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Office of
Emergency and
Remedial Response

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May 1986

EPA

Superfund Record of Decision:

Millcreek, PA

TECHNICAL REPORT DATA (Please read Instructions on the reverse before completing)		
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15. SUPPLEMENTARY NOTES		

16. ABSTRACT

The Millcreek site is a 84.5 acre tract of land located in Millcreek Township, Erie County, Pennsylvania. The site was once a 75-acre freshwater wetland. During the past 40 years, all but 4 acres have been filled with foundry sand and industrial and municipal waste. The site operated as an unpermitted active landfill during this time. For the past 15 years, unknown parties bulk disposed halogenated volatile solvents in soils in the eastern portion of the site. This disposal has resulted in significant ground water contamination both on- and offsite. Unit cancer risk calculations reveal that offsite ground water contamination exceeds 10^{-2} cancer risk levels adjacent to the eastern portion of the site. In addition, Region III's Remedial Investigation discovered extensive soil, sediment, and surface water contamination. The major clases of compounds detected included: polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), phthalates, volatile organics, phenols and metals such as lead and copper.

The selected remedial action for this site includes: excavation and consolidation of contaminated soil and sediments under a RCRA cap to meet proposed criteria; site grading; placing a soil cover over remaining low level contaminated soils not exceeding the proposed criteria; construction of surface water management basins and ditches; revegetation of soil cover and cap; installation of additional monitoring wells;
(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Millcreek, PA Contaminated Media: gw, sediments, soil, sw, wetlands Key contaminants: Heavy Metals, PCBs, Phenols, Polynuclear Aromatic Hydrocarbons (PAH), Trichloroethylene (TCE), VOCs		

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EPA/ROD/R03-86/023
Millcreek, PA

16. ABSTRACT (continued)

construction of a flood retention basin on property owned by Millcreek Township; pumping and treating of contaminated ground water; additional sampling and well installation and ground water monitoring. Total capital cost estimates for the selected remedial alternative vary from $12,000,000 to $18,000,000 with an estimated baseline cost of $15,000,000. For these estimates, capital costs included all costs associated with excavation, regrading, revegetating, capping and ground water pumping and treating for two years. Additional sampling and monitoring wells will be considered as part of the design. Design is estimated to cost approximately $1,000,000 and will be funded entirely by trust fund monies. Total present worth cost for O&M is estimated to be $1,763,000.

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

Site: Millcreek Site, Erie County, Pennsylvania

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Millcreek site:

- Millcreek Remedial Investigation (NUS Corporation, August, 1985)
- Millcreek Feasibility Study (NUS Corporation, August, 1985)
- Technical Support Documents prepared by EPA Region III staff to establish groundwater protection goals, soil criteria, and sediment criteria.
- Staff summaries and recommendations
- Summary of Remedial Alternatives Selection
- Responsiveness Summary

DESCRIPTION OF SELECTED REMEDY

- Soil excavation and consolidation under a RCRA cap to meet proposed soil criteria (criteria to be reevaluated during design).
- Sediment excavation and consolidation under a RCRA cap to meet proposed sediment criteria (criteria to be reevaluated during design).
- Site grading.
- Soil cover over remaining low level contaminated soils not exceeding criteria.
- Construction of surface water management basins and ditches.
- Revegetation of soil cover and cap.
- Installation of additional monitoring wells.
- Construction of flood retention basin on property owned by Millcreek Township.
- Pumping and treating of contaminated groundwater.
- Design of the remedy which will require additonal sampling and well installation.
- Operation and maintenance will be implemented by the State of Pennsylvania on the RCRA cap, flood retention basins, surface

water management systems and monitoring systems six months after construction of these systems. The groundwater pumping and treatment program, and associated monitoring, will be operated as a source control remedial action for a period of at least two years and will be eligible for Trust Fund monies.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the described selected alternative provides adequate protection of public health, welfare, and the environment. The Commonwealth of Pennsylvania has been consulted and agrees with the approved remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the on-site secure disposition is more cost-effective than other remedial actions, and is necessary to protect public health, welfare or the environment.

5/7/86
Date

James M. Seif
Regional Administrator

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120

April 29, 1986

Bureau of Waste Management

717-783-7816

Mr. Thomas Voltaggio, Chief
Superfund Branch
U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Ninth and Chestnut Streets
Philadelphia, PA 19107

Dear Mr. Voltaggio:

The draft Record of Decision for the selection of the alternative for the remediation of the Millcreek site has been reviewed by DER staff members. We concur with your assessment of the proposed alternatives and with the selection of the final remediation measures. Soils and sediments exceeding the proposed criteria should be excavated and consolidated under the proposed RCRA cap, along with any drums found containing non-RCRA wastes. Drums containing RCRA hazardous liquids or solids should be disposed of off-site where appropriate. The floodwater retention basin and the surface water management basins and ditches should be installed to help prevent the infiltration of precipitation, and of possible floodwaters, in order to reduce the chance of future leachate generation. A design study should be undertaken to further characterize the extent of contamination and to determine the technical feasibility of the proposed groundwater contaminant source reduction program.

We should proceed as expeditiously as possible with the design study in order to determine more fully the extent of contamination at the Millcreek site. With this information, we can then ensure that the proposed remedial alternative will adequately protect the public health and the environment of the Commonwealth.

If you have any questions or comments concerning this matter, do not hesitate to contact Don Becker or Eric Tartler.

Sincerely,

James P. Snyder
Assistant Bureau Director

IV

SITE DESCRIPTION AND SUMMARY OF REMEDIAL ALTERNATIVE SELECTION FOR THE MILLCREEK SITE

Site Location and Description

The Millcreek site is a 84.5 acre tract of land located in Millcreek Township, Erie County, Pennsylvania. It is situated approximately two miles west of the city of Erie as shown in Figure 1 . The property is presently owned by Millcreek Township (4 acres), Ralph Riehl, Jr. (57 acres) Joseph Halmi (13.5 acres), and James Sitter (10 acres).

The topography of the site is relatively flat except for several isolated mounds of foundry sand and debris. Flood potential maps of the area show that the site is located within a 100-year and 500-year flood zone. Flooding occurs frequently, though, east of the site in a residential area during heavy rains.

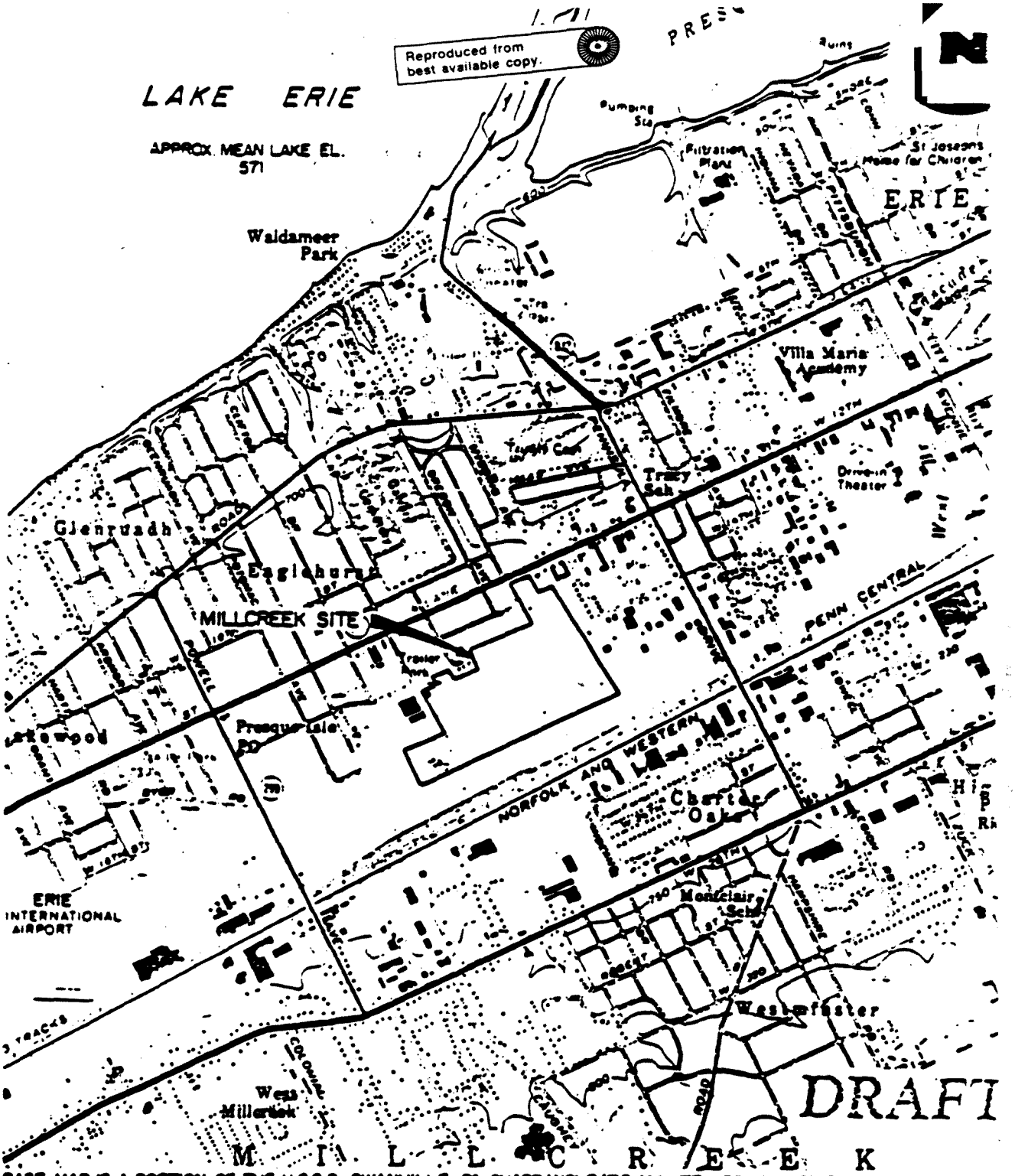
The site is bordered to the north, northeast, and northwest by residential areas. A commercial trucking firm borders the site to the east, and a children's baseball field to the west. Erie International Airport is located about 2000 feet west of the site. At least 2,000 people work or reside within a 2500 foot radius from the center of the site.

