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Emergency and
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June 1991

Superfund Record of Decision:

Modern Sanitation Landfill, PA

50272-101

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Modern Sanitation Landfill, PA
First Remedial Action - Final

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16. Abstract (Limit: 200 words)

The 83-acre Modern Sanitation Landfill site is an active landfill in the Townships of Windsor and Lower Windsor, York County, Pennsylvania. Land use in the area is predominantly agricultural and residential, with nearby woodland areas. The site includes an old, inactive, unlined 66-acre landfill area, which is the subject of this Record of Decision (ROD), and an adjacent active 17-acre double-lined landfill area to the north. Other site features include borrow areas for landfill soil cover material; ground water extraction systems to the east, west, and south of the landfill; a wastewater treatment plant; a landfill gas-extraction system; and a low-permeability final cover system. Since the early 1940's, Modern Trash Removal has used the site for municipal, and non-hazardous and hazardous industrial waste stream disposal activities. Industrial waste disposed of onsite includes inorganic production residues, pesticide waste sludge, PCB wastes, and oil and paint waste. In 1977, a ground water interceptor trench was constructed to collect leachate from the west side of the site. The collected water currently is pumped to the onsite treatment facility. In 1981, the State detected onsite ground water contamination by VOCs on the western site border, and in 1983, determined that the western interceptor

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Modern Sanitation Landfill, PA
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Contaminated Media: soil, debris, gw
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes) metals (lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 54
	20. Security Class (This Page) None	22. Price

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Abstract (Continued)

trench should be upgraded and modified, and that quarterly sampling of monitoring wells should be implemented to detect the leachate seeps and the presence of leachate constituents in ground water. As a result, extraction wells to augment the western interceptor trench were installed. Leachate studies in 1985 also identified organic contamination in the eastern site area; and, as a result, 13 extraction wells were installed along the eastern perimeter. Four surface impoundments were operated onsite to treat ground water and leachate collected by the interceptor and extraction wells. In 1987, the surface impoundments were clean closed, and a replacement treatment facility, which included metal precipitation, filtration, and air stripping, was constructed. In addition, as of 1990, 64 of the 66-acre unlined landfill had been covered with a low permeability cap. This ROD provides a final remedy for the source of leachate seeps and ground water constituents. The primary contaminants of concern affecting the soil, debris, and ground water are VOCs including benzene, PCE, TCE, toluene, and xylenes; and metals including lead.

The selected remedial action for this site includes completing the low permeability cap and final cover system over the 66-acre unlined landfill; expanding the existing ground water extraction system on both the eastern and western sides of the site; maintaining the onsite wastewater treatment facility that treats extracted ground water with physical/chemical and biological treatment, followed by filtration and air stripping prior to discharge of the treated wastewater onsite; managing the landfill gas collection system; and continuing ground and surface water monitoring. The present worth cost for this remedial action is $18,078,000, which includes an annual O&M cost of $1,175,000.

PERFORMANCE STANDARDS OR GOALS: Ground water clean-up goals are based on State and Federal standards and background contaminant levels, whichever are lower. Chemical-specific ground water goals include benzene 5 ug/l (MCL), PCE 5 ug/l (MCL), and TCE 5 ug/l (PMCL).

RECORD OF DECISION
MODERN LANDFILL

DECLARATION

SITE NAME AND LOCATION

Modern Landfill Site
Windsor and Lower Windsor Townships
York County, Pennsylvania

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Modern Landfill Site, also known as the CERCLA Site in the Remedial Investigation, in York County, Pennsylvania. The selected remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA); and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site.

The Pennsylvania Department of Environmental Resources (PADER), acting on behalf of the Commonwealth of Pennsylvania, has verbally concurred with the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE REMEDY

Modern Landfill is located in the Townships of Windsor and Lower Windsor, in York County, PA, and is adjacent to Prospect Road approximately one-half mile south of Route 124. The Landfill has been used continually for waste disposal since the early 1940's, and it has principally accepted municipal/residual wastes throughout its history of operation. Evidence exists,

however, that some disposal of hazardous substances has occurred at this site, though the exact quantities, the nature of these substances, and the particular locations of their disposal are currently unknown to EPA. According to existing records, some of these wastes have been removed from the site.

In response to public health concerns, Modern Trash Removal of York, Inc., under a 1987 Administrative Consent Order and Agreement with the Pennsylvania Department of Environmental Resources (PADER), conducted a Remedial Investigation/Feasibility Study (RI/FS) for this site. Early in the RI process, it was determined that groundwater contamination emanates from the old, unlined portion of the landfill. This unlined portion, which is currently inactive, is part of what is referred to as the CERCLA site, because it is the subject of EPA's and PADER's remedial efforts under CERCLA.

The selected remedy for this site addresses the long-term threats present at the Modern Landfill site. The principal components of the selected remedy are as follows:

- Continued operation and maintenance of all previous remedial actions conducted onsite, including the landfill cap, groundwater extraction system, onsite wastewater treatment facility, gas extraction system (for removal and destruction of landfill generated methane gas) and groundwater and surface water monitoring.

- Completion of the landfill cap system and final cover for the unlined 66-acre landfill.

- Maintenance of site fencing and all access restrictions.

- The addition of extraction wells to the eastern and western extraction systems to prevent contaminated groundwater from bypassing those systems.

- The completion of additional monitoring and/or extraction wells as needed to ensure protectiveness and to control groundwater flow, respectively.

- As a goal, restore contaminated groundwater to background quality.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective.

This remedy utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable, and

satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because the selected remedy will result in hazardous substances remaining onsite above health-based levels, a review under Section 121(c) of CERCLA, 42 U. S. C. 9621(c) will be conducted within five years after the commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Edwin B. Erickson
Regional Administrator

6/28/91
Date

RECORD OF DECISION
MODERN LANDFILL SITE
DECISION SUMMARY

A. SITE NAME, LOCATION, AND DESCRIPTION

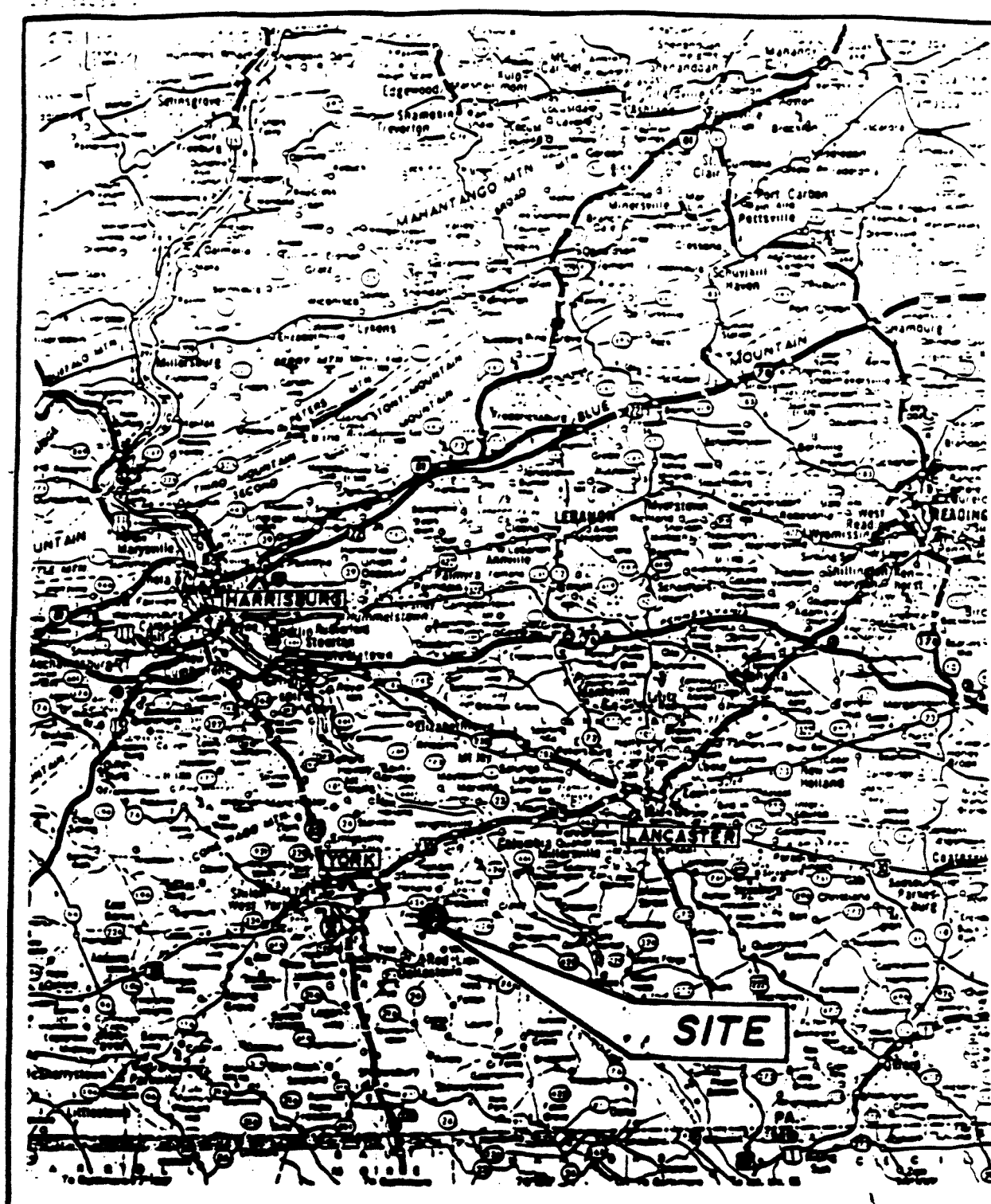
General

Modern Landfill is located in the Townships of Windsor and Lower Windsor, in York County, PA. It is approximately adjacent to Prospect Road, one-half mile south of Route 124. The Modern Landfill Site, also referred to as the CERCLA Site in the Remedial Investigation/Feasibility Study (RI/FS), consists of the original 66-acre unlined landfill together with all other property that as a whole is bounded on the east and west by the respective groundwater extraction and monitoring systems, on the north by the 17-acre, double-lined landfill expansion, and on the north by the Southern extension of both monitorin and extraction systems. The Modern Landfill Site is only a portion of what is referred to in the RI/FS as Modern Landfill. The landfill has been used continuously for waste disposal since the early 1940's, and it has principally accepted municipal/residual wastes throughout its history of operation. The Site is shown on maps in Figures 1 and 2.

Modern Landfill is an active landfill permitted by the Pennsylvania Department of Environmental Resources (PADER) to accept municipal waste and a number of non-hazardous industrial waste streams. It includes an inactive, unlined 66-acre area and an active, synthetic HDPE double-lined area. The original 66-acre unlined landfill is located on land owned by Horace Heindel and is operated by Modern Trash Removal of York, Inc., (Modern) under terms of a lease agreement. Modern owns additional property contiguous to the leasehold.

