United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R03-90/089
June 1990

EPA

Superfund Record of Decision:

Walsh Landfill, PA

50272-101

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First Remedial Action

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Washington, D.C. 20460

13. Type of Report & Period Covered
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14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 7-acre Walsh Landfill site encompasses an approximately 1.5-acre landfill and surrounding area in a heavily wooded region of Honeybrook Township, Chester County, Pennsylvania. The landfill reportedly received mixed municipal and industrial wastes for disposal between 1963 and 1976; although State investigations in 1979 revealed that disposal of hazardous waste at the site had resumed after that period. Investigations by the State revealed the presence of fifteen to twenty drums containing various hazardous substances, including VOCs. Fumes from the drums reportedly sickened local residents, and organic and inorganic compounds were detected in monitoring wells and private wells. In addition to waste disposal, open burning of material was conducted in the southeastern portion of the landfill. Residential well sampling from 1987 through 1989 resulted in an interim remedial measure in 1989 to provide bottled water to 44 residences. Currently, the site is being operated as a solid waste transfer station and salvage yard, and operations are increasing the volume of landfill/junkyard debris, and the overall size of the site. This Record of Decision (ROD) addresses final source control for the landfill and allows for expedited action on the contaminated drinking water supply. A second ROD will address
(See Attached Sheet)

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

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

Availability Statement	19. Security Class (This Report) None	21. No. of Pages 80
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

stract (Continued)

the contaminated ground water. The primary contaminants of concern affecting soil, sediment, and ground water are VOCs including benzene, PCE, and TCE; other organics including PAHs; and metals including arsenic and lead.

The selected remedial action for this site includes removal of bulky items and debris from the landfill surface for resource recovery, followed by construction of an approximately 5.2-acre landfill cap; provision of an alternate water supply to approximately 50 residences by extending the municipal water system; ground water monitoring; and implementation of site access restrictions and institutional controls, including land use, ground water use, and deed restrictions. The estimated present worth cost of this remedial action is $3,768,000, which includes an estimated annual O&M cost of $63,090 for 25 years except years 5, 10, 15, 20, and 25 which will have an estimated O&M cost of $108,950 due to the five-year reviews.

PERFORMANCE STANDARDS OR GOALS: Provision of an alternate water supply will ensure availability of water meeting SDWA MCLs.

RECORD OF DECISION

WALSH LANDFILL SUPERFUND SITE
(a.k.a. Welsh Road/Barkman Landfill Site)

DECLARATION

SITE NAME AND LOCATION

Walsh Landfill Site (a.k.a. Welsh Road/Barkman Landfill Site)
Chester County, Pennsylvania.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Remedial Action selected for the first operable unit at the Walsh Landfill Site. This action provides for an alternate water supply and landfill cap to address the primary risks posed by the site conditions. This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA); and, to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300. The decisions contained herein are based on information contained in the administrative record for this Site. A second Record of Decision (ROD) will be prepared following the completion of the focused ground water and feasibility study, and will address the contaminated ground water aquifer at the site.

The Commonwealth of Pennsylvania has concurred with the selection of this 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," Section VII, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to the public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

EPA has selected, and the Commonwealth of Pennsylvania has concurred on, the following Remedial Action for the first operable unit at the Walsh Landfill Site. The remedial action for this operable unit includes a final source control action for the landfill and an alternate water supply. The second operable unit will address the contaminated ground water aquifer. The major components of the Selected Remedial Action for the first operable unit are as follows:

Selected Remedial Action: Alternative 4

* Construction of new water service lines, mains, hydrants, and valves, and the connection to the Honey Brook Borough Water Authority's water supply mains. It is estimated that 50 residences will be provided with this service, based on previous sampling results, and the number of residents currently receiving bottled water. The number and location of residences which will receive public water will be verified during the design of this remedial action.

* Approximately 6500 feet of 8-inch water main, 7500 feet of 4-inch and 3000 feet of 2-inch distribution lines will be installed along PA State Route 10 and Welsh Road. Service lines will be installed for each of the 50 households.

* The current water supply system will be upgraded to provide sufficient capacity to service the impacted residences. One water supply well will be installed and connected to the Honey Brook Borough water supply system. A booster pump and 120,000-gallon water storage tank will also be required to service the residents.

* Control of the new water lines and services will be transferred to the Honey Brook Borough Water Authority as soon as construction is completed.

* Resource recovery activities will be completed to remove the bulky items and debris from the surface of the landfill in order to prepare for construction of a landfill cap. Additional information will be collected on the composition of the landfill

materials during the design of a landfill cap. At a minimum, a multi-media landfill cap that meets the requirements of the Pennsylvania Municipal Solid Waste Regulations will be constructed at the site. The cap will consist of a topsoil component underlain by a soil layer, a drainage layer with a permeability greater than a 1×10^{-3} cm/sec., a high-density polyethylene geomembrane, and a base soil layer over the landfill. The cap will be designed to cover an area of at least 5.2 acres, and will be vegetated and sloped in accordance with the State regulations. Surface water control measures will be incorporated into the design of the landfill cap.

* Institutional controls including the construction of a six-foot high fence topped with barbed or razor wire around the perimeter of the landfill, and modification of the property deeds for the landfill will be completed to restrict unauthorized use or access to the site, and to restrict future use and property development.

STATUTORY DETERMINATIONS

The Selected Remedial Action (Alternative 4) 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. Connection to the public water supply and capping the landfill is an effective remedy that will prevent human exposure to the contaminated media which are posing the primary risks at the site: ground water and soils. This remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable for this site. However, because treatment of the principal threats at the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will leave hazardous substances on-site, a 5-year review under Section 121(c) of CERCLA, 42 U.S.C. 9621(c), will be conducted for the Site to ensure that the remedy continues to provide adequate protection of human health and the environment.

Edwin B. Erickson
Regional Administrator

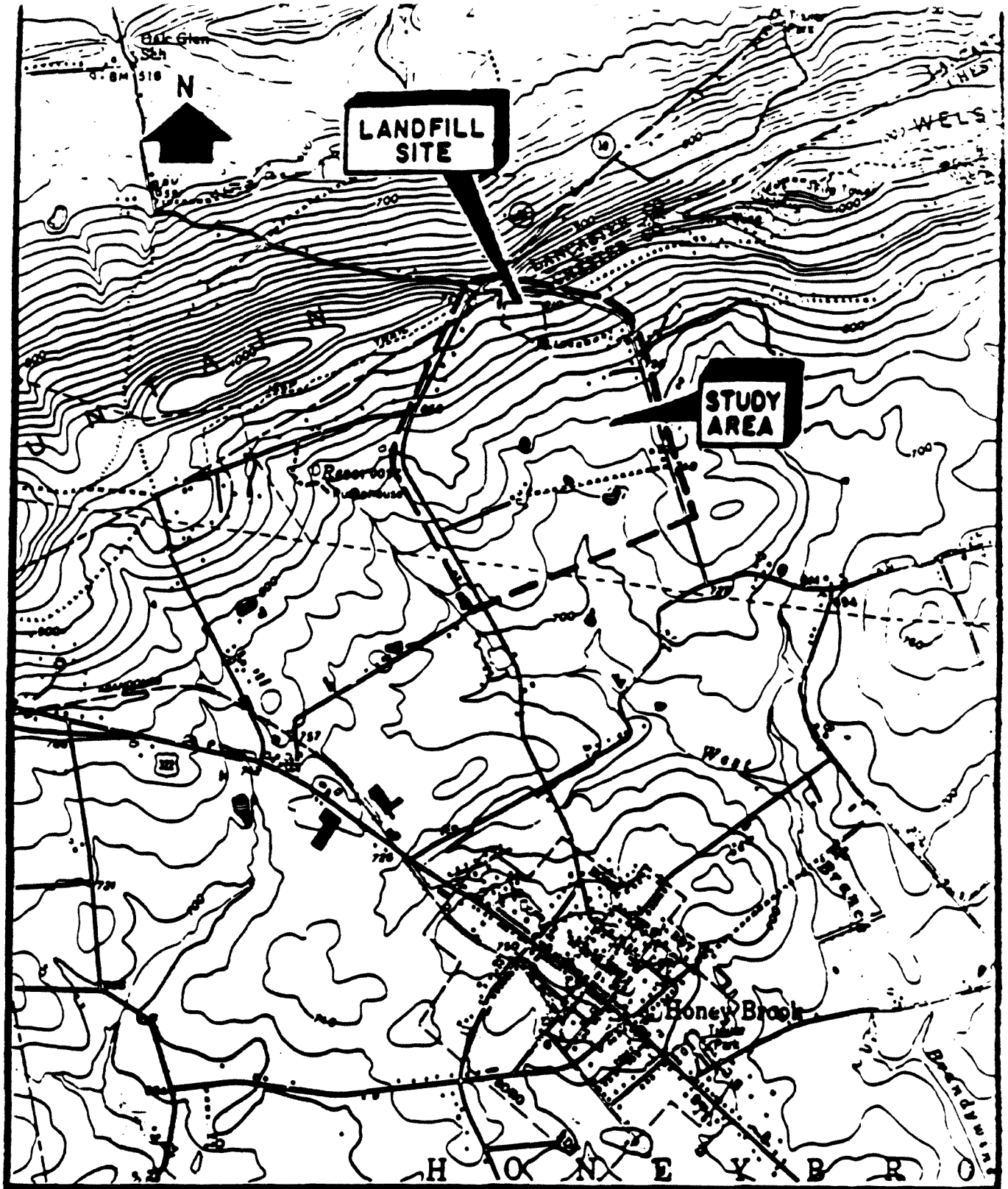
6/29/96
Date

I. SITE NAME, LOCATION AND DESCRIPTION

The Walsh Landfill Site is located on approximately seven acres, near the top of Welsh Mountain in Honeybrook Township, Chester County, Pennsylvania (Figure 1-1). Approximately five-sixths of the property area lies south of the Honeybrook Township, Chester County line, while the remainder is located in Caernarvon Township, Lancaster County. The entrance to the site borders on Welsh Road, 200 feet east of the intersection of Welsh Road with PA Route 10. The area surrounding the landfill is heavily wooded, with agricultural activity situated approximately one-half mile south of the site. Approximately 49 homes or residential structures are situated within a half-mile radius north, east, and west of the landfill. Several residents live in house trailers that are situated within five to ten feet of the current salvage operation.

