decrease in permeability is probably not great; however, even a moderate decrease will be sufficient to deflect or refract the flow pattern along the slightly more permeable central portion of the site. Potentiometric surface maps support this idea. The mine spoil ridge is not presented as an impermeable or low permeability barrier as interpreted by the commenter.

In response to comments regarding inconsistencies associated with water level measurements in the Homewood Aquifer, examination of the water levels in the Homewood wells reveals that between the October 20, 1988, and February 21, 1989, a consistent 1.5-3 foot rise in water levels was noted, except in well UMW5. It appears that a 10-foot error was probably made in recording the water level in this well, as an increase in 10 feet would make this change in water levels fit in with the other data. All other water levels have been checked to identify any outliers (none have been found).

The commenter questions the presence of mounding on the basis of possible leakage along the well bore of monitoring well MWH4.

This is extremely unlikely as significant shrinkage cracks are uncommon and, if present, can be expected to be very localized especially where the cement is below the water table, as is the case for MWH4. Also, the highest water level was not measured in MWH4, but in UMW5, a well installed during a previous Hart investigation. Of the nine Homewood wells, UMW5, MWH4, and MWH2 all had water levels consistently several feet higher (5 feet or more) than the other wells. These wells also lie along a linear trend, which supports the RI report conclusions in preference to the commenter's interpretation. Pumping test data conclusively shows a greater hydraulic connection among these wells that exists between these wells and the six outlying wells.

The latter portion of the comment is also inaccurate as follows: The commenter states that the report describes the mound as a zone of increased transmissivity without increased recharge. The axis of the mound is considered to be an area of increased transmissivity; however, the report does not state anywhere that increased recharge is not occurring. In fact, increased recharge is fundamental to the existence of the mound. This recharge may be occurring near the offsite pond, as evidence by the highest observed hydraulic head being measured in UMW5. The highest hydraulic head will be found closest to the area of greatest recharge; therefore, UMW5 is the closest well to the recharge zone. The low gradient observed along the axis of the mound, coupled with the steep gradients away from the mound, support the RI conclusions as opposed to the commenter's assessment. Steepening of flow gradients can be a general indication of decreased permeability; therefore, the mound axis is a reflection of localized higher permeability instead of lower permeability as the commenter contends.

With respect to the comment that the Homewood Formation short-term pumping test was invalid, the short-term pumping test was designed to provide a general approximation of the Homewood aquifer characteristics. The results are considered to be a good estimation (much better than averaging slug test data but definitely not sufficient for final design of a groundwater extraction system). It would be premature to go through the considerable time and added expense to perform a long-term test before a determination is made whether remediation is likely to be required. Such a long-term test may require that a new pumping well be drilled and the addition of several more observation wells, along with additional manpower and equipment costs. The possible magnitude of error of the values calculated is greatly overstated by the commenter, as quasi-steady state conditions were being approached by the conclusion of the test. The probable range of error is less than one-half order of magnitude, in contrast to the commenter's contention of several orders of magnitude.

The commenter also presents a series of calculations intended to prove that the observed cone of influence could not have been created by the pumping test. The approach used by the commenter is totally inappropriate for the situation, as the fact that the aquifer is semi-confined is ignored in the analysis. A review of the summary of calculations reveals that porosities of 10 percent and 1 percent were used and that the approach taken assumes that the aquifer is dewatered (area of 2-foot drawdown contour is approximately 500 feet x 150 feet, 500 feet x 150 feet x 2 feet drawdown x 0.10 porosity = 15,000 ft^3 = 112,200 gallons). This ignores the fundamental fact that the aquifer is semi-confined and as such, was not dewatered at all during the test. As no dewatering occurred, the only release of water was from storage. According to Freeze and Cherry (1979), storativities in confined aquifers typically range from 0.005 to 0.00005. This release of water only from storage is why much larger, extensive cones of depression develop due to pumping from confined aquifers versus pumping from an equally permeable and porous unconfined aquifer (which would release water both from storage and due to draining of the interstitial pores). Substituting a range of storage values for the porosity values used in the commenter's analysis will result in an excellent match between the volume of water pumped and the observed cone of depression.

With respect to the comment that actual hydrologic values (Homewood Formation) cannot be determined using the data presented in the RI Report, the rapid drawdown observed is a characteristic response to pumping from a confined or semi-confined aquifer. Fracture controlled flow within the formation will further enhance this response, but does not by itself explain the drawdown patterns observed at UMW3 and UMW4. The proximity of these wells to the subcrop of the Brookville underclay, as mentioned in the RI report, is a more likely explanation for the non-characteristic responses observed in these two wells. The data were not made to fit any preconceived conclusions as suggested by the commenter, but was interpreted using an approach consistent with accepted analysis techniques. As "ideal" conditions and responses are rarely observed in actual field tests, especially in an aquifer with both primary and secondary permeabilities, an approximate fit rather than exact fit of the data is common and is routinely used in the analysis of pumping tests. The occurrence of varying rates of leakage from an overlying aquifer and the subcrop of the pumped formation in the vicinity of the test further complicate the situation, calling for a best fit approach rather than hoping for (and almost certainly never obtaining) an exact fit.

The analysis of the test data used is consistent with generally accepted practices, as sufficient pumping was performed to offset any early-time inconsistencies in the data, and quasi-steady state conditions were being approached. If remediation is required and a more elaborate pumping test is performed, alternate methods of analysis can be explored. The data obtained should be of greater detail due to the addition of additional and closer, observation wells, and thus appropriate for a more detailed analysis.

With respect to the comment that the RI Report attempted to substantiate the results of the pump test by performing a water balance, the analysis presented in the RI Report estimates the rate of leakage through the Brookville underclay by calculating discharge rates from the Homewood Formation along the site boundary. This approach assumes that the recharge to the Homewood Formation is due to vertical leakage from the overburden through the underclay onsite, which is consistent with the presence of a groundwater mound in the Homewood Formation onsite. The comment appears to have little or no relationship to this analysis. Either the comment represents a misunderstanding on the reviewer's part or additional clarification of the comment is needed. Groundwater discharge from the overburden into the mine void and the subsurface location of the Brookville underclay crop line have no bearing on the analysis, as the comment attempts to indicate.

With respect to comments regarding inaccuracies in the evaluations of site geology, and specifically the observed variability in the Clarion Formation thickness, it is obvious from examination of the boring logs and topography that the reported variation in thickness of the Clarion Formation is due to erosion of the upper portion of the Clarion Formation near the site. This is and has been understood all along; however, it does not alter the fact that the observed thickness of the formation ranged from 15 feet (where eroded) to 73 feet in the study area.

With respect to the comment pertaining to inaccuracies in the thickness of the Brookville underclay, the thickness on page 49 is reported to range from 0.1 to 9 feet, while on page 63, the thickness is reported to range from less than 1 foot to approximately 10 feet. It can be argued that 9 feet versus approximately 10 feet and 0.1 feet versus less than 1 foot represent somewhat of an inconsistency; however, it is obvious that the significance of this is minimal, if any. The range reported on page 63 is a generalization of the more precise numbers given on page 49. The implication that defining the thickness to within one inch is critical to understanding vertical migration rates is an oversimplified treatment of the actual conditions. In reality, the thickness varies considerably across the site due to depositional, erosional, and man-induced (mining) factors, thus leakage rates will vary considerably across the site and surrounding area. In some areas, the clay may be totally absent and in others it may exceed 9 (or 10) feet. The accuracy of any calculations must be considered approximate due to the variations in thickness and also the probable wide variations in permeability within the Brookville underclay. The commenter implies that a much greater degree of accuracy would be gained by a more precise definition of the underclay thickness, when in fact, the improvement in accuracy that is implied would actually be minimal due to other variations in physical characteristics.

With respect to the comment pertaining to consistencies and inaccuracies of Figures 3-4, 3-5, and 3-7 (in the RI report), the water levels appear inconsistent because they were recorded on different dates. Figure 3-5 water levels were taken August 5, 1988, and can be added to the legend of this figure. Figure 3-7 water levels were taken on February 21, 1989, as indicated. Due to the scale of Figure 3-5, the screened interval at MWV2 and MC3 was not indicated. This interval could be added to the figure. Furthermore, well construction diagrams, which can be found in the appendices, indicate the screened intervals of all wells. The Upper Burgoon sandy shale shown for MWB2 is shown to be the same thickness on both Figures 3-4 and 3-5. This thickness is scaled off to be approximately 29 feet. The total thickness of the Burgoon formation at MWB2, as shown on both figures is approximately 110 feet. It does appear that there is a slight drafting error on Figure 3-1 showing the placement of the top of the open borehole, which should start just below the gray sandy shale. This can be corrected; however, the thickness of the Burgoon Formation at this well is depicted correctly on both figures.

In response to the comment pertaining to inconsistent water level measurements between Figure 3-6 and Figure 3-7, water levels depicted on these two figures were measured on separate days. Those water levels shown on Figure 3-6 were taken March 3, 1989, and the water levels depicted on Figure 3-7 were taken February 21, 1989. Both figures do indicate the date of the water level measurement event.

With respect to the comment that states that various figures do not display the water levels by which those figures were derived, pages 55 and 56 of the RI report (Table 3-1) display all water levels from various dates of all the monitoring wells at the site. It is from this table that the contour maps were constructed. A reference to this table could be inserted under the legend of the above noted figures.

In response to the comment that the water level for MWU2 was deleted in the interpretation of the potentiometric surface and that that this may affect the depicted direction of flow, the water level elevation for MWU2 was not deleted in the interpretation of the potentiometric surface and flow directions are not affected (see Table 3-1 for water level elevations). However, no contour lines were drawn at MWU2 due to the lack of data points near this well and due to the distance of MWU2 from the other 3 wells. Water level elevations of MWU2 on the 3 dates used to construct the potentiometric surface maps are lower that the 3 upgradient wells, indicating a general flow direction towards MWU2, i.e., a northwesterly flow direction as mentioned on page 71 of the RI report.