Ground water for drinking water purposes is utilized by municipal wells located about 1200 feet south (hydraulically upgradient) of the site boundary. Ground water is not presently utilized downgradient of the site. Sometime during the past 15 years, unknown parties bulk disposed of halogenated volatile solvents in soils in the eastern portion of the site. This disposal has resulted in significant ground water contamination both onsite and offsite. Unit cancer risk calculations reveal that offsite ground water contamination exceeds 10^{-2} cancer risk levels adjacent to the eastern portion of the site. There are presently no State, County, or Municipal restrictions against ground water use in the site area.

Shallow ground water discharges to a stream (Marshalls Run) east of site during high water table conditions (spring, summer). Marshalls Run discharges to Lake Erie 1.2 miles downstream from the site. Aquatic life (fish and macroinvertebrates) are abundant near the mouth of Marshalls Run near Lake Erie.

In addition to identifying volatile organic compound contamination in ground water, Region III's Remedial Investigation discovered extensive soil and sediment contamination. The major classes of compounds detected included: polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PNAs), phthalates, volatiles, phenols, and metals such as lead and copper.

The perimeter of the site is deciduous forest, while the central, southern, and southwestern portions are composed of fill material. A wetland of about 4 acres lies on the southern perimeter of the site.



BASE MAP IS A PORTION OF THE U.S.G.S. SWANVILLE, PA QUADRANGLE (7.5 MINUTE SERIES, 1957, PHOTOREVISED 1969 1975). CONTOUR INTERVAL 10'.

FIGURE 1

LOCATION MAP
MILLCREEK SITE, MILLCREEK TWP., PA

SCALE: 1" = 2000'

Debris such as junk cars, and abandoned machinery are strewn throughout the site along with numerous drums of foundry sand and slag.

Site History

The site was once a 75 acre freshwater wetland. During the past 40 years, though, all but 4 acres have been filled in with foundry sand, industrial and municipal waste. The site operated as an unpermitted active landfill during this time.

During the past 10 years, waste oils containing high concentrations of PCBs were bulk disposed in site fill, along with phthalates, phenols, polycyclic aromatic hydrocarbons (PNAs), and heavy metals. These contaminants and tentatively identified compounds (TICs) were detected in site fill during the Remedial Investigation (RI).

In April, 1981, the Pennsylvania Department of Environmental Resources (PADER) discovered dumping of drums in the central portion of the site. The drums were later sampled and found to contain trichloroethene (TCE). The PADER later closed the site in 1981. In August, 1982, the Erie County Health Department (ECHD) discovered drums on the surface of the site while investigating a natural gas well fire on the Halmi portion of the site.

In November, 1982, EPA dispatched its Environmental Response Team (ERT) to conduct drum, soil, sediment, ground water, and surface water sampling at the site to evaluate potential health risks. In November, 1983, EPA conducted a planned removal of 75 liquid filled drums which contained waste oils, solvents, and antifreeze.

The four property owners, except for Millcreek Township, owned their property at the time of filling. In 1973, the Sitter brothers purchased the Sitter portion, and from 1974 to 1979 filled it in with foundry sand. In 1981, Millcreek Township purchased a 4 acre parcel of land from Mr. Riehl for the purpose of constructing a flood control structure. PADER denied a permit for construction in 1982 pending the results of EPA's RI/FS study.

Personnel who worked on the Riehl property indicated that from 1977 to 1979, an unknown amount of nonhalogenated solvents and ink wastes, 300 drums a year of polyester resins, 6,600 gallons a year of caustics, 3,000 drums total of paint wastes, and 180 drums a month of slag were disposed of at the site. Most liquid disposal is believed to have occurred by bulk methods. The operators also ran a metals reclaiming facility in the eastern portion of the site and constructed a deep pond to supply water for foundry sand washing.

Current Site Status

EPA Region III completed a Remedial Investigation/Feasibility Study (RI/FS) at Millcreek in August, 1985. Data collected in the RI and in previous studies done by EPA's Environmental Response Team (ERT), Pennsylvania Department of Environmental Resources (PADER), and the Erie County Health Department (ECHD) were used to describe the nature and extent of contamination. Additional soil, sediment, surface water, and ground water samples will be collected during design.

Pathways and receptors are described in detail along with known or suspected risks posed by contaminants in the Remedial Investigation and Feasibility Study Reports and in the EPA Region III Technical Support Documents.

The following is a brief summary of the types and concentrations of contaminants detected in soil, sediment, ground water and surface water:

- Soil

  - elevated levels of polychlorinated biphenyls (PCBs) were detected in the eastern and south central portions of the site. Concentrations of PCBs were found up to 31 mg/kg wet weight.

  - elevated levels of polynuclear aromatic hydrocarbons (PNAs) were detected through out the site, especially in the southwestern portion. Concentrations of PNAs were found to 539 up mg/kg wet weight.

  - elevated levels of phthalates were also detected throughout the site. The predominant area of contamination was found to be in the southern portion of the site. Concentrations were found up to 72 mg/kg wet weight.

  - elevated levels of phenols were detected in the southern and eastern portion of the site in concentrations up to 7 mg/kg wet weight.

  - volatiles were detected in the south central portion of the site in concentrations up to 6 mg/kg. Volatiles are also believed to be concentrated in the eastern portion of the site as indicated from monitoring well data. Soil concentrations in this area will be determined during design since this portion of the site did not undergo test pitting or soil boring during the RI.

  - metals were also detected throughout the site at various concentrations. Two metals of concern, copper and lead, were found in concentrations up to 20,500 and 2,375 mg/kg, wet weight.

- High concentrations of tentatively identified compounds (TICs) were detected throughout site soil. Most TICs are believed to be hydrocarbon derivitives possibly resulting from the bulk disposal of oil. The RI contains a complete list of all TICs detected in soil. The list probably exceeds 1000 compounds. TICs were detected in concentrations over 1000 mg/kg. Because toxicological information on many of the TICs is sparse, the RI risk assessment only considered Hazardous Substance List (HSL) compounds present in soil. The risk posed by TICs will continue to be evaluated during predesign and design.

• Sediment

- Except for volatiles, which were not detected, many of the same compounds detected in soil were detected in sediments of the wetland in the southern portion of the site, in ditches within and on the perimeter of the site, and in Marshalls Run bordering the eastern portion of the site.

- PCBs were detected in concentrations up to 1.50 mg/kg wet weight.

- phthalates were detected in concentrations up to 5.0 mg/kg wet weight.

- phenols were detected up to 0.99 mg/kg wet weight.

- metals such as lead and copper were detected in concentrations up to 0.67 and 6.61 mg/kg wet weight respectively.

- TICs were found in concentrations up to 115 mg/kg wet weight.

• Ground Water

- Except for the metals, manganese and iron, elevated levels of detectable ground water contaminants were restricted to the eastern portion of the site.

- Volatiles were detected in concentrations over 30 mg/l. The list below outlines the most frequently occurring volatile organic compounds (VOCs) and their corresponding maximum concentration detected during the RI.

Compound	Max. Conc. (ug/l)
1-1-dichloroethane (1,1-DCA)	260
1,1-dichloroethene (1,1-DCE)	16
1,2-dichloroethene (1,2-DCE)	29,000
trichloroethene (TCE)	300
1,1,1-trichloroethane (1,1,1-TCA)	960
vinyl chloride (VCM)	220

- phthalates were also detected in ground water. Diethyl phthalate was found in concentrations up to 41 ug/l while di-n-butyl phthalate was detected at a concentration of 21 ug/l.