Modern Landfill contains several components including:

- The original 66-acre unlined landfill;
- An existing, PADER-approved, contiguous 17-acre double-lined landfill area;
- Borrow areas for daily, intermediate, and final cover;
- A proposed, contiguous northern horizontal expansion area;
- A proposed, noncontiguous southwest expansion area;
- Eastern and western perimeter groundwater extraction systems and western groundwater interceptor trench;
- A wastewater treatment plant;
- A landfill gas-extraction system;
- Erosion and sedimentation control systems; and

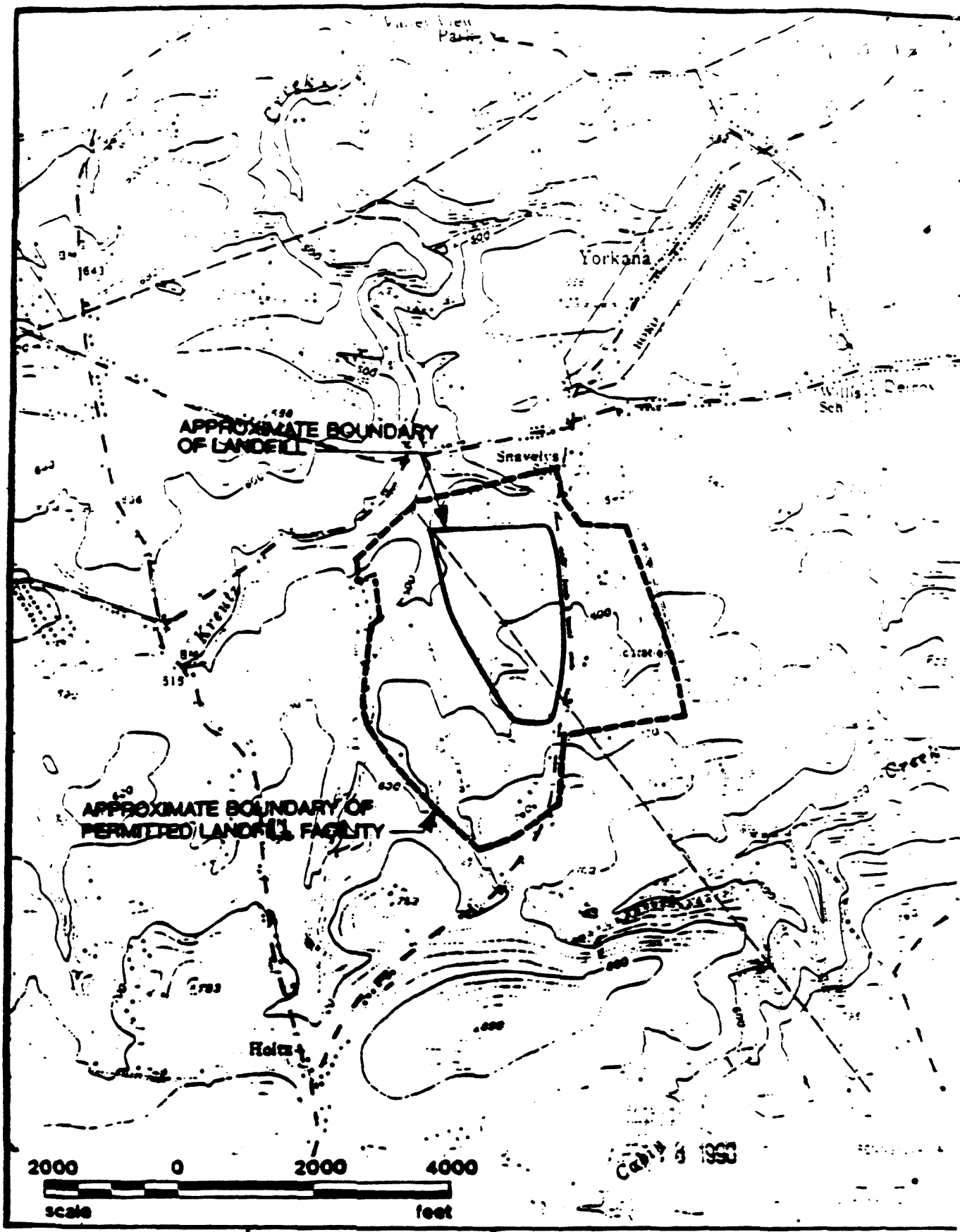


SCALE AS SHOWN

SITE LOCATION PLA

MODERN LANDFILL

FIGUR



SCALE AS SHOWN

REGIONAL LOCATION MAP

MODERN LANDFILL

FIGURE 2

- A low-permeability final cover system.

To ensure consistency with the Remedial Investigation/Feasibility Study (RI/FS), throughout this Record of Decision the following definitions will be used to describe the various areas of the Modern Landfill Site:

- **The CERCLA Site:** This area includes the unlined 66-acre landfill and all Modern Landfill property (leased by Modern from Horace Heindel) up to and including the monitoring wells just within the eastern and western edges of the extraction system, as well as land owned by Modern. The boundaries of the CERCLA Site are shown in Figure 3.

- **The property:** This area includes all Modern Landfill property (owned and leased) exclusive of the CERCLA Site.

- **Off the property:** This area includes local areas beyond the CERCLA Site and the property.

The facility is located within the Conestoga Valley Section of the Piedmont Physiographic Province. Topographically, this province is characterized by well-developed northeast-southwest trending valleys and drainage patterns. The Landfill is located on a hill bounded on the north, east, and west by streams (unnamed tributaries to Kreutz Creek).

Approximately 800 people live within a one-mile radius of Modern Landfill, while about 3,100 people live within a three-mile radius of the Site. Land usage in the area is primarily farming and residential. Away from the immediate vicinity of the Modern Landfill the land is used predominately for arable farming with some pasture land existing. Several woodland areas and small apple orchards are also located in the area.

The nearest city to the Modern Landfill is York, Pennsylvania, located about 8 miles to the west, with other communities located within a distance of 4 to 6 miles from the Site.

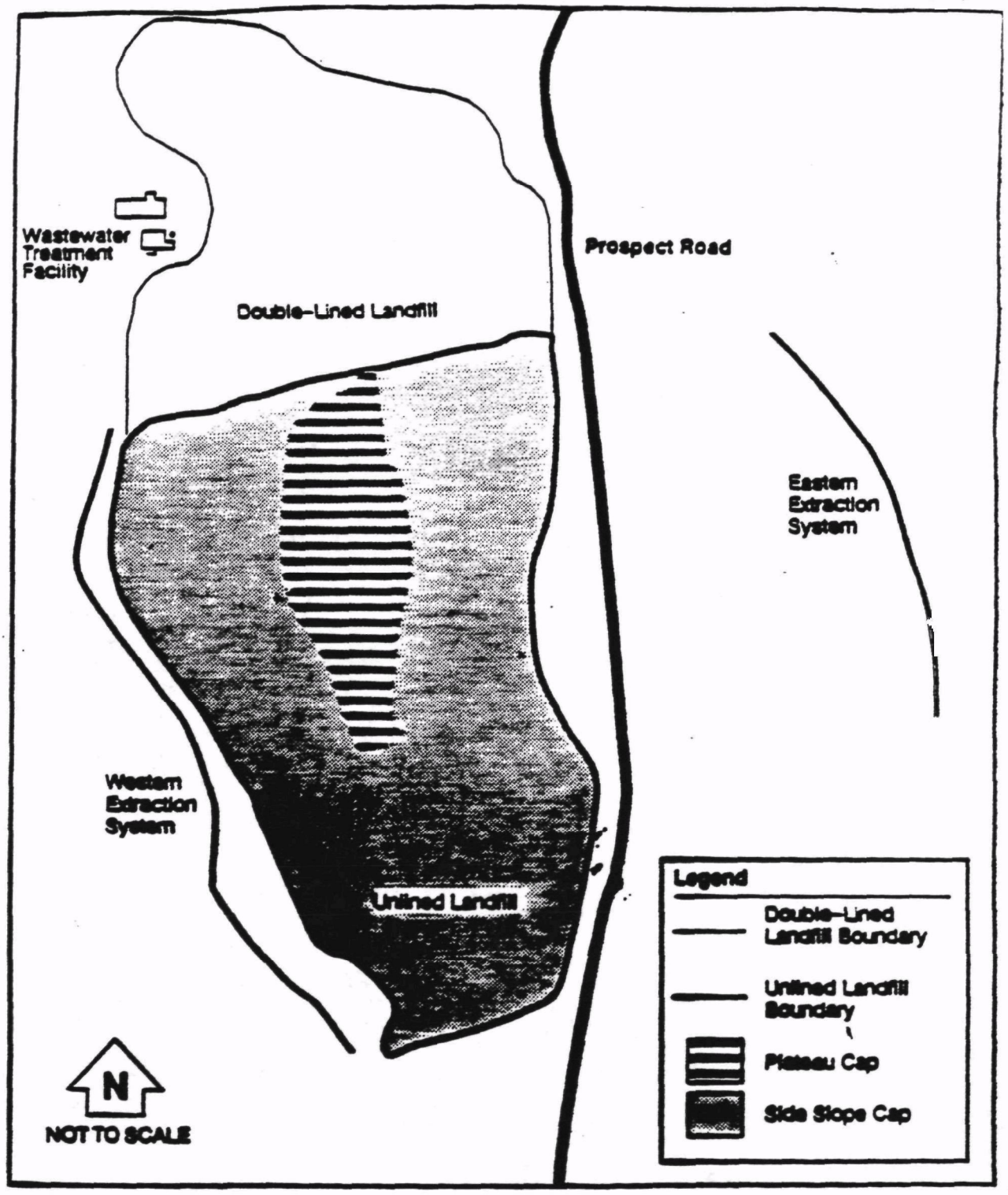
Climate

The climate of the area is relatively mild and humid. The average precipitation observed at the York, Pennsylvania, meteorological station is 41 inches per year. Average snowfall is about 30 inches per year, which is equivalent to about 2.5 inches of rainfall. Mean winter temperature is 34 degrees F and the mean summer temperature is 76 degrees F, with temperature extremes above 95 degrees F and below 0 degrees F not uncommon.

Surface Water Hydrology

FIGURE 3

Final Cover—Plan View



The drainage patterns evident in this area of York County vary between trellis and dendritic with a tendency towards north-south and northeast-southwest trending valleys. These drainage patterns are considered to reflect the underlying geologic structure. The landfill Site is bounded on the east, north, and west by two tributaries which are referred to as the eastern and western tributaries. The tributaries are fed by springs and runoff, and flow effectively northward and discharge into Kreutz Creek, which then flows northwards and then eastward, 11 miles, into the Susquehanna River. Kreutz Creek does not supply water to any downstream inhabitants or municipalities.

Regional Geology

Modern Landfill is located in the Conestoga Valley section in the northern part of the Piedmont Province. The Piedmont Province is a broad plateau sloping gently eastward from the Blue Ridge Province to the Coastal Plains. It is underlain by metamorphic or plutonic rocks, and cut by sediment filled basins of Jurassic age. The Piedmont Province is the eastern extreme of the five tectonic provinces which compose the Appalachian Mountain Chain. The main regional structure in the area is a pre-metamorphic thrust fault which forms the boundary between Precambrian metavolcanics and schists and Cambrian meta-sediments. This fault, known as the Martic Line, is locally a well defined pre-metamorphic thrust fault with Precambrian Wissahickon Schist overlying Ordovician Conestoga Limestone. In the area to the south of Modern Landfill, the Martic line is poorly defined as it divides the Cambrian phyllite from the Precambrian/Cambrian schists, two very similar rock types. This information suggests that much of the classic work done in Lancaster County may not be an analog for the geologic setting in the vicinity of Modern Landfill.

B. Site HISTORY AND ENFORCEMENT ACTIVITIES

History

Prior to the commencement of the Remedial Investigation/Feasibility Study, Modern Landfill and the area around the Modern Landfill had already been the subject of several geologic studies. The first study relating to remedial activities at Modern Landfill was conducted in 1975. At that time, the investigations centered on the feasibility of utilizing shallow pumping wells as a primary leachate recovery system for Modern Landfill and concluded that leachate from the 66-acre unlined landfill could be effectively collected in this manner.

Between January and May, 1981, PADER collected groundwater samples from wells and springs in the vicinity of Modern Landfill

and detected volatile organic chemicals in some of these samples. The EPA Region III Field Inspection Team (FIT) contractor then conducted a Preliminary Assessment and Site Investigation (PA/SI) in 1982. The PA/SI report recommended the following actions be taken:

- Periodic sampling of nearby residential wells;
- Sampling of groundwater and surface water being used by area farms for livestock and irrigation;
- Determining the effectiveness of the leachate collection system;
- Investigating reactivation of the onsite wastewater treatment facility; and,
- Investigating possible actions to mitigate the groundwater problem.

Additional studies were conducted based on these recommendations.

A hydrogeologic study of the landfill was conducted in 1982 and involved the installation of two monitoring wells and the extension of two existing monitoring wells. Surface water, monitoring wells, and residential drinking wells were sampled.

In 1983 the effectiveness of the western interceptor trench was evaluated and it was determined that the interceptor trench should be modified and upgraded. Quarterly sampling of monitoring wells began in August 1983.

An investigation of leachate collection alternatives in the western perimeter region was conducted in 1984. Geologic data was reviewed, wells were installed and sampled, and the need for additional work was determined. A series of borings were completed, existing perimeter wells were sampled, and 11 interceptor wells were installed. An existing water supply well was activated as an extraction well.

In June, 1984, the 66-acre unlined landfill was scored in accordance with the Hazard Ranking System for possible inclusion on the National Priorities List (NPL) under CERCLA. The unlined landfill received a score of 36, based on potential for exposure to contaminated groundwater. The Modern Landfill Site was proposed for inclusion on the NPL in October 1984.

A follow-up study in 1985 was conducted to investigate leachate interception alternatives in the northern and eastern perimeters of the CERCLA Site. Organic contaminants were found at the eastern, but not the northern, border of the CERCLA Site.

As a result of this investigation, 13 extraction wells were installed along the eastern perimeter.