A salvage operation and waste transfer station are currently operating on top of, and in the area surrounding the landfill. The original landfill area covered approximately 1.5 acres on the southern portion of the site. A large garage and mobile office trailer are currently located near the main entrance to the landfill, along Welsh Road. The surface of the landfill is covered with assorted vehicles, dumpsters, appliances, tires, batteries, empty underground storage tanks and drums, construction waste and other debris. The southeastern portion of the landfill was formerly used as a burn area, and currently two patches of dead trees, and sparse vegetation exist along the southern border. A stone/gravel access road exists along the western and southern borders of the landfill property. A fifty-foot power line/utility right-of-way also lies along the southern border of the property. Areas to the north, east, and west are woodlands interspersed with houses constructed on cleared lots.

The Walsh Landfill was constructed as a side-hill facility in which the landfill materials were placed directly on the existing ground surface near the ridge line of Welsh Mountain. The axis of Welsh Mountain extends northeast to southwest, with the mountain being the dominant topographic feature of the site area. Surface runoff from the landfill generally flows to the south and southeast. Several spring-fed ponds in the Walsh Landfill study area are situated to the south of the landfill, and are drained by streams running south and southeast. These streams drain into the West Branch of Brandywine Creek, which eventually flows into the Delaware River.



1000 0 1000 2000 3000 4000 5000

QUADRANGLE LOCATION

FIGURE 1-1
WELSH ROAD/ BARKMAN LANDFILL SITE
PROJECT LOCATION MAP

SOURCES: HONEYBROOK, PA. U.S.G.S. 7.5 TOPOGRAPHIC MAP, 1955, REV. 1983
MORGANTOWN, PA. U.S.G.S. 7.5 TOPOGRAPHIC MAP, 1956, REV. 1980

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Walsh Landfill Site reportedly received mixed municipal and industrial wastes for disposal between 1963 and 1976. The site consists of several land parcels, bought at different times by Grace and Ernest Barkman. Mr. Barkman operated a trash hauling business, "Ernest Barkman's Trash Disposal," and a landfill on the property during this period. From 1970 up through the time of the reported landfill closure in 1976, Mr. Barkman made several attempts to obtain State and Township approval for a landfill at this location. Due to citizen complaints regarding the site activities and continued non-compliance with municipal solid waste regulations, as noted by several inspections by State, county, and township officials, Mr. Barkman's operation was never permitted.

Site inspections conducted by the Chester County Health Department in 1970 described evidence of burning automotive materials and rebuilding of a sewage collection truck on the site. The Pennsylvania Department of Environmental Resources (PADER) inspected the site various times from 1971 through 1974 and issued several fines to Mr. Barkman for unacceptable landfill practices and violation of the Pennsylvania Solid Waste Management Act. On July 31, 1973, criminal charges were filed against Mr. Barkman by PADER, with respect to the unlawful operation of a waste facility without a permit and for burning of solid waste at the site. Subsequent inspections of the site by PADER in 1974 noted several continuing violations in the landfill's operation. In addition, a formal objection was raised by Honeybrook Township regarding the landfill's location in an area zoned as farm-residence.

In January 1976, PADER noted that the landfill was approaching capacity, and requested that Mr. Barkman submit a final closure plan for the landfill in place of a permit application for continued operation. PADER modified the closure plan submitted by Mr. Barkman and approved it in December 1976. PADER continued to inspect the site to monitor the closure activities. The State inspection reports note several violations of the Pennsylvania Solid Waste Management Act and little progress with landfill closure.

In the summer of 1979, PADER received complaints from local citizens regarding the dumping of suspected hazardous materials at the site. The State investigated this complaint and visited

the site on July 7, 1979 to find that waste disposal activities had resumed. Numerous drums were found on the site with labels describing their contents and source as sludge residue from roofing tars and Calcozine from Sunoco Products in Downingtown, PA. PADER also observed evidence of leakage from 20 full 55-gallon drums onto an adjacent residential property. Information obtained from the drum labels described the contents and source as Ridoline 442 (corrosive) and various acids from Penguin Industries in Coatesville, PA.

In conjunction with the above findings, PADER received a complaint that fumes emanating from the drums had sickened local residents. The State and Chester County Health Department proceeded to sample private wells in the area and found elevated levels of organic and inorganic compounds. Also, in accordance with the landfill closure plan, four onsite monitoring wells were installed, sampled, and found to contain organic and inorganic contamination. PADER and Chester County continued to receive citizen complaints during 1980 and 1981 regarding noticeable odors and a foul taste of their well water, and sampling results continued to show elevated levels of contaminants in the wells. During a March 1981 site inspection, 15 to 20 full 55-gallon drums were noted onsite, and open burning of other material was occurring. The State advised Mr. Barkman of proper handling procedures, but a follow-up inspection in May 1981 showed the drums remained onsite.

On September 2, 1982, a 60-day notice of intent to file a citizen suit in accordance with the Pennsylvania Clean Streams Law was issued to Mr. Barkman for improper operation, maintenance, and construction of a landfill which rendered water in nearby wells unfit for consumption. In February 1983, Mr. Barkman's consultant, Nassaux-Hemsley, Incorporated, proposed that the dumping of liquids used to clean out dairy tanks at three sites in close proximity to the landfill were partially responsible for the ground water contamination.

In April 1983, a fuel oil spill occurred at the site when a heating oil tanker leaked and oil pooled on the landfill surface. EPA and PADER's files indicate that twelve drums of fuel oil were collected by Mr. Barkman and shipped to what Mr. Barkman termed his "other location," and 25 cubic yards of soil were removed and taken to Lanchester Landfill for disposal. In addition, one full 55-gallon drum, labelled "ARCO Polymers, D-3, SHEREX Chemical Company, Dublin, Ohio" was found on the landfill.

In December 1983, DER prepared a draft order to be issued to Mr. Barkman for voluntary closure of the landfill and the elimination of soil and ground water pollution by May 1984. This draft order was never finalized due to the placement of the site on EPA's National Priorities List in September 1984.

Prior to the NPL listing, in June 1984, EPA sampled several 55-gallon drums found on Mr. Barkman's landfill. The drums contained various hazardous substances including: toluene, ethylbenzene, 1,1-dichloropropane, chlorobenzene and methylene chloride. EPA issued a unilateral order to Mr. Barkman on February 22, 1985, directing him to complete the containment and removal of these drums to a permitted disposal facility. Mr. Barkman initially agreed to complete this work, but later proved uncooperative, and EPA completed the work using Federal funds.

In 1985, PADER became the lead agency for the Walsh Landfill Site, and entered into a cooperative agreement with EPA to conduct a Remedial Investigation and Feasibility Study (RI/FS). The site was classified as a state-lead Superfund site, and PADER proceeded to hire a contractor, SMC Martin, to perform the required site investigation work.

In the fall of 1985, EPA issued correspondence requesting information from five companies whose labelled drums had been found on the site. The five companies included: Penquin Industries, Inc. of Coatesville, PA; Schick Electric, Inc. of Lancaster, PA; Sperry New Holland of New Holland, PA; Sonoco Products of Downingtown, PA; and, Sherex Chemical Company of Dublin, Ohio. EPA received responses from these companies indicating that they had no information and/or knowledge regarding the disposal of hazardous materials or drummed wastes at the Walsh Landfill Site. Thus Mr. Barkman, the site owner was the only responsible party who received a notice letter for the RI/FS work; Mr. Barkman received notice from PADER in January 1985 and April 1986, and from EPA on May 31, 1989. Mr. Barkman did not volunteer to complete or fund the required work for the site.

The RI field studies were initiated in 1987 and the final RI report was submitted by PADER's consultant in 1988. PADER conducted several rounds of residential well sampling in 1987, 1988, and 1989. Based on the results of this sampling, PADER

issued an advisory to local residents in March 1989 and began supplying bottled water to 44 residential units, or structures. The provision of bottled water constituted an interim remedial measure, and the action was taken in order to be protective of public health. Low levels of primarily organic contaminants were detected at random intervals and various well locations among the 49 residential structures in the Site area. In addition, little documented information was available on the health effects of exposure to the detected contaminants. Due to these uncertainties, the provision of bottled water was selected as a protective measure for the residents who use ground water as their domestic water supply.

The Site is currently operated as a solid waste transfer station and salvage yard. Access to the Site is unsecured, and the continuing operations are contributing to the increased volume of landfill/junkyard debris, and the overall size of the Site.

III. COMMUNITY PARTICIPATION

In accordance with Sections 113(k)(2) and 117 of CERCLA, on March 18, 1990, EPA placed a quarter page advertisement in the West Chester Daily Local and the Lancaster New Era, announcing the 30-day comment period on the Proposed Plan for the first operable unit of the Walsh Landfill Site. Also announced was the availability of the Proposed Plan, RI/FS, and Public Health Evaluation reports, as part of the Administrative Record in the site information repository: Honey Brook Public Library.

The public comment period began March 18, 1990, and ended May 18, 1990. EPA received a timely request for an extension of the comment period, and thus granted the minimum 30-day extension, in accordance with the revised provisions of the NCP.

A public meeting was conducted on March 27, 1990 in order to facilitate receiving the public's comments and concerns with the proposed action for the first operable unit at the site. The local citizens who attended the meeting appeared to generally agree with the proposed remedial action for the contaminated drinking water supply and the landfill. Specific comments and concerns raised by the local community are addressed in the Responsiveness Summary.

IV. SCOPE AND ROLE OF OPERABLE UNIT

The Walsh Landfill Site has been divided into two operable units (OUs), or site components, in order to effectively address the complex contamination problems present in the various environmental media. The institutional and containment actions included in the remedy for the first OU will address the principal threats to human health posed by the presence of elevated levels of organic and inorganic contaminants in private wells and landfill soils. OU number one allows for expedited action on the contaminated drinking water supply and final source control action for the landfill. OU number two will consist of the remedy selection for contaminated ground water. This approach to remediation will allow for expedited action to address health threats while further study of ground water clean-up alternatives is completed.

The remedy for OU number one removes the threats to public health posed by the ingestion and/or inhalation of contaminated ground water by extending a municipal water line to service the affected residents in the area of the site. The remedy also addresses the threats to public health posed by the ingestion of, inhalation of, and dermal contact with contaminated landfill soils by placing a cap over the landfill and fencing the area. The landfill cap will address the threat to the environment by substantially reducing the amount of percolation through the landfill, and thus the amount of leachate entering the ground water.

The remedial action for the first operable unit also will address the local community's concerns with Mr. Barkman's current operations. The local citizens are concerned with the open burning practices and miscellaneous waste handling activities that are reported to occur at the site, and any health or environmental risks that these may pose. Capping the landfill will necessitate ceasing the current operations on Mr. Barkman's property, and will require the removal and decontamination of the salvage materials and waste products currently placed on the site.