Issue No. 4: The evidence does not show that vinyl chloride has migrated to the Homewood or Burgoon Formations from the site, and therefore further study to monitor the levels in those wells should not be assessed against the Osborne Landfill Site.

Comment:

The most significant comment pertained to whether the Homewood Formation, which has exhibited low levels of trichloroethene at one well near the boundary of the fill material, is a receptor of contamination from the above disposal area (onsite water table). Commenters indicated that they felt that the low levels of TCE were due to leakage along the well bore rather than from leakage between the formations. Similar comments were made with respect to the Burgoon Formation, which exhibited low levels of vinyl chloride. Commenters also indicated that the vinyl chloride contamination in the Burgoon could be the result of improper well construction. Comments submitted by the PRPs indicated that resampling of these wells (which exhibited contamination during the RI but not during the resampling) proved that the contamination detected during the RI was probably due to leakage along the well bore.

Response:

No elaborate theories regarding groundwater migration from the site to the Burgoon aquifer were presented in either the RI or FS reports for the site. The Fred C Hart sampling of the wells in 1989 does not provide any evidence to support the contention that leakage along the well bore annulus is responsible for contaminants found in deeper aquifers. Extended pumping of the wells prior to sampling would serve to increase any leakage rates from overlying aquifers to the well, as the greatest drawdown due to pumping would occur in the immediate vicinity of the well. This would accelerate any leakage that might be occurring; therefore, if leakage is occurring, contaminant levels in the well could be expected to rise due to the pumping.
The Hart idea that shrinkage cracks may be a migration pathway is an extremely remote possibility at best, as the shrinkage cracks would have to propagate vertically for great distances or be found as a network of closely spaced, interconnecting fractures throughout the length of the cased-off borehole. This is extremely unlikely, especially in solid rock and under saturated conditions.

The well construction techniques used during the field activities conform to the current guidelines for monitoring well installation through a confining layer (using steel casing set and grouted in place through the confining layer). The sampling performed by Cooper did nothing to substantiate the potential for leakage along the casing annulus, as the extended pumping would serve to accelerate any leakage that may be occurring instead of negating the leakage effects. The Cooper sampling actually <u>confirmed</u> the presence of TCE in the Homewood monitoring well MWH4. The sample collected (MWH4-2) after pumping the well for an extended period actually exhibited low levels of TCE (2 μg/l), based on the laboratory backup sheets that were submitted to EPA by Cooper Industries.

Issue No. 5: Serious deficiencies in sampling procedures were noted, which call into question the validity of some analytical test results.

Comment:

Numerous comments were received that identified alleged deficiencies during the various sampling activities. The most frequent comment pertained to improper or lack of decontamination procedures during the field investigation. Other comments pertained to improper sample preservation procedures, inadequate mixing of groundwater for sample splitting, inconsistent sampling procedures during the soil gas study, improper backfilling procedures of test borings, improper sample collection with respect to the sampling interval, inconsistent use of latex gloves during sampling, potential contamination of wells due to polyethylene shavings being observed falling into some wells, and improper collection of one residential sample. Another comment indicated that a metal sampling device was (accidentally) dropped into one of the monitoring wells.

Response:

The deviations from the Field Operations Plan (FOP) were minor and appropriate safeguards were taken to ensure that quality data were gathered. As invariably occurs with any field investigation of this magnitude, unexpected conditions are encountered and situations develop which require field modifications to planned procedures. The stated magnitude of the potential problems described by the PRP is greatly overstated. The procedures employed, in general, conform to currently acceptable methodologies for field work. The levels of contaminants detected in monitoring wells and the close agreement between analyses of samples obtained from the same wells over multiple sampling rounds is a clear indication of the overall high quality of the data gathered.

It is important to additionally note that the PRP oversight personnel were present during all activities and did not express concern regarding any of the field procedures or minor modification of procedures at that time. In fact, certain modifications (e.g., soil boring sampling intervals) were modified at the request of the oversight personnel in order to accommodate their requirement to split samples.

With respect to the comment regarding the use of "dirty" polyethylene (PE) tubing, REM III field personnel rely on purging procedures to guard against contamination due to unanticipated field events such as small amounts of dust on the PE tubing. Our procedure is to lower the tubing a short distance below the water surface prior to purging. This minimizes contact between the PE tubing and sampling media. Near the end of a purge, the tubing is slowly withdrawn to insure that water, which has contacted the PE tubing, is removed. If the portion of the tubing that will enter the well is visually dirty, it is wiped off prior to use.

With respect to the comment that samples collected from two monitoring wells (SW2 and UMW3) were not filtered or acidified until the following day, this occured only due to problems with obtaining electric power in the field trailer and problems with the gas generator, which is the alternate source of power. Due to this occurrence and the approach of darkness, REM III personnel were forced to filter the remaining samples the following morning. A review of the analyses for the two samples in question do not appear to be significantly different from other wells in their respective formations. Thus, the effect of filtering and preserving the two samples on the following day does not appear to have impacted the usage of these results.

The use of latex gloves was found to be ineffective when raising or lowering the submersible pump and were not always used as the commenter stated. The weight of the submersible pump shredded the latex gloves, making their use irrelevant. As stated above, our purging procedures should protect against the chance of contamination caused by hand contact with the PE tubing or rope used for lowering the submersible pump. Latex gloves were used when handling the submersible after deconning and prior to entry in the well, unless it could be placed in the well without hand contact.

With respect to the comment that inadequate mixing of split samples sometimes occurred, not inverting a mixing bottle was an oversight that had a negligible effect on sample mixing due to the homogeneous nature of the sample media (groundwater) and the mixing that occurs during the introduction of the sample from each bailer into the mixing bottle. The REM III Team was never informed that the PRP split sample results were not similar in nature.

With respect to the comment that the amount of preservative added was not always measured and that the use of pH paper is a subjective way to measure pH, the amount of preservative used will vary slightly from person to person. The requirement during preservation is to meet a specified pH, not to use a specified amount of preservative. Unless an excessive amount of preservative is used to reach a pH level, then the amount of preservative used is inconsequential. The subjectiveness involved when two people compare colors of pH paper in the process of preserving samples is trivial to the resulting analysis.

In response to the comment that PE shavings were observed falling into monitoring wells MWH2, there is always a possibility of PE shavings entering a well when introducing or removing PE tubing. The sampling practice of using bottom loading bailers (lowered 5 feet to 6 feet below the surface of the water) should minimize PE shavings being introduced into the sample. When PE shaving are found in the sample, the labs are notified to take corrective action. No shavings were observed in any of the samples themselves.

In response to the comment that dirty nylon rope was used to lower the pump at well MWB1, it is not clear what Hart means by "dirty." It is REM III policy to use clean PE rope at each well. Prior to purging MWB1, it was established that the recharge rate was greater than the purge rate. The submersible pump was lowered to just below the water's surface minimizing any chance of contamination even if the rope was "dirty". The well results came back clean, again proving that the purging techniques were sound.

With respect to the comment that the Framus (a Framus is a small sampling device) was dropped into well MWV2, the framus is made of stainless steel and it is of no consequence that the Framus was left in the well. This well was found to be contaminated with vinyl chloride and not metals.

In response to the comment that water samples were collected from a garden hose at the Breese residence, sample 05-RW2-1 was taken directly from the spigot located on the outside wall of the Breese residence and not from the hose as implied by the commenter. The garden hose was only used to divert water away from the house while purging.

Issue No. 6: Serious deficiencies in the drilling procedures were noted which call into question the validity of some analytical results.

Comment:

A number of comments were generated by the PRP's consultant that pertained to alleged deficiencies during both the Phase I and II drilling programs. The most frequent comment pertained to whether some of the wells were properly installed (specifically, wells MWV2 and MWH4, which exhibited low levels of volatile organics). The commenters questioned whether some of the casings were properly decontaminated, whether the wells were properly grouted, or whether bentonite was used in the grout at all of the well locations. Other comments pertained to the integrity of well MWC1, since it was constructed near another monitoring well (MWO1) that was suspected of vandalism by the PRP's consultant.

Response:

The deviations from the Field Operations Plan (FOP) were necessary in a few situations due to unanticipated geologic conditions, which is not uncommon when installing monitoring wells. The modifications (or deviations) from the FOP were most often standard and acceptable practices for installing monitoring wells at hazardous waste sites. In some instances, what appeared to be a serious deficiency by the PRP oversight contractor was often either a minor issue, which had no consequence on the validity of the data, or was a misunderstanding of what was actually being done in the field. Overall, procedures employed during the drilling program conformed to acceptable practices for installation of monitoring wells.

In a few instances temporary surface casings were dragged over the site due to problems with site access in the early stages of the job. The casings were subsequently cleaned at the drill site by flushing with potable water and wiping away visible dirt, to the approval of the Site Geologist. All other permanent casings were decontaminated and moved to well locations on a skid. All further moving of temporary and permanent casing from the decon area to the drill site was performed by using a skid pulled by a small dozer.

The soil borings (i.e., test borings) were not grouted with a cement-bentonite slurry, but were backfilled with the cuttings as per the Field Operations Plan. Since the borings were advanced only to the confining layer, no migration from the upper horizons to the deeper horizons is likely and backfilling with grout is not warranted.