The Modern Landfill Site was officially listed on the NPL in June, 1986.

Previous Actions

The original 66-acre landfill had no active method of leachate control. The area is now equipped with groundwater interceptor and collection systems to control the migration of leachate constituents from the unlined landfill.

As of December, 1990, approximately 64 acres of the 66-acre unlined landfill are presently covered with a PADER approved, low-permeability cap. The entire 66-acre unlined landfill is scheduled to receive a PADER approved low-permeability final cover system. Thirty-six acres are already at final elevations and are currently being capped. When final elevations are reached, the 66-acre landfill will have a 20-acre plateau area and a 46-acre side slope area. The synthetic geomembrane final cover system proposed for the 20-acre plateau area and the 46-acre clay side slope cap area are designed to reduce infiltration of precipitation and thereby reduce the quantity of leachate generated by the landfill.

Leachate seeps and the presence of leachate constituents in the groundwater were noticed in the past on the west side of the CERCLA Site and, as a result, a groundwater interceptor trench and lagoon treatment system were constructed in 1977. The groundwater interceptor trench is between 6 and 15 feet below ground and is approximately 2,200 feet long. Seepage water collected by this trench is pumped to an onsite treatment facility.

In January 1985, a network of 12 groundwater extraction wells, designed to augment the western groundwater interceptor trench, became operational. In 1987 two additional wells were added to the system and a 14th well became operational in January 1990. Water pumped from these wells is treated at the onsite treatment facility.

A groundwater extraction system similar to that installed on the western side of the landfill was constructed on the eastern perimeter and became operational in November 1986. Water pumped from this extraction system is also treated at the onsite treatment facility.

Modern operated four surface impoundments to treat groundwater and leachate collected by the interceptor and extraction wells along the western perimeter of the CERCLA Site. Treatment consisted of metals precipitation, aeration, and

clarification. These surface impoundments were lined with 6 to 12 inches of soil cement and an asphalt coating. These impoundments were clean-closed in May 1987 under a PADER-approved closure plan.

In April, 1987, a replacement treatment facility for the surface impoundments became operational. The replacement facility accepts flow from the eastern and western groundwater extraction well systems, the western interceptor trench, and leachate from the existing double-lined landfill and slope cap area. This facility has a design capacity of 500,000 gallons per day and includes physical/chemical and biological treatment systems. The physical/chemical portion includes metals precipitation, filtration, and air-stripping. The biological treatment portion was added to enable treatment of leachate collected in the recently constructed double-lined landfill cells.

Permits and PADER Consent Orders

Modern Landfill and the associated extraction and treatment systems operate in accordance with several permits and Consent Orders issued by PADER. Each of these is briefly described below.

Modern Landfill is permitted by PADER under Solid Waste Permit No. 100113 issued on August 17, 1978, to accept municipal waste and a number of non-hazardous industrial (residual) waste streams. The original 66-acre unlined landfill does not accept waste and is being capped. The active double-lined landfill and vertical expansion area are operated pursuant to a permit modification issued by PADER on December 12, 1986. The gas extraction system is also covered by this solid waste permit.

Modern operated four surface impoundments from September 1976 to April 1987 to treat leachate seepage collected by an interceptor trench and extraction wells along the western perimeter of the landfill under a PADER Water Quality Management Permit No. 6786201 issued on September 24, 1976.

On November 20, 1986, PADER issued NPDES Permit No. PA0046680 that permitted construction of a temporary treatment plant to treat groundwater from the eastern groundwater extraction wells; continued operation of the impoundment treatment system for the western extraction wells and interceptor trench; and construction of a new treatment plant consisting of physical/chemical and biological treatment. The temporary treatment plant and four surface impoundments were decommissioned by June 1987 in accordance with a May 27, 1987 agreement with PADER.

The physical/chemical portion of the new treatment plant includes an air stripper, permitted under PADER Air Quality Control Permit No. 67-330-004, to remove volatile compounds from the extracted groundwater and leachate.

CERCLA Enforcement Activities

Modern entered into a September 20, 1984 Consent Order and agreement with PADER to correct conditions at Modern Landfill, most notably, leachate from the 66-acre unlined landfill contaminating the groundwater and surface water. This Consent Order and Agreement was superseded by a Consent Agreement and Order dated December 3, 1986. In accordance with these Orders and Agreements, Modern undertook several remedial actions, including construction of groundwater extraction systems and a wastewater treatment plant.

The RI/FS for the Modern Landfill Site was conducted pursuant to a Consent Order and Agreement entered into by Modern and PADER on November 4, 1987.

Potentially Responsible Party (PRP) Searches for the Modern Landfill Site have been conducted in the past and are continuing at the present time. Two PRPs have been identified and have been issued General Notice Letters. Several other parties have been issued requests for information under Section 104(e) of CERCLA.

C. HIGHLIGHTS OF COMMUNITY PARTICIPATION

There has been moderate community interest in the Modern Landfill Site due to its proximity to and its impact on the groundwater of nearby residences.

In accordance with Sections 113 and 117 of CERCLA, 42 U.S.C. Sections 9613 and 9617, EPA held a public comment period from April 16, 1991 through June 15, 1991 for the proposed remedy at the Modern Landfill Site. A public meeting on the proposed remedy for this Site was held on May 7, 1991 at the Eastern High School, York County , PA. With respect to the remedy proposed by EPA for this Site, however, little community interest exists.

Some concern was expressed by those in attendance at the meeting that not all citizens interested in the Site may have been aware of the meeting, and both an extension to the comment period and a second public meeting were requested. In lieu of the public meeting, EPA prepared a fact sheet on the proposed action at the Site and directly mailed the fact sheet to several hundred potentially interested residences. EPA also offered to meet informally with local officials and/or representatives of any citizens groups if requested. No such meeting requests were

received. In response to requests made at the May 7, 1991 meeting, however, the public comment period was extended to June 15, 1991.

D. SCOPE AND ROLE OF THE RESPONSE ACTION

The only concern presenting significant risk to necessitate remediation at the CERCLA Site is the presence of volatile organic contaminants in the leachate from the 66-acre unlined landfill. There is no principal threat at Modern Landfill. Previous Site investigations have detected volatile organic compounds and some inorganic constituents in the groundwater and surface water on the CERCLA Site as well as in some on-property residential drinking water wells; however, these residences are no longer in existence.

Groundwater beneath the CERCLA Site exceeded Federal and State drinking water standards for the following chemicals: benzene, carbon tetrachloride, 1,2-dichloroethene, 1,1-dichloroethene, trichloroethene, and vinyl chloride. The presence of these chemicals indicates that an Excess Lifetime Cancer Risk (ELCR) for the potential ingestion of water from beneath the CERCLA Site is greater than the acceptable EPA risk limits. The current response action will reduce or eliminate the low level threat posed by the contaminated groundwater beneath the CERCLA Site.

E. SUMMARY OF Site CHARACTERISTICS

Disposal History

The disposal history of Modern Landfill is based on a review of correspondence between regulatory agencies and Modern and its industrial customers. Also investigated were complaints, permits, Site inspections, and other documents related to the Site. Modern Landfill users were identified from gate receipts, but those receipts did not provide information as to waste type or composition. Data currently available provide only partial information on the Modern disposal history and in most cases waste quantities and locations in the 66-acre unlined landfill are not currently known to EPA.

In addition to commercial and residential refuse, Modern Landfill was permitted to accept and did accept several industrial waste streams during the operating history of the 66-acre unlined landfill. Information on these wastes, to the extent known is given below.

Sodium Molybdate Waste. Approximately 15 to 20 tons per year of an inorganic residue from sodium molybdate production were disposed of at Modern Landfill for an

undetermined number of years starting prior to 1972. The waste was reported to have been composed of the following: Molybdenum Trioxide, Sulfur, Cupric Oxide, Ferric Oxide, Silicon Dioxide, and Water.

Pesticide Waste. Pesticide wastes from an unspecified source were disposed of at Modern Landfill in the summer of 1972.

Rare Earth Chlorides. In 1973, PADER approved in principle the encapsulation of rare earth wastes in crushed limestone in the 66-acre unlined landfill. About 1,000 cubic yards of rare earth chlorides containing thorium and uranium and 500 cubic yards of cerium fluoride were disposed of at Modern Landfill between 1975 and 1979. The exact composition of the wastes is unknown. Although some traces of these elemental species were found in groundwater and soils during the Remedial Investigation (and their analysis subsequently carried through the Risk Assessment), no evidence of risk from these wastes has been determined at the Site.

Paper Manufacturing Sludge. A sludge from paper manufacturing was disposed of at Modern Landfill during 1975 through 1981. The waste was reported to contain 60 percent inorganic material and 40 percent organic material. The waste apparently had a low pH and contained heavy metals. Modern was eventually ordered to cease acceptance of this waste by PADER.

Polychlorinated Biphenyls (PCBs). An estimated 20 to 70 drums of PCB wastes were disposed of at Modern Landfill in the mid-1970's. In September and October 1985, these drums and 400 cubic yards of contaminated soil were excavated and transported offSite for disposal.

Ethylene Diamine. On December 13, 1980, a rolloff container was unloaded at Modern Landfill. A liquid leaking from the container was analyzed and determined to contain ethylene diamine. There is no clear evidence that this waste was ultimately disposed of at Modern Landfill.

Oily Wastes. During a PADER inspection of Modern Landfill on March 10, 1982, about 40 cubic yards of mixed residual and municipal wastes were unloaded at the facility. About one fourth of the waste mixture was saturated with a petroleum liquid. The exact nature of the waste was apparently never determined.

Paint Waste. Paint waste was disposed of at Modern Landfill according to a PADER inspection in April, 1984. PADER ordered the generator to cease sending this waste to facilities not permitted to accept such wastes. The

characteristics and composition of the waste and the quantity disposed are not known.

A set of chemicals of potential concern at the Site has been selected for detailed evaluation in the risk assessment and are shown in Table 1, summarized by environmental media.

Geologic and Hydrogeologic Conditions

The surface and subsurface investigation determined that a synform underlies Modern Landfill and that the presence of a synform structure under Modern Landfill is consistent with the regional geology mapped in the RI/FS report.

The hydraulic conductivity of the geologic formations at Modern Landfill decrease with depth and can be related to the presence or absence of lineations, which are interpreted to be main fracture sets. Within the rock materials, the phyllite exhibits a strong anisotropy, while the hydraulic conductivity of the meta-sandstone appears to be relatively isotropic. The dolostone zone exhibits a heterogeneous distribution of hydraulic conductivity values, which are probably related to fracture systems trending east-west through the zone. Most geologic contacts show higher hydraulic conductivity values than the adjacent rock mass.

Groundwater flows towards the eastern and western extraction systems with the possible exception of the groundwater flowing from beneath the north-central area of the 66-acre unlined landfill, which may be bypassing the western extraction system. This flow possibly bypassing the extraction system passes through Vintage dolostone, which has characteristic east-west zones of high hydraulic conductivity alternating with zones of low hydraulic conductivity.

It is conservatively estimated that the travel time of leachate percolating from the central section of the 66-acre unlined landfill and moving to the western extraction system is 2 years, while the travel time to the eastern extraction system is 3.5 years under non-pumping conditions.

The groundwater extraction systems at Modern Landfill have lowered the groundwater surface elevation along both the eastern and western extraction systems. These drawdown troughs cause groundwater to flow toward the extraction wells, effectively capturing the majority of contaminated groundwater. This drawdown has also substantially reduced stream flows in both the eastern and western tributaries of Kreutz Creek.

Organic contaminant concentrations in wells at or inside the extraction systems have generally followed a bell-shaped curve since startup of the groundwater extraction systems.

Concentrations rose after startup of the extraction system as contaminated groundwater was pulled to the wells, then fell, usually below their initial levels. This trend is consistent among wells in all areas of Modern Landfill, indicating that the changes are due to the extraction system, rather than to changes in the contaminant source.

Wells outside the extraction system generally have either continued to show no contamination or contaminant concentrations have decreased since startup of the extraction system.

Sediment, Surface Water, and Air Quality

Modern Landfill is located in the drainage catchment area for Kreutz Creek and is bounded on the east and west by two unnamed tributaries which are fed by springs and runoff. Background data were unavailable for comparison with the Modern Landfill sediment data because the eastern and western tributaries originate on Modern Landfill property; however, as discussed later, risks from low levels of compounds in sediments were within ranges generally considered acceptable by EPA.

During the Remedial Investigation, surface water samples were collected from the eastern and western tributaries, the sedimentation ponds, and the wastewater treatment plant outfall. No organic chemicals and 15 inorganic chemicals were detected in the surface water. Because the tributaries originate on the Modern Landfill property, no background surface water data are available and samples could not be compared to background levels.