The remedial actions included in the first OU will address the primary human health threats posed by Site conditions. The remedy for the first OU will allow for the primary health risks to be addressed while the investigation required for the

second OU, the contaminated ground water aquifer, proceeds. A limited study of the site's ground water flow dynamics and chemical characteristics will be completed in order to develop information on effective cleanup remedies for the aquifer, as the second OU for the site.

V. SUMMARY OF SITE CHARACTERISTICS

Environmental Setting and Climate

Chester and Lancaster Counties, which encompass the Walsh Landfill Site, are located in Southeastern Pennsylvania. This area lies within the Piedmont physiographic province of the Appalachian Highlands. The province is bounded on the west by the Blue Ridge province, and to the east by the Coastal Plain. The topography of the site is dominated by Welsh Mountain, which extends northeast to southwest.

The climate in the area is mild, humid, with well-defined seasons. Temperatures are usually moderate. Precipitation is generally ample and dependable, with the greatest amount falling during summer months. The prevalent wind direction is from the west with an average speed of 9.5 miles per hour.

1. Regional Geology

Bedrock underlying the Walsh Landfill Site is characterized by two distinct, highly fractured geologic units. The oldest of these is a Precambrian-aged amphibolite and granulite facies felsic gneiss and graphite-bearing felsic gneiss. This unit is located just to the south of the landfill.

The second unit is the Hellam Conglomerate member of the Cambrian Chickies Quartzite Formation. This unit, which forms the ridge-cap of Welsh Mountain, is located directly beneath the landfill and consists of a fractured, white, tan or gray to blue-gray conglomerate with occasional interbedded green, fine-grained quartzite, occasional iron staining, and occasional thin shaley layers.

The contact between the Precambrian gneiss and the Cambrian quartzite is characterized by a heavily fractured and weathered zone approximately three feet in thickness. The Cambrian-

Precambrian contact is located approximately 300 to 350 feet south of the southern border of the landfill and strikes N69 degrees E. The dip of the contact is believed to be between 40 degrees and 53 degrees to the northwest.

The bedrock is generally overlain by saprolite. Saprolite is defined as a soft, variably to thoroughly decomposed rock formed in place by chemical weathering of igneous or metamorphic rocks. Both the Precambrian gneiss and the Chickies quartzite have associated saprolite layers. This overburden material ranges in thickness from approximately 10 to 40 feet beneath the Walsh Landfill to over 90 feet in the vicinity of the Cambrian - Precambrian contact.

2. Hydrogeology

Ground water in the vicinity of the Walsh Landfill Site occurs in a fractured bedrock aquifer under confined to semi-confined conditions. The ground water in the landfill area is encountered in the quartzitic and gneissic bedrock and in the saprolitic overburden. Both of these systems apparently are interconnected and are flowing in a general south-southeasterly direction following the surface topography. The bedrock is a fractured medium and, therefore, ground water migrates mostly along avenues of secondary porosity, such as interconnected bedrock fractures. Ground water flow through the interconnected fractures can be rapid compared to that in the surrounding bedrock material, and the direction locally may vary substantially from the average gradient.

Ground water flow is controlled by the geometry, orientation, and interconnections within the bedrock fractures. These properties are quite variable, and thus a complex flow field has developed at the site. In general, the ground water appears to be flowing from the northwest to the southeast. However, due to the fractured nature of the bedrock, and induced stresses on the aquifer due to the pumping of residential wells, the actual direction of ground water flow may vary a great deal from the direction of the average gradient. These variations may induce local ground water flow and contaminant migration to occur in any direction. Contaminant migration will also be influenced by dispersive processes acting within the aquifer.

The fractured bedrock aquifer currently is the primary source of water in the site vicinity; most residents use ground water as a source of potable water for their homes and farms.

Due to the detection of organic contaminants in several residential wells in the area, PADER initially provided bottled drinking water to 44 residential structures beginning in March 1989. The number of residential structures receiving bottled water has varied over the past two years. The primary reasons for such variation have been independent sampling completed by residents, and families moving in and out of the area. Many residents continue to use ground water for other activities such as bathing and washing.

3. Hydrology

Soils in the site area are generally the silt loams typical of the Neshaminy-Glenelg and Edgemont Associations. The soils at the site are a mixture of native soils, demolition and construction debris, and various plastics, paper, and metal debris. The landfill area drains south and southeast by surface runoff. Several spring-fed ponds situated to the south of the landfill are drained by streams running south and southeast. The surface water from the landfill drains into the West Branch of Brandywine Creek, which flows into the Delaware River.

VI. NATURE AND EXTENT OF CONTAMINATION

The primary risks attributed to the previous disposal practices at the Walsh Landfill Site are the degradation of the ground water quality (specifically, the potable drinking water supply), and soils contamination. Surface soils and sediments at the site have elevated levels of polynuclear aromatic hydrocarbons (PAHs) and metals including arsenic, cadmium, lead and nickel. The ground water system, including the potable water supply, contains volatile organic contaminants including 1,1-dichloroethane, chloroform, benzene, trichloroethylene, tetrachloroethylene, and the metals arsenic, cadmium, lead and mercury.

All sampling completed during the field studies indicated the landfill as the source of contamination. No sampling of the landfill materials was completed to characterize the composition of the waste materials in the landfill, or to identify zones or pockets of concentrated contamination. The data identifies localized areas of soil contamination, and sporadic occasions of ground water contamination offering no clearly defined or predictable contaminant plume.

The routes of exposure to the contaminants present at the site include: ingestion and inhalation of ground water; and ingestion of, inhalation of, and dermal contact with landfill soils by local residents and landfill workers. At present, 44 residential structures are receiving bottled drinking water from PADER. These residents continue to use ground water for bathing and washing, and thus remain at risk from inhalation of volatiles in their homes.

The ongoing activities at the landfill involve heavy vehicle traffic during the solid waste transfer and salvage operations. This activity may pose a potential risk to local residents by generating dust from the landfill soils and sediments, and creating a possible mechanism for an airborne release of contaminants. In addition, the unsecured status of the southern, eastern and western edges of the landfill/junkyard may allow local residents to come into direct contact with the inorganic contaminants and PAHs detected in landfill soils. Access to the site may also pose a general safety hazard to local residents due to the placement of various unstable piles of salvage materials, vehicles, and construction debris on the sloped areas around the site perimeter.

A. Remedial Investigation (RI)

The RI field activities and analytical program were designed to define the extent of environmental contamination from the landfill, to identify migration pathways, and to provide data to support a feasibility study of potential remedial actions. In 1985, PADER retained the services of SMC Martin Incorporated, of Valley Forge, PA to conduct the RI/FS for the Walsh Landfill Site.

The scope of SMC Martin's RI included: surface water and sediment sampling, surface and subsurface soil sampling; monitoring well construction, testing, and sampling; residential well sampling; limited air quality sampling, and preparation of a report summarizing the results of the field and analytical program.

The following figures are provided to illustrate the scope of the field program:

Figure 1 - Surface Soil Sampling Locations;
Figure 2 - Surface Water & Sediment Sampling Locations;
Figure 3 - Monitoring Wells/Sampling Locations; and
Figure 4 - Residential Wells/Sampling Locations.

Figure 1

WELSH ROAD/BARKMAN LANDFILL SITE
COMPOSITE SURFACE SOIL SAMPLING LOCATION
MODIFIED FROM SMC (1988)