The decontamination procedure performed on the sampling equipment by NUS personnel was in accordance with the EPA-approved Field Operations Plan (FOP). This is the accepted decontamination procedure for Region III. The acid rinse step was omitted due to the leaching ability of nitric acid on stainless steel. As per the EPA REM III Program Guidelines -- "The acid rinse step is to be omitted if a stainless steel sampling device is being used and metals analysis is required with detection limits less than approximately 50 ppb." A nitric acid rinse was used on the filtering equipment glassware, as required in the FOP.

In response to the comment that sampling over a 4-foot interval is not an accepted practice for this type of study, this was not the original intention of the sampling program but rather, it was necessary to use this interval in order to collect a sufficient sample volume to split with the PRP's oversight contractor per their request.

In response to the comment questioning the integrity of well MW02 because it is located adjacent to a well that was suspected of tampering, the monitoring well (MW02) was installed according to specifications outlined in the FOP. This was a shallow (23-foot) well which required a flush mount construction. When installed this well did produce water, but later upon sampling, this well was dry and no chemical data was obtained. Furthermore, it is not known for certain the nature of the damaged well (MWC1), which could have been the result of a construction problem, rather than that of vandalism. A replacement well for the original MWC1 was installed as mentioned above. However, there is no evidence that the original well was vandalized and damage is most likely the result of a construction problem. In any event, the chemical data from well MWC1 showed no contamination (further indication that vandalism as described above did not occur).

With respect to the comment pertaining to not decontaminating water level indicators prior to inserting them into the borehole, the water level indicator in question was used to determine depth to gravel packs and bentonite during well construction and was used exclusively for measuring these depths, as this device had a weighted end and was graduated in 5-foot intervals. This device was sprayed with DI water between boreholes. In addition, most measurements were made above the water table. A separate water level indicator was used to record water level measurements upon completion of the well. This instrument was also sprayed with DI water between boreholes. Additionally, it must be noted that the sampling procedure requires that wells be purged between 3 to 5 well volumes prior to sampling, to insure that an unbiased "representative" sample is obtained.

In response to the comment suggesting that a small fire may have contaminated well MWB1, the fire in question was built by the drilling subcontractor and not under the supervision of the Site Geologist, as indicated by the commenter. The fire was built away from the well (MWB1) and all equipment. Furthermore, chemical results of the groundwater at this location showed no contamination.

With respect to the comment that an 8-inch temporary steel casing was not steam-cleaned and was visibly dirty prior to installing it in boring MWB2, an 8-inch casing was not set in well MWB2. A series of casings were set in this well to get below the coal seam and included a 12-inch temporary casing to 20 feet and a 10-inch temporary casing to 57 feet. A 6-inch permanent casing was ultimately set at 190 feet. The 10-inch casing was decontaminated at the subcontractor's shop -- as this casing had to be set quickly in the field, due to placing it below the mine void opening (i.e., to prevent almost immediate hole collapse). The permanent 6-inch casing was decontaminated properly and was grouted in according to the specifications. It should be noted that groundwater from the sampled zone does not at any point contact the 10-inch casing.

The commenter stated that the 6-inch casing (set to 205 feet in borehole MWB1) had small gaps due to the re-welding and re-setting of this casing. In response to this allegation, no gaps were observed by the REM III field representative and as mentioned earlier, a 4-inch casing was set to 210 feet within this 6-inch casing and properly grouted as return of grout was evidence at the surface, ensuring a complete grouting operation. Furthermore, as mentioned earlier, the chemical results of the groundwater from this well showed no contamination.

In response to the comment that stated that bentonite was not used in the grout mixture at wells MWB1, MWB2, and MWH2 and that this increases the probability for shrinkage cracks, bentonite was used in the grout mixture for all of the permanent casing installations. The drilling subcontractor was informed of this prior to initiation of work. It may have been possible that for a temporary installation -- even though grouting was not required -- the subcontractor elected to use a cement-only grout so that the outer casing did not become dislodged during drilling.

With respect to the comment that Pennsylvania Drilling personnel were seen dragging a compressor hose across the site without decontaminating it before use, the dragging of the compressor hose over the ground may have occurred on one or two occasions. However, the subcontractor was instructed to decontaminate the development hose before inserting it into the well. Furthermore, in most cases, the hose was not completely submerged. In addition, prior to sampling, all wells were purged of 3 to 5 volumes according to EPA protocol.

In response to the comment that the annular space between the casing and the borehole was insufficient to insure proper grout placement (MWB2), the annular space between casing and borehole involving permanent installations was properly achieved. In instances where temporary casing was installed, it was not required to have an annular space and in some cases the casing did have to be driven in place as the commenter indicated. Monitoring well MWB2 had 3 different size casings set in place, two of which were temporary. The permanent 6-inch casing, which was set to 234 feet, was set in a 10-inch hole drilled to 190 feet, then due to drilling difficulties, was reduced to an 8-inch hole from 190 to 234 feet. Nevertheless, the entire string of 6-inch casing was set without difficulty to 234 feet and properly grouted. In addition, the entire 6-inch casing from 57 feet to 234 feet was set and grouted in bedrock, which ensures a more competent annular space than for example an overburden situation.

Issue No. 7: The data do not show that PAHs or PCBs are dissolved in the onsite water table and are not mobile.

Comment:

Numerous comments were submitted by the PRP and their consultants on whether PAH and PCB constituents are present in the water table. The major point of these comments is that it has not been analytically proven that these constituents are in soluble form, but rather that they are suspended particles and would not be able to migrate offsite. Commenters also indicated that the supplemental groundwater sampling performed by Cooper Industries did not detect any contamination in the onsite monitoring wells (with the exception of low levels of naphthalene) and that the presence of PAHs and PCB in the "RI" samples may be due to improper well development or purging. Other comments indicated that due to the low water solubility of PAHs and PCB, these contaminants are not likely to leach into the groundwater.

Response:

The sampling of the onsite water table monitoring wells (i.e., the LW series wells) was conducted in accordance with proper sampling protocols. The commenters indicate that the presence of PAHs and PCBs in the groundwater analytical results may be due to improper well development or purging. The wells were developed by the PRP's consultant when they were installed in 1984 and no information is available regarding the procedures used to develop the wells. It was assumed that these wells were properly developed when they were constructed. The sampling of the LW series wells during the REM III RI followed EPA-approved protocols. The wells were purged of 3 to 5 well volumes except in the case of monitoring LW-4, which was purged dry and left to recover (per the requirements of EPA guidelines). A comparison of field notes between the REM III Team sampling (1988) and the PRP's supplemental sampling (1989) revealed no differences in either sampling procedures (wells were sampled using either a stainless steel bailer or a teal pump) or purging procedures (the PRP's purging procedures were very similar to REM III's procedures). Additionally, no comments were submitted by the PRP's oversight contractor that implied that the wells were improperly purged. In summary, it is unknown why there were such extreme differences in the analyses. One may need to examine the analytical procedures to answer this question (the RI samples were analyzed by the EPA Central Regional Laboratory in Annapolis, Maryland).

Because the wells were properly purged, there was no reason to suspect that the PAHs or PCBs were not present in the onsite water table given the fact that the waste is below the water table and the waste is contaminated with both PCBs and PAHs. Additionally, data received by the laboratory did not indicate any problems with either the samples or the analysis of those samples. Split sample analyses for the most recent sampling (i.e., October 1989) revealed low levels of PAHs in Well LW-1. These PAHs included naphthalene (20 μg/L), fluorene (5 μg/L), phenanthrene (8 μg/L), and pyrene (2 μg/L). This confirms that PAH compounds are present in the onsite water table.

Other comments indicated that the PCBs and PAHs were most likely the result of suspended material because the samples were turbid. In response to this, some of the groundwater samples were turbid, which was not surprising since the wells do monitor the actual disposal area. However, samples collected from monitoring well LW-2 were reported as clear (i.e., not turbid) and this well was also found to contain PCBs and PAHs. Additionally, split sample analyses that were filtered in the laboratory (October 1989) revealed low levels of phenanthrene (2 μg/L), pyrene (0.3 μg/L), fluorene (2 μg/L), and naphthalene (10.3 μg/L), which suggests that these contaminants may be in the dissolved state.

Various comments indicated that the concentration levels found in the onsite water table samples were above the water solubility (in some cases) for those contaminants, indicating that the results are most likely representative of suspended particles. This was pointed out as a possibility in the RI. However, other groundwater contaminant levels were not above the water solubility and therefore, could not be ruled out as being representative of suspended particles especially since the wells are monitoring a flow system in which the waste is in direct contact with the groundwater and there is a potential for leaching. As noted above, lab-filtered samples revealed low levels of PAHs, which may indicate that some of the PAHs are not suspended, but rather dissolved.

Regarding those comments that indicated that the PAHs and PCBs are probably not mobile and would not be expected to migrate from the site, the REM III project team concurs with this. This was stated in the RI.

Issue No. 8: Inaccuracies in sample collection and evaluation of analytical results greatly impact the final conclusions within the public health assessment and the selection of remedial alternatives in the FS Report.

Comment:

A number of comments pertained to inaccurate assessments of the data base and the conclusions drawn from the these data. The most significant comment identified by the PRP pertained to the distribution of PCBs and PAHs throughout the fill material. Commenters stated that the limited amount of data from the disposal area were not sufficient to draw the conclusion that the entire fill area was for the most part similar and that only general statements could be made with respect to the distribution of contamination. One comment suggested that the data indicate that areas of potential concern are localized within the fill. Commenters also indicated that it was not valid to state that a single sample collected from the bottom of the fill is representative of the entire bottom portion of the disposal area.