Air samples were analyzed for total volatile organic compounds. Volatilization of organic compounds and fugitive dust generations are the main release mechanisms into air at Modern Landfill. The operating methane gas monitoring, extraction, and flare system, which consists of gas extraction wells and gas collection trenches around the southern, eastern, and western perimeters of Modern Landfill, minimizes the potential for air releases to the ambient air form the CERCLA Site. The wastewater treatment plant includes an air stripper to remove volatile compounds during treatment of water from the interceptor trench and extracted groundwater from the extraction systems.

During air monitoring of the Site, only trace levels of organic vapors and no radiation above Site specific background were detected in the ambient air. The 66-acre unlined landfill has been covered with soil or synthetic caps and therefore no potential for fugitive dust emission exists from this area.

F. SUMMARY OF Site RISKS

Human Health Risks

The 66-acre unlined landfill has received a PADER-approved closure cover which is being upgraded with a low permeability cap. In some portions above the 66-acre unlined landfill, a synthetic liner has also been installed. As a result of these conditions, there is no potential for fugitive dust emissions from potential contaminant source areas in the 66-acre unlined landfill.

The 66-acre-unlined landfill, covered and capped, is not a source of direct contact exposure. Based on this consideration, combined with the lack of information on the exact locations of potential contaminant source areas and the fact that capping the 66-acre unlined landfill has reduced the accessibility to such source areas, it was determined that subsurface solids sampling within the 66-acre unlined landfill itself would not be feasible or necessary. Continued operation of the extraction system will steadily deplete concentrations from potential source areas within the 66-acre unlined landfill. For the reasons summarized above, evaluation of potential exposure pathways related to ambient air and to possible source areas in the CERCLA Site was not necessary for this assessment.

Based on sampling results and a review of the summarized data, chemicals identified as potentially Site-related were selected for further evaluation in the risk assessment. The criteria for selection included presence in environmental media at concentrations above background and/or blank concentrations and their relationship to past disposal practices at the Site.

Sample concentrations of inorganic chemicals were compared with those levels considered to be naturally occurring in the Site region; if the detected levels were elevated above background, the chemical was considered for further evaluation in the assessment. Site-specific background sediment or surface water samples could not be collected during the RI since the eastern and western tributaries originate on the property. A comparison of Modern Landfill Site sediment results with available regional soil background values was made. Sediment concentrations which were within these background ranges were considered to be present at naturally occurring levels and were not further evaluated. Available regional background data of inorganic chemicals in soil throughout the state and from three locations within 50 miles of the Modern Landfill were used in the evaluation.

As a final screen to select chemicals of potential concern, organic chemicals which were detected infrequently in the samples

collected from a specific medium, and were detected at consistently low concentrations in a sampled environmental medium, and are not known to be associated with past disposal practices, were not considered to be chemicals of potential concern. Prior to removing chemicals from further evaluation based on these considerations, except for those chemicals that are present at or below naturally occurring background levels, their applicable or relevant and appropriate requirements or toxicity criteria were checked to ensure that chemicals that may be toxic even at very low doses were not removed.

Based on a review of the Modern Landfill RI/FS data, a set of chemicals of potential concern has been selected for detailed evaluation in the risk assessment. These chemicals are summarized by environmental media in Table 1.

For risk assessment purposes, individual pollutants were separated into two categories of chemical toxicity depending on whether they exhibit noncarcinogenic or carcinogenic effects. This distinction relates to the currently held scientific opinion that the mechanism of action for each category is different. EPA has adopted, for the purpose of assessing risks associated with potential carcinogens, the scientific position that a small number of molecular events can cause changes in a single cell or a small number of cells that can lead to tumor formation. This is described as a no-threshold mechanism, since there is essentially no level of exposure to a carcinogen which will not result in some finite possibility of causing the disease. In the case of chemicals exhibiting noncarcinogenic effects, however, it is believed that organisms have protective mechanisms that must be overcome before the toxic endpoint is manifested. This threshold view holds that a range of exposures from just above zero to some finite value can be tolerated by the organism without appreciable risk of causing cancer. Some chemicals can exhibit both carcinogenic and noncarcinogenic effects.

Health criteria for chemicals exhibiting noncarcinogenic effects are generally developed using reference doses (RfDs). The RfD, expressed in units of mg/kg/day, is an estimate of the daily exposure to the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfD provides a benchmark to which chemical intakes by other routes may be compared. Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the Hazard Quotient (HQ) [or, the ratio of estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose]. The HQ is also referred to as the Dose/RfD ratio. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for

Table 1

CHEMICALS OF POTENTIAL CONCERN FOR THE MODERN LANDFILL RISK ASSESSMENT

Chemical	Groundwater	Surface Water	Sediment
Organics:			
1,1,1-trichloroethane	X		
1,1-dichloroethane	X		
1,1-dichloroethene	X		
1,2-dichloroethane	X		
1,2-dichloroethene (total)	X		
1,4-dichlorobenzene	X		
4-methylphenol			X
acetone			X
benzene	X		
bis(2-ethylhexyl)phthalate			X
carbon tetrachloride	X		
chloroethane	X		
chloroform	X		
dichlorofluoromethane	X		
ethylbenzene	X		
methylene chloride	X		
noncarcinogenic PAHs			X
o+p-xylenes	X		
tetrachloroethene	X		
toluene			X
total dichlorobenzenes	X		
trans-1,2-dichloroethene	X		
trichloroethene	X		
trichlorofluoromethane	X		
vinyl chloride	X		
xylenes (total)	X		
Inorganics:			
aluminum		X	
barium	X	X	
cadmium	X		
cobalt		X	
cyanide			X
iron		X	
lead		X	X
manganese		X	
mercury	X		
nickel		X	X
vanadium		X	
Radioactive Compounds:			
radium 226	X		X
radium 228	X		X
thorium 230	X		X
uranium	X		X

gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Human carcinogenic risk is evaluated by determining the excess lifetime cancer risks (ELCRs) for actual or potential exposures. ELCRs are determined by multiplying a contaminant's exposure dose by the cancer potency factor (CPF). CPFs are expressed in units of $(mg/kg/day)^{-1}$ and describe an upper bound estimate of the relative carcinogenic potency of a toxicant.

These calculated risks are probabilities that are generally expressed in scientific notation. An ELCR of 1×10^{-6} indicates that, as a reasonable upper bound, an individual has a one-in-one million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at a Site.

Data showing Health Effects Criteria and other important risk related information used in determining the risks associated with this Site are contained in the Tables in Appendix A to this Record of Decision.

The following risk summary is presented for this Record of Decision:

In the risk assessment, a set of chemicals of potential concern were selected for detailed evaluation based on the RI sampling results. Chemicals were selected separately for three environmental media: groundwater, surface water, and sediments. A total of 26 organic chemicals, 11 inorganic chemicals, and four radionuclides were selected for the risk assessment. The risk assessment then evaluated the potential human health risks associated with exposure to those chemicals of concern.

To evaluate potential human health risks, several exposure pathways were selected for detailed evaluation under both current and possible future Site use conditions. An exposure pathway, defined as a source and mechanism of chemical release, an environmental transport medium, a point of potential exposure, and a route of exposure, is considered "complete" is all of these elements are present. If an exposure pathway was considered complete, then the potential risk was quantitatively calculated.

In addition to the above conditions, two scenarios were considered during the risk assessment: a no-action and a no-further-action alternative. The no-action alternative reflects the Site as it would be without the current groundwater extraction and treatment system operating. The no-further-action alternative corresponds to the current condition of the Modern Landfill CERCLA Site with the extraction and treatment systems operating. The assessment of these two alternatives

enables a determination to be made of whether further remedial action is required for Modern Landfill.

For the no-action and no-further-action alternatives under both future and current Site use conditions, the pathways for direct contact with surface waters and sediments on the CERCLA Site was not complete because no sediments or surface waters exist on the CERCLA Site. No quantitative evaluation was conducted for these pathways.

The pathways for direct contact with surface waters and sediments, for the no-action and no-further-action alternatives off the property under current Site use conditions is complete; however, because off property RI data for sediments and surface water are not available, no quantitative evaluation was conducted.

For both future and current Site use conditions under the no-further-action alternative, surface water flows on the property are intermittent, and surface water contact is minimal. For this reason, no quantitative evaluation of this pathway was conducted.

For current Site use under the no-further-action alternative, no groundwater pathway was found to exist because no receptors are currently located on the CERCLA Site, on the property, or off the property. No current groundwater receptors exist as no residences currently exist on the CERCLA Site. The eastern and western tributaries form a discharge for the aquifers and therefore on-property and off-property residential wells, which are located beyond the tributaries would not be expected to contain Site-related leachate constituents. Residents north, northeast, and northwest of the CERCLA Site have been hooked up to the municipal water system.

For future Site use under the no-action alternative, the groundwater pathway was found to be complete for receptors on the property. Available data, however, were insufficient to quantitatively evaluate this pathway.

For each complete exposure pathway, potential risks to human health were quantitatively estimated. The results of the risk assessment are summarized in Table 2 and are discussed below.

- **Current Land Use Conditions-Potential for Noncarcinogenic Effects. No-Action and No-Further Action Alternatives.** The hazard index values associated with incidental and infrequent direct contact with sediments in the eastern and western tributaries were less than one for both the average and maximum reasonable cases. The hazard index values associated with incidental and infrequent direct contact with surface water in the eastern and western tributaries

Table 2

SUMMARY OF POTENTIAL HUMAN HEALTH RISK ESTIMATES FOR MODERN LANDFILL
(NO-ACTION AND NO-FURTHER-ACTION ALTERNATIVES)

Exposure Pathway	Excess Lifetime Cancer Risk (a)			Hazard Index for Noncarcinogenic Effects (b)		
	Average Case	Maximum Plausible Case	Predominant Chemicals (c)	Average Case	Maximum Plausible Case	Predominant Chemicals (c)
Current Land Use Conditions						
No-Action Alternative (d)						
Direct Sediment Contact						
Western Tributary	2E-09	1E-08	NA	<1	<1	NA
Eastern Tributary	2E-09	2E-08	NA	<1	<1	NA
Direct Surface Water Contact						
Western Tributary	NC	NC	NC	<1	<1	NA
Eastern Tributary	NC	NC	NC	<1	<1	NA
Future Land Use Conditions						
Ingestion of Groundwater (e)						
On the CERCLA Site						
No-Action Alternative	3E-05	8E-03	VC, 1,1-DCE, 1,1-DCA, CCl4	<1	>1	1,2-DCE, CCl4, trans-1,2-DCE, TC
No Further Action Alternative	3E-05	8E-03	VC, 1,1-DCE, 1,1-DCA, CCl4	<1	>1	1,2-DCE, CCl4, trans-1,2-DCE, TC
On the Property						
No Action Alternative	Insufficient data available to evaluate.					
No Further Action Alternative	2E-06	2E-05	(f)	<1	<1	NA
Off the Property						
No-Action Alternative	1E-06	7E-06	(g)	<1	<1	NA
No Further Action Alternative	2E-07	1E-06	NA	<1	<1	NA

(a) The upper bound individual excess lifetime cancer risk represents the additional probability that an individuals may develop cancer over a 70-year lifetime as a result of exposure conditions evaluated. The target cancer risk range used by EPA to evaluate Superfund sites is from 1E-06 to 1E-04.
(b) The hazard index indicates whether or not exposures to mixtures of noncarcinogenic chemicals may result in adverse health effects. A hazard index less than one indicates that adverse human health effects are unlikely to occur.
(c) Listed chemicals are those with excess lifetime cancer risks of 1E-06 or greater for carcinogens and those with CDI:RfD ratios of one or greater for average case conditions.
(d) The results for these pathways are also considered representative of the no further action alternative since the surface water and sediment monitoring data were collected while the extraction system was operating.
(e) For volatile chemicals present in tap water, potential risks from inhaling volatiles released into indoor air may be as large as those associated with direct ingestion.
(f) None of the average-case risks for the individual chemicals detected is equal to or greater than 10-6; however, the combined risk for 1,1-DCA, TDS, Ra226, and Ra228 is greater than 1E-6. Approximately one-half of the total calculated excess cancer risk is from radionuclides, which occur naturally.
(g) None of the average-case risks for the individual chemicals detected is equal to or greater than 10-6; however, the the combined risk for TDS, Ra226, and Ra228 is greater than 1E-06.