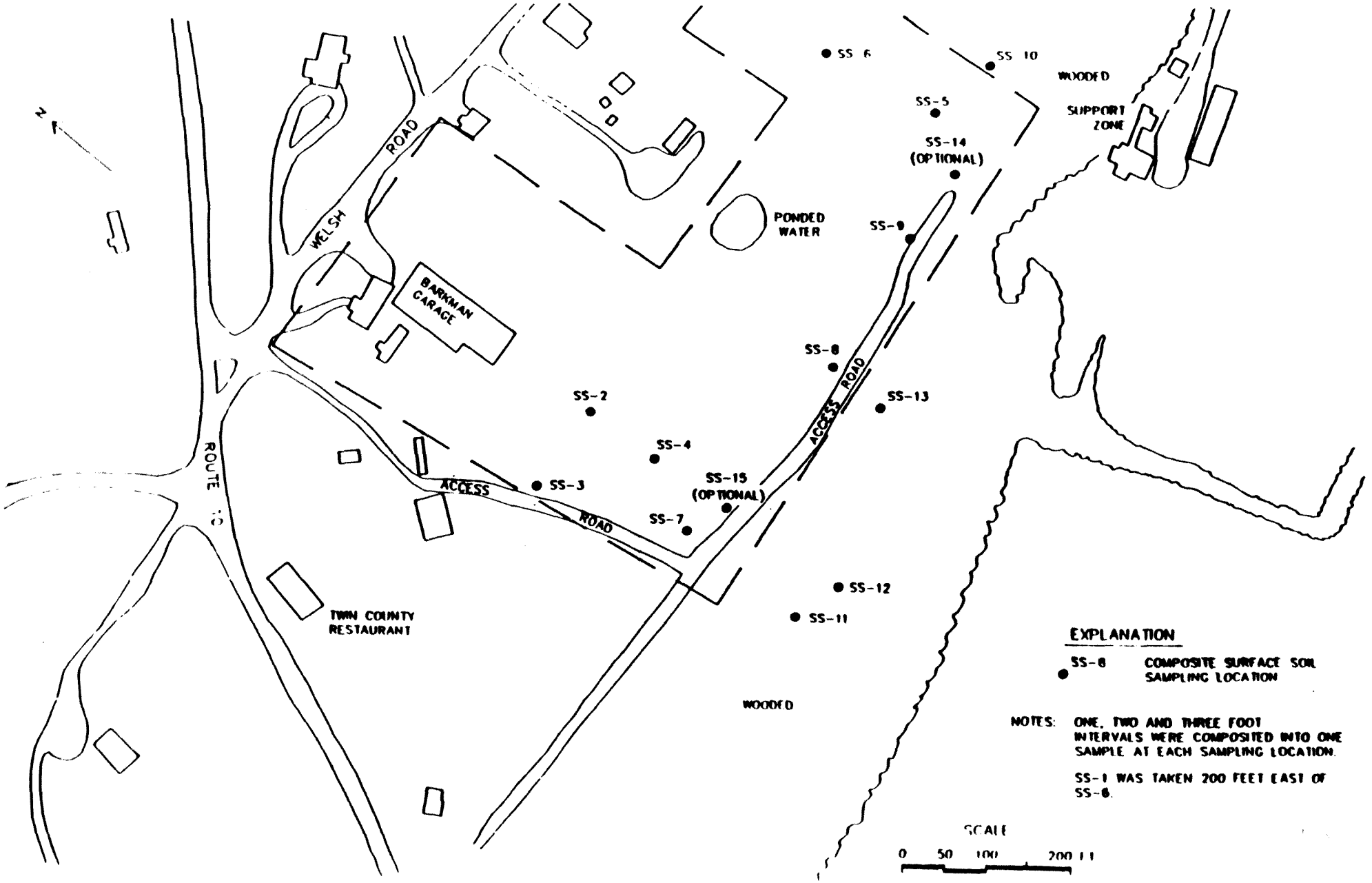
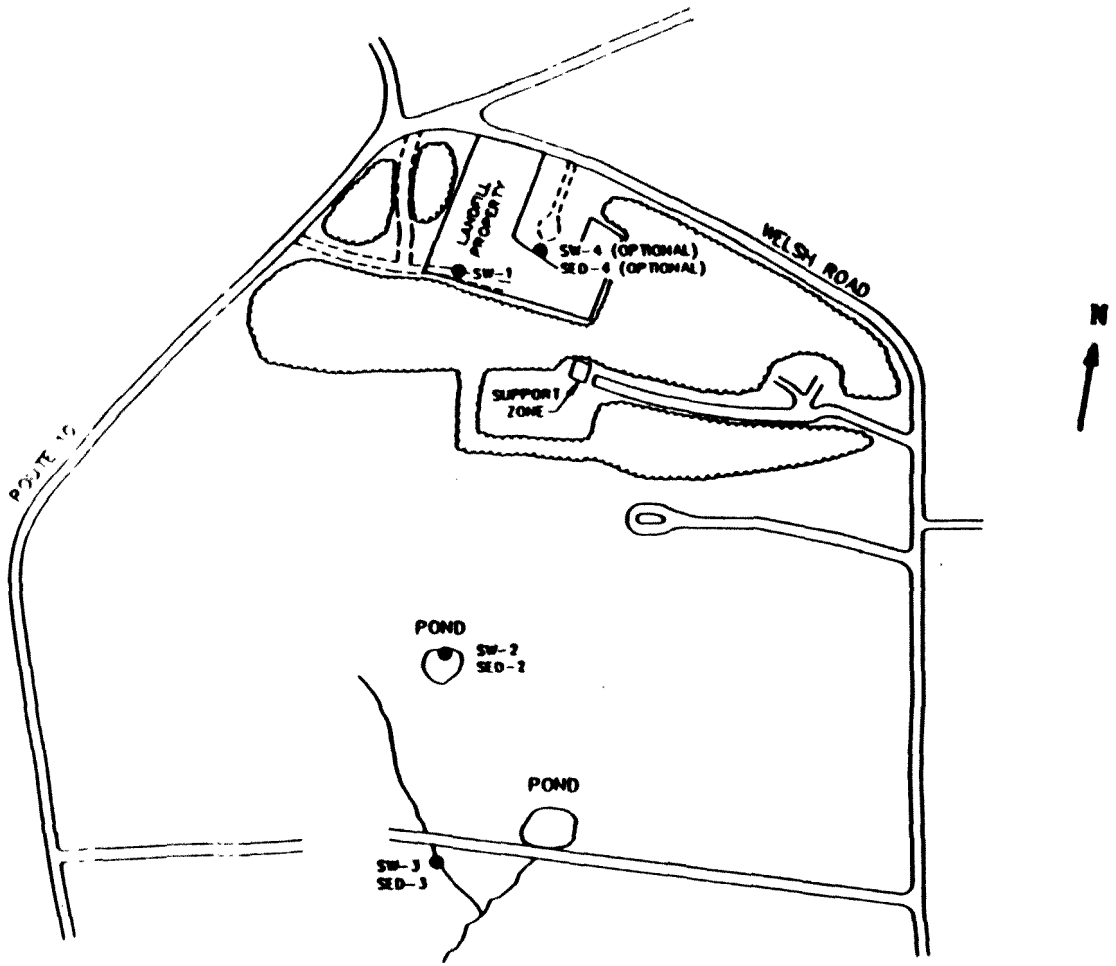


Figure 2

WELSH ROAD/BAR AN LANDFILL SITE
SURFACE WATER AND SEDIMENT SAMPLING LOCATION
MODIFIED FROM SMC (1988)



EXPLANATION

SW-2
● SED-2 SURFACE WATER AND SEDIMENT SAMPLING LOCATION

NOTE: SEDIMENT SAMPLE AT SW-1 LOCATION IS IDENTICAL TO COMPOSITE SOIL SAMPLE TAKEN AT THIS LOCATION (SS-15)

SCALE

0 500 1000

Figure 3

WELSH ROAD/BARKMAN LANDFILL SITE
MONITORING WELL SAMPLING LOCATIONS
MODIFIED FROM SMC (1988)

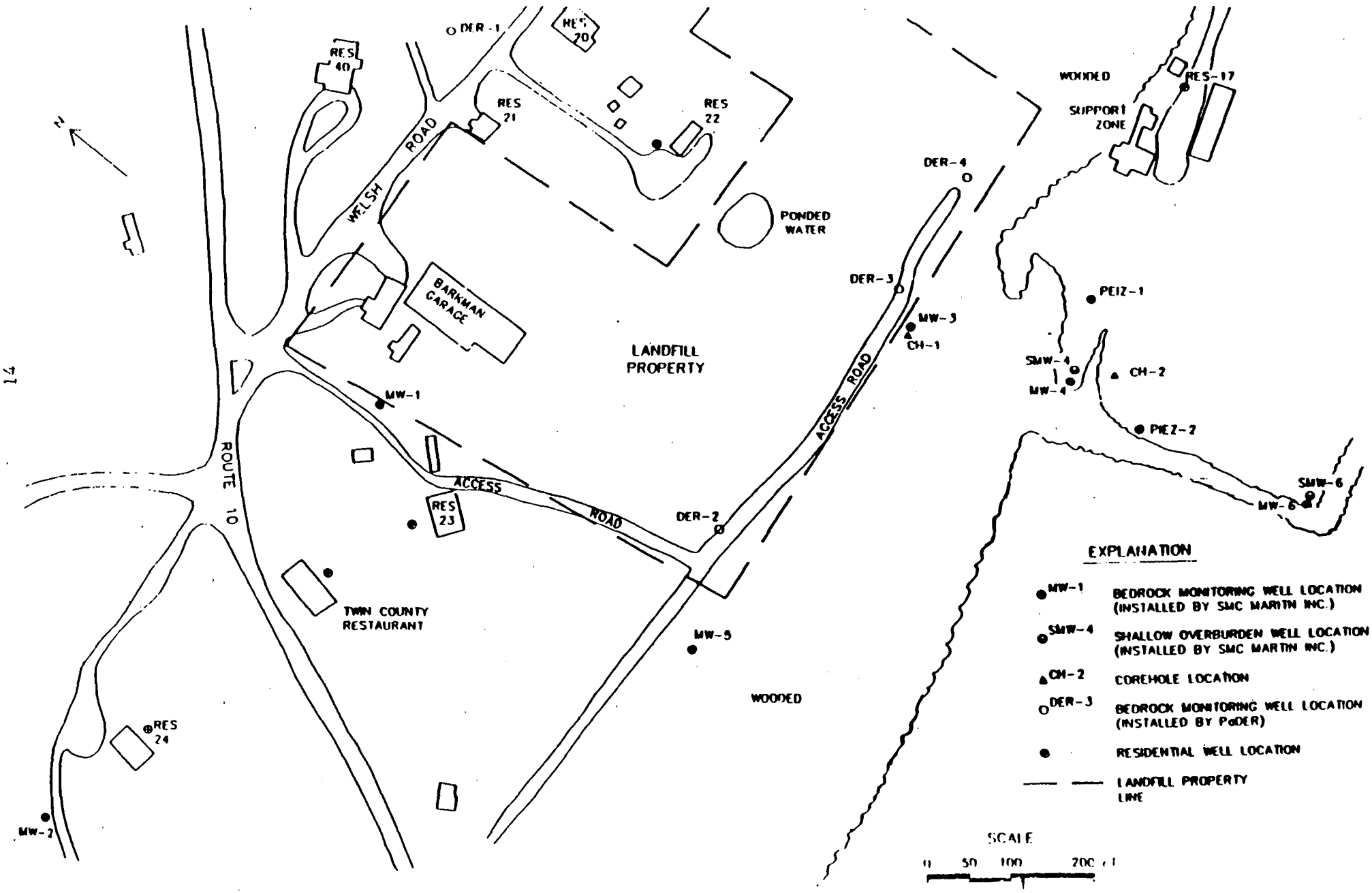
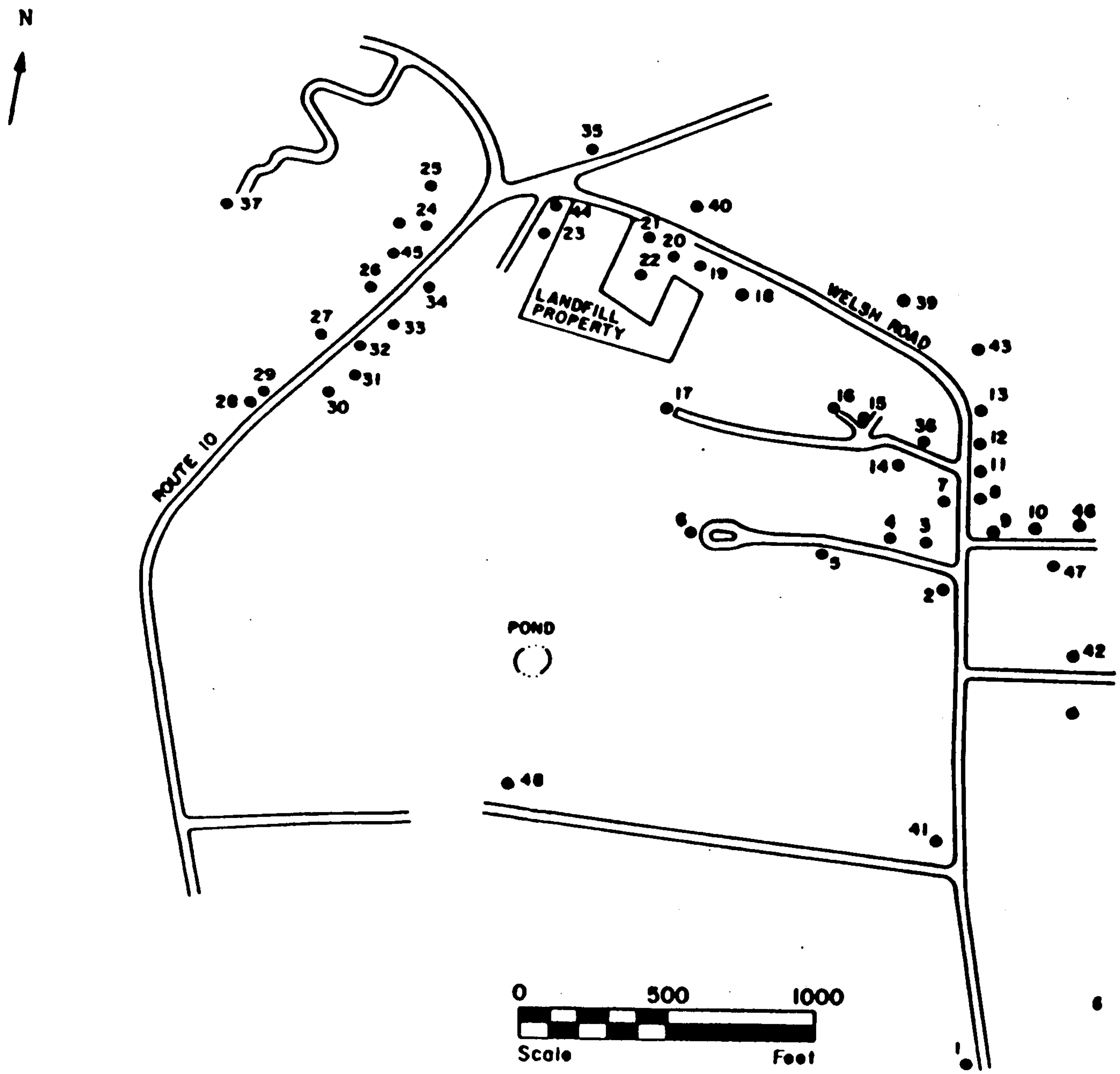