- iron and manganese were detected in concentrations up to 20,800 and 1,920 ug/l respectively. These represent filtered (0.45 um) samples.

- TICs were also detected in ground water in the eastern portion of the site. A total of 16 TICs were identified and present in concentrations over 1000 ug/l.

• Surface Water

- Marshall's Run and drainage ditches throughout the site were dry during the RI so evaluations are based on previous sampling attempts and sampling in the wetland located in the southern portion of the site which is wet throughout the year.

- Volatiles were detected in Marshall's Run during the 1982 ERT investigation. The list below summarizes VOCs and corresponding concentrations.

VOC	Concentration (ug/l)
VCM	18
1,1,1-TCA	93

- Metals were detected in the wetland in the southern portion of the site and in Marshalls Run. The list below summarizes elevated levels of metals detected and corresponding concentrations.

Metals	Concentrations (ug/l)
Copper	9,560
Iron	21,600
Manganese	1,580
Lead	1,940
Zinc	6,270
Aluminum	6,270
Mercury	0.81
Nickel	386
Tin	385
Cadmium	3.7

Alternatives Evaluation

This section will briefly define the public health and environmental objectives of remediation; screening methods to determine appropriate remedial technologies; and specific alternatives considered. The Feasibility Study contains a more in-depth analysis of these discussions.

- Public health and environmental remediation objectives:
  - prevent onsite air dispersal of particles containing potentially hazardous substances.
  - prevent direct dermal contact with potentially hazardous substances.
  - prevent offsite transport of contaminated soil and sediment via erosion or storm transport.
  - remediate offsite ground water contamination to ground water protection goals. Tentative levels established for cost estimating purposes are outlined in Table 1.
  - remediate soil contamination to safe soil levels capable of preventing future ground water contamination. Tentative levels established for cost estimating purposes are in Table 2.
  - remediate sediment contamination capable of causing an impact on aquatic life or wildlife in the wetlands and Marshalls Run. Tentative levels established for cost estimating purposes are outlined in Table 3.
  - remediate potential surface water contamination by remediating ground water, soil and sediment contamination. Tentative levels used for cost estimating purposes are outlined in tables 1, 2, and 3.

The tentative soil and sediment criteria and the groundwater protection goals were based on a site-specific risk analyses presented in the EPA Region III technical support documents. The exception is the soil criteria for PCBs, which was based on a consensus policy for residential areas proposed to EPA by a committee of environmental organizations and industry groups which is under consideration by EPA for use as the basis for a TSCA PCB policy. will use 10 ppm unless additional information becomes available during design which would require the use of a lower number. A site specific analysis for the other compounds was necessary because there are no existing regulations for those compounds.

Table 1

Ground Water Protection Goals

Compound	(ug/l)
Organics	
*vinyl chloride	0.015 (10^{-6} UCR)
*trichloroethene	1.8 (adjusted 10^{-6} UCR)
*1-2-dichloroethene	70 (adjusted 10^{-6} UCR)
*1,2-dichloroethane	0.95 (10^{-6} UCR)
1,1,1-trichloroethane	22 (HA)
*1,1-dichloroethene	0.24 (10^{-6} UCR)
*chloroform	0.19 (10^{-6} UCR)
*benzene	0.70 (10^{-6} UCR)
xylene	440 (HA)
toluene	2000 (HA)
ethyl benzene	680 (HA)
phenols	300 (taste)
phthalates	3 (aquatic life)
Base/Neutral	
Inorganics	
lead	11 (aquatic life)
copper	27 (aquatic life)
arsenic	50 (HA)
cadmium	3 (aquatic life)
chromium III	341 (aquatic life)
chromium VI	11 (aquatic life)
mercury	0.012 (aquatic life)
zinc	710 (aquatic life)
nickel	150 (HA)
iron	300 (taste)
manganese	50 (taste)
HCN	5 (aquatic life)
NH_3(unionized)	128 (aquatic life)

* Carcinogens

° UCR - Unit cancer risk

° HA - Health Advisory Level

° For Inorganics, assume 260 ug/l $CaCO_3$ hardness, pH=7.5, and T=15°C

Table 2

Soil Criteria For Organics

Compound	Criteria (ug/kg dry weight)
*vinyl chloride	<10 (Detection Limit)
*trichloroethene	<10 (Detection Limit)
*1-2-dichloroethene	594
*1,2-dichloroethane	<10
*1,1-dichloroethene	<10
*chloroform	<10
*benzene	<10
1,1,1-trichloroethane	540 (10^{-6} UCR)
xylene	41,926
toluene	1,783
ethyl benzene	26,396
phenols	9,000
Base/Neutral	
phthalates	338,000
*PNAs	2,940 (10^{-6} UCR)
*PCBs	10,000

* Carcinogens

Table 3

Sediment Criteria For Organics

Compound	Criteria (ug/kg dry weight)
phenols	1843
phthalates	7183
*PNAs	1730
*PCBs	40 (background)

* Carcinogens

Table 4

Surface Water Criteria Goals (ug/l)

Compound	Concentration
volatiles	1000 (aquatic life)
phenols	2560 (aquatic life)
phthalates	3 (aquatic life)
*PNAs	0.03 (wildlife and human health)
*PCBs	0.005 (background)
Inorganics	
lead	11 (aquatic level)
copper	27 (aquatic level)
arsenic	190 (aquatic level)
cadmium	3 (aquatic level)
chromium III	341 (aquatic level)
chromium VI	11 (aquatic level)
mercury	0.012 (aquatic level)
zinc	710 (aquatic level)
nickel	197 (aquatic level)
iron	1000 (aquatic level)
cyanide	5 (aquatic level)
ammonia (unionzed)	128 (aquatic level)

Assume: $Ca\ CO_3$ hardness = 260 mg/l, pH = 7.5 and T = 15°C

* Carcinogens

Compliance with ground water protection goals, soil, sediment, and surface water criteria will be determined in an additive fashion separately for carcinogens and non carcinogens. The criteria outlined in Tables 1 through 4 will be in calculations of fractions of risk posed by each contaminant. The individual fractions cannot exceed unity.

- Factors Used in Screening Remedial Technologies

  - Technical Criteria

    - applicability to site conditions (geology, topography, etc.)
    - applicability to waste characteristics
    - effectiveness and reliability
    - implementability (construction), operation, and maintenance)

  - Environmental and Public Health Criteria

    - except for risk posed by direct contact or atmospheric dispersal of contaminants, criteria to protect human health and the environment are presented in Tables 1 through 4.

  - Cost Criteria

    - increased cost offering no greater reliability or effectiveness
    - increased cost offering no greater protection of public health or environment as established by criteria

  - Institutional Criteria (Compliance with other environmental laws)

    - TSCA
    - RCRA
    - CWA
    - NPDES
    - etc.

For a detailed analysis of technologies screened out see Section II of the FS.

Technologies Considered in Detail Include:

- ground water remediation
  - no action
  - monitoring
  - pumping with injection
- ground water treatment
  - no action
  - monitoring
  - flow equalization
  - precipitation of metals
  - filtering
  - air stripping of volatiles
  - GAC filtering of exhaust gases associated with air stripping
- surface water remediation
  - same technologies as ground water treatment
- soil remediation
  - no action
  - covering
  - capping
  - excavation
- soil treatment
  - offsite disposal
  - onsite disposal under RCRA cap
- sediment remediation
  - same technologies as soil
- sediment treatment
  - same technologies as soil

° Alternatives Considered in Detail.

Five alternatives incorporating the technologies considered in detail were evaluated for remedial action. These 5 alternatives were:

1) No action with ground water and surface monitoring.

2) Grading, surface water diversion, soil cover, revegetation, and ground water and surface water monitoring.

3) Alternative 2 with ground water pumping and treatment.

4) Alternative 3 with capping of soils exceeding criteria in Table 2 and dredging of sediments exceeding criteria in Table 3 with incorporation under onsite cap areas.

5) Alternative 3 with excavation or dredging of soils and sediments exceeding criteria which would be incorporated under a RCRA cap constructed in the central portion of the site.

Excavation of contaminated soil to background levels with offsite disposal in a RCRA regulated facility was not considered in detail because of the high costs associated with this option. If it is assumed that the average depth of foundry sand is 7 feet, 35 acres of land are contaminated, and the average offsite disposal cost per cubic yard is $300, this option would cost about 118 million dollars.

Alternative 1: No action with monitoring of ground water and surface water, would function as a detection system to warn of increasing contaminant concentrations in ground water or surface water. This alternative is not appropriate because:

For Ground Water

° present offsite ground water contamination exceeds levels considered safe for human ingestion. Present offsite unit cancer risk equals 10^{-2}.

° EPA Region III calculations show that active restoration will remediate ground water to safe levels much more rapidly than natural restoration.

° ground water pumping is technically feasible and a well accepted practice to reduce ground water contaminant levels.

° EPA policy requires remediation of offsite contamination.

For Soil

° air dispersal of contaminated soil particles presents a potential human health impact.