NA = Not applicable because the hazard index values are less than one, or excess lifetime cancer risk less than 1E-06.
NC = Not calculated because none of the selected chemicals of concern in surface water exhibit carcinogenic effects.

CHEMICAL ABBREVIATIONS:
1,1-DCE = 1,1-dichloroethene; 1,1-DCA = 1,1-dichloroethane; CCl4 = carbon tetrachloride; 1,2-DCE = 1,2-dichloroethene (total); trans-1,2-DCE = trans-1,2-dichloroethene; TCE = trichloroethene; VC = vinyl chloride; 1,4-DCB = 1,4-dichlorobenzene;
Ra226 = radium 226; Ra228 = radium 228; U = uranium; 1,2-DCA = 1,2-dichloroethane.

were less than one for the no-action alternative. Direct surface water contact for the no-further-action alternative was not quantitatively evaluated. Adverse noncarcinogenic effects would not occur under the exposure scenarios evaluated.

• **Future Land Use Conditions: Excess Lifetime Cancer Risks.** Sediment and surface water contact pathways were not evaluated separately under future land use conditions because the present Site use scenarios addressing these pathways of exposure are considered to be representative of possible future Site use exposure conditions.

Several groundwater ingestion pathways were, however, evaluated under potential future CERCLA Site and surrounding land use conditions. These included ingestion of groundwater on the CERCLA Site, on the Modern Landfill property, and off the Modern Landfill property. With the exception of on the property risks for the no-action alternative, each pathway was evaluated for both the no-action and no-further-action alternatives.

No-Action Alternative. The potential excess lifetime cancer risks for groundwater ingestion on the CERCLA Site are 3×10^{-5} for the average case and 8×10^{-3} for the maximum reasonable case. The chemicals with estimated cancer risks greater than 10^{-6} for the average case included vinyl chloride, 1,1-dichloroethane, 1,1-dichloroethene, and carbon tetrachloride.

The concentrations measured in wells on the CERCLA Site assumed to be unaffected by the extraction system were also used to provide a very conservative indication of potential on property concentrations under the no-action alternative. Thus the risks presented for ingestion of groundwater on the CERCLA Site provide an upper bound indication of potential future risks on the property under the no-action alternative.

For potential groundwater ingestion off the property, the estimated excess lifetime cancer risks for the no-action alternative were 2×10^{-7} for the average case and 1×10^{-6} for the maximum reasonable case, which are at or below the low end of EPA's target cancer risk range.

No-Further-Action Alternative. The potential excess lifetime cancer risks for groundwater ingestion on the CERCLA Site under the no-further-action alternative were the same as the risks for groundwater ingestion on the CERCLA Site under the no-action alternative because the same set of groundwater data were used for both alternatives.

For groundwater ingestion on the property for the no-further-action alternative, the total cancer risk estimates were 2×10^{-6} for the average case and 2×10^{-3} for the maximum reasonable case. No individual chemical exceeded the 10^{-6} excess cancer risk for the average case. The risks estimated for future groundwater ingestion on the property are likely to be overestimated since reductions in chemical concentrations due to continued operation of the extraction system and natural processes were not assumed to occur.

For potential groundwater ingestion off the property under the no-further-action alternative, the estimated cancer risks were 2×10^{-7} for the average case and 1×10^{-6} for the maximum reasonable case.

• **Future Land Use Conditions: Potential for Noncarcinogenic Effects. No-Action Alternative.** Adverse noncarcinogenic effects would not be expected to occur under the average case but could occur under the maximum reasonable case scenario as a result of daily ingestion of groundwater on the CERCLA Site in the future under the no-action alternative. This would result from daily exposures for 70 years to the currently measured maximum detected concentrations of 1,2-dichloroethene, trans-1,2-dichloroethene, carbon tetrachloride, and trichloroethene in groundwater. It is likely that the hazard index values are overestimates since this scenario assumes that current groundwater concentrations will persist for at least 30 to 100 years in the future even though concentrations will likely decrease over time.

The data from the CERCLA Site also provide an upper-bound estimate of the potential for noncarcinogenic effects to occur due to the daily ingestion of groundwater on the property for future Site use conditions under the no-action alternative.

Potential use of groundwater off the property in the future, under the no-action alternative, is not expected to result in adverse noncarcinogenic effects as the hazard index values are less than the threshold level of one.

No-Further-Action Alternative. Since the data from the CERCLA Site were used to evaluate both no-action and no-further actions alternatives, the potential for noncarcinogenic effects to occur due to the ingestion of groundwater on the CERCLA Site in the future under the no-further-action alternative is the same as the potential for noncarcinogenic effects to occur under the no-action alternative.

Potential use of groundwater on the property and off the property in the future, under the no-further-action alternative, is not expected to result in adverse noncarcinogenic effects as the hazard index values are less than the threshold level of one.

Based on the Excess Lifetime Cancer Risk from the potential ingestion of groundwater on the CERCLA Site, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health,welfare, or the environment.

Environmental Evaluation

An ecological assessment was not conducted as part of this risk assessment. This was based on several reasons, including the results of an aquatic biological investigation conducted from the summer of 1981 to the spring of 1982 in the western tributary by PADER. PADER concluded that "leachate from Modern Landfill has not resulted in any degradation to the unnamed [western} tributary to Kreutz Creek. The greatest single factor contributing to poor conditions in the creek was siltation causes by grazing cattle on the Heindel farm." This study was conducted prior to the operation of the western extraction system, when groundwater recharge to the tributary was still a potentially important migration pathway for volatile organic chemicals from the 66-acre unlined landfill. Since it began operating, the extraction system has significantly reduced the surface water flow in both the western and eastern tributaries and thus also minimized the potential for Site-related chemicals to have an adverse impact on the tributaries. Additionally, there is currently no potential for chemicals of potential concern associated with the CERCLA Site to migrate via surface runoff into the tributaries.

According to the Pennsylvania Fish and Game Commission, none of the fish, amphibians, or reptiles on the state's endangered or threatened species lists are known to occur in the vicinity of the Modern Landfill. According to the U.S. Fish and Wildlife Service, except for occasional transient species, no federally listed or proposed threatened or endangered species under their jurisdiction are known to exist in the general vicinity of Modern Landfill. Finally, according to PADER"s Bureau of Forestry, there are no "significant natural features of concern" (such as plant and animal species of special concern, exemplary natural communities and unique geologic features) in the general vicinity of Modern Landfill. A 1988 wetlands field study also concluded that wetlands of the kind and size observed at Modern Landfill is not a uniquely important ecological habitat. Based on this information, it was concluded that an ecological assessment need not be conducted as part of the risk assessment.

G. DESCRIPTION OF ALTERNATIVES

Based on data collected and the risk assessment results of the Remedial Investigation/Feasibility Study, EPA has established remedial action objectives for the Modern Landfill Site. Remediation is generally focused on exposure pathways showing excess lifetime cancer risks greater that 1×10^{-6} or, for noncarcinogens, a hazard index greater than the threshold level of one. These points of departure were exceeded for the groundwater ingestion exposure pathway only. Remedial action objectives have therefore been developed for groundwater only.

The general remedial action objectives for the Modern Landfill Site are:

- Reduce leachate production and migration to groundwater.
- Reduce the amount of groundwater degradation on the CERCLA Site.
- Decrease the potential for migration of degraded groundwater from the Modern Landfill property.
- Minimize migration of leachate constituents into surface water.
- Prevent exposure to contaminated groundwater.
- Restore contaminated groundwater to beneficial uses where practicable.
- As a goal, restore contaminated groundwater to background quality.

The baseline risk assessment concluded that under the no-further-action alternative, risks from ingestion of groundwater on the property and off the property were well within EPA's target risk range of 10^{-6} to 10^{-4}. Even for the no-action alternative, risks off the property were calculated to be well within this range. Thus, remediation is needed only on the CERCLA Site, not on the property and/or off the property.

The following substances have been evaluated for groundwater ingestion risks on the Modern Landfill CERCLA Site with an estimated upper bound excess lifetime cancer rusk of 1×10^{-6} or greater, or with a CDI to RfD ratio of 1.0 or greater. These substances will be removed to their background levels as described later in this Record of Decision.

benzene	carbon tetrachloride
chloroform	1,4-dichlorobenzene
total dichlorobenzenes	1,1-dichloroethane

1,2-dichloroethane	1,1-dichloroethene
trans-1,2-dichloroethene	1,2-dichloroethenes (total)
methyl chloride	tetrachloroethene
trichloroethene	vinyl chloride

Area of Attainment

The National Contingency Plan, in discussing documentation of the remedy selection in the ROD states that "Performance shall be measured at appropriate locations in the groundwater, surface water, soils, air, and other affected environmental media." Under current Site conditions, groundwater flow from the CERCLA Site is effectively contained by the existing groundwater extraction system. To monitor the effectiveness of the remediation and protection provided to users of the groundwater in the vicinity, groundwater monitoring points outside the extraction system are appropriate (and some are already installed).

The attainment area for Modern Landfill is located between the CERCLA Site and the existing groundwater compliance monitoring and assessment points. All of these compliance monitoring and assessment points are located well within the property boundaries so that if water quality is determined to be unacceptable, steps can be taken to prevent further migration and to protect human health and the environment. Additional compliance and monitoring points may be constructed if deemed necessary by the PADER and/or EPA.

Summary of Alternatives

EPA studied a variety of technologies to determine which were applicable for use at the Modern Landfill Site. After a preliminary screening of technologies was completed, those most applicable to the Site were developed into remedial alternatives. The alternatives which were developed to treat the relatively low level threat from the Modern Landfill Site are as follows:

- Alternative 1 -- No-Action

- Alternative 2A -- No Further Action (Continued Operation of Groundwater and Vapor Extraction Systems)

- Alternative 2B -- Groundwater and Vapor Extraction Systems and Final Cover

- Alternative 2C -- Augmented Extraction Systems plus Final Cover

A more detailed description of each of these alternatives follows.

Alternative 1 -- No Action

Capital Cost: $0

Operation and
Maintenance Costs: $218,500

Present Worth Cost: $3,398,000

The National Contingency Plan requires that a no action alternative be evaluated in detail. This provides a baseline for comparison to other alternatives. At the Modern Landfill Site, however, a true no-action alternative is not possible. The best approximation to a no-action alternative is ceasing current actions, that is, shutting off the extraction system and ceasing maintenance of the cap and other components of the existing remedial action . The no-action alternative would include groundwater monitoring consisting of sampling and analysis in accordance with PADER Solid Waste Permit No. 100113.

This alternative provides more protection to human health and the environment than a true no-action alternative as some leachate constituents have already been removed from the landfill, the cap already in place will continue to reduce infiltration and the concentration of leachate constituents in the groundwater, and the Site fence will continue to restrict access to the Site.

In general, this alternative would not meet the Applicable or Relevant and Appropriate Requirements (ARARs) for this Site, particularly the groundwater remediation goals of background water quality.

Alternative 2A -- No Further Action (Continued Operation of the Existing Groundwater and Vapor Extraction Systems)

Capital Cost: $47,000

Operation and
Maintenance Costs: $1,107,500

Present Worth: $16,963,500

This alternative involves the continued operation and maintenance of all existing remedial actions, including the landfill cap, groundwater extraction system, onsite wastewater treatment facility, vapor extraction system, and groundwater monitoring.

A landfill cap and final cover are currently under construction. This alternative does not include completion of the landfill caps currently under construction but does allow for

maintenance of completed caps. The purpose of the cap system is to reduce infiltration of precipitation which will ultimately result in the reduction of the amount of leachate produced from the Site area, thereby reducing the concentration of leachate constituents in the groundwater.

A network of 12 groundwater extraction wells which was designed and installed in 1985 augments the western groundwater interceptor trench. An additional two extraction wells were added in 1987, bringing the total number of extraction wells on the western perimeter to 14. Along the eastern perimeter a similar extraction system, consisting of 13 wells, became operational in 1986.

The purpose of the extraction system is to create a hydraulic barrier to groundwater flow from the CERCLA Site and to remove groundwater containing leachate constituents. All extracted water is diverted to and processed through the onsite wastewater treatment facility. The treatment facility, permitted under PADER Water Quality Management Permit No. PAD00678201, is designed to accept flow from both the eastern and western groundwater extraction systems and the groundwater interceptor trench. The wastewater treatment facility is comprised of a physical/chemical plant and a biological plant to treat extracted groundwater. Wastewater received from the physical/chemical treatment plant is processed in the biological treatment plant and returned to the physical/chemical plant prior to sand filtering. Wastewater is then processed through the air strippe before discharge.