Figure 4

WELSH ROAD/BARK .AN LANDFILL SITE
RESIDENTIAL WELL SAMPLING LOCATIONS
MODIFIED FROM SMC (1988)



I.D. #	Property Owner	Multi Use
1	D Stoltzfus	
2	B Wingenroth	
3	L. Algier	Shares Well #4
4	E Beachy	Shared Well
5	A Poulson	Shares Well #4
6	L. Stoltzfus	
7	G Green	
8	T Smith	
9	R. Romsey	Shared Well
10	M Spencer	Shares Well #9
11	D&K Degenello	Shared Well
12	Fulton	Shares Well #11
13	Heineman	
14	J. Miller	
15	G Messer	Shares Well #16
16	T. Stacey	Shared Well
17	T. Stacey	
18	J. Spiker	
19	J Cole	
20	A. Fox	
21	O Diem	
22	R. Shenk	
23	M Miller	Shares Well #44
24	R. Benner	
25	A. Bisceschi	
26	F. Samuels	Shared Well
27	R Byer	
28	J Schouren	
29	T Doehong	
30	L. Stoltzfus	
31	L. Boggs	
32	M Milford	
33	H Logan	
34	Weitzel	No Well
35	E Scheffler	
36	D Sheree	
37	R. Funk	
38	–	
39	Dolich	
40	E Barkman	
41	D Stoltzfus	
42	L Harsh/L. Harsh Jr.) C Keiffer	
43	D Hayes	
44	R Hoffman	Shared Well
45	J Samuels	Shares Well #26
46	D Charron	
47	L. Brown	

6 • RESIDENTIAL WELL SAMPLING LOCATION
(SAMPLE DESIGNATION IS RES-GW-6)

In July 1989, PADER contracted with Baker/TSA, Incorporated of Coraopolis, PA to complete the feasibility study, a ground water summary report, and the public health evaluation required as part of the RI/FS for the Walsh Landfill Site. Baker used the results of the RI conducted by SMC Martin in order to complete the Feasibility Study (FS) and public health evaluation.

B. Summary of RI Findings

A summary of the results from the RI sampling program conducted by SMC Martin is presented below.

Soils

a) Elevated concentrations of arsenic (17 ppm), chromium (86 ppm), copper (43 ppm), lead (115 ppm), and zinc (616 ppm) were detected in the composite soil samples collected from the southern portion of the landfill.

b) Sampling locations SS-4, SS-8, SS-12, and SS-15 OPT showed elevated levels (390-6000 ppb) of several contaminants that are classified as coal tar derivatives (acenaphthylene, phenanthrene, fluoranthene, pyrene, chyrsene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene).

c) Subsurface soil samples collected during well construction activities showed elevated levels of bis(2-ethylhexyl)phthalate (1300 ppb) at location SMW-4-SS.

Monitoring Well Sampling

a) Results from two rounds of monitoring well sampling showed elevated levels of trichloroethane, chloroethane, toluene and total xylenes (5-35 ppb range) in wells MW-1, MW-3, MW-4, MW-4, MW-5, and MW-6.

b) Bis(2-ethylhexyl)phthalate was detected at elevated levels (20-72 ppb) in samples from MW-4, MW-5, and MW-6.

c) Arsenic (34 ppb), barium (703 ppb), cadmium (20.2 ppb), chromium (48.7 ppb), lead (16 ppb), mercury (2.1 ppb), and zinc (427 ppb) were elevated in samples from several site monitoring wells. The metals aluminum, iron, magnesium, potassium, and sodium were also elevated in samples from several wells (MW-3, SMW-4, MW-4, MW-5).

Residential Well Sampling

a) Results from two rounds of residential well sampling showed elevated levels of carbon disulfide, 1,1-dichloroethane, chloroform, 2-butanone, 1,1,1-trichloroethane, bromodichloromethane, benzene, toluene, ethylbenzene and total xylenes (5-87 ppb range). These contaminants were detected in wells situated to the east and west of the landfill area.

b) Di-n-butylphthalate and bis(2-ethylhexyl) phthalate were detected at levels ranging from 11-150 ppb in several residences near the landfill.

c) High levels of iron (129,200 ppb), magnesium (11,050 ppb), and manganese (7,340 ppb) were detected at locations RES-17, RES-18, RES-23, and RES-26.

d) Barium (214 ppb), cadmium, chromium (19 ppb), cobalt (51 ppb), copper (233 ppb), lead (24.5 ppb), mercury (8.2 ppb), zinc (321 ppb), and phenols (24 ppb) were detected at elevated levels in numerous residences near the landfill.

Air

a) Results of the air quality surveillance showed elevated concentrations of chloroform (0.14 mg/m) and hydrogen chloride (4.1 mg/m) along the western perimeter of the site. These levels were detected in only one of three sampling episodes. It is assumed that these contaminants were detected from the current site operation and junkyard activities since the landfill was reportedly closed by 1976.

Tables A, B, and C summarize the maximum, minimum and average concentrations of the constituents of concern for the soils, sediments and surface water, and ground water at the site.

TABLE A

WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY STATISTICS FOR SURFACE SOIL AND SEDIMENT SAMPLES

Constituent	CONCENTRATION (µg/kg)			Frequency
	Maximum	Minimum	Mean	
Surface Soil				
Chloroform	6.00	6.00	3.28	1/20
PAHs	1.1×10^3	3.9×10^2	2.68×10^2	4/20
Arsenic	1.7×10^4	6.1×10^3	9.49×10^3	15/18
Cadmium	1.16×10^4	1.70×10^3	3.01×10^3	8/18
Lead	1.15×10^5	3.8×10^3	1.69×10^4	17/18
Nickel	5.50×10^4	5.50×10^3	1.37×10^4	17/18
Sediment				
PAHs	6.7×10^2	6.7×10^2	4.79×10^2	1/4
Cadmium	8.7×10^3	7.10×10^3	4.43×10^3	2/4
Lead	2.2×10^4	2.2×10^4	4.32×10^3	1/4
Nickel	4.3×10^4	8.7×10^3	2.09×10^4	4/4

TABLE B

WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY STATISTICS FOR SURFACE WATER SAMPLES

Constituent	CONCENTRATION (µg/l)			Frequency
	Maximum	Minimum	Mean	
Arsenic	12.20	12.20	5.98	1/5
Cadmium	3.80	3.80	2.72	1/5
Lead	10.10	9.30	4.30	2/5

TABLE C

WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY STATISTICS FOR GROUNDWATER SAMPLES

Constituent	CONCENTRATION (µg/l)			Frequency
	Maximum	Minimum	Mean	
1,1-Dichloroethane	9.00	1.00	1.82	12/113
Chloroform	87.00	8.00	2.82	7/113
Benzene	7.00	1.00	1.84	15/113
Ethylbenzene	24.00	1.00	1.73	14/113
Xylenes (Total)	35.00	2.00	1.96	12/113
Trichloroethylene	20.00	1.00	1.80	22/113
Tetrachloroethylene	3.00	1.00	2.03	16/113
Arsenic	34.00	8.30	2.62	5/116
Cadmium	24.00	2.30	2.18	14/116
Lead	106.00	2.60	2.84	43/116
Mercury	8.20	0.11	0.05	31/116
Nickel	111.00	5.30	11.80	16/116

C. Conclusions from the RI

The data collected during the RI do not identify any one specific source area of contamination, other than the landfill as a whole. In general, the RI identified localized areas of contamination in both soils and ground water. Elevated levels of contaminants were detected in surface soils, sediment and surface water on top of, downgradient from, and adjacent to the landfill; levels of contaminants decreased with greater distance from the site.

Ground water contamination also appeared to be present in certain localized areas, with only one area identified as a potential plume migrating from the landfill. This area extends approximately 600 feet south of the landfill property, and the characteristic contaminants include: toluene, ethylbenzene, xylene, trichloroethylene, and 1,1-dichloroethane. The RI data, however, did not reveal a well defined plume.

Residential well sampling completed prior to, and during the RI provided water chemistry information on 49 residences situated adjacent to the site. Results of this sampling showed that elevated levels of site-related contaminants were being detected in residential wells at random intervals and varying concentrations. Due to the uncertainties associated with predicting contaminant flow in ground water, PADER issued a drinking water advisory and began to provide bottled drinking water to 44 residential units in March 1989 as an interim remedial action. While the primary health risks from contaminated well water have been addressed, the residents remain potentially exposed to volatile contaminants when bathing or washing with well water.

The geology at the site is complex, and thus the testing completed during the RI did not succeed in identifying or predicting preferential flow pathways for contaminants to move in the subsurface. Based on historical sampling data, it appears that a contaminant plume originating at the landfill may have existed at one time. The RI data, however, did not succeed in defining the extent of such a plume nor did it show that any plume exists currently. The data also did not suggest that such a plume will develop in the future.