For Soil

- air dispersal of contaminated soil particles presents a potential human health impact
- not remediating soil below criteria outlined in Table 2 could cause continued or potential future ground water contamination.
- present site conditions could cause contaminated soils to be carried offsite during heavy storms by surface runoff.
- present soil contaminant levels may cause a direct contact risk through dermal contact and ingestion by children.

For Sediment

- not remediating sediment below criteria outlined in Table 3 may cause continued surface water contamination by desorption.

For Surface Water

- not remediating sediment and surface soil will cause continued surface water contamination through desorption of organics and surface runoff from soil. Ground water discharge to surface water could also impact surface water quality.

Cost

The FS estimates that this alternative would cost about $1,500,000 over a 30 year period. Monitoring would include analysis of present monitoring wells and selected surface water locations.

Alternative 2: Grading, soil cover, revegetation, surface water management, and monitoring of ground water and surface water.

In this alternative, the site would be graded to prepare a soil cover. Exposed solid waste or slag drums would be buried during grading activities. The soil cover would consist of 18 inches of borrow material below 6 inches of top soil. All exposed areas would be covered with soil. Three or four storm water runoff ponds would be constructed, along with erosion central benches and surface water diversion ditches.

The advantages of this alternative include:

- elimination of public health risk caused by atmospheric dispersal of contaminated soil.
- reduction or elimination of erosion and surface water runoff containing contaminated particles thus increasing surface water quality.
- decrease in percolation of rainfall through the unsaturated zone thus reducing the contaminant migration through soil.
- elimination of direct contact risk.

Disadvantages associated with this alternative include:

- reduced, but continued flow of contaminants through the unsaturated zone, thus impacting ground water. Remediation to proposed soil levels in Table 2 is necessary to eliminate future ground water contamination.
- no remediation of present ground water contaminant which may pose a risk to future downgradient users or aquatic life or wildlife living in or subsisting in Marshall's Run. Ground water remediation to ground water goals is necessary to prevent future risk to human health, aquatic life or wildlife.
- no remediation of sediment, thus impacting surface water quality from the desorption of contaminants. Excavation to Table 3 levels is necessary to prevent future risks to aquatic life and wildlife.
- in general, this alternative provides greater protection, but still is insufficient to prevent risks posed by contaminants.

Costs

Capital and operation and maintenance costs were obtained from the FS. Capital costs include:

- stormwater basin construction = $1,226,000
- soil grading, clearing, cover, and revegetation = $2,064,000
- offsite disposal of exposed drums containing solid wastes = $37,000

Total Capital Costs = $3,000,000

Operation and maintainance costs obtained from the FS, including monitoring:

= $1,700,000

Therefore, total costs are estimated to be $5,000,000

Alternative 3: Alternative 2 plus ground water remediation.

Ground water remediation would consist of up to 24 months of pumping with some effluent being reinjected to upgradient ground water to increase flow velocity. The construction and placement of reinjection and pumping wells is illustrated in the FS. It is estimated that 435 gallons per minute of effluent would be discharged to Marshall's Run over the two year period. Effluent must be discharged to Marshall's Run instead of in a POTW because Millcreek Township's POTW sewer system is at capacity and the closest server system in the city is also near capacity and would require an additional pipeline.

Marshall's Run presently undergoes severe flooding on Harper Road at the eastern boundary of the site during heavy rainstorms. This discharge will cause more frequent flooding and worse flooding during rain storms which could eventually cause onsite flooding. To remedy this situation, it is recommended that a flood retention basin be constructed along the eastern border of the site. Since Millcreek Township has already purchased land to construct a flood retention basin, and since soil contamination is present on Millcreek Township's property above soil criteria levels, this soil would have to be excavated anyway.

Excavation would have to proceed to safe sediment levels, since basin soils would be in direct contact with surface water. If sediment contaminant levels are suitable after ground water remediation, the flood control basin could be seeded to also function as a wetland to some restored area lost to previous filling.

The level of ground water treatment will be determined by a NDPES permit which will be developed during design. For costing purposes, it is assumed that treatment will be extensive: precipitation, filtration, air stripping and granular activated carbon.

The advantages and disadvantages of Alternative 3 are the same as Alternative 2, except ground water risks would be reduced with this alternative, while the ground water pumping and treatment program is in operation. However, a disadvantage would be that continued long term contamination of the ground water and surface water would occur because contaminants in the soil and sediments would remain in place and continue to leach.

Cost

Total costs are the same as Alternative 2 with the exception of ground water pumping and treatment and the construction of a flood retention basin which would cost an additional $3,012,000 and $500,000 respectively. Therefore, total costs =

$5,036,000 + $3,072,000 + $500,000

= $8,608,000 or about $8,600,000.

Ground water pumping and treatment and construction of the flood retention basin are considered capital costs. Operation and maintenance costs would vary with the duration of pumping. If pumping occurs over a maximum of 2 years, O & M costs would be similar to Alternative 2.

Alternative 4: Alternative 3 with capping

Alternative 4 is the same as Alternative 3 except it would require capping over areas exceeding soil criteria and excavation of sediments exceeding sediment criteria. This alternative would require additional sampling of soil and sediment to determine all areas on site exceeding established criteria. Excavated sediment would be incorporated under one of several of the areas onsite. Also, since the flood retention basin area contains contaminated soils, excavated soil would have to be incorporated under one of several of the capped areas.

Advantages

This alternative would hydraulically isolate soil contaminants in the unsaturated zone exceeding soil criteria, and thus provide a high degree of protection. Sediment exceeding criteria would also be excavated, surface water would also be adequately protected. Overall, this alternative is technically feasible.

Disadvantages

The predominant disadvantage of this alternative is that most soils exceeding the soil criteria levels lie in the eastern portion of the site bordering Marshall's Run. The eastern portion of the site lies in a flood plain and therefore capping in this area would not be in compliance with RCRA regulation. Flooding could damage the cap by scouring. Also, areas of soil contamination exceeding criteria could be scattered throughout the site and thus cause capping at many areas around the site. This could cause difficulty in monitoring the capped areas for possible seepage. It would be more effective to cap one area and install additional monitoring wells to ensure ground water compliance.

Costs

If it is assumed that an area 1200 feet by 500 feet would be capped adjacent to Marshall's Run along with an additional 250,000 ft^2 throughout the site, and that contaminated soil from the retention basin and sediment from the wetland and Marshall's Run is incorporated under one or more of the caps, a total capped area of at least 1,000,000 ft^2 or about 7 acres would be required. Past experience has shown caps to cost about $400,000 per acre, so the capped area would cost at least $2,800,000. Excavation of sediments could cost an additional $500,000 to $700,000 based on the potential excavation of all sediments in the wetland on Marshall's Run and additional sampling and analysis could cost $450,000. Additional sampling would be considered as part of design and thus would be funded as such.

Therefore, capital costs could approach

$$\$6,900,000 + \$2,800,000 + \$700,000 + \$450,000$$

$$= \$10,850,000$$

O & M costs are expected to be about $1,700,000 over a 30 year period. Total costs are expected to be about $12,550,000.

Alternative 5: Alternative 3 with Excavation

Alternative 5 would be the same as Alternative 4 except that soils and sediments exceeding established criteria would be excavated or dredged and consolidated under an onsite, RCRA cap. The cap would be outside the flood plain area. As with Alternative 4, Alternative 5 provides a high degree of protection, but does not have Alternative 4's disadvantages. A comprehensive ground water monitoring system would be established both upgradient and downgradient of the capped area and involve additional installation of monitoring wells. Alternative 12 in the FS most closely resembles Alternative 5, therefore, total costs should be similar except for the required additional sampling and installation of monitoring wells. Additional sampling could cost about $ 450,000. The additional monitoring wells could cost approximately $60,000.

The Concept of Alternative 5 is as follows:

1) Pump ground water for an initial period of time determined during design not to exceed 2 years. After the initial period has passed, groundwater protection goals will be reevaluated to determine their technical feasibility. At that time, pumping could continue at the same or new goals or be discontinued if the designed goals were met. This strategy is necessary because the effectiveness of pumping to reduce VOC contaminants to ug/l levels over a long time period is unknown. The proposed goals for the first period are outlined in Table 1. These goals will be reevaluated during design to ensure technical feasibility and protection of human health and the environment.

2) Treat ground water to levels consistent with NPDES permit standards. Treatment would include the construction of a flood retention basin on Millcreek Township's property for flow equalization and prevention of onsite and offsite flooding. Ground water may also be treated for inorganic and organic removal by precipitation, filtration, air shipping and granular activated carbon. Cost estimates assumed extensive treatment. The NPDES standards will consider technical feasibility and protection of aquatic life and humans or wildlife which may ingest aquatic life.

3) Excavate soil to proposed levels outlined in Table 2 and incorporate under an onsite RCRA cap. Region III will reevaluate the criteria during design. Criteria for PCBs and PAHs are in Table 2. The criteria presented in this ROD are for cost estimates only.