Site fencing is included in this alternative to restrict Site access. The section of the CERCLA Site west of Prospect Road is surrounded by existing Site fencing and sections of the CERCLA Site east of Prospect Road are enclosed by Site fencing. The risk assessment showed that risks associated with direct surface water and sediment contact for the no further action alternative to be below the regulatory levels of concern. The existing Site fence is therefore protective of human health and the environment by restricting Site access.

The purpose of the landfill gas management system at Modern Landfill is to prevent landfill gas migration off the property. The operation of the landfill gas management system subjects the entire refuse volume to a pressure equal to or slightly less than that of atmospheric pressure, reducing landfill gas migration.

In addition to the above, groundwater monitoring in accordance with the PADER Solid Waste Permit NO. 100113 would continue with this alternative, both upgradient and downgradient of the Site to detect changes in groundwater quality. The groundwater monitoring program currently includes three quarterly sampling and analysis periods during the months of March, June,

and December, and one annual sampling and analysis period during September.

The current water quality monitoring system consists of 19 groundwater monitoring wells, 14 groundwater constituent assessment wells, the 27 eastern and western extraction wells, and 17 surface water sampling points.

New groundwater monitoring and assessment wells may be needed on the property to evaluate progress toward meeting the remediation goals in the attainment area. The exact location and number of these wells will be determined in the Remedial Design phase.

This alternative would be expected to meet all ARARs, except the groundwater remediation goals under future conditions.

Alternative 2B -- Groundwater and Vapor Extraction Systems and Final Cover

Capital Cost: $3,486,500

Operation and
Maintenance Costs: $1,166,500

Present Worth Cost: $17,947,000

This alternative consists of the some remedial actions as Alternative 2A plus additional remedial actions that are currently planned and permitted to enhance the effectiveness of the overall remedy. These additional actions include completion of the cap and final cover over the 66-acre unlined landfill.

In additional to the completion of the landfill caps, the entire 66-acre unlined landfill will receive a PADER approved low-permeability final cover system. The final cover over the landfill will include a 20-acre plateau cap and a 46-acre side slope cap.

This alternative is also expected to comply with ARARs. Under future use conditions, however, the Pennsylvania background requirement for background quality may not be met either on and/or off the site should groundwater bypass the extraction system.

Alternative 2C --Augmented Extraction Systems Plus Final Cover

Capital Cost: $3,509,000

Operation and
Maintenance Costs: $1,175,000

Present Worth Cost: $18,078,000

This alternative includes all of the actions undertaken and planned for in Alternatives 2A and 2B above. In addition, this alternative includes further expansion of the existing groundwater extraction system. The objective of this alternative is to minimize the flow of degraded groundwater that could potentially escape the extraction well system to the northwest.

In this alternative, two additional wells are proposed at the northwest end of the western extraction system. These proposed wells are strategically located to capture groundwater that might bypass the current the north end of the western extraction system.

This alternative, like Alternative 2A and 2B, is expected to meet ARARs.

H. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

The four remedial action alternatives described above were evaluated under the nine criteria in the NCP, 40 CFR 300.430(e)(9). These nine criteria can be further categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria, as follows:

Threshold Criteria

- Overall protection of human health and the environment
- Compliance with applicable or relevant and appropriate requirements (ARARs)

Primary Balancing Criteria

- Long-term effectiveness
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria

- Community Acceptance
- State Acceptance

These evaluation criteria, which measure the overall feasibility and acceptability of the remedy, relate directly to requirements in Section 121 of CERCLA, 42 U.S.C. Section 9621. Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to

weigh major trade-offs between alternatives. State and community acceptance are modifying criteria formally taken into account after public comment is received on the Proposed Plan.

The comparative evaluation of alternatives follows.

Overall Protection of Human Health and the Environment.

Alternative 1 would not be protective of human health and the environment as the Site would return to its previous uncontrolled state and leachate constituents could migrate in both the groundwater and surface water. As this Alternative is not protective of human health and the environment, it will not be considered further in this Record of Decision. Alternatives 2A, 2B, and 2C would be protective of human health and the environment by decreasing the potential for direct contact with surface water and sediments, and by decreasing the potential for ingestion of groundwater containing leachate constituents. Alternative 2B would be more protective than 2A as the completion of the cap would further reduce the potential of leachate generation, while Alternative 2C, in addition to the above benefits, would ensure the removal of contaminants that may be bypassing the extraction system to the north.

Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 2C would comply with all ARARs. Groundwater extraction will continue until the Pennsylvania ARAR for background water quality is reached. Under Alternatives 2A and 2B, however, requirements may not be met on and/or off the property in the future should groundwater bypass the current extraction system. Alternative 2C will ensure that such bypassing does not occur.

Long Term Effectiveness

The magnitude of residual risk will be substantially reduced by implementation of any of the Alternatives. The use of groundwater extraction and landfill gas extraction serves as a method of leachate constituent removal. This, in combination with reduced mobility of leachate constituents from the existing low-permeability landfill cap, will mitigate a substantial amount of potential risk.

The risks associated with direct contact with sediment and surface water have been shown to be well below the regulatory levels of concern. These risks will be further minimized by the existing Site fencing and the reduction of constituent migration to the surface water. The risks associated with ingestion of groundwater are being reduced by the installation of landfill caps, the connection of an additional well under Alternative 2B,

and the completion of final cover and another extraction well under alternative 2C.

Reduction of Toxicity, Mobility, or Volume Through Treatment.

All three alternatives, 2A, 2B, and 2C reduce the inherent hazards associated with ingestion of degrades groundwater by operation of the groundwater extraction system. Degraded groundwater removed by the extraction system typically contains chlorinated hydrocarbons and some inorganic compounds. Leachate constituents are physically and chemically separated from the groundwater by the onsite wastewater treatment plant.

Some reduction in the volume of leachate constituents present in the landfill has and will be accomplished by the groundwater and vapor extraction systems. The mobility of leachate constituents will be reduced by the existing low-permeability landfill cap. The reduced infiltration of precipitation results in reduced migration of leachate constituents into the groundwater.

Alternatives 2B and 2C will each remove incrementally greater amounts of contaminants from the groundwater, and Alternative 2C will further reduce the mobility of contaminants with the completion of the final landfill cover system.

Short Term Effectiveness

With all three Alternatives, implementation of the full remedies would commence almost immediately. As the groundwater extraction and vapor extraction systems have been in operation for some time, the short term effectiveness of each remedy has already been demonstrated.

Alternatives 2B and 2C would require some additional time from selection of remedy to implementation; however, this timeframe would be expected to be less than one year. Additionally, the final cover system to be implemented with Alternative 2C would further reduce the mobility of the contaminants in an extremely short timeframe.

The community, workers, or the environment are not expected to be adversely affected by any of the Alternatives.

Implementability

All phases of Alternative 2A have been implemented except the installation of additional monitoring wells. Implementation of this Alternative poses no technical difficulties. This alternative is relatively simple to operate and is reliable.

All components of Alternative 2B have been implemented with the exception of the installation of additional monitoring wells, and completion of landfill capping and final cover. Again, the implementation of these actions pose minimal difficulty.

All components of Alternative 2C have been implemented except the installation of additional monitoring wells, completion of landfill capping and final cover, and the design and installation of two additional extraction wells. The completion of these actions pose minimal difficulty. The alternative is relatively simple to operate and is reliable.

All materials and services required by this alternative are common construction items and procedures, and involve routine sampling and analytical procedures.

Cost

The capital cost for Alternative 2A is relatively low at $47,000 as most of the components of this remedy have already been implemented. The Operation and Maintenance Costs of all of the Alternatives are, for all practical purposes, about equal at just over $1 million, and the Present Worth Costs of all of the Alternatives are just about equal, ranging from $16,963,500 for Alternative 2A to $18,078,000 for Alternative 2C.

Community Acceptance

A public meeting on the proposed plan for Modern Landfill was held on May 7, 1991. Comments received from the public during the public comment period are referenced in the Responsiveness Summary attached to the Record of Decision. No major public objection to the proposed remedy for Modern Landfill exists.

State Acceptance

PADER, on behalf of the Commonwealth of Pennsylvania, has verbally concurred in the selection of Alternative 2C.

I. THE SELECTED REMEDY

Based upon consideration of information available for the Modern Landfill Site, including the documents available in the Administrative Record, an evaluation of the risks currently posed by the Site, the requirements of CERCLA, the detailed evaluation of alternatives, and community input, EPA has selected Alternative 2C as the remedy to be implemented at Modern Landfill.

This Alternative involves the continued operation and maintenance of all existing remedial actions, including the completion and maintenance of the landfill cap and final cover system, groundwater extraction system, installation of additional extraction wells to ensure the capture of contaminated groundwater flowing to the north, onsite wastewater treatment facility, vapor extraction system, and groundwater monitoring. The 66-acre unlined landfill will have a 20-acre plateau area and a 46-acre side slope area. A total of 27 groundwater extraction wells will continue in operation. The groundwater extraction system will continue to operate until the remediation goal of background levels of contaminants is reached. The clean up level for the aquifer contaminants are, for each contaminant, the lower of (1) the standards listed in Table 3 and (2) the background level of that contaminant. Background concentrations for each of the contaminants listed in Table 3 shall be the method detection limit for the method of analysis utilized with respect to that contaminant. As of the date of this Record of Decision, the appropriate methods of analysis are 40 C.F.R. Part 136 (Series 601 and 602), and 40 C.F.R. Part 141 (Series 524.2). The attainment area for this remediation is located between the CERCLA Site and the groundwater compliance monitoring and assessment points, all of which are located within the property boundaries. If implementation of the selected remedy demonstrates, in corroboration with hydrogeological and chemical evidence, that it will be technical 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.

Groundwater form both the eastern and western extraction systems and the groundwater interceptor trench will be treated at the onsite wastewater treatment facility and discharged to the unnamed tributary to Kreutz Creek in accordance with the requirements of PADER permit PAD00678201. The treatment process consists of both biological and physical/chemical treatment trains, sand filtering, and air stripping.

Continued groundwater and surface water monitoring is also a part of the selected remedy as is the installation of additional monitoring and extraction wells if needed. Site fencing is included in this alternative to restrict Site access and minimize any direct contact threat.

Remediation of these low level threats at the Modern Landfill Site will effectively eliminate the risks associated with potential ingestion of groundwater on the CERCLA Site.

Table 3

Remediation Goals for Groundwater

COMPOUND (a)	TARGET CONCENTRATION (ug/l)	
	VALUE	BASIS
BENZENE	5	MCL
CARBON TETRACHLORIDE	5	MCL
CHLOROFORM	13	RISK BASED (b,c)
1,4-DICHLOROBENZENE	75	MCL
TOTAL DICHLOROBENZENE	75	MCL (d)
1,1-DICHLOROETHANE	5	QUANTITATION LIMIT (e)
1,2-DICHLOROETHANE	5	MCL
1,1-DICHLOROETHENE	7	MCL
TRANS-1,2-DICHLOROETHENE	100	PMCL
1,2-DICHLOROETHENES (TOTAL)	70	PMCL (f)
METHYLENE CHLORIDE	11	RISK BASED (b)
TETRACHLOROETHENE	5	PMCL
TRICHLOROETHENE	5	MCL
VINYL CHLORIDE	2	MCL

REFER TO PAGE 28 OF THE RECORD OF DECISION FOR A COMPLETE DISCUSSION OF GROUNDWATER REMEDIATION GOALS FOR THIS SITE.

TABLE 3 (con't.)

REMEDIATION GOALS FOR GROUNDWATER
(CONTINUED)

ND Not detected at levels at or above the quantitation limit.

(a) Includes all chemicals evaluated for groundwater ingestion risks on the Modern Landfill CERCLA site with an estimated upper bound excess lifetime cancer risk of 1×10^{-6} or greater, or with a CDI to RfD ratio of 1.0 or greater (see Table 6-31 of the risk assessment, Chapter 6 of the RI Report).

(b) Risk-based levels are calculated assuming ingestion of 2 liters/day, 365 days/year, for 30 years by a 70 kg individual.

(c) The MCL for total trihalomethanes is 100 µg/l.

(d) Value for 1,4-dichlorobenzene.

(e) Based on the EPA Contract Laboratories Program contract-required quantitation limit. This is consistent with the MCL for 1,2-dichloroethane, which has approximately the same cancer potency as 1,1-dichloroethane. The risk-based concentration for 1,1-dichloroethane would be 0.9 µg/l (1×10^{-6} excess lifetime cancer risk.

(f) Value for cis-1,2-dichloroethene.