Another major comment was whether there was any potential for future contaminant releases due to potentially buried drums at the site. Commenters indicated that the potential for buried drums was overstated and unfounded and it was unlikely that intact drums (with liquids) are present due to the age of the drums and the depth of the fill. One comment stated that liquid observed flowing from the drum during the 1985 test pit investigation was most likely water and not a liquid waste. A few comments also focused on the fact that over 600 drums have been removed from the site, and most of these drums contained solids, which would not move from the burial location by way of some environmental transport process.

Commenters also disagreed that the foundry sand exhibits an oily appearance, as stated in the RI and FS Reports. According to these comments, the oily appearance is due to coke breeze, which is a very fine material that is found in the cores.

A few comments dealt with the interpretation of the bioassay results (the RI Report indicated that the results were inconclusive). These comments suggested that the contaminated sediments were not impacting wetland biota, based on the results of the bioassay.

Response:

With respect to comments regarding the extent and characteristics of contamination throughout the fill material, based on the data collected during the REM III RI, it was apparent through boring logs that the entire fill material (from the surface to the base of the disposal area) was similar in physical appearance. Although the data base consisted of samples representing the top portion of the fill material (i.e., the top 15 feet), the sample analyses were similar in that both PAHs and PCB-1254 were often present. The one sample that was collected from the bottom of the fill material also exhibited these contaminants and the PAH concentration was similar to those samples collected from the top portion of the fill. Additionally, samples collected from the LW series wells exhibited PCB and PAHs, which indicates their presence at the bottom portion of the fill. Based on these facts, one could draw a conclusion that PAHs and PCBs are present throughout the entire disposal area. If more samples were collected, especially from the base of the disposal area, it is likely PAHs and PCB would be detected at similar concentrations.

With respect to those comments indicating the unlikelihood that future releases would occur at the site due to buried intact or crushed drums, there is sufficient evidence to not rule out this possibility. Based on the fact that 2 drums were uncovered during the EPA FIT investigation in 1984 and that numerous drum fragments were uncovered during the REM III test pit investigation, there is a possibility that a future (or most likely ongoing) release is possible. Information obtained from EPA files on the quantity of waste products taken from the Cooper foundry to the site also supports the potential for future releases from the site area. This was proven by the EPA FIT investigation when a leaking drum was detected. The contents of the material leaking from the drum was sampled and found to contain xylene and ethylbenzene and not water as stated by the commenter.

Several commenters indicated that the oily appearance of the foundry sand is due to "coke breeze" rather than oil (the RI and FS reports describe the foundry sand as having an oily appearance). This may or may not be true. Examination of boring logs indicate that those samples that exhibited an oily appearance often exhibited a fuel-like odor. This was also true of boring logs that were submitted by Hart during the 1984 Remedial Investigation. Based on this description, along with information pertaining to the types of materials disposed of at the site (scrap oils, etc.), it was not unreasonable to state that the foundry sand exhibits an oily appearance. It is the opinion of REM III personnel that the foundry sand was oily in appearance because of substances disposed of at the site. The fact that not all of the foundry exhibited an oil appearance does not support the PRP's theory that coke breeze is responsible for the oily appearance.

Various comments indicated that the source of volatile organics is not supported by the data. Groundwater samples collected during the 1984 RI from the LW series wells, which monitor the onsite water table, exhibited low levels of vinyl chloride. Samples collected from the Clarion Formation (during both of the RIs) also exhibited vinyl chloride. The source of this vinyl chloride is suspected to be the site based on the history of waste disposal at this site, and the high levels of vinyl chloride in the near vicinity of the site (near the highwall). Although soil contamination did not exhibit any significant levels of volatile contamination, this may be due to any one of the following situations:

- The source within the fill material was not detected (the soil data base is small compared to the total size of the site).
- The source of volatile contamination may have been remediated during the earlier removal action, when 45 cubic yards of stained soil were removed by the PRPs (no full chemical analysis of these soils could be found in any report).

With regard to comments suggesting that the bioassay results indicate no impact to the wetland biota, one cannot conclude that the bioassay tests are representative or accurate because of major problems with the control samples. It is agreed that those samples collected from the wetland sediment did not indicate significant impacts to the wetland biota, however, the accuracy of the tests are questionable and that as a whole, the results of the tests are inconclusive because of control sample (QA/QC) problems.

Issue No. 9: Based on the analytical and empirical results presented in the Final RI Report, the RI objectives were only partially achieved. Much of the resultant investigation did not further expand on the analytical evaluation provided by Cooper in their 1984 RI Report.

Comment:

Various comments indicated that the RI performed by EPA failed to demonstrate a more accurate approximation of contaminant distribution throughout the fill area; failed to identify contaminant pathways, which are required to support the report's conclusions in a logical manner; and it failed to identify an onsite source for the vinyl chloride contamination in the Clarion Formation and mine void. One commenter indicated that the initial RI did adequately characterize the fill material in the context of evaluating health risks and developing remedies.

Response:

The RI conducted under the REM III Program was by far a more thorough and accurate assessment of the site than what was known beforehand. Previous studies conducted by the PRP were limited in data collection such that it was difficult if not impossible to meet the requirements of SARA. For example, the RI performed in 1984 did not result in the collection any soil samples for chemical analysis. Additionally, after determining that the Clarion Formation and onsite water table were contaminated, no further sampling was performed to determine the extent of the groundwater contamination. The risk assessment performed under the PRP's RI was inadequate in that it did not include quantitative assessments of carcinogenic risks or calculate hazard indices. Overall, the Risk Assessment did not meet EPA requirements under SARA.

For the most part, the REM III RI resulted in characterizing the fill material and the extent of groundwater contamination.

Issue No. 10: CERCLA does not require removal or treatment of the onsite material.

Comment:

A lengthy comment was submitted by the PRP with respect to whether the intent of CERCLA was to prefer treatment alternatives over containment alternatives. The comment also indicated that the calculated public health risks were within the range of 10^{-4} to 10^{-7}, which (according to the PRP) is "defined as acceptable for a CERCLA site by long-standing EPA policy." The comment also states that the FS goals (with respect to PCB action levels) are inconsistent and that the PADER goal of cleaning up PCBs to background levels is not an ARAR. Objections were also made with respect to whether TSCA was an ARAR, since TSCA was intended for spills which occurred prior to 1987.

Response:

Under SARA, there is definitely a preference to select, to the maximum extent practicable, remedial actions that utilize permanent solutions and alternative treatment technologies or resource recovery alternatives.

The range of carcinogenic health risks (i.e., 10^{-4} to 10^{-7}) does not imply that if a certain risk estimate falls into this range then no action is appropriate. The goal of EPA is to reduce carcinogenic risks to the 10^{-6} risk level.

In response to the comment that the FS goals (for remediating PCBs) are inconsistent, a broad range of cleanup objectives (and not "goals" as stated by the commenter) are appropriate since there is more than one ARAR that deals with PCBs (e.g., TSCA provides various cleanup levels depending on the site conditions). In addition, risk-based action levels were considered, which resulted in other action levels. The PADER ARAR for cleaning up PCBs was also considered in the FS since it differed from TSCA. PADER has indicated that the cleanup of PCBs to background level is a state ARAR.

Issue No. 11: Groundwater within the Overburden Formation was erroneously considered to be Class IIB.

Comment:

Commenters questioned whether the overburden and deep mine void flow systems were Class IIB aquifers as opposed to Class III. Commenters also objected to these flow systems being treated as viable potable water resources for which public health risks were estimated. One commenter indicated that the RI report failed to show any analysis or justification for the classification of the various flow systems.

Response:

Several of the groundwater flow systems in the site vicinity are somewhat unusual and do not fall into rigid categories. The determination of the classification in these cases is somewhat subjective. The approach taken in the RI was to take the more conservative of two options, if the aquifer fell into a "gray" area according to the EPA guidelines. This approach is consistant with the intent of the guidelines, as environmental protection is the goal of the guidelines. A synopsis of the considerations used in the classification process was provided in the RI.

The commenter also seems to use a more restricted definition of the aerial extent of the aquifers in his assessment then was used in the RI. While the commenter apparently tries to limit the Clarion and overburden aquifers to within the site boundaries for classification purposes, the RI classification was based on these aquifers extending beyond the site boundaries and being used or potentially used offsite.

The Clarion aquifer is used in the area as a potable water source, while the overburden flow system could be developed for small scale use in the areas surrounding the site. Thus, both should be considered Class II. The RI executive summary was somewhat misleading relative to the actual assessment, as the evaluation of the overburden flow system was not limited to the onsite area as implied (nor should it have been) but was expanded to include the local area surrounding the site.

The Class II B classification for overburden groundwater is appropriate. While an argument can be made for onsite overburden groundwater to be assigned a Class III designation, the overburden aquifer in the area surrounding the site could potentially be used for small scale water supply. Offsite overburden groundwater is not substantially degraded and could be used either as is, or at worst, with some minor, easily implemented treatment system.

Issue No. 12: "For the most part, the mechanics of the [Feasibility] study have been undertaken properly with the exceptions noted... The following paragraphs highlight specific area of concern and shortfalls of the FS evaluations and recommendations."

Comment:

Specific FS comments were:

- The solidification technology should have been eliminated from consideration since the site wastes were not EP toxic and the contaminants were not subject to extensive movement due to leaching.
- Based on the results of the bioassay, the wetland sediments should be eliminated from consideration for remediation.
- Piping of treated water for discharge to surface streams at an offsite location should be considered as an alternative to reinjection to the mine pool.
- Diversion of offsite flows away from the site and into the adjacent wetlands needs further consideration because of the potential adverse impacts.
- It is economically infeasible to pump and treat the Clarion Aquifer and associated mine pool.
- Removal or treatment of all of the wastes onsite was considered in most of the alternatives in the Feasibility Study.
  Partial excavation or treatment should be considered since only some of the wastes are sufficiently contaminated to require remediation.
- An incomplete understanding of groundwater conditions at the site was used in formulating remedial options in the Feasibility Study. The selection of remedial options for groundwater should be deferred until after a more detailed study and analysis of groundwater conditions is performed.
- The Feasibility Study does not focus on a single set of remediation goals, but rather presents a broad set of goals that are sometimes conflicting.