Technologies to reduce contaminant levels to soil criteria will be considered to decrease the volume of excavated soils and their associated costs prior to excavation.

As previously explained, soil criteria are calculated using many variables, two of which are the area and concentration within that area of contaminants. Further sampling will be required during design to gain additional information on the areal extent of soil contamination, especially in the eastern part of the site where elevated concentrations of volatiles are expected to be present.

4) Excavate sediment to proposed levels outlined in Table 3 and incorporate under an onsite RCRA cap. As with soil criteria, sediment criteria in Table 3 are for cost estimates only. Region III will also reevaluate sediment criteria during design.

5) Any drums found during sampling or earth moving activities will be sampled, either individually or as a composite, as appropriate. Drums containing solid non-RCRA waste will be consolidated under the cap. Any liquid filled drums or drums containing RCRA hazardous wastes will be disposed of off-site.

6) Place soil cover over remaining areas of site not exceeding soil criteria to protect against atmospheric dispersion of contaminated soil.

7) Grade and revegetate soil and cap areas.

8) Construct surface water management basins to control run on, run off and erosion.

9) Install additional monitoring wells around the cap and other areas on site to detect possible future releases.

Total capital costs ranges for 10^{-4}, 10^{-5}, and 10^{-6} UCR values are estimated to be 9-11, 10-12, and 12-18 million dollars. EPA has chosen a 10^{-6} UCR value which is consistent with policy and EPA's long-term ground water protection strategy. Therefore, including additional sampling and monitoring wells, costs are expected to range from 12 million to 18 million. These costs are estimates based on the soil criteria developed by EPA Region III.

Figure 2 illustrates a conceptual sketch of this alternative.

Recommended Alternative

Alternative 5 is the only alternative complying with other environmental laws and remediating the site to safe ground water, surface water, soil, and sediment levels to protect human health, aquatic life, and wildlife. Based on our evaluation of the cost-effectiveness of each of the proposed alternatives, the comments received from the public, the state, and potentially reponsible parties, information from the RI/FS and Region III technical support documents, Region III recommends that Alternative 5 be implemented.

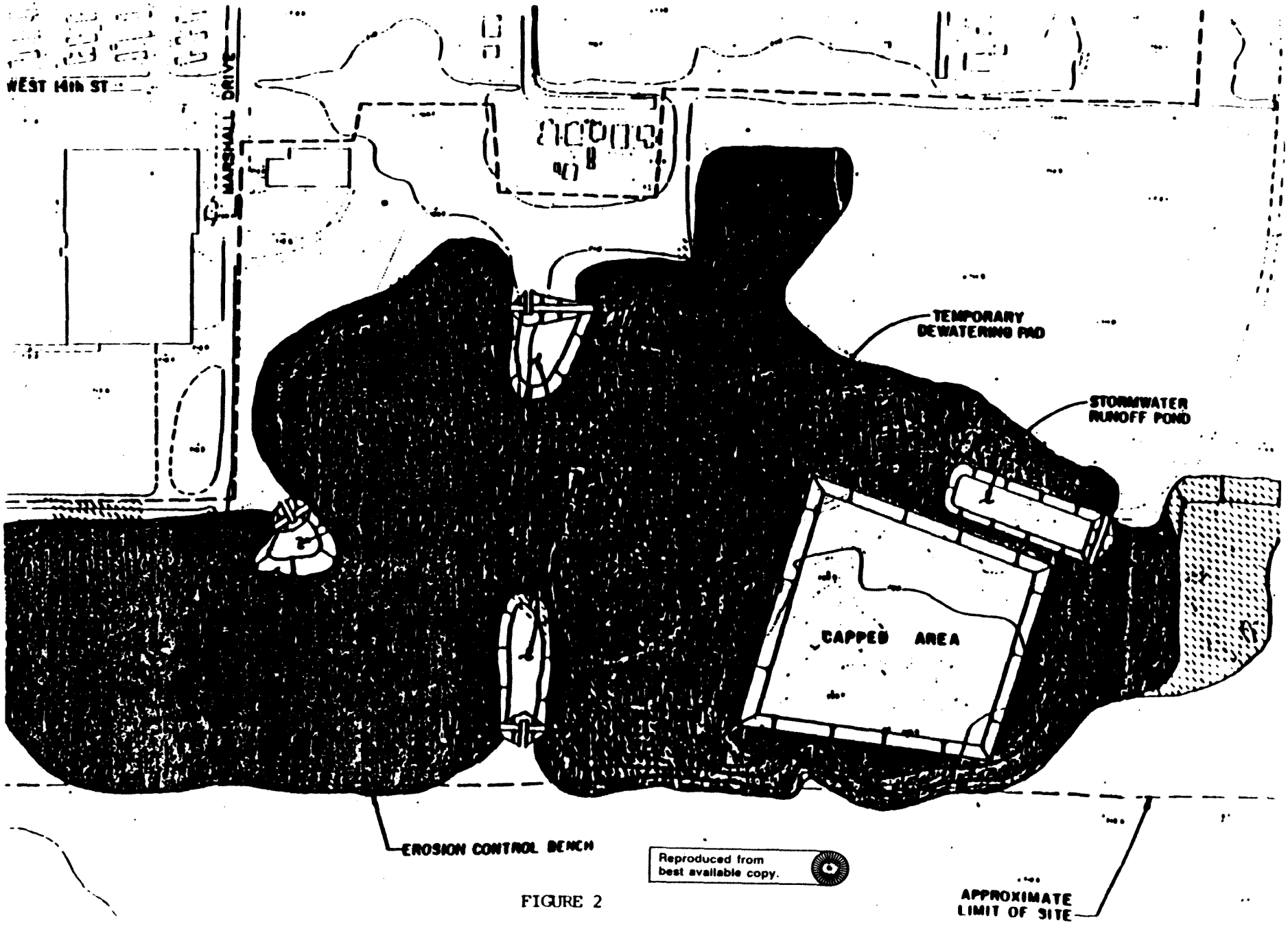


FIGURE 2

Consistency With Other Environmental Laws

The recommended alternative was evaluated to determine consistency with applicable or relevant and appropriate environmental laws.

The transport and offsite disposal of drums will have to comply with all applicable RCRA regulations regarding the transport and disposal of hazardous wastes.

The surface water discharge from the groundwater treatment facility will comply with NPDES discharge requirements.

The cap will be designed and constructed to comply with the RCRA capping requirements of 40 CFR §264.310(a).

EO 11988, Floodplain Management, will be complied with through the construction of a flow equalization and prevention basin which will minimize the impact of this action on flood hazards. Additonally, contaminated soils and sediments will be removed from the floodplain and the soils will be consolidated and capped outside the floodplain.

EO 11990, Protection of Wetlands, will be complied with through the construction of the flow equalization and prevention basin which can be constructed and revegetated to serve as a wetland providing the benefical uses described in EO 11990. In addition, contaminated sediment will be removed from the remaining wetlands on-site. The action to remove the sediments will be designed to minimize the harm such action will have on the wetlands.

The basin and the run-off/run-on control system will be designed to meet the requirements of the RCRA regulations in 40 CFR §264.301(c), (d), (e).

The establishment of soil and sediment criteria, consolidation of material exceeding these criteria under a RCRA cap and a ground water monitoring program to verify that the ground water protection goals are met, complies with the CERCLA policy for consistency with the Safe Drinking Water Act and RCRA regarding ground water contamination and RCRA Closure/ Soil Contamination Requirements. This CERCLA policy is described in the preamble to the National Contingency Plan published in the Federal Register on November 20, 1985, on pages 47922-47923.

The recommended alternative is also consistent with the EPA's forthcoming Superfund groundwater strategy as discussed in a March 24, 1986, memorandum from J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, to James Seif, Regional Administrator, Region III.

Costs

The projected costs were developed in accordance with EPA policy for estimating costs within a reasonable range (-30% to +50%) of the actual implementation costs. Total projected present worth costs range from $14,800,000 to $20,800,000 with a baseline estimate of $17,800,000.

Design Costs -

Additional sampling and monitoring wells will be considered as part of the design. Design is estimated to cost approximately $1,000,000. Design will be funded 100% by trust fund monies.

Capital Cost-

Capital cost estimates vary from $12,000,000 to $18,000,000, with an estimated baseline cost of $15,000,000. For these estimates, capital costs included all costs associated with excavation, regrading, revegetating, capping and groundwater pumping and treating for two years (although pumping may be needed for a period beyond two years, two years was selected for cost estimating purposes). Trust fund monies will be used to pay for 90% of these costs and the State of Pennsylvania will finance 10% of these costs.

Operation and Maintenance (O & M)-

Total present worth costs for O & M is $1,763,000.

The components of the recommended alternative that may require operation and maintenance are:

- RCRA Cap
- Surface water management systems
- Flood retention basin
- Monitoring (excluding that necessary to monitor the effectiveness of the pumping and treatment program while it is being financed by the trust fund).