VII. SUMMARY OF SITE RISKS

The Public Health Evaluation addresses the human health and environmental impacts associated with the existing contamination at the Walsh Landfill Site. The evaluation assesses the risks associated with the no action alternative, or the risks posed in the absence of remedial corrective action.

The public health evaluation is based on the results of sampling completed during the RI (1987,1988), and residential well sampling completed during 1989. This sampling data were reviewed to identify chemicals that would be evaluated during the public health evaluation. A selection process was used to identify the chemicals present at the site that pose the greatest potential public health risk. Chemicals were selected for detailed evaluation if they were present in environmental media at levels above background concentrations and based on their characteristic toxicity, mobility, persistence, and quantity.

The primary risks posed by the site are the contaminated drinking water supply and the landfill soils and sediments. The concentrations of individual contaminants (maximum, minimum, average concentrations) that contribute to this risk are described in Tables A, B, and C.

The response actions for the first OU will remove these risks, stabilize the site, and substantially reduce further degradation of the ground water aquifer at the site. The response actions will serve to rapidly and permanently address the primary risks to the local residents (contaminated well water) that have been present for over two years. The response action will also remove additional risks that may be caused by the continuing salvage and solid waste transfer operations by requiring these operations to cease.

A. Exposure Assessment Summary

The goal of the exposure assessment is to determine the type and magnitude of potential human exposure to the contaminants present at, and migrating from, the Walsh Landfill Site. The exposure assessment was conducted to estimate the risk imposed by the site if no remedial action was taken.

To determine if human and environmental exposure to the contaminants of concern might occur in the absence of remedial action, an exposure pathway analysis was performed. An exposure pathway is comprised of four necessary elements: 1) a source and mechanism of chemical release; 2) an environmental transport medium; 3) a human or environmental exposure point, and 4) a feasible human or environmental exposure route at the point of exposure. This section of the ROD summarizes the potential for completion of exposure pathways at the Walsh Landfill Site.

1. Air Exposure Pathway and Population

There are two potential release mechanisms to be considered in evaluating the air pathways: release of contaminated particulates and volatilization from surface soil, ground water and surface water. The release mechanisms to the air are fugitive dust generation and volatilization; the transport mechanism is the air. The route for human exposure to contaminated air is via inhalation. Potential exposure points from the site are areas of human activity next to the site and residential users of contaminated ground water for showering and bathing.

The population potentially exposed via the air pathway includes the residents of the approximately 49 homes near the site and workers at the landfill.

2. Soil Exposure Pathway and Population

The two potential release sources for the soil pathway include the contents of the landfill and contaminated soils. The release mechanisms are fugitive dust generation and deposition, tracking, surface runoff, and leaching: the transport media are the surface and subsurface soils, and surface water sediments. The routes for human exposure include ingestion, inhalation, and dermal contact. Potential exposure points from the site include areas of human activity on and adjacent to the site.

The population potentially exposed via the soil pathway includes adults and small children from approximately 49 homes in the landfill area. Onsite workers could also be exposed via incidental ingestion and dermal contact.

3. Ground Water Exposure Pathway and Population

The two potential release sources for the ground water pathway include landfill contaminants and contaminated soils. The release mechanism is site leaching and the transport medium is the ground water in the soil overburden and bedrock aquifers. Human exposure routes to contaminated ground water include ingestion, inhalation and dermal contact. Potential exposure points from the site are potable wells in the local area that withdraw contaminated ground water.

The population potentially exposed via the ground water pathway includes the residents from approximately 49 homes near the site with potable wells. This group includes those residents who are currently receiving bottled water supplies.

4. Surface Water Exposure Pathway and Population

The two potential release sources for the surface water pathway include contaminated soils and ground water. The release mechanisms are surface runoff and ground water seepage; the transport mechanism is surface water originating from local ground water discharge and the headwaters of the West Branch of Brandywine Creek. The routes for human exposure are via dermal contact and incidental ingestion; surface waters are not known to be used as a potable water supply.

The population potentially exposed via the surface water pathway includes small children who reside in the 49 residential structures near the site. Environmental receptors may include aquatic species living in the surface waters and cattle using surface water as a drinking supply.

RT Toxicity Assessment Summary

The purpose of the toxicity assessment is to weigh available evidence regarding the potential for site-related contaminants to cause adverse effects in exposed individuals, and to provide an estimate of the relationship between the extent of exposure to a contaminant and the increased likelihood and severity of adverse effects.

Table D summarizes the public health and environmental criteria for the contaminants of concern at the site. This information is developed using data on the fate and transport, or distribution relationships (transport between air, water, soil, and biota), of individual contaminants, and the documented health effects or health hazards posed by individual contaminants. The toxicity of contaminants is determined based on the observed effects on humans and/or laboratory animals, and is obtained from published literature describing epidemiologic or toxicologic studies. Table D primarily summarizes health-related information for the contaminants of concern at the site, and includes such data as: enforceable standards for public water supplies; and classification of contaminants as carcinogenic or non-carcinogenic.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of mg/kg-day, are multiplied by the estimated intake of potential carcinogen mg/kg-day, to provide an upper bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CPFs are derived from the results of human epidemiological studies or chronic animal bioassay to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RFDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RFDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media can be compared to the RFD. RFDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. These uncertainty factors help ensure that the RFDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

TABLE D

WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY OF PUBLIC HEALTH AND ENVIRONMENT CRITERIA

Chemical	1,1-Dichloroethene	Tetrachloro-ethylene	Trichloro-ethylene	Chloroform	Benzene	Ethylbenzene	Xylene (Total)	Benzo(a) Pyrene (Representing PAHs Carcinogens)	Arsenic	Cadmium	Lead	Mercury	Nickel
AIC (mg/kg/day)													
Oral	1×10^{-1}	1.0×10^{-2}		1.0×10^{-2}		1.0×10^{-1}	2.0		$1 \times 10^{-4*}$	5.0×10^{-4}		3.0×10^{-4}	2.0×10^{-2}
Reference	HEAST	IRIS		IRIS		IRIS	IRIS		IRIS	HEAST		HEAST	IRIS
Inhalation	1×10^{-1}						6.0×10^{-1}						
Reference	HEAST						HEAST						
PF (mg/kg/day)$^{-1}$													
Oral	9.1×10^{-2}	$5.1 \times 10^{-2*}$	1.1×10^{-2}	6.1×10^{-3}	2.9×10^{-2}			11.5*	1.75		1.84×10^{-4}		
Reference	HEAST	HEAST	IRIS	IRIS	IRIS	IRIS		SPHEM	HEAST		EPA III	IRIS	
Weight of Evidence	B2	B2	B2	B2	A	D		B2	A		B2	D	
Inhalation		$2.3 \times 10^{-3*}$	1.3×10^{-2}	8.1×10^{-2}	2.9×10^{-2}			6.1*	5.00×10^{1}	6.1	1.84×10^{-4}		1 (Refinery Dust), 8.4×10^{-1} (NiSo4)
Reference		HEAST	IRIS	IRIS	IRIS	IRIS		SPHEM	IRIS	IRIS	EPA III	IRIS	IRIS
Weight of Evidence		B2/c	B2	B2	A	D		B2	A	B1	B2	D	A
MCL (µg/l) (IRIS)	--	200	5	100**	5	--			50	10	50	2	
Water Quality Criteria (µg/l) Aquatic Organisms (Fresh Water)													
Acute		685	2,250	1,946	640	2,900			360	3.9	82	2.4	1,400
Chronic		139	450	389	128	580			190	1.1	3.2	0.012	1160
Reference		PADER	PADER	PADER	PADER	PADER			PADER	PADER	PADER	PADER	PADER

* Under EPA Review
** Total Trihalomethanes

HEAST = Health Effects Assessment Summary Tables (EPA, 1989c)
IRIS = Integrated Risk Information System (EPA, 1989b)
EPA III = Environmental Protection Agency - Region III
SPHEM = Superfund Public Health Evaluation Manual (EPA, 1985a)
PADER = Pennsylvania Department of Environmental Resources (PADER, 1989)

C. Risk Characterization Summary

The risk characterization process is the final step in completing the public health evaluation for the site conditions. In this step, the toxicity and exposure assessments are summarized and integrated into quantitative and qualitative expressions of risk. To characterize potential non-carcinogenic effects, comparisons are made between projected intakes of substances and toxicity values. To characterize potential carcinogenic effects, probabilities over a lifetime that an individual will develop cancer due to site-related exposure are estimated from projected intakes and chemical-specific dose-response information. In addition, comparisons are made between chemical-specific ARARs and estimated concentrations of constituents of concern. These comparisons include: (1) an average exposure (AE) scenario using the mean concentrations of the medium-specific sample results and average values for each parameter in the exposure assessment equations; and (2) a worst-case exposure (WCE) scenario using the maximum constituent concentrations from the media-specific sample results and the upper end range (90th or 95th percentile) for each parameter in the exposure assessment equations. The exposure scenarios are then used to estimate individual risks.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (i.e., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in a 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 the site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ). The HQ is determined by calculating the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. 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 gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Tables E, F, and G summarize the potential carcinogenic and noncarcinogenic risks posed to adults, children, and landfill workers who may be exposed to site-related contaminants via the associated exposure pathways. These tables present calculated health risks for exposure to each contaminant of concern via the average and worst-case exposure scenarios. Each table also presents a total for the combined risks (carcinogenic and non-carcinogenic) posed by exposure to all contaminants via the combination of exposure pathways that are reasonably expected to affect the human receptors for the Site (i.e., adults and children residing near the landfill and landfill workers).

When reviewing the quantitative information presented in these summary tables, the following threshold levels should be used. For noncarcinogenic risks, a chronic hazard index value above a value of 1.0 indicates the potential for an adverse health impact. For the carcinogenic risks, a value greater than the 10^{-4} to 10^{-6} is generally recognized as indicating a risk beyond the acceptable level.

Tables E, F, and G show that the highest health risks are posed by the worst-case exposure scenarios, or exposure via combined pathways to the maximum concentrations of site-related contaminants. The child receptors, or children in the local community, appear to have the highest potential health risk from exposure to the site conditions. While the health risks posed by the average exposure scenarios do not appear to reflect an elevated risk, there are several factors which make consideration of the worst case scenario more realistic for decision making on the basis of protectiveness. These factors include the absence of control for site access and the continuing waste and refuse handling and disposal practices at the site. The specific nature of the continued operations at the site are undefined, but it is likely that hazardous substances are being handled, and possibly stored and/or disposed of, on and around the site property, to which access is readily available. Due to these circumstances, it is more realistic to view the risk levels calculated through the worst case scenarios as protective of human health and the environment.