The Capital Cost of this Alternative is $3,509,000, the annual Operation and Maintenance Costs are $1,175,000, and the Present Worth Cost is $18,078,000.

J. STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund Sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA established several other statutory requirements and preferences. These specify that when complete, the selected remedial action for a Site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is granted. The selected remedy must also be cost-effective and utilize treatment technologies or resource recovery technologies to the maximum extent practicable. Finally the statute includes a preference for remedies that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes.

Protection of Human Health and the Environment

The selected remedy will be protective of human health and the environment by eliminating the threat posed by the hazardous substances within the Modern Landfill. These hazardous substances currently provide a threat to human health due to potential ingestion of groundwater on the CERCLA Site. The selected remedy will eliminate that potential risk by extracting the contaminated groundwater beneath the Site and treating the contaminated groundwater before discharge.

Any potential for direct contact with Site contaminants will be eliminated by completion of the cap and final cover systems over the unlined 66-acre landfill. These cap and cover systems will also reduce the production of leachate and contaminated groundwater which originates under the CERCLA Site. In addition, Site fencing will restrict access to the Site to further reduce the direct contact risk.

The selected remedy will not pose any unacceptable short-term risks or cross-media impacts to the Site, the workers, or the community. The selected remedy will be readily implementable.

Compliance with ARARs

The selected remedy will attain all applicable or relevant and appropriate requirements for the Site. These requirements are shown in Appendix B. Most specifically, the Pennsylvania action-specific requirement to remediate groundwater to

background concentrations (25 PA Code,Chapter 75, Part 264.97) will be met through implementation of this remedy. 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.

Cost Effectiveness

The estimated present worth cost of the selected remedy is $18,078,000. EPA and the Commonwealth of Pennsylvania believe the selected remedy is cost-effective in mitigating the risks posed by the Modern Landfill Site. Although the no-action alternative can be implemented at a much lower cost, that alternative is not protective of human health and the environment and does not meet ARARs. Alternatives 2A and 2B are only slightly less expensive than the selected remedy and do not provide the same amount of protection as the selected remedy.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedial action represents the maximum extent to which permanent solutions and treatment technologies can be utilized while providing the best balance among the other evaluation criteria. Of the alternatives that are protective of human health and the environment and meet ARARs, EPA has determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence; implementability; short-term effectiveness; reduction in toxicity, mobility, or volume through treatment; state and community acceptance; and the CERCLA preference for treatment.

The selected remedy addresses the long-term, low-level threats posed by the Site contaminants at MOdern Landfill. The remedy is protective of human health and the environment, meets ARARs, and is cost-effective. Treatment as a principal element is provided for in the onsite treatment of extracted groundwater and leachate prior to discharge.

As this alternative would result in hazardous substances remaining onsite, 5-year reviews, pursuant to Section 121(c) of CERCLA, will be required to monitor the effectiveness of this alternative.

K. DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes from the Proposed Plan have been made.

HEALTH EFFECTS CRITERIA FOR INHALATION EXPOSURE TO CHEMICALS OF POTENTIAL CONCERN

Chemical	Reference Dose (RfD) (mg/kg/day)	Safety Factor (a)	Source (b)	Cancer Potency Factor (mg/kg/day)-1	Source (b)	Weight of Evidence
Acetone	--	--	--	--	--	--
Aluminum	--	--	--	--	--	--
Barium	0.0001	1,000	HEA	--	--	--
Benzene	--	--	--	2.9E-02	IRIS	A
Carcinogenic PAHs (as Benzo[a]pyrene)	--	--	--	6.1 *	HEA (d)	B2
Bis(2-ethylhexyl)phthalate	--	--	--	--	IRIS	B2
Cadmium	--	--	--	6.1	IRIS	B1
Carbon tetrachloride	--	--	--	1.3E-01	IRIS	B2
Chloroethane	--	--	--	--	--	--
Chloroform	--	--	--	8.1E-02	IRIS	B2
Cobalt	--	--	--	--	--	--
Cyanide	--	--	--	--	--	--
Dichlorobenzenes:						
(as 1,2-Dichlorobenzene)	0.04	1,000	HEA	--	--	--
(as 1,4-Dichlorobenzene)	0.7 mg/m3	100	HEA	--	HEA	B2
1,1-Dichloroethane	0.1	1,000	HEA	--	--	--
1,2-Dichloroethane	--	--	--	9.1E-02	IRIS	B2
1,1-Dichloroethene	--	--	--	1.2	IRIS	C
1,2-Dichloroethene (total):						
cis-	--	--	--	--	--	--
trans-	--	--	--	--	--	--
Dichlorofluoromethane	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--
Iron	--	--	--	--	--	--
Lead	--	--	--	--	--	B2
Manganese	0.00009	100	HEA	--	--	--
Mercury:						
Inorganic	--	--	--	--	--	--
Inorganic and Alkyl	--	--	--	--	--	
Mercurial	--	--	--	--	--	
Methylene chloride	3 mg/m3*	100	HEA	1.4E-02	IRIS	B2
4-Methylphenol	--	--	--	--	--	--
Noncarcinogenic PAHs (as Naphthalene)	--	--	--	--	--	--
Nickel:						
Soluble salts	--	--	--	--	--	--
Refinery dust	--	--	--	8.4E-01	IRIS	A
Subsulfide	--	--	--	1.7	IRIS	A
Radium 226	--	--	--	-- *	--	--
Radium 228	--	--	--	-- *	--	--
Tetrachloroethene	--	--	--	0.0033 *	HEA	B2
Thorium 230	--	--	--	--	--	--
Toluene	1	100	HEA	--	--	--
Trichloroethene	--	--	--	4.6E-03	HEA (g)	B2
Trichlorofluoromethane	0.2	1,000	HEA (f)	--	--	--
Uranium	--	--	--	-- *	--	--
Vanadium	--	--	--	--	--	--
Vinyl chloride	--	--	--	2.95E-01 (h)	HEA	A
Xylenes (total):						
Mixed	0.4 *	1,000	HEA	--	--	--
1,1,1-Trichloroethane	0.3	1,000	HEA	--	--	--

Footnotes are on Table 6-18C.

HEALTH EFFECTS CRITERIA FOR ORAL EXPOSURE TO CHEMICALS OF POTENTIAL CONCERN

Chemical	Reference Dose (RfD) (mg/kg/day)	Safety Factor (a)	Source (b)	Cancer Potency Factor (mg/kg/day)-1	Source (b)	Weight of Evidence
Acetone	0.1	1,000	IRIS	--	--	--
Aluminum	-- (l)	--	--	--	--	--
Barium	0.05	100	IRIS	--	--	--
Benzene	--	--	--	2.9E-02	IRIS	A
Carcinogenic PAHs (l) (as Benzo[a]pyrene)	--	--	--	11.5 *	HEA (d)	B2
Bis(2-ethylhexyl)phthalate	0.02	1,000	IRIS	1.4E-02	IRIS	B2
Cadmium	0.001 (food) * 0.0005 (water)	10	HEA	-- (e)	--	--
Carbon tetrachloride	0.0007	1,000	IRIS	1.3E-01	IRIS	B2
Chloroethane	-- (l)	--	--	--	--	--
Chloroform	0.01	1,000	IRIS	6.1E-03	IRIS	B2
Cobalt	0.03 (k)	--	--	--	--	--
Cyanide	0.02	500	IRIS	--	--	--
Dichlorobenzenes (l) (as 1,4-Dichlorobenzene)	0.1	1,000	HEA	2.4E-02	HEA	B2
1,1-Dichloroethane	0.1	1,000	HEA	9.1E-02	HEA	B2
1,2-Dichloroethane	--	--	--	9.1E-02	IRIS	B2
1,1-Dichloroethene	0.009	1,000	IRIS	6.0E-01	IRIS	C
1,2-Dichloroethene (total) (l):						
cis-	0.01	1,000	HEA	--	--	--
trans-	0.02	1,000	IRIS	--	--	--
Dichlorofluoromethane	-- (l)	--	--	--	--	--
Ethylbenzene	0.1	1,000	IRIS	--	--	--
Iron	-- (l)	--	--	--	--	--
Lead	--	--	--	--	--	B2
Manganese	0.2	100	HEA	--	--	--
Mercury:						
Inorganic	--	--	--	--	--	--
Inorganic and Alkyl	0.0003 (f)	10	HEA	--	--	--
Mercurial	0.0003 *	1,000	HEA	--	--	--
Methylene chloride	0.06	100	IRIS	7.5E-03	IRIS	B2
4-Methylphenol	0.05	1,000	IRIS	--	--	--
Noncarcinogenic PAHs (l) (as Naphthalene)	0.4 *	100	HEA	--	--	--
Nickel:						
Soluble salts	0.02	300	IRIS	--	--	--
Refinery dust	--	--	--	-- (e)	--	--
Subsulfide	--	--	--	-- (e)	--	--
Radium 226	--	--	--	3.5E-04 (j)	--	--
Radium 228	--	--	--	1.7E-04 (j)	--	--
Tetrachloroethene	0.01	1,000	IRIS	0.051 *	HEA	B2
Thorium 230	--	--	--	--	--	--
Toluene	0.3	100	IRIS	--	--	--
Trichloroethene	0.00735 *	1,000	HEA	1.1E-02	HEA	B2
Trichlorofluoromethane	0.3	1,000	HEA	--	--	--
Uranium	--	--	--	5.0E-05 (j)	--	--
Vanadium	0.007	100	HEA	--	--	--
Vinyl chloride	--	--	--	2.3	HEA	A
Xylenes (total):						
Mixed	2	100	IRIS	--	--	--
1,1,1-Trichloroethane	9E-02	1,000	IRIS	--	--	--

Footnotes are on Table 6-10C.

FOOTNOTES FOR HEALTH EFFECTS CRITERIA

(a) Safety factors are the products of uncertainty factors and modifying factors. Uncertainty factors used to develop reference doses generally consist of multiples of 10, with each factor representing a specific area of uncertainty in the data available. The standard uncertainty factors include the following:
- a 10-fold factor to account for the variation in sensitivity among the members of the human population;
- a 10-fold factor to account for the uncertainty in extrapolating animal data to the case of humans;
- a 10-fold factor to account for uncertainty in extrapolating from less-than-chronic NOAELs to chronic NOAELs; and
- a 10-fold factor to account for the uncertainty in extrapolating from LOAELs to NOAELs.

Modifying factors are applied at the discretion of the reviewer to cover other uncertainties in the data.

(b) IRIS = the chemical files of EPA's Integrated Risk Information System (as of 08/01/89); HEA = Health Effects Assessment Summary Tables (04/01/89); HA = Health Advisory (Office of Drinking Water).

(c) EPA weight of evidence classification scheme for carcinogens: A--Human Carcinogen, sufficient evidence from human epidemiological studies; B1--Probable Human Carcinogen, limited evidence from epidemiological studies and adequate evidence from animal studies; B2--Probable Human Carcinogen, inadequate evidence from epidemiological studies and adequate evidence from animal studes; C--Possible Human Carcinogen, limited evidence in animals in the absence of human data; D--Not Classified as to human carcinogenicity; and E--Evidence of Noncarcinogenicity.

(d) Health Effects Assessment for Benzo(a)pyrene, Environmental Criteria and Assessment Office, Cincinnati, Ohio. EPA 540/1-86-048.

(e) There is inadequate evidence for carcinogenicity of this compound by the oral route.

(f) Based on RfD for methyl mercury.

(g) Bellies, R. 1988. Personal communication with Dr. Robert Bellies, Carcinogen Assessment Group, EPA. Also in the EPA 1984 Health Effects Assessment for Trichloroethylene, Environmental Criteria and Assessment Office, Cincinnati, Ohio. EPA/540/1-86-048.

(h) Based on metabolized dose.

(i) For these chemical mixtures, toxicity data for one of the most toxic compounds in the mixture is used to represent the entire mixture, e.g., benzo(a)pyrene for carcinogenic PAHs, naphthalene for noncarcinogenic PAHs, 1,4-dichlorobenzene for dichlorobenzenes, cis-1,2-dichloroethene for 1,2-dichloroethenes.

(j) The cancer potency factor, derived using information in EPA (1986), is in units of (pCi/kg/day)-1.

(k) An interim RfD was calculated for use in this assessment from the oral LOSG (RTECS 1987) according to the approach described in Layton et al. (1987).

(l) An interim RfD could not be calculated because oral LOSG values were not available (RTECS 1987).

* = Pending/under review.

APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

MODERN LANDFILL

REQUIREMENT	DESCRIPTION
RCRA Maximum Concentration Limits (40 CFR 264.94)	Federal Standards for several toxic chemicals are set forth to protect groundwater. Standards will be used when setting goals for acceptable levels of the listed chemicals.
Safe Drinking Water Act Maximum Contaminant Levels (40 CFR Part 141)	Federal Standards for several chemicals including the RCRA MCLs, adopted to protect public drinking water systems. Standards will be considered and used in characterizing human health risks associated with possible contaminated groundwater used for public consumption.
PA Hazardous Waste Regulations (25 PA Code 264.97)	Requires cleanup of groundwater to background levels.
PA Safe Drinking Water Act of 1984 (25 PA Code 109 et. seq.)	State act which established drinking water standards at least as stringent as Federal Standards.
PA Municipal Waste Landfill Regulations (Title 25, Chapter 273.281-288)	State Requirements on monitoring groundwater for potential leachate constituents.
PA Water Quality Standards (PA Code Title 25, Chapter 93)	PADER Water Quality Standards include requirements for dissolved oxygen, temperature increase, pH, total coliform, and chemical-specific effluent limits. Limits set on a case by case basis.
PA NPDES System (PA Code Title 25, Chapter 92)	State requirements on limitation of discharge from treatment facilities.

PA Wastewater Treatment Requirements (PA Code Title 25, Chapter 95 et. seq.)	State Requirements that set levels for surface water releases from treatment facilities.
PA Clean Streams Law (35 P.P. Section 691.1)	State Requirements set forth to protect and ensure the integrity of streams.
Clean Air Act-- National Ambient Air Quality Standards (40 CFR 50)	Standards for particulate matter.
PA Air Pollution Control Regulations (PA Code Title 25, Chps 121-143)	Standards regulate emissions from air pollution control devices.
Construction, Modification, Reactivation, and Operation (Air Stripping) (PA Code Title 25, Chapter 127)	Requirements include BAT (Best Available Technology), plan approval, and special requirements in non-attainment areas.
PA Municipal Waste Landfill Regulations (PA Code Title 25, Chapter 273.234-273.236, and 273.292,293)	Design and performance standards for final cover. Closure with waste in place. Requirements for landfill gas management practices at municipal waste landfills.
PA Water Resources Regulations and NPDES (25 PA Code 92.1 et. seq.)	Authorizes NPDES discharges and treatment facility construction.
PA Municipal Waste Landfill Regulations (PA Code Title 25, Chapter 273.271-273.277)	Leachate Management and Treatment Standards.

40 CFR 122.44, 125	Best Available Technology to control toxic and non-conventional pollutants from treatment of wastewater.
40 CFR 125.100, 125.104	Best Management Practices and objectives for control of toxic constituents to surface waters.
PA Municipal Waste Landfill Regulations (Operation and Maintenance) (PA Code Title 25, Chapter 273.321-322)	A closure and post-closure plan must be submitted to and approved by PADER.
PA Code Title 25 Ch. 102	Development of an Erosion and Sedimentation Control Plan.
PA Code Title 25, Chapter 273.242	Requires erosion and sedimentation control for municipal waste landfills.
29 CFR 1926	Safety and health regulations for construction work.
PA Hazardous Sites Cleanup Act (PA Code Title 35, Chs. 1-13)	Outlines hazardous sites cleanup in the state of Pennsylvania.

RESPONSIVENESS SUMMARY
MODERN LANDFILL RECORD OF DECISION
YORK COUNTY, PENNSYLVANIA

From April 16, 1991 through June 15, 1991, the U. S. Environmental Protection Agency (EPA) held a public comment period on the Proposed Plan and the Remedial Investigation/Feasibility Study (RI/FS) for the Modern Landfill site in York County, Pennsylvania. A public meeting on the Proposed Plan was held on May 7, 1991, a transcript of which is part of the Administrative Record for this site. This responsiveness summary summarizes comments on the Proposed Plan and RI/FS pertinent to the Record of Decision that were expressed by interested parties and provides EPA's responses to the comments.

This responsiveness summary is divided into the following sections:

- Overview
- Background on Community Involvement
- Summary of Comments Received during Public Comment Period and Agency Responses
- Remaining Concerns

A. OVERVIEW

At the time of the public comment period, EPA had already endorsed a preferred alternative for the Modern Landfill site. EPA's recommended alternative addressed contaminated groundwater at the site. The preferred alternative specified in the Record of Decision (ROD) consists of the following:

- Continued operation and maintenance of all previous remedial actions conducted onsite, including the landfill cap, groundwater extraction system, onsite wastewater treatment facility, gas extraction system (for removal and destruction of landfill generated methane gas) and groundwater and surface water monitoring.

- Completion of the landfill cap system and final cover for the unlined 66-acre landfill.

- Maintenance of site fencing and all access restrictions.

- The addition of extraction wells to the eastern and western extraction systems to prevent contaminated groundwater from bypassing those systems.

- The completion of additional monitoring and/or extraction wells as needed to ensure protectiveness and to control groundwater flow, respectively.

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.

B. BACKGROUND ON COMMUNITY INVOLVEMENT

There has been moderate community interest in the Modern Landfill site due to its proximity to and its impact on the groundwater of nearby residences. With respect to the remedy proposed by EPA for this site, there has been little community interest. A fact sheet on EPA's proposed action at the site was sent to representatives of Windsor and Lower Windsor Townships and to several hundred residents in the area who EPA believed may have been interested in EPA's proposed action.

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Comments raised during the public comment period for the Modern Landfill Site are summarized below. EPA responses to the comments are provided.

Comments received from Modern Sanitation of York, Inc.

Modern Sanitation of York Inc., the current operator of the site, provided several comments to EPA. These are addressed below.

1. Modern Landfill commented that the Pennsylvania ARAR for remediation of groundwater to background levels is neither applicable nor relevant and appropriate.

   EPA Response: EPA disagrees. EPA has accepted the Pennsylvania requirement for remediation of groundwater to background levels as an ARAR.

2. Modern Landfill commented that if a state or federal ARAR is not met, it may be waived. In particular, ARAR waivers are appropriate when compliance with the requirement is technically impracticable from an engineering perspective. Modern has therefore requested that the Pennsylvania ARAR

requiring treatment of groundwater to background levels be waived.

EPA Response: EPA disagrees that the Pennsylvania ARAR requiring treatment of groundwater to background levels should be waived. Modern Landfill has submitted two reports, one entitled "Review of Remediation Goals at Modern Landfill," Golder Associates Inc., June 1991, and the second a letter report by ICF Kaiser Engineers, dated June 14, 1991, to support this waiver request. Based on site geology and using data from the existing extraction systems, Modern has demonstrated that remediation of groundwater to background quality, using Method Detection Limits as the background standard, would take in excess of 100 years and, for some of the contaminants of concern, up to 200 years. EPA Guidance on Remedial Actions for contaminated Groundwater (OSWER Directive 9283.1-2) contains provisions for ARAR waivers based on the technical impracticability of an ARAR. Specifically, for groundwater remedies, those remedies which generally would exceed 100 years for implementation may be waived using the technical impracticability standard.

EPA does not fully agree with the contents of the reports submitted by Modern Landfill. In particular, EPA takes exception to the development of the linear regression constants using total priority pollutant concentrations and applying those constants to individual components. This method does not reflect a true representation of the value of those constants. EPA also cannot support, based on the information contained in the reports, the assumptions made about contaminant dilution due to groundwater flow. Without verification of these assumptions, the conclusions of the reports are not acceptable. EPA believes that with the collection of additional data from the continued operation of the extraction systems, a re-evaluation of this situation can be made. If implementation of the selected remedy demonstrates, in corroboration with hydrogeological and chemical evidence, that it will be technically impractiable 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 (ESD) to inform the public of alternative groundwater goals.

3. Modern commented that a waiver of the background water quality ARAR is appropriate based on inconsistent application of a State requirement.

EPA Response: EPA disagrees. While it is correct that an ARAR may be waived when it has been inconsistently applied, the background ARAR has historicaly be applied in a consistent manner.

4. Modern commented on some inaccuracies in the Proposed Plan.

a. Modern commented that the Proposed Plan states that 362 acres of Modern Landfill is permitted and currently active; however, 362 acres are permitted, 17 acres are lined, another 17 acres are under construction and 66 acres, which are included in the CERCLA site, are unlined.

EPA Response: EPA agrees to this clarification.

b. Modern commented that the record should reflect that the landfill principally accepted non-hazardous municipal/residual waste.

EPA Response: EPA does not believe that sufficient data on past disposal practices exists to state this definitively. EPA believes that the majority of the wastes appear to have been municipal wastes but the extent of their composition is not currently known to EPA.

c. Modern commented that the record should state that drums of PCBs were not disposed at the site but rather, the drums were removed from the Site for disposal elsewhere.

EPA Response: EPA agrees. The Record of Decision reflects this fact.

d. Modern commented that the proposed plan states as one of the goals of the remedial action the restoration of contaminated groundwater to beneficial uses. Modern further states that this was not a goal set forth in the Feasibility Study and is not appropriate for the Site.

EPA Response: EPA disagrees. EPA's policy is to restore groundwater to beneficial uses wherever practicable. This goal, though not stated in the FS, is appropriate for the Modern Landfill Site.

e. Modern commented that the proposed plan discusses closure of the unlined landfill and installation of a cap in accordance with PADER regulation. Modern states that this should be clarified to state that closure and installation are in accordance with applicable PADER municipal solid waste regulations to avoid possible misinterpretations.

EPA Response: EPA agrees with this clarification.

f. Modern commented that the approximately $15 million in pre-1990 capital and operation and maintenance costs spent by Modern Landfill for remedial actions to date should be included in the cost of the alternative remedies discussed in the plan.

EPA Response: EPA disagrees. The pre-1990 costs are not part of the proposed remedial action. Furthermore, since these costs are common to all alternatives, the evaluation of alternatives is not considered to be inaccurate.

g. Modern commented that the proposed plan inaccurately describes the extent of the area to be covered upon completion of the low permeability cap and placement of the final cover over the site. The plan states that these actions will cover the entire CERCLA site which, for the purpose of this record of decision, has been defined as the unlined 66-acre landfill and all Modern property up to and including the monitoring wells. The actual remedy provides for a cap and final cover over the unlined landfill only.

EPA Response: EPA agrees with this description of the proposed remedy.

h. Modern states that in the section on Evaluation of Alternatives, the proposed plan should state that the potential risk from ingestion of groundwater is hypothetical.

EPA Response: EPA disagrees. The risk from ingestion of groundwater on the CERCLA Site is a potential one being addressed by this Record of Decision. The fact that a risk is potential does not make it hypothetical.

5. Comments were received from Mr. James Smith, a resident near Modern Landfill.

a. Mr. Smith states that in 1988 Modern was drilling wells which were affecting the water level in Mr. Smith's well.

EPA Response: As a result of the Remedial Investigation for this site, it has been shown that groundwater flow is not in the direction of the Smith property. Mr. Smith presented no evidence to determine that a causal relationship exists between the well pumping at Modern Landfill and the levels in his wells. These facts notwithstanding, the proposed remedy will continue to monitor groundwater and surface water at the site to ensure the effectiveness of the remedy and the protection of human health and the environment.

b. Mr. Smith presented data to show that contaminants from beneath the CERCLA Site are not being contained.

EPA Response: There is no indication of the source of the data submitted nor the sampling and analysis methods used in the data gathering process. No inference can be made from this data, based on the Remedial Investigation, that contaminants from Modern Landfill are affecting offsite

wells. The proposed remedy will, however, provide for continual monitoring and evaluation of the effectiveness of the extraction systems and allows for their augmentation if deemed necessary by EPA or PADER.

c. Mr. Smith commented that a major fault exist directly beneath the unlined landfill.

EPA Response: Mr. Smith's conclusion that the fault line lies directly beneath the landfill is based on preliminary reports done before the commencement of the Remedial Investigation at the Site. The information in those reports was updated and refined through subsequent investigations to show that the fault line in question is south of the Modern Landfill and not beneath it.

d. Mr. Smith commented that the public notice advertising the public meeting for the site was done improperly as the notice was placed with commercial advertising and not the legal notices and, as a result, fewer people than expected attended the public meeting.

EPA Response: EPA disagrees. EPA followed its normal procedures for advertising public meetings. In addition, EPA mailed several hundred fact sheets after the public meeting to potentially interested parties and offered to meet with representatives from each township and interested citizens to discuss their concerns. EPA believes that the public was adequately notified and had ample time to provide comments on the proposed plan.