The above listed items will be considered normal operation and maintenance and will be the responsibility of the State of Pennsylvania six months subsequent to completion of construction.

The ground water pumping and treatment program will be considered part of the approved remedy for a period of at least two years. If targets are not reached after two years of remedial activity the Regional Administrator will determine if it is technically feasible to reach those targets. If further pumping and treatment are required, this will also be considered as part of the approved remedy and eligible for Trust Fund monies with 90% of the program financed with trust fund money and 10% financed with State money.

Schedule

Approve ROD	4/86
Start Predesign	6/86
Complete Predesign	12/86
Award Superfund IAG to U.S. Army Corps for Design	1/87
Start Design	3/87
Complete Design	12/87
Award Superfund Contract for Construction	2/88
Start Construction	5/88
Complete Construction	12/88

Table 1: Descriptions of Alternatives Considered at the Millcreek Site

Alternative	Total Cost x 1000	Public Health and Environmental Goals	Compliance With Other Environmental Laws
Alt. 1: No Action with Surface Water and Ground Water Monitoring	1,500	Does not meet ACL, soil, sediment, or surface water criteria or goals. Site would continue to pose a potential risk to public health, aquatic life, and wildlife. This alternative would do little but warn of worsening conditions.	Would not comply with RCRA closure requirements nor with EPA's current ground water protection strategy.
Alt. 2: Grading, Soil Cover, Revegetation, Surface Water Management, and Monitoring	5,000	Would eliminate risk posed by direct contact and inhalation of contaminated particles. Would decrease future surface water contamination by preventing runoff. This alternative, though, would not remediate ground water, soil, and sediment contamination to acceptable levels, and thus provides inadequate protection to receptors.	Same as above.
Alt. 3: Alt. 2 Plus Ground Water Remediation	8,600	Offers same benefits previously described in Alt. 2 plus remediation of ground water. This alternative, though, would not eliminate the potential for future ground water and surface water contamination caused by soil and sediment levels exceeding criteria.	Would comply with EPA's ground water protection strategy and RCRA's closure policy for ground water contamination. It would not comply with RCRA's closure requirements for contaminated soil and sediment
Alt. 4: Alt. 3 plus Capping of Areas Exceeding Soil Criteria	12,500	By capping areas exceeding soil criteria and excavating sediment exceeding sediment criteria, this alternative would provide a high degree of protection. Contaminated sediment would be incorporated under an onsite cap area. A major disadvantage of this alternative is that the predominant area of capping lies in a flood plain.	Would not comply with RCRAs closure requirements since capping would be required in a flood plain.
Alt. 5: Alt. 3 plus Excavation of Soils and Sediment Exceeding Criteria with On Site Dis[illegible] under a RCRA Cap	14,800 to 20,800	Would provide a high degree of protection meeting all criteria and standards established.	Complies with all applicable environmeantal laws.

21.2

Millcreek Responsiveness Summary

A responsiveness summary usually accompanies a Record of Decision (ROD) to provide EPA an opportunity to respond to comments made or submitted by citizens, environmental groups, or Potentially Responsible Parties (PRPs) on the Remedial Investigation/Feasibility Study (RI/FS) or other previous studies conducted by Federal or State agencies used to formulate a remedial action at a CERCLA site. The responsiveness summary, along with public meetings, informs concerned citizens and PRPs of EPA's assessment of data collected and recommended means of remediating any risk posed to public health or the environment.

EPA, Region III, conducted a public meeting on September 11, 1985, to inform citizens of the findings from the RI/FS and to propose a recommended remedial alternative. The topics discussed during the public meeting are outlined in Appendix RS-1.

Since any comments submitted by citizens or PRPs should be a matter of public record, all correspondence received by EPA is contained in Appendix RS-2.

PRPs' Comments

The PRPs' comments will first be summarized and responded to since their comments are the most extensive and in-depth. To aid in the technical review of the RI/FS, the PRPs consulted with the IT and Environ Corporations.

- Ground Water

The first major topic is that EPA's RI/FS does not have sufficient data to properly characterize and assess the risk posed by ground water contamination, and that there is no need for active remediation because ground water is not utilized downgradient of the site. Specifically, the PRPs claim that:

- temporal (time-variant) characterization of ground water quality cannot be assessed with present data.

- insufficient data to evaluate the extent to which natural restoration will occur.

- downgradient ground water is not currently being used and is unlikely to be used in the future because of the proximity of Lake Erie and the current distribution system servicing residents of Millcreek Township.

- the upgradient public water supply (Yoder Wells) is unlikely to be affected because of hydrogeological factors and the fact that the wells only use 1 part well water for 3 parts Lake Erie water in their distribution system.

- downgradient use is rendered even less likely because the Millcreek Township supervisors are willing to pass an ordinance restricting any future use.

- EPA has been confronted previously with similar decisions at other sites (2 within Region III; Wade and Drake Chemical) at which it has decided not to take active ground water remedial measures.

- available data indicate that ground water contamination is decreasing with time and is thus already naturally restoring itself.

- EPA's analysis of biodegradation of TCE into vinyl chloride which would increase the risk of concern from potential ingestion is incorrect. There do not appear to be any temporal or spatial trends in ground water data which indicate that biodegradation is occurring. In addition, current literature indicates that biodegradation of TCE should not occur in conditions present in Millcreek ground water.

Response:

The decision whether to pursue active ground water remedial measures involves not only a technical risk assessment, but a policy decision on EPA's part to protect currently unused aquifers. Because of the latter concern, Region III delayed the issuance of the ROD in order to obtain clear guidance from EPA-HDQS. EPA is currently uncertain about the long term effectiveness of institutional controls as a means of restricting ground water use. As a result, the Superfund program generally does not encourage ground water remedies with long time-frames. EPA's preference is for rapid restoration as may be achieved by pumping ground water (e.g. 2 years) as opposed to long term restoration which may take in excess of 100 years as calculated in Appendix A.

In response to specific comments, Region III collected additional ground water samples in December, 1985, to better characterize temporal trends in the eastern portion of the site. Sampling points were restricted to monitoring wells in the eastern portion of the site since this is the only area where contaminants of concern were detected.

With the December VOC sampling Region III believes that sufficient data is available to generally characterize the temporal ground water trends onsite.

In regard to the possibility that the upgradient public supply wells will be affected by the site, EPA could conceive of a problem during a prolonged severe drought. EPA will recommend periodic upgradient monitoring well sampling if these conditions should occur.

In regard to the decision of the Millcreek Township supervisors to restrict future downgradient use, refer to their recent letter to the Regional Administrator in Appendix RS-2.

In regard to other ROD decisions such as Drake and Wade, a decision on Drake has been deferred and ground water at Wade was not remediated because it lies adjacent to a major river (Delaware) where the areal

extent of the aquifer was very restricted. Therefore, at this site there is a set of conditions distinct from Wade in both dimension and time of contamination, and in the technical feasibility of ground water restoration.

As previously mentioned, during the December resampling, EPA sampled two sump pumps on Harper Drive. In one sump pump hole, 15 ug/l of vinyl chloride was dectected. Subsequent CLP analysis detected 190 ug/l of vinyl chloride. The owner of the residence explained to the EPA project manager that he experiences periodic basement flooding during high water table conditions. The year-around presence of water in his sump hole indicates that his basement is very close to the ground water table as are other basements in the area. There is a possibility of volatilization of volatile organic chemicals such as 1,1,1-trichloroethane, vinyl chloride, and 1,2-dichloroethene from the water table into people's living space near the site. EPA intends to sample this basement air for volatiles where vinyl chloride was detected to confirm or deny this possibility.

EPA agrees that chlorination of drinking water raises the VCR associated with ingestion, but this matter is irrelevent to the decision to pursue active ground water measures. Chlorinating an already contaminated ground water supply would aggravate an already potentially harmful situation. Also, ground water contamination may last for decades, whereas an alternate means of disinfection could be utilized in a shorter period of time. Also, chlorination at present offers a benefit to consumers, whereas chemical VOC contamination offers none.

Finally, in regard to TCE biodegradation, the following response is provided. Although there is considerable controversy concerning the dehalogenation of short chain chlorinated aliphaties, specifically trichloroethene (TCE), and 1,1,1-trichloroethane (1,1,1-TCA) in environmental matrices, a growing body of evidence seems to indicate that biologically controlled dehalogenation can occur under favorable field or laboratory conditions. The Environ Corporation presented a summary of some available data that indicating that degradation occurs during reducing, anaerobic conditions in ground water and in aqueous laboratory samples. Recently, a number of researchers from EPA, Ecology and Environment, Inc. and the University of Missouri showed that anaerobic degradation of TCE can also occur in soil (Environ Sci-Technicol, 1985 - 19, 277-279). TCE and 1,1,1-TCA have also been observed to undergo dehalogenation under reducing anaerobic conditions in ground water near municipal landfills and solvent recovery facilities (Management of Uncontrolled Hazardous Waste Sites, November 1984, Page 217). It is interesting that at one solvent recovery site, the ground water table was shallow and within 15 feet of the surface as is Millcreek.