TABLE E

WELSH ROAD/BARKMAN LANDFILL SITE
TOTAL CHRONIC HAZARD AND RISK FROM POTENTIAL CARCINOGENS
CHILD RECEPTOR

Constituent	CHRONIC HAZARD INDEX					
	Inhalation		Oral		Dermal Contact	
	AE	WCE	AE	WCE	AE	WCE
1,1-Dichloroethane	2.2×10^{-3}	8.0×10^{-2}	4.5×10^{-4}	4.2×10^{-3}	3.4×10^{-7}	3.2×10^{-6}
Chloroform			7.0×10^{-3}	4.0×10^{-1}	1.6×10^{-5}	4.0×10^{-4}
Benzene						
Ethylbenzene			4.3×10^{-4}	1.1×10^{-2}	3.2×10^{-7}	8.5×10^{-6}
Xylenes	4.8×10^{-4}	6.6×10^{-2}	2.4×10^{-5}	8.1×10^{-4}	1.8×10^{-8}	6.2×10^{-7}
Trichloroethylene						
Tetrachloroethylene			5.1×10^{-3}	1.4×10^{-2}	3.8×10^{-6}	1.1×10^{-5}
PAHs						
Arsenic			1.5×10^{-1}	2.4	1.2×10^{-2}	1.0×10^{-1}
Cadmium			2.4×10^{-1}	4.3	1.9×10^{-2}	2.5×10^{-1}
Lead						
Mercury			4.2×10^{-3}	1.3	3.1×10^{-6}	9.7×10^{-4}
Nickel			3.0×10^{-2}	5.0×10^{-1}	2.2×10^{-3}	3.0×10^{-2}
TOTAL	2.6×10^{-3}	1.5×10^{-2}	4.4×10^{-1}	8.9	3.4×10^{-2}	3.8×10^{-1}

TOTAL CHRONIC HAZARD INDEX AE: 4.7×10^{-1} WCE: 9.4

AE - Average Exposure Scenario
WCE- Worst-case Exposure Scenario

TABLE E - CONTINUED

WELSH ROAD/BARKMAN LANDFILL SITE
TOTAL CHRONIC HAZARD AND RISK FROM POTENTIAL CARCINOGENS
CHILD RECEPTOR

Constituent	POTENTIAL CARCINOGENIC RISK					
	Inhalation		Oral		Dermal Contact	
	AE	WCE	AE	WCE	AE	WCE
1,1-Dichloroethane			3.3×10^{-7}	6.1×10^{-6}	2.5×10^{-10}	4.6×10^{-9}
Chloroform	2.2×10^{-6}	1.0×10^{-3}	3.4×10^{-8}	3.9×10^{-6}	7.7×10^{-11}	3.7×10^{-9}
Benzene	4.8×10^{-7}	2.8×10^{-5}	1.1×10^{-7}	1.5×10^{-6}	7.9×10^{-11}	1.1×10^{-11}
Ethylbenzene						
Xylenes						
Trichloroethylene	2.1×10^{-7}	3.6×10^{-5}	3.9×10^{-8}	1.6×10^{-6}	2.9×10^{-11}	1.2×10^{-9}
Tetrachloroethylene	5.7×10^{-8}	1.3×10^{-6}	2.1×10^{-7}	1.1×10^{-6}	1.5×10^{-10}	8.6×10^{-10}
PAHs	5.0×10^{-8}	1.6×10^{-6}	3.1×10^{-6}	8.1×10^{-5}	6.3×10^{-6}	1.2×10^{-4}
Arsenic	1.4×10^{-5}	2.0×10^{-4}	1.5×10^{-5}	5.6×10^{-4}	1.7×10^{-6}	2.2×10^{-5}
Cadmium	5.6×10^{-7}	1.7×10^{-5}				
Lead	9.4×10^{-9}	5.1×10^{-7}	2.4×10^{-7}	2.5×10^{-5}	3.2×10^{-8}	1.6×10^{-6}
Mercury						
Nickel	7.1×10^{-7}	2.2×10^{-5}				
TOTAL	1.9×10^{-5}	1.3×10^{-3}	1.9×10^{-5}	6.8×10^{-4}	8.1×10^{-6}	1.4×10^{-4}

TOTAL POTENTIAL CARCINOGENIC AE: 4.6×10^{-5} WCE: 2.2×10^{-3}

TABLE F

WELSH ROAD/BARKMAN LANDFILL SITE
TOTAL CHRONIC HAZARD AND RISK FROM POTENTIAL CARCINOGENS
ADULT RECEPTOR

Constituent	CHRONIC HAZARD INDEX						POTENTIAL CARCINOGENIC RISK					
	Inhalation		Oral		Dermal Contact		Inhalation		Oral		Dermal Contact	
	AE	WCE	AE	WCE	AE	WCE	AE	WCE	AE	WCE	AE	WCE
1,1-Dichloroethane	5.4×10^{-4}	2.1×10^{-2}	2.7×10^{-4}	2.6×10^{-3}	2.8×10^{-7}	2.7×10^{-6}			3.0×10^{-7}	9.3×10^{-6}	3.1×10^{-10}	9.8×10^{-9}
Chloroform			4.2×10^{-3}	2.5×10^{-1}	4.4×10^{-6}	2.6×10^{-4}	8.5×10^{-7}	6.6×10^{-4}	3.1×10^{-8}	6.0×10^{-6}	3.2×10^{-11}	6.3×10^{-9}
Benzene							1.9×10^{-7}	1.8×10^{-5}	9.6×10^{-8}	2.3×10^{-6}	1.0×10^{-10}	2.4×10^{-9}
Ethylbenzene			2.6×10^{-4}	6.8×10^{-3}	2.7×10^{-7}	7.2×10^{-6}						
Xylenes	1.2×10^{-4}	1.7×10^{-2}	1.5×10^{-5}	5.0×10^{-4}	1.5×10^{-8}	5.2×10^{-7}						
Trichloroethylene							8.2×10^{-8}	2.3×10^{-5}	3.6×10^{-8}	2.5×10^{-6}	3.7×10^{-11}	2.6×10^{-9}
Tetrachloroethylene			3.0×10^{-3}	8.5×10^{-3}	3.2×10^{-6}	9.0×10^{-6}	2.2×10^{-8}	8.3×10^{-7}	1.9×10^{-7}	1.7×10^{-6}	1.9×10^{-10}	1.8×10^{-9}
PAHs							9.3×10^{-9}	5.4×10^{-7}				
Arsenic			3.9×10^{-2}	9.7×10^{-1}	4.1×10^{-5}	1.0×10^{-3}	2.7×10^{-6}	6.9×10^{-5}	8.2×10^{-6}	6.8×10^{-4}	8.6×10^{-9}	7.1×10^{-7}
Cadmium			6.5×10^{-2}	1.4	6.8×10^{-5}	1.4×10^{-3}	1.0×10^{-7}	5.7×10^{-6}				
Lead							1.8×10^{-9}	1.7×10^{-7}	9.4×10^{-8}	2.2×10^{-5}	9.7×10^{-11}	2.3×10^{-8}
Mercury			2.5×10^{-3}	7.8×10^{-1}	2.6×10^{-6}	8.2×10^{-4}						
Nickel			8.8×10^{-3}	1.6×10^{-1}	9.2×10^{-6}	1.7×10^{-4}	1.3×10^{-7}	7.6×10^{-6}				
TOTAL	6.8×10^{-4}	3.8×10^{-2}	1.2×10^{-1}	3.5	1.3×10^{-4}	3.7×10^{-3}	4.1×10^{-6}	7.9×10^{-4}	9.0×10^{-6}	7.2×10^{-4}	9.3×10^{-9}	7.6×10^{-7}

TOTAL CHRONIC HAZARD INDEX AE: 1.2×10^{-1} WCE: 3.6 **TOTAL POTENTIAL CARCINOGENIC RISK** AE: 1.3×10^{-5} WCE: 1.5×10^{-3}

TABLE G

WELSH ROAD/BARKMAN LANDFILL SITE
TOTAL CHRONIC HAZARD AND RISK FROM POTENTIAL CARCINOGENS
LANDFILL RECEPTOR

Constituent	CHRONIC HAZARD INDEX				POTENTIAL CARCINOGENIC RISK					
	Oral		Dermal Contact		Inhalation		Oral		Dermal Contact	
	AE	WCE	AE	WCE	AE	WCE	AE	WCE	AE	WCE
1,1-Dichloroethane	6.2×10^{-5}	4.4×10^{-4}					1.1×10^{-7}	1.6×10^{-6}		
Chloroform	9.7×10^{-4}	4.3×10^{-2}	3.5×10^{-6}	2.2×10^{-5}	4.7×10^{-11}	3.2×10^{-10}	1.2×10^{-8}	1.0×10^{-6}	4.2×10^{-11}	5.4×10^{-11}
Benzene							3.7×10^{-8}	4.0×10^{-7}		
Ethylbenzene	5.9×10^{-5}	1.2×10^{-3}								
Xylenes	3.4×10^{-6}	8.6×10^{-5}								
Trichloroethylene							1.4×10^{-8}	4.3×10^{-7}		
Tetrachloroethylene	7.0×10^{-4}	1.5×10^{-3}					7.1×10^{-8}	3.0×10^{-7}		
PAHs					2.9×10^{-7}	4.4×10^{-6}	6.0×10^{-8}	4.9×10^{-7}	2.6×10^{-6}	7.4×10^{-5}
Arsenic	9.9×10^{-3}	1.7×10^{-1}	4.0×10^{-3}	2.5×10^{-2}	8.4×10^{-5}	5.6×10^{-4}	3.5×10^{-6}	1.2×10^{-4}	1.4×10^{-6}	1.7×10^{-5}
Cadmium	1.6×10^{-2}	2.4×10^{-1}	2.5×10^{-3}	3.4×10^{-2}	3.3×10^{-6}	4.7×10^{-5}				
Lead					5.5×10^{-8}	1.4×10^{-6}	4.2×10^{-8}	3.9×10^{-6}	2.6×10^{-8}	1.2×10^{-6}
Mercury	5.7×10^{-4}	1.3×10^{-1}								
Nickel	2.1×10^{-3}	2.7×10^{-2}	2.9×10^{-4}	4.0×10^{-3}	4.1×10^{-6}	6.2×10^{-5}				
TOTAL	3.0×10^{-2}	6.1×10^{-1}	6.8×10^{-3}	6.3×10^{-2}	9.2×10^{-5}	6.8×10^{-4}	3.8×10^{-6}	1.3×10^{-4}	4.0×10^{-6}	9.3×10^{-5}

TOTAL CHRONIC HAZARD INDEX AE: 3.7×10^{-2} WCE: 6.8×10^{-1}
TOTAL POTENTIAL CARCINOGENIC AE; 1.0×10^{-4} WCE: 8.9×10^{-4}

D. Uncertainty Analysis

The procedures and inputs used in the public health evaluation for the Walsh Landfill Site are subject to uncertainties. In general, the main sources of uncertainty include: environmental chemistry sampling and analysis; environmental parameter measurement; fate and transport modelling; exposure parameter estimation; and, toxicological information. Each of these sources of uncertainty is discussed in detail in the Public Health Evaluation Report completed by Baker/TSA, Incorporated. This report is part of the Administrative Record for the site.