Response:

Solidification technology was included for consideration because of its ability to reduce migration of the site contaminants through leaching and erosion. Evaluation of the site and possible remedial alternatives was based on reducing risk and environmental impacts. Whether the wastes are EP toxic was not a sufficient criteria for immediate elemination of solidification technologies.

The bioassay was conducted to determine if there were any environmental impacts to wetland biota other than those revealed by other methods of analyses used in the investigation. Including alternatives to remediate the wetland sediments was also based on the Commonwealth of Pennsylvania criteria that PCB contamination should be remediated to background levels.

Piping of treated water for discharge to surface streams at an offsite location was considered as an alternative to reinjection to the mine pool. This approach would require construction of several thousand feet of discharge pipeline. However, reinjection to the mine pool was judged to be feasible from a technical and regulatory standpoint. Since reinjection would not require constructing the longer discharge pipeline, it was apparently the less expensive approach. From a technical standpoint, discharge to surface streams is acceptable as an alternative to reinjection.

The potential adverse impacts of diverting offsite flows away from the site and into the adjacent wetlands was considered. Presently, the flow is ponded onsite where it slowly leaches through the waste deposit into groundwater and the mine pool. This situation is clearly unacceptable. Restoring the flow to its original (premining) course was selected as an alternative. The plan was reviewed with EPA and judged as not adversely affecting the offsite pond or wetlands. However, if a more detailed review indicates otherwise, construction of stormwater retention ponds to reduce peak flows may be needed.

It is economically feasible to pump and treat the Clarion Aquifer and associated mine pool. The fact that the mine pool is a large storage reservoir does not mean that remediation is impractical. Only a limited portion of the mine pool is currently contaminated. Assuming an average thickness of the mine void of 4 feet, a porosity of 50 percent (half the coal extracted), and a contaminated area of 50 acres, the total water volume is about 30 million gallons. This volume could be extracted by pumping at 60 gallons per minute above the recharge rate for a period of one year. Additional calculations are included in Appendix B of the Feasibility Study report. The Fred C. Hart pump test has no bearing on the above conclusion other than to illustrate that the mine void contains a large volume of water and is relatively permeable.

Removal or treatment of all of the wastes onsite was considered in most of the alternatives in the Feasibility Study because partial excavation or treatment of only some of the more contaminated wastes was judged impractical. As described on page 83 of the draft Feasibility Study report, results of the chemical analyses were reviewed to determine if there was a discernible pattern of contamination. Based on the physical and chemical characteristics of the waste, it is very likely that all of the foundry sand is contaminated with PCBs and PAHs. Therefore all remedial alternatives were based on dealing with all 233,000 cubic yards of waste material. It is agreed that only two sample locations exhibited high PCB levels. However, there is also the likelihood that additional areas exist that have not been detected.

The Feasibility Study does not focus on a single set of remediation goals, but rather presents a broad set of goals because of the need to address ARAR criteria, PADER criteria, and the generally more stringent risk-based criteria. Table 2-4 on pages 81 and 82 of the draft Feasibility Study report lists the remedial action objectives for the various site media.

Issue No. 13: "One of the most viable options for the remediation of this site, the use of Vertical Barriers, was prematurely eliminated from consideration."

Comment:

Several comments were directed toward the use of a slurry wall to partially contain the site. An alternative using a slurry wall was developed by the PRP and included in an addendum to the EPA draft feasibility study report.

Comments regarding the slurry wall alternative can be grouped into two categories. Some comments were directed toward the reasons that the slurry wall was originally eliminated from consideration. Other comments were directed toward the assessment of the slurry wall alternative as considered in the addendum to the draft feasibility report. Specific points raised in comments were:

- The slurry wall permeability will be lower than that used in assessing this alternative. Using a higher permeability results in higher estimated pumping rates and therefore higher water treatment costs.
- The slurry wall alternative is less disruptive than other alternatives such as onsite landfilling. This comment applies both during and after construction.
- The slurry wall will be as effective as other containment alternatives in preventing offsite migration of contaminants.

Response:

Elimination of vertical barriers during initial screening in the feasibility study was based on the need to extend the slurry wall several tens of feet through rock and through an abandoned mine. No record of previous construction under these types of adverse conditions were found. The alternative was reinstated after discussions with staff of Geo-Con Inc., a major slurry wall contractor. Based on using newly developed equipment that has been further modified by Geo-Con, they believe that construction under site conditions is feasible.

EPA organized a panel of experts to appraise the slurry wall technology in this unusual field environment. Their review supported the selection of the slurry wall alternative if proper studies are made before the design of the wall and if appropriate quality controls and quality assurance proceedures are followed.

OSBORNE LANDFILL SITE
ADMINISTRATIVE RECORD FILE *
INDEX OF DOCUMENTS

I. SITE IDENTIFICATION

1) Memorandum to File, re: Investigation of Osborne Site, 4/18/80. P. 100001-100002. Photographs of the site are attached.

2) Technical Direction Document, prepared by Ecology and Environment, Inc., 5/22/81. P. 100003-100003.

3) U.S. EPA Potential Hazardous Waste Site Identification, 6/14/81. P. 100003a-100003a.

4) Technical Direction Document, prepared by Ecology and Environment, Inc., 6/16/81. P. 100004-100017. The following are attached:

   a) an Acknowledgment of Completion for TDD form;
   b) a handwritten revised summary;
   c) a Model Worksheet form;
   d) six groundwater data sheets;
   e) a handwritten model justification.

5) Memorandum to Mr. Gary Bryant, U.S. EPA, from Mr. Ron Naman, Ecology and Environment, Inc., re: Comments on Sampling of the Osborne Landfill, 6/30/81. P. 100018-100018.

6) File Inventory List, 7/8/81. P. 100019-100060. The following are attached:

   a) a U.S. Government Bill of Lading;
   b) a U.S. Government Freight Waybill;
   c) seven Volatile Organics LSS forms;
   d) seven Organics Characterization LSS;
   e) handwritten sample notes;
   f) two Chain of Custody Records;
   g) a handwritten packing list;
   h) six Quality Control reports;
   i) an Inorganics Analysis data sheets for sample numbers 17C-1M, 17C-2M, 17C-3M, 17C-4M, 17C-5M, 17C-6M and 17C-M7;
   j) five Inorganics Quality Assurance sheets.

* Administrative Record File available 8/22/89. Updated 9/18/90.

Note: Company or organizational affiliation is identified in the index only when it appears in the file.

7) Official Osborne Waste Site Sampling Data for Sample Numbers 17C-3, 17C-4, 17C-5, and 17C-6, 7/16/81. P. 100061-100064.

8) Memorandum to Mr. R. W. Schrecongost, U.S. EPA, from Mr. Gary Bryant, U.S. EPA, re: Dump Site Investigation, Trip Report, 7/16/81. P. 100065-100067. A sketch of Sample Points is attached.

9) Organics Analysis Data Sheets for Sample Numbers 17C-1, 17C-2, 17C-3, 17C-4, 17C-5, 17C-6, and 17C-7, 7/22/81. P. 100068-100105. A history of the Osborne Dump is attached.

10) U.S. EPA Site Inspection Report, 7/29/81. P. 100106-100119. The following are attached:

- a) a site location map;
- b) an Application for a Waste Disposal Permit;
- c) a Ground Water Module sheet;
- d) a Technical Direction Document.

11) Report: Hazard Ranking System Model of Osborne Dump, prepared by Ecology and Environment, Inc., 7/29/82. P. 100120-100175.

12) U.S. EPA Site Inspection Report, 11/17/81. P. 100176-100194. The following are attached:

- a) a RCRA Checklist for Surface Impoundments;
- b) a memorandum regarding a trip report to the site;
- c) a sketch of sample points;
- d) Official Data Sheets for Sample Number 17C-3, 17C-4, 17C-5, and 17C-6;
- e) a map of the Grove City Quadrangle.

13) U.S. EPA Site Inspection Report, 7/2/82. P. 100195-100200. A site location map is enclosed.

14) Memorandum to Mr. Steve Jarvella, from Mr. Lanny Doan, and Mr. Bruce Doremus, re: Osborne Dump Sampling, 11/10/82. P. 100201-100204. A site map and two Chain of Custody records are attached.

15) Memorandum to Mr. Daniel K. Donnelly, U.S. EPA, from Mr. Rick Dreisch, U.S. EPA, re: Analysis of water samples from sample series 821108-11-13 for volatile organic compounds, 12/6/82. P. 100205-100243. The following are attached:

- a) Volatile sample results for Sample Numbers 822108-12 and 8211-01-13;
- b) a Quality Assurance Summary form;

c) a memorandum regarding soil samples analyzed by GC/MS for volatile organic compounds;
d) Volatiles sample results for Sample Number 821108-02, 821108-03, 821108-04, 821108-07, and 821108-09;
e) a Quality Assurance Summary;
f) a memorandum regarding the organic compound sample results;
g) a list of sample descriptions;
h) a list of Base/Neutral Extractable Priority Pollutant Compound Detection Limits;
i) Base/Neutral Extractable Priority Pollutant Compounds for Sample Numbers 821108-11, 821108-12, and 821108-13;
j) twenty pages of Base/Neutral and Acid sampling results;
k) Surrogate Spike Recoveries for Sample Numbers 821108-11, 821108-12, and 821108-13;
l) a Quality Control Sheet;
m) two Chain of Custody Records;
n) two Technical Direction Document forms;
o) an Acknowledgement of Completion form;
p) two Federal Express airbills receipts.