Environ stated that biodegradation of TCE in ground water at the Millcreek site is highly improbable because ground water at the site is probably anaerobic and monitoring data show no clear patterns suggestive of degradation. Region III disagrees with the latter statement and believes that monitoring data strongly suggests that conversion of TCE in 1,2-DCE and VCM is occurring. This finding is explained in more detail in Appendix A. Degradation is resulting hehalogenation which could conceivable be caused by hydroyses but is more like to be caused by biodegradation. When one compares the concentration of TCE to its breakdown

products in umoles/l, a clear pattern emerges which not only suggests biodegradation but a probable source area for TCE.

On the question of the absence of a reducing environment, an assumption should not be made that just because an aquifer is shallow that it will always be aerobic. Besides, the literature indicates that although degradation occurs more rapidly during anaerobic conditions it may also occur in aerobic conditions at a much reduced rate. Region III attempted to determine the reducing potential in ground water with an Eh Meter but was unsuccessful due to the malfunctioning of the instrument. EPA did, however, obtain measurements of dissolved oxygen which varied from 1.60 to 4.30 ppm onsite. Most values were around 2.0 ppm. This indicates a low oxygen but not an anaerobic environment. It is interesting though that the concentrations of dissolved iron and manganese are very high in onsite ground water and that ground water seepage to drainage ditches appears as an orange tainted ooze. Orange seepage near landfill and swampy areas are indicative of iron and manganese oxidation occurring when water containing reduced iron and manganese come in contact with air. Dissolved iron and manganese are typically found in reduced forms when these two inorganics are detected in high concentrations in ground water. Therefore, the ground water at Millcreek could be in a reducing environment.

Even if the ground water is only slightly reduced, degradation could still occur at slower rates. One point that must be emphasized from laboratory studies is that laboratory tests are not sensitive enough to detect biodegradation rate slower than 0.001 days $^{-1}$. This is pointed out several times in Environ literature review. It must be remembered that ground water is an extremely slow medium and that persistent contaminants such as TCE typically persist for decades. Region III calculated the biodegradation rate of TCE into 1,2,-DCE and 1,2-DCE into VCM based on their predicted mass balances in the aquifer. The degradation rate for the former was estimated at 0.0003 days $^{-1}$ while the degradation rate for the latter was estimated at 0.000008 days $^{-1}$. While these appear as extremely low rates under laboratory conditions, they are meaningful in site ground water when reactions occur in years or decades intead of weeks in laboratory conditions. The point that TCE degradation can slowly proceed under weakly reducing or even anaerobic conditions is supported by a number of researchers as evidence in Environ literature survey. Another indication that biodegradation is occurring perhaps even as secondary metabolic reaction, is the presence of low concentrations of TIC hydrocarbons (1 ppm) in ground water in the eastern part of the site. Some studies have shown that microbes can use other organics in ground water as a carbon source and metabolize halogenated alkenes and alkanes by cometabolism.

Thus in conclusion, Region III believes it has sufficient evidience to document degradation of TCE and perhaps also 1,1,1-TCA. The literature provided by Environ provides for a better understanding of the process, but does not disprove that TCE, and 1,2-DCE are undergoing biodegradation at this site.

- Soil Contamination

The other major area where IT submitted comments is on soil contamination, specifically the mobility of PCBs, PAHs, and metals. The following summarizes their comments.

- EPA has no scientifically valid data to assess VOC subsurface soil contamination since most VOC data was rejected during validation.

- A scientifically sound determination as to the need for soil removal to prevent ground water contamination cannot be made because analyses of waste fill and natural soils were not differentiated in the RI and no leachate data from direct field measurements or column tests exist. The existing data suggest soil removal is not necessary at this site.

- Adequate surface soil data does not exist to allow a delineation of "clean" vs. "contaminated" soil at the site.

- All highly mobile VOC may have already entered the ground water from the soil column.

- EPA's method of determining soil criteria from partition coefficients and completely reversible linear isotherms is not a scientifically valid approach. A better method is using batch or column desorption test or monitoring ground water samples to show that metals, PAHs, and PCBs are not migrating to the ground water.

- EPA has developed PCB soil criteria at other sites such as Lehigh Electric at 10 to 50 ppm yet the PCB criteria at the Millcreek is much lower.

Responses

Only a minor fraction of the VOC soil contamination data was rejected during validation. For the most part, surface and subsurface VOC data are believed to be accurate with the exception of the detection of acetone and methylene chloride. These two contaminants are common field and laboratory contaminants. The distribution pattern of acetone and methylene chloride in soil indicates that they are probably blank contaminants.

In regard to the determination of the need for soil removal to protect ground water, Region III will conduct additional field and laboratory work especially with more hydrophobic chemicals like PCBs and PAHs.

In regard to PCB soil contamination, surface soil is obviously contaminated with moderate levels of PCBs. Most PCB contaminated soil seem to be on Millcreek Township's property and in the south central portion of the site near the existing wetland. Test pit samples indicate

PCBs in foundry sand at various depths. Test pit 016 contained PCB-1248 in natural soil at a concentration of 357 ug/kg. PCBs were detected in two borehole samples, one of which is offsite directly southeast of the site where previous bulk disposal is suspected. In both borings, PCBs were detected in natural soils at depths up to 10.5 feet.

Test pit and boring data is very limited, but there is an indication that PCBs have migrated in low concentrations in natural subsoil. Boring 20A indicates that PCB-1254 has migrated to the aquifer.

The fact that PCBs have not been detected in monitoring wells is expected. Most monitoring wells onsite and in suspected PCB contaminated areas lie below silty or clayey residual soil which would significantly attenuate PCB migration to the aquifer. Very few monitoring wells monitor perched water zones lying above clayey or silty residual soil in foundry sand. PCBs could be concentrated in these areas. Another reason why PCBs were not detected in ground water is that the CLP detection limits are too high. Depending on the isomer class, the aqueous detection limits for PCBs are either 0.5 or 1 ug/l. PCBs could cause long term health effects in the part per trillion range.

Therefore, it is inaccurate to state that PCBs have not migrated and are not contaminating ground water at levels which may be of concern. Likewise, it is also inaccurate to state that PCBs will not migrate in the future. Data needed to confirm or deny the presence of PCBs in ground water will be gathered during design.

It is not generally recognized that hydrophobic compounds will, in fact, migrate in moderate or low concentrations. PCBs were probably bulk disposed with solvents or oils which could have carried them through the soil column without significant adsorption. PCBs could then be released from soil via desorption or molecular diffusion. This occurrence is commonly observed in creosote pits or coal tar spills. It should be recognized also, that dissolved organic carbon competes with organic carbon in soil for hydrophobic adsorption sites. Hydrophobic compounds, especially phthalates, are commonly observed in landfill leachate where DOC can exceed 1000 mg/l. It should be noted that garbage was disposed throughout the site and in some areas where PCBs were detected. Garbage would naturally generate DOC and serve as an adsorbent for PCBs.

To confirm the presence of PCBs and other hydrophobic molecules in subsurface water, additional monitoring wells or lysimeters need to be installed and anaylsis performed with lower detection limits. These activities will be recommended during design along with desorption tests to aid in determining safe, residual PCB levels in foundry sand and soil.

In regard to PAH soil contamination, PAHs have been detected in surface soil throughout the site at concentrations exceeding 800 ppm in soil. The highest concentrations seem to be located in the southern and western portions of the site. The distribution pattern of PAH contamination indicates that they are the result of either massive and widespread bulk disposal or were used with foundry sand as a binding agent. Phenols are also commonly used in foundries and were detected with PAHs in many instances. It appears that for most parts of the site, PAH contamination was from the

latter mechanism. IT suggest that PAH contamination could be from coal powered locomotives which were common in the past. Region III, though, believes that this is unlikely since PAHs are distributed in moderate concentrations throughout the soil column (a condition that would be unlikely because of strong hydrophobic binding) and because the highest concentrations of PAHs were detected on property which was only filled in 15 or 20 years ago.

The well boring samples may provide some indication of the transport of PAHs to the underyling residual soil. While this is important in respect to the potential for aquifer contamination it must be remembered that PAHs are distributed fairly evenly in foundry sand, and local perched water tables commonly encroach 1 or 2 feet into foundry sand. Perched water conditions may enhance the ability of PAHs to desorb from foundry sand and eventually migrate to the aquifer. It is believed that PAHs were not detected in ground water for the same reasons that PCBs were not.

Borings provide the best opportunity to observe any possible migration. In B-21A, several PAHs were detected below CLP detection limits (commonly about 1500-2000 ug/kg) at 9-10.5 feet. This may be significant since the fill only extends to 5.5 feet. The same situation was observed in boring 18. In boring 18, PAHs were detected in foundry sand at 3-4.5 feet at a concentration of 539,510 ug/kg. In the same boring at 4.5-6 feet, PAHs were detected but at concentrations below the CLP detection limit. Residual soil was found at 5.5 feet.

In regard to inadequate sampling data being available to delineate areas of contaminated soil, sufficient data is available to arrive at an order of magnitude cost estimates (+50% to -30%) of potential remedial alternatives. Region III agrees that additional sampling must be done during design to refine the estimates. Soil criteria is based on the physical, biological and chemical properties of the compound and soil to which it is adsorbed and on the area and depth of contamination. Only in this way can an estimate be made of contaminants percolating to the perched or real water table. These are tentative criteria which will be redeveloped during design based on additional sampling, field, and laboratory desorption tests.

In regard to all VOCs having already left the soil column, test pit samples reveal that low to moderate levels of VOCs still exist in soil in some areas. For instance, in test pit 7 at 2.5 feet, 733 ug/kg and 307 ug/kg of vinyl chloride and 1,2-dichloroethene were detected. Additional sampling will be conducted during design to more precisely define the full extent of VOC contaminated soil.

In regard to selecting lower PCB levels than had already been chosen in previous RODs, Region III is not bound to previous soil criteria selected by other Regions or within Region III itself. The proposed PCB criteria is a health based number for residential areas. This is appropriate because the site is frequented by hunters and children and borders residential areas.

Marshall's Run

• There is no current information on conditions in Marshall's Run. Thus the need, if any, for remedial action to limit surface water exposure cannot be determined.

Response

Both the onsite pond and Marshall's Run support wildlife and migratory fowl. Hunters use the swamp area during spring and fall for hunting waterfowl. Red tail fox and other wildlife have been seen onsite. Wildlife and fowl ingest surface water and phytoplankton such as duck weed growing in surface water. Also aquatic life such as shiners and small bass were found adjacent to the site in Marshall's Run. Rainbow trout and other cold water fish species use Marshall's Run for spawning at the mouth of Lake Erie. Existing data shows that the existing wetland and Marshall's Run are viable pathways to wildlife receptors.

Air

• No organic vapor or particulates analyses of air samples were conducted. Thus, no data exist to justify eliminating or reducing potential air exposure routes.

Response

EPA's consultant, the NUS Corporation, conducted volatile air monitoring during field reconnaissance test pitting and monitoring well drilling. During test pitting, the OVA meter registered over 1000 ppm thus signifying the presence of volatiles in high concentration. EPA did not collect tenax air samples though for subsequent analysis nor samples for particulate analysis. EPA's assessment of the risk posed by inhalation of particulates is based on the presence of known carcinogens in high concentrations in soil and the possibility of air dispersion of soil.
On windy days, especially in areas with little vegetative cover, significant air dispersal of dusts may occur.

Response to Comments Other than PRPs

Erie County Department of Health

Comments:

Agree with proposed remedial action alternative except that soil exceeding determined criteria should be removed offsite instead of incorporated onsite under an impermeable cap because it would still be exposed to ground water.

Response:

Soil exceeding determined criteria would be hydraulically isolated from lateral ground water flow and percolating rainfall because soil would be placed above ground and then capped.

Millcreek Township

Comments:

Township favors the construction of a storm water retention basin on its parcel of land on the site to reduce offsite flooding.

Township acquired its parcel after the site was no longer being used as a landfill.

Township is concerned that placing a cap over contaminated soil will fail to contain hazardous substances within the site.

Township is concerned that Yoder Wells be protected and that adequate monitoring be maintained to ensure a safe water supply.

Response:

EPA will contruct a storm water retention basin onsite if it is needed to equalize ground water discharge to Marshall's Run, or is more cost-effective than backfilling the PCB contaminated areas with clean soil. A retention basin may also be needed to prevent erosion of PCB-containing residual soils during flooding conditions since PCB contaminated soils are within a 100 year flood plain.

EPA's enforcement personnel are aware of conditions involving purchase of property formerly owned by Ralph Reihl.

The cap will eliminate lateral ground water flow and greatly reduce rainwater percolation through contaminated soil. Complete hydraulic isolation is not technically feasible, but contaminants present in seepage should be in low concentrations and dilute to levels protective of public health by the time they migrate offsite.

EPA will work with the Erie County Department of Health to establish a periodic sampling strategy for the Yoder Wells. Monitoring wells both upgradient and downgradient of the site will also be sampled periodically to determine if offsite migration of ground water contaminants is occurring. If the Yoder Wells become threatened by the site, EPA or PADER will expeditiously take action to remedy the situation.

Northwest Citizens for a Clean Environment Comments:

Concerned that capping will not effectively eliminate the threat posed by the site. Request that EPA provide documentation that capping is an effective means to isolate wastes.

Believes that additional monitoring wells should be placed beyond the landfill.

Believes that ground water pumping and treatment should be established on a cycle of two year pumping to purify water.

Request more frequent monitoring well sampling.

Signs and a fence should be installed.

What specific responsibility will be assigned to agencies for operation and maintenance.

RI/FS states that a health survey is being developed and the citizens committee would like to be kept informed of its progress.

Request a more thorough written explanation of EPA's intent to develop site specific criteria.

Request that EPA specify responsibilities of EPA, DER, Erie County Health Department, and Millcreek Township during cleanup and monitoring.

Request that a time schedule be presented for cleanup.

Want responsible parties at fault to be prosecuted and bear the full costs of cleanup.

Favor the construction of a holding basin.

Concerned that recommended alternative may prove more costly in the long run.

If better technologies are available at a later time for site remediation that they be applied at the site.

Response

Capping has proved to be an effective method of greatly reducing rainwater infiltration at hazardous wastes facilities and is an established engineering practice. Capping must be strictly evaluated in this context and viewed as part of the overall cleanup strategy. By excavating contaminated soils capable of causing continued ground water contamination, EPA will greatly reduce the leachate generation caused by lateral ground water flow. By incorporating this contaminated soil underneath a clay cap with a permeability of no more than 10^{-7} cm/s, EPA will ensure leachate generation caused by rainwater percolation is kept at a minimum. Subsequent dilution in ground water will result in acceptable levels offsite.

EPA is evaluating the need for additional monitoring wells to ensure that any future release would be quickly recognized and remediated if necessary. Sampling of monitoring wells is an essential mechanism in determining the success of cleanup activity and thus EPA places great importance in the location and sampling frequency of wells.

EPA intends to install warning signs around the site when funds become available. Also, EPA is again evaluating the need for a fence around the site and will make a decision when funds become available.

EPA's Remedial Investigation/Feasibility Study consultant believes that removing most of the volatile organic contaminants from the ground water and pore spaces within the ground water may require removing 12 pore volumes of water which could take two years in time. If monitoring wells indicate that ground water remediation is accomplished in less than two years, pumping wells may be turned off. EPA will establish acceptable levels of ground water contamination and then pump to meet those levels.

Frequency of monitoring well sampling will be established to detect a ground water release as soon as possible.

It will be EPA's specific responsibility to develop a remedial action alternative and implement it through the Army Corps of Engineers. It is then DER's responsibility to provide future maintenance of the remedial action and sampling of the monitoring wells. The Erie County Department of Health will be responsible to periodically sample the Yoder Wells.

A health study has not been initiated at this site. Available data indicates that sufficient information is not available to warrant an epidemiological study. EPA may however request the Centers for Disease Control (CDC) assistance in conducting a study if additional soil sampling during design reveals information which may warrant it.

A more thorough explanation of soil criteria is contained in Appendix B.

A cleanup schedule is provided in the ROD.

Concerning the long-term cost of cleanup, EPA has attempted to be conservative in its calculations to minimize any possible risk in the future and thus reduce any possible future costs.

In regard to the use of better technology at a later date, EPA may consider this option if unforeseen events occur which produce a significant risk to public health or the environment and it is apparent that the technology originally used is not alleviating this risk.

Parent Teacher Association - Tracey Elementary School

Comments:

Ask that PRPs be prosecuted to the full extent of the law.

Ask that site area be completely fenced in.

If a storm water retention basin is constructed it should be fenced in if it could cause a potential hazard.

Wish for more extensive monitoring of the Yoder Wells.

If contaminants are air - dispersed during site activities, every precaution should be taken to prevent any possible health risks.

Response:

EPA is actively negotiating with the PRPs for implementation of the remedial design and action. If the PRPs refuse to implement the above, it is EPA's opinion that they are liable for costs of Superfund actions implemented at the site and are subject to the cost recovery provisions of Section 107 of CERCLA.

If a storm water retention basin is constructed EPA will ensure that it does not present an acute or chronic health risk.

EPA will work with the Erie County Department of Health to ensure that the wells are periodically sampled.

EPA will evaluate the possible risks posed by air dispersal of soil during remedial action. EPA will take sufficient precautions to ensure that air dispersal is kept to a minimum.