16) Memorandum to Ms. Margot Hunt, U.S. EPA, from Mr. Joseph P. Dugandzic, U.S. EPA, re: Laboratory Analyses of water samples from Wells 1-3, 12/27/82. P. 100244-100244.

17) Memorandum to Mr. Steve Jarvella, U.S. EPA, from Mr. Daniel K. Donnelly, re: Osborne Data Reports, 1/5/83. P. 100245-100249. The following are attached:

a) a list of sample numbers and descriptions;
b) a memorandum regarding the metals results of the Osborne Dump Sample;
c) metals results for Sample Numbers 8921108-06, 8921108-07, 821108-08, 821108-09, 821108-10, 821108-01, 821108-02, 821108-03, 821108-04, and 821108-05.

18) Memorandum to Mr. Daniel K. Donnelly, U.S. EPA, from Ms. S. Rosemary Kayser, U.S. EPA, re: Pesticide and PCB Analysis of Osborne Dump, 1/10/83. P. 100250-100252. The Pesticide/PCBs results for Sample Numbers 821108-02, 821108-03, 821108-04, 821108-05, 821108-06, 821108-07, 821108-08, 821108-09, 821108-10, 821108-11, 821108-12, 821108-12, 821108-13, Blank, Spike, Sox Blanks, and Sox Spike are attached.

19) Letter to Mr. Russell H. Wyer, from Mr. James A. Rogers, Skadden, Arps, Slate, Meagher, & Flom, re: Transmittal of comments on the Osborne Site's inclusion on the proposed National Priorities List, 2/2/83. P. 100253-100264. The comments are attached.

20) Memorandum to File from Mr. Edward Shoener, U.S. EPA, re: Site Inspection of August 17, 1983. P. 100265-100267. A memorandum regarding the site inspection of Osborne Dump on June 9, 1983 is attached.

21) Inorganics Analysis Data Sheet for Sample Numbers 17C-3M, 17C-4M, 17C-5M, 17C-6M, 17C-7M, 17C-3, 17C-4, 17C-5, 17C-6, and 17C-7. P. 100268-100299. A handwritten note on items discussed at the meeting is attached.

22) A National Priorities List Site Informational Sheet for Osborne Landfill, prepared by the U.S. EPA, (undated). P. 100300-100300.

II. REMEDIAL ENFORCEMENT PLANNING

1) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Review of the Draft Remedial Investigation Report for the Osborne Landfill Site, 7/31/89. P. 200001-200009. The following are attached:

   a) a handwritten data sheet for the calculation of the geometric mean of PCB concentrations;
   b) a graph of the lognormal probability distribution;
   c) a handwritten sheet of calculations;
   d) a facsimile cover sheet.

2) Letter to Mr. Micael Steiner, Pennsylvania Department of Environmental Resources (PADER), from Mr. Edward Shoener, U.S. EPA, re: A "sumphole" at Osborne Landfill, 11/28/83. P. 200010-200010.

3) Report: Annual Report to Shareholders, Cooper Industries. 1988. P. 200011-200075.

4) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Good faith offer to perform remedial design/remedial action for Osborne Landfill, 10/27/89. P. 200076-200104. The Remedial Action Plan is attached.

5) Letter to Mr. Robert W. Teets, Cooper Industries, Inc., fromm Mr. Abraham Ferdas, U.S. EPA, re: 104(e) request for information, 11/16/89. P. 200105-200107.

6) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: 104(e) response, 12/6/89. P. 200108-200110.

7) Letter to Mr. Stephen R. Wassersug, U.S. EPA, from Mr. Matthew P. Drain, General Electric, 12/12/89. P. 200111-200111.

8) Letter to Ms. Patricia Tan, U.S. EPA, from Mr. John Gorgol, EBASCO Services, Inc., re: Contaminated soils and debris, 1/20/89. P. 200112-200120.

9) Letter to Mr. Stephen R. Wassersug, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Communication Problems, 4/9/90. P. 200121-200122.

10) Letter to Mr. Keith McDougall, from Mr. Frank Vavra, U.S EPA, re: Telephone Conversation on April 10, 1990, 4/16/90. P. 200123-200125. An article concerning landowner defense is attached.

11) Letter to Mr. Robert W. Teets, from Mr. Frank Vavra, U.S. EPA, re: Gate at the site, 4/16/90. P. 200126-200127.

12) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Richard H. Uber, Cooper Industries, re: Damaged gate, 5/16/90. P. 200128-200129. A photo is attached.

13) Letter to Mr. Robert W. Teets, from Mr. Stephen R. Wassersug, U.S. EPA, re: Review of remedy, 5/17/90. P. 200130-200132.

III. REMEDIAL RESPONSE PLANNING

1) Report: Remedial Action Master Plan, Osborne Site, Pine Township, Mercer County, Pennsylvania, prepared by NUS Corporation, 3/83. P. 300001-300120. References are listed on P. 300090-300092.

2) Report: Summary of Surface Waste Sampling Operations at the Osborne Landfill, prepared by Fred C. Hart Associates, Inc., 5/11/83. P. 300121-300142.

3) Report: Osborne Site Remedial Investigation Report, prepared by Fred C. Hart Associates, Inc., 6/84. P. 300143-300303. References are listed on p. 300270-300273. A report entitled "Final Evaluation Report, Review of Remedial Investigation Report" is attached.

4) Report: A Field Trip Report for Osborne Disposal, prepared by NUS Corporation, 9/11/86. P. 300304-300632.

5) Memorandum to Ms. Pat [sic] Tan, U.S. EPA, from Mr. H. Ronald Preston, U.S. EPA, re: Recommendations for the Remedial Investigation made by the Bioassessment Task Group, 10/14/86. P. 300633-300634.

6) Report: Second Draft Feasibility Study Work Plan, Osborne Site, prepared by Dynamac Corporation, 6/18/87. P. 300365-300769. References are listed on P. 300735-300736.

7) Report: Draft Evaluation Report, Review of the RPs Feasibility Study Work Plan (Second Draft), prepared by Ebasco Services Incorporated, 8/3/87. P. 300770-300784.

8) Memorandum to Ms. Pat [sic] Tan, U.S. EPA, from Mr. H. Ronald Preston, U.S. EPA, re: Changes requested in the environmental assessment of the draft Work Plan, 2/25/88. P. 300785-300786.

9) Letter to Mr. Frank Simunic, Cooper Industries, Inc. [sic], from Ms. Patricia Tan, U.S. EPA, re: Transmittal of responses to comments made on the Remedial Investigation/Feasibility Study Work Plan and Field Operations Plan, 7/15/88. P. 300787-300788. A Memorandum of the Call is attached.

10) Letter to Mr. Abraham Ferdas, U.S. EPA, from Mr. Stephen D. Von Allmen, U.S. Department of Health & Human Services, re: Transmittal of the Draft Preliminary Health Assessment for review, 10/13/88. P. 300789-300793. The Draft Preliminary Health Assessment is attached.

11) Letter to Ms. Patricia Tan, U.S. EPA, from Mr. John Gorgol, Ebasco Services Incorporated, re: Soil treatment alternatives at the Osborne Landfill Site, 1/20/89. P. 300794-300808. The following are attached:

   a) a table entitled "Public Health Assessment, Adverse Health Effects of Contaminated Site Soils";
   b) a table entitled "Treatment Levels for Treatability Variances for Contaminated Soil and Debris, Organics";
   c) a table entitled "Superfund Guidelines on Response Actions for PCB-Contaminated Soil";
   d) a map of the Disposal Area Boundary at the Osborne Landfill Site;
   e) a Routing and Transmittal Slip.

12) Letter to Ms. Patricia Tan, U.S. EPA, from Mr. John F. Gorgol, Ebasco Services Incorporated, re: Potential remedial alternatives for the Osborne Landfill Site, 3/30/89. P. 300809-300815. A Summary of Potential Alternatives is attached.

13) Report: Draft Remedial Investigation Report (Volume I of III), prepared by NUS Corporation, 5/89. P. 300816-301042. References are listed on p. 301040-301042.

14) Report: Draft Remedial Investigation Report (Volume II of II), prepared by NUS Corporation, 5/89. P. 301043-301427.

15) Report: Draft Remedial Investigation Report (Volume III of III), prepared by NUS Corporation, 5/89. P. 301428-301687.

16) Letter to Ms. Patricia Krantz, U.S. EPA, from Mr. Eric L. Blischke, Ebasco Services Incorporated, re: Transmittal of the NUS Resubmittal Data Validation package, 7/20/89. P. 301688-301689. An envelope is attached.

17) Report: Draft Feasibility Study Report, prepared by NUS Corporation, 7/89. P. 301690-302161.

18) List of Exposure Pathways and Receptors, (undated). P. 302162-302187. The following are attached:

   a) a table entitled "Comparison of Existing Surface Water Data and ARAR's";
   b) a map of Surface Water Sampling Results;
   c) a table entitled "Comparison of Existing Groundwater Data and ARAR's";
   d) a report entitled "Osborne Landfill Site, Grove City, Pennsylvania, RI/FS Scoping Meeting".

19) Table: Site Associated Contaminants Exceeding Pertinent ARARs in Onsite Groundwaters, (undated). P. 302188-302193. A table entitled "Site-Associated Contaminants Exceeding Pertinent ARARs In Onsite and Offsite Surface Waters" and a table entitled "Site-Associated Contaminants Exceeding Pertinent ARARs in Study Area Offsite Groundwater" are attached.

20) Table: Hazard Indices and Incremental Cancer Risks for Exposures to Contaminated Foundry Sands, Mine Spoils, and Soils, (undated). P. 302192-302199. The following are attached:

a) a table entitled "Hazard Indices and Incremental Cancer Risks for Exposure to Contaminated Surface Water During Recreational Activities";
b) a table entitled "Hazard Indices and Incremental Cancer Risks Associated With the Domestic Use of Groundwater Within the Site";
c) a table entitled "Hazard Indices and Incremental Cancer Risks Associated With the Domestic Use of Groundwater Outside of the Site Boundary";
d) a table entitled "Hazard Indices and Incremental Cancer Risks for Exposure to Contaminated Fugitive Dusts Emanating From Surface Soils, Foundry Sands, and Mine Spoils";
e) a table entitled "Hazard Indices and Incremental Cancer Risks for Dermal Contact With Contaminated Onsite and Offsite Sediments".

21) Report section: Identification and Screening, prepared by the U.S. EPA, (undated). P. 302200-302217.

22) Map of the Osborne Landfill Site, (undated). P. 302218-302218.

23) Table: Summary of Alternatives and Costs, Osborne Landfill Site, Grove City, Pennsylvania, (undated). P. 302219-302219.

24) Handwritten Notes, re: Telephone numbers, (undated). P. 302220-302220.

25) Map of Approximate Limits of Study Area, Osborne Landfill Site, (undated). P. 302221-302221.

26) Map of Conceptual Diagram of Contaminant Migration Routes, (undated). 302222-302222.

27) Routing and Transmittal Slip, re: Contractor's ability to do the PRAP [sic], (undated). P. 302223-302223.

28) Map of Site Location, Osborne Landfill Site, (undated). P. 302224-302224.

*29) Letter to Mr. Frank Kocevar from Mr. Rudy L. Davis, re: List of Waste Materials, 8/18/67. P. 302225-302234. A report entitled "Feasibility Report for the Cooper-Bessemer Landfill" is attached.

30) Report: Draft Feasibility Study Addendum, prepared by EBASCO Services Incorporated, 8/89. P. 302235-302296.

31) Report: Final Remedial Investigation Report, Volume I-III, Osborne Landfill, Grove City, Pennsylvania, 8/89. P. 302297-303222. References are listed on P. 302527-302529.

32) Report: Superfund Program Proposed Plan, EPA Region III, prepared by U.S. EPA, 8/89. P. 303223-303245.

33) Report: Summary of Cooper Industries, Inc. Involvement in the Investigation of the Osborne Landfill Remedial Investigation/Feasibility Study, prepared by Cooper Industries, Inc., 9/1/89. P. 303246-303609. References are listed on P. 303508-303509.

34) Report: Processes, Procedures, and Methods to Control Pollution from Mining Activities, prepared by U.S. EPA, 10/73. P. 303610-303617.

35) Letter to Mr. Thomas C. Voltaggio, U.S. EPA, Mr. Dwight D. Worley, Pennsylvania Department of Environmental Resources, and Mr. Edgar A. Bircher, Cooper Industries, Inc, from Mr. Edward L. McDougall and Ms. Janet L. McDougall, re: Consent to enter premises, 8/11/83. P. 303618-303618.

36) Report: Design of Bulkheads for Controlling Water in Underground Mines, prepared by U.S. Department of Interior, 1985. P. 303619-303659.

37) Paper: "Gravel Bulkheads for Confining Hydraulic Backfilling of Abandoned Underground Coal Mines," presented at Society of Mining Engineers of AIME prepared and presented by M.S. Van Dyke, 10/16-18/85. P. 303660-303662.

38) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Review comments for the RI, 7/31/89. P. 303663-303667.

* This document is located in the confidential portion of the Administrative Record File at EPA Region III, Philadelphia, PA.

39) Letter to Mr. Thomas C. Voltaggio, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Concerns over RI and FS reports, 8/18/89. P. 303668-303669.

40) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Michael J. O'Brien, Cooper Industries, re: Request for authorization to implement a sampling program, 9/19/89. P. 303670-303685. A letter concerning a proposal for groundwater sampling and Analytical Results of Residential Well Sampling are attached.

41) Report: Appendices A - F, prepared by Fred C. Hart Associates, Inc., 10/89. P. 303686-303876.

42) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Comments on the U.S. EPA proposed plan, 10/20/89. P. 303877-303911. A letter concerning corrections and the comments are attached.

43) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Jeffrey O. Cerar, Squire, Sanders, and Dempsey, re: Supplemental comments on the proposed plan, 10/23/89. P. 303912-303914.

44) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Good faith offer for Remedial Design/Remedial Action (RD/RA), 10/27/89. P. 303915-303946. A Remedial Action plan is attached.

45) Letter to Mr. Roy Shrock, U.S. EPA, from Mr. Michael J. O'Brien, Cooper Industries, re: U.S. EPA "preferred alternative", 11/9/89. P. 303947-303948.

46) Memorandum to Mr. Frank Vavra, U.S. EPA, from Mr. Daniel K. Donnelly, U.S. EPA, re: Analytical reports for Osborne Landfill, 11/9/89. P. 303949-303995. Three organic reports are attached.

47) Report: Final Feasibility Study Report, (Volume I of II), 12/89. P. 303996-304287.

48) Report: Final Feasibility Study Report (Volume II of II), prepared by EBASCO Services Incorporated, 12/89. P. 304288-304598.

49) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Mark D. Gorman, for Mr. Donald J. Benczkowski, PADER, re: Summary of State ARAR's 12/7/89. P. 304599-304602.

50) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Roy Wattras, Cooper Industries, re: Requested response, 12/7/89. P. 304603-304610. The response and a letter regarding the RI/FS are attached.

51) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Jeffrey O. Cerar, Squire, Sanders and Dempsey, re: Negotiations for consent agreement, 12/15/89. P. 304611-304611.

52) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Jeffrey O. Cerar, Squire, Sanders and Dempsey, re: Comments on ARAR's, 1/2/90. P. 304612-304613.

53) Letter to Mr. Gene Harris, U.S. EPA, from Mr. Frank Vavra, U.S. EPA, re: Technical assistant, 2/13/90. P. 304614-304615.

54) Memorandum to Ms. Anita Miller, U.S. EPA, and Ms. Alyce Fritz, U.S. EPA, from Mr. Jeffrey Pike, U.S. EPA, re: Status of EPA activities, 2/16/90. P. 304616-304616.

55) Letter to Mr. Michael O'Brien, Cooper Industries, from Mr. Kenneth B. Andromalos, re: Information on the installation of a temporary deep mine bulkhead, 2/20/90. P. 304617-304640. A report on subsidence control by high volume grouting and a letter concerning technical information on deep mine bulkheads is attached.

56) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Michael J. O'Brien, Cooper Industries, re: Information on mine void bulkhead installation, 2/26/90. P. 304641-304665. A letter concerning temporary deep mine bulkhead proposed remediation methods, a report on subsidence control by high volume grouting, and a letter concerning a request for information are attached.

57) Letter to Cooper Industries from Mr. Kenneth B. Andromalos, Geo-Con Inc., re: Three technical papers for references, 2/28/90. P. 304666-304719. The papers are attached.

58) Memorandum to Mr. Frank Vavra, U.S. EPA, from Mr. Scott A. Fritzinger, U.S. EPA, re: Osborne Landfill Slurry Wall Alternative, 3/9/90. P. 304720-304721.

59) Memorandum to Mr. Frank Vavra, U.S. EPA, from Mr. Walter E. Grube, U.S. EPA, re: Comments on bulkhead proposal from Geo-Con, 4/4/90. P. 304722-304723.

60) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Robert W. Teets, Cooper Industries, re: Technical report, 4/9/90. P. 304724-304725.

61) Handwritten notes on 4/16/90 conversation with Dr. Kimborough, U.S. EPA PCB expert. P. 304726-304727. A letter regarding Weston comments on Evaluation of the Toxicology of PCB's report is attached.

62) Letter to Mr. Robert W. Teets, Cooper Industries, from Mr. Frank Vavra, U.S. EPA, re: Weston review of reports, 4/24/90.
P. 304728-304728.

63) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Michael J. O'Brien, Cooper Industries, re: Potential design and construction problems, 5/10/90. P. 304729-3304735. A letter regarding estimate of costs to be incurred is attached.

64) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Michael J. O'Brien, Cooper Industries, re: Summary letter from Mr. Ken Miller, 5/22/90. P. 304736-304750. The letter is attached.

65) Letter to Mr. Thomas Voltaggio, U.S. EPA, from Ms. Bridget Hofman, PADER, re: Delegation of functions, 7/16/90. P. 304751-304763. A memorandum concerning department participation in the Federal NPL program and an memorandum concerning NPL enforcement sites are attached. P. 304751-304763.

66) Memorandum to Mr. Frank Vavra, U.S. EPA, from Mr. Roy L. Smith, U.S. EPA, re: EPA assessment of cancer risk, 5/24/90. P. 304764-304766.

67) Letter to Mr. Frank Vavra, U.S. EPA, from Mr. Donald J. Benczkowski, PADER, re: ARAR's for Osborne Landfill Site, 7/17/90. P. 3304767-304768.

68) Letter to Mr. Thomas Voltaggio, U.S. EPA, from Ms. Bridget Hofman, PADER, re: Submittal of ROD, 7/24/90. P. 304769-304770.

69) Letter to Mr. Donald Becker, PADER, from Mr. Frank Vavra, U.S. EPA, re: Record of Decision for Osborne Landfill, 8/24/90. P. 304771-304772. A letter regarding review of the ROD is attached.

70) Report: Osborne Landfill EPA Response to Comments Submitted by Cooper Industries and Their Contractors, (undated). P. 304773-304823.

71) Report: Appendix E - Subsidence Control by High Volume Grouting, prepared by Mr. Kenneth B. Andromalos, Geo-Con Inc., and Mr. Christopher R. Ryan, Geo-Con Inc., (undated). P. 304824-304841.

V. COMMUNITY INVOLVEMENT/CONGRESSIONAL CORRESPONDENCE/IMAGERY

1) Aerial Photograph, 7/28/84. P. 500001-500001.

2) Aerial Photograph, 7/28/84. P. 500002-500002.

3) Report: Draft Community Relations Plan, Osborne Landfill Site, Pine Township, Pennsylvania, prepared by Booz, Allen & Hamilton Inc., 7/21/88. P. 500003-500045. The following are attached:

   a) a report entitled "Information on Grove City Public Water Supply";
   b) the handwritten notes regarding public affairs issues;
   c) a marked-up copy of a list of interested parties for the Osborne Landfill Site.

4) Report: Final Draft Community Relations Plan, Osborne Landfill Site, Pine Township, Pennsylvania, prepared by CDM Federal Programs Corporation, 8/24/89. P. 500046-500075.

5) Memorandum to Mr. Hamid Saebfar, U.S. EPA, from Mr. Edward Shoener, U.S. EPA, re: Notice letters for Osborne Dump, 12/17/82. P. 500076-500076.

6) Letter to Mr. Thomas C. Voltaggio, U.S. EPA, from Mr. Edgar A. Bircher, Cooper Industries, re: Remedial measures, 4/28/83. P. 500077-500079.

7) Report: Final Title Report, Osborne Landfill, prepared by CDM, 4/10/89. P. 500080-500144.

8) Report: Final Draft Community Relations Plan, Osborne Dump Site, prepared for U.S. EPA, 8/24/89. P. 500145-500174.

9) Letter to Mr. John Claussen, General Electric Corp., from Mr. Stephen R. Wassersug, U.S. EPA, re: Notification of potential responsibility, 9/8/89. P. 500175-500180. A copy of the letter and a certified mail receipt are attached.

10) Letter to Mr. John Burnstein, Castle Iron & Metals Co., from Mr. Stephen R. Wassersug, U.S. EPA, re: Notification of potential responsibility, 9/8/89. P. 500181-500186. A copy of the letter and a certified mail receipt are attached.

11) Letter to Mr. Edwin H. Bircher, Cooper Industries, from Mr. Stephen R. Wassersug, U.S. EPA, re: Notification of potential responsibility, 9/8/89. P. 500187-500192. A copy of the letter and a certified mail receipt are attached.

12) Letter to Mr. Thomas F. Davis, Ashland Chemical Co., from Mr. Stephen R. Wassersug, U.S. EPA, re: Notification of potential responsibility, 9/8/89. P. 500193-500197. A copy of the letter is attached.

13) Osborne Landfill Superfund Site Public Meeting Response Card from Mrs. Kris Lambert to Ms. Barbara Brown, U.S. EPA, 9/14/89. P. 500198-500228. Nineteen additional Response Cards from the following are attached:

a) Mr David J. Berry;
b) Mr. Paul J. Shimek;
c) Mr. Thomas C. Ponceroff;
d) Ms. Betty Lingle;
e) Mr. Lee McCoy;
f) Ms. Nancy J. Parker;
g) T.W. Kearns;
h) Chris Wright;
i) Mr. Jerry D. Weis;
j) Ms. Darla Royer;
k) Mr. Michael Orange;
l) A.K. Rao;
m) Ms. Roxann Sansotta;
n) Mr. Bill Ryan;
o) Mr. Michael Orange (duplicate);
p) Ms. Darla Royer (duplicate).

14) U.S. EPA Region III Public Information Meeting for the Osborne Landfill Superfund Site list of meeting attendees, 9/14/89. P. 500229-500238.

15) Transcript of Public Meeting, re: Osborne Landfill Superfund Site, 9/14/89. P. 500239-500315.

16) Handwritten sign-in sheet for meeting with local officials, Osborne Landfill Site, 9/14/89. P. 500316-500316.

17) Memorandum to Mr. Stephen R. Wassersug, U.S. EPA, from Mr. Thomas C. Voltaggio, U.S,. EPA, re: Special notice letters, 10/10/89. P. 500317-500317.

18) Letter to U.S. EPA Region III, from Mr. Charles W. Smith, re: Proposals for cleanup, 10/13/89. P. 500318-500318.

19) Handwritten notes from PRP-requested meeting to organize a steering group, 10/13/89. P. 500319-500320.

20) Notes from meeting requested by Cooper Industries to determine if additional PRP's will participate in the remedial design/remedial action at the Osborne Superfund Site, 10/13/89. P. 500321-500321.

21) Letter to U.S. EPA, Region III from Mr. Joseph and Ms. Janice Kopnisky, re: Questions about EPA site plans, 10/15/89. P. 500322-500322.

22) Handwritten notes on Congressman Ridge's Office, 10/17/89. P. 500323-500323.

23) Handwritten letter from Mr. and Mrs. Walter Sloan and Family, re: Site cleanup, 10/21/81 [sic]. P. 500324-500330. The following are attached:

    a) an envelope;
    b) a routing slip;
    c) a copy of the letter;
    d) a copy of the 10/13/89 letter from Mr. Charles W. Smith.

24) <u>Grove City Allied News</u> article entitled, "Unless Somebody Listens to Reason, We'll Have to Spend $100 Million to Solve a Problem that ISN'T," 10/25/89. P. 500331-500331.

25) Routing and Transmittal Slip to Mr. Tom Voltaggio, Mr. Roy Schrock, and Mr. Frank Vavar from Mr. Don Welsh, re: Letter from Pennsylvania Chamber of Commerce, 10/31/89. P. The letter is attached. 500332-500336.

26) Meeting on Osborne Landfill-Mercer County list of participants, 11/2/89. P. 500337-500337.

27) Report: <u>Meeting Summary for the Proposed Remedial Action Plan at the Osborne Landfill Superfund Site</u>, prepared by Booz, Allen & Hamilton, Inc., 11/9/89. P. 500338-500349.

28) Letter to Ms. Nancy Breese from Mr. Frank Vavra, U.S. EPA, re: Quality of well water, 11/28/89. P. 500350-500350.

29) Letter to Mr. and Mrs. Kopnisky from Mr. Frank Vavra, U.S. EPA, re: Information concerning Osborne remedial alternative, 11/28/89. P. 500351-500353.

30) Letter to U.S. EPA Region III from Mr. Charles Flynn, re: Letter to PADER, 12/12/89. P. 500354-500355. The letter is attached.

31) Routing and Transmittal Slip to Mr. Frank Vavra from Kim, re: Outgoing Cong. [sic] file, 1/11/90. P. 500356-500362. The following are attached:

a) a copy of a routing slip;
b) a letter concerning Cooper-Bessemer Industries remedial action;
c) a meeting participant list;
d) a letter concerning an Osborne Landfill meeting.

32) Letter to Mssrs. Harold E. Bell, Joseph F. Fragle, and William M. Reznor, from Mr. Edwin B. Erickson, re: Financial effects on the Grove City community, 2/26/90. P. 500363-500367. A letter concerning support of Cooper-Bessemer cleanup effort and a letter concerning financial effects on the Grove City community are attached.

33) Correspondence Control Slip from Mr. John Heinz, re: Cooper Reciprocating/Osborne Landfill, 3/5/90. P. 500368-500373. The following are attached:

a) a routing slip;
b) a control slip of the office of congressional correspondence;
c) a letter concerning the attached communication;
d) a letter concerning the Cooper reciprocating action;
e) a newspaper article regarding the Osborne Plan.

34) Letter to the Honorable John Heinz, U.S. Senate, from Mr. Guerne DeJones for Mr. Edwin B. Erickson, re: Cooper reciprocating's liability, 3/16/90. P. 500374-500375.

35) Routing slip to Ms. Kim Lonasco from Mr. Arlen Spector, re: Response for R.A.'s signature, 3/19/90. P. 500376-500386. The following are attached:

a) a control slip for the office of congressional correspondence;
b) a letter concerning U.S. EPA remedial alternative for Osborne Landfill;
c) a second copy of the letter concerning U.S. EPA remedial alternative for Osborne Landfill;
d) a letter regarding a concerned citizen;
e) a letter concerning the controversy of the Osborne Landfill;
f) a newspaper article;
g) a third copy of the letter concerning U.S. EPA remedial alternative.

36) Letter to Mr. Robert W. Teets from Mr. Stephen R. Wassersug, U.S. EPA, re: Concerns about proposed plans for remediation, 5/17/90. P. 500387-500393. A copy of the letter and a letter concerning failed communications is attached.

37) Letter to the Honorable Howard Fargo, Pennsylvania House of Representatives, from Mr. Stephen R. Wassersug, U.S. EPA, re: Remediation of the Osborne Superfund Site, 5/17/90. P. 500394-500399. A copy of the letter and a letter concerning a slurry wall and dewatering system remedy are attached.

38) Routing and transmittal slip to Mr. Frank Vavra from Kim, re: Outgoing cong. [sic] for file, 5/24/90. P. 500400-500412. The following are attached:

a) a routing slip;
b) a letter concerning the remediation of the Osborne Site;
c) a second copy of the letter;
d) a letter concerning a remedy for the Osborne Site;
e) a letter addressing the viability of a slurry wall;
f) a letter regarding U.S. EPA consideration of Cooper Industries proposed remedy.

39) Fact Sheet, Osborne Landfill, Grove City, PA, (undated). P. 500413-500422.