E. Risk Assessment Conclusions

The Walsh Landfill Site's surface soils and ground water have a significant potential adverse health impact on receptor populations as calculated by the chronic health index and the risk from potential carcinogens indices. There were three complete exposure pathways identified: the air exposure pathway via inhalation of ground water and particulates by receptors; the ground water exposure pathway via ingestion, inhalation, and dermal contact by receptors of water supply wells; and, the soil exposure pathway via ingestion and dermal contact by receptors.

The air pathway was not deemed to represent a significant health hazard with respect to the volatilization of organics from the surface waters or from surface soils. However, the air pathway was deemed to represent a potential health hazard from inhalation of volatile organics during showering and bathing and fugitive dust caused by vehicle traffic. The chemicals contributing the most significantly to the potential adverse health impacts and risks from the inhalation of volatile organics included chloroform, benzene, trichloroethylene and tetrachloroethylene. These contaminants were detected in the ground water samples collected during and after the RI/FS. The exposed population included children and adults living in the local area and using the ground water for domestic purposes. The chemicals contributing the most significantly to the potential adverse health impacts and risks from fugitive dust inhalation included PAHs, arsenic, cadmium, lead and nickel. The exposed population included landfill workers and local residents living downwind of the landfill.

The soil pathway was identified as a health hazard from ingestion and dermal contact exposure to contaminated surface soils and sediments. The landfill workers are potentially at risk from dermal contact with surface soils contaminated with PAHs, arsenic, and lead. In addition, the children in the area are potentially at risk from ingestion and dermal contact with sediments contaminated with PAHs and lead. However, only the sediments found onsite at location SED-4/OPT (See Figure 2) were contaminated with PAHs and lead.

The ground water exposure pathway represented a potentially significant health risk, as indicated by chronic health index values greater than one, and projected carcinogenic risk values above the target risk values of 1×10^{-6}. The compounds contributing the most to the potential health impacts were 1,1-dichloroethane, chloroform, benzene, trichloroethylene, tetrachloroethylene, arsenic, cadmium, lead and mercury. The exposed population includes children and adults living and working in the local area and using the ground water for domestic purposes. The exposed population has been preliminarily defined as the 49 residences situated along PA Route 10 and Welsh Road, whose water supply wells were sampled during the RI/FS, and where contaminants were detected at elevated levels. In addition, residences situated along the general direction of regional ground water flow are included in the group as potentially impacted by contaminated ground water in order to address possible future health impacts.

Future land use in the site area will include residential dwellings and farming. Honeybrook Township and the Borough of Honey Brook have expressed a desire to control future development by restricting growth to that of a farming or low-density residential nature within the municipalities where the Walsh Site is located. To this end, future growth is likely to be controlled by the local government's zoning and permitting process.

Based on the limited information available, the surface water exposure pathway did not appear to represent a significant risk to human health. The metals cadmium and lead occurred at concentrations above their respective ARARs for protection of

aquatic life at locations SW-1 and SW-4 (See Figure 2). However, these contaminated surface waters did not support a diverse or highly productive aquatic life community. In addition, these surface waters are present on an intermittent basis, and depend greatly on precipitation. The remedial action selected for this operable unit will involve capping the landfill surface, which includes the areas of periodically ponded water.

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

VII. DESCRIPTION OF ALTERNATIVES

Five remedial alternatives were retained from the feasibility study to address the first OU. These alternatives were designed to eliminate or reduce the health risk posed to the local community by exposure to contaminated ground water and landfill soils. Each alternative was evaluated against the following criteria: the overall protection of public health and the environment; how well the action complies with State and Federal laws and advisories (ARARs); its short-term effectiveness; its long-term effectiveness; how well the action reduces toxicity, mobility, and volume; the implementability of the alternative; the acceptance (or rejection) of the alternative by the State and community; and the total cost of the alternative. Table ES-1 presents a summary of the detailed evaluation that was completed using these criteria. Table ES-1 also includes cost figures for each alternative, and Table H provides a detailed cost breakdown for the selected remedy.

Remedial Action Alternative No. 1 - No Action

The No Action alternative is required by the National Contingency Plan (NCP) for consideration during the detailed analysis and is included for purposes of comparison. If No Action was chosen at the Walsh Landfill Site, the present and future potential health risks would go unabated. The No Action

alternative does not meet SARA's mandate to be protective of public health and the environment. It is also very unlikely that the State or community would accept No Action at the site.

The No Action alternative includes no remedial action to clean up contamination or to address risks posed by the site. The current provision of bottled drinking water would cease; however, this alternative would provide for continued ground water monitoring. This monitoring consists of the annual collection, analysis, and evaluation of ground water samples collected from site monitoring wells, piezometers, and residential wells, to further define the extent, migration, and fate of indicator contaminants and to track contaminant movement in the ground water. The results of the sampling would be used to assess any risks and to provide a baseline with which future results and risks may be compared. Detailed reviews of site conditions as required by CERCLA would be performed at five-year intervals.

Remedial Action Alternative No. 2 - Institutional Actions

Alternative No. 2 consists of four activities: expansion of an existing water supply system; ground water monitoring; fencing; and, property deed modifications. The principal activity is the expansion of the Honey Brook Borough Water Authority's water supply system to provide a long-term source of potable water to residents affected by contaminated water in the site vicinity. An eight-inch main line from the Honey Brook Water Supply System currently extends to a location approximately one mile south-southwest of the landfill. This eight-inch line would be extended to, and along PA State Route 10 to a storage tank near the top of Welsh Mountain. From the storage tank the water would be distributed by gravity flow through 2-inch and 4-inch mainlines to approximately 50 households. The water supply system expansion involves two components: extension of the current system; and upgrade of the system capacity.

The major components of the water supply system extension include an eight-inch mainline, four-inch and two-inch distribution lines, a booster pump, and a 120,000 gallon water storage tank. This design may be affected by ordinances imposed by Honeybrook Township which may require using minimum six-inch distribution lines. These ordinances may also include mandatory well abandonment and connection to the new system for domestic use.

The water supply system upgrade consists of the installation of one water supply well and connection of this well to the current distribution system. It is estimated that this water well will increase the current system capacity by an estimated 115,000 gpd. This should provide sufficient additional system capacity to supply affected residents with potable water as well as to satisfy fire flow demand.

The approximately 50 households to be serviced by the water line extension comprise the group of homes whose wells were sampled during the RI/FS. These homes have been identified as those presently or potentially at risk from contaminated ground water from the site. Ground water monitoring activities will include the sampling of site monitoring wells to track contaminant movement, and further define the migration and fate of site-related contaminants to ensure that homes outside of the water line extension area will not be at risk. Through this and the work to be performed for the second OU, the ground water flow dynamics will be defined, and EPA will be better able to identify any additional homes that may be impacted by contaminated ground water.

EPA (and the State) will not be responsible for the operation and maintenance of the water supply system once it is operational. Control of the new water lines will be transferred to the Honey Brook Borough Water Authority as soon as construction is complete. Therefore, construction details must meet the requirements of Honey Brook Borough and Honeybrook Township, as well as local fire codes.

Additional activities include the construction of a six-foot high fence topped with either barbed wire or razor ribbon around the perimeter of the landfill. It will be necessary to locate property boundaries and the lateral extent of the landfilled material prior to constructing the fence. The fence is designed to restrict access to the site and prevent use of the property for continued or future waste disposal. In addition, deeds for properties underlying, or in the vicinity of the landfill would be modified to indicate the landfill presence, restrict future use and property development, and restrict the use of ground water by preventing the installation of wells on the property.

This alternative could be implemented relatively quickly; it is expected to take approximately one year to design and construct the water line extension. Coordination with the Honey Brook Borough, Honey Brook Borough Water Authority, Honeybrook Township, and the Chester County Health Department will be required for the construction of the water supply system expansion.

The techniques involved in connecting the residences to a public water system are well established and use common engineering and construction practices. Generally, public water systems are very reliable and require only limited maintenance. The water quality of the proposed system will be regulated by the National Primary Drinking Water Regulations and the Pennsylvania Water Quality Standards, in conjunction with the requirements of the Chester County Health Department and the Honey Brook Borough Water Authority. This action will be in compliance with the ARARs for the Walsh Landfill Site.

This alternative will require the approval of the Honey Brook Borough Water Authority. The Authority is currently planning to expand their system's capacity. Through preliminary discussions with EPA and the State, the Authority has indicated that this proposed extension to service the approximately 50 homes will fit within the scope of their system's design. The Authority has expressed concern with the well abandonment issue, and may pursue making abandonment mandatory for those households being hooked up to the water line extension.

Remedial Action Alternative No. 3 - Institutional Actions

Alternative three consists of four actions: bottled water supply; ground water monitoring; fencing; and property deed modifications. This alternative is similar to RAA No. 2, with the primary difference being the use of bottled water rather than the expansion of a water supply system. Based on the supply schedule currently in place, it is estimated that approximately 44 to 50 households would require delivery of three cases of bottled water every two weeks to be used as their drinking water source.

These residents will continue to use their well water for washing and bathing activities, which may expose the residents to volatile organics detected in ground water via the inhalation exposure pathway. This alternative therefore is not protective of human health, but it is included based on input received from the community. Several residents expressed a desire to continue receiving bottled water as a permanent remedy for contaminated ground water exposure, regardless of any continued health risk.

As with RAA No. 2, ground water monitoring activities involving the sampling of site monitoring wells and residential wells on an annual and five-year review basis will be completed. This monitoring will serve to track contaminant movement, and to aid in the further definition of the migration and fate of site-related contaminants. This monitoring will assist in identifying any additional homes that may be impacted by contaminated ground water.

The fencing and property deed modification activities included in this alternative are identical to those described for RAA No. 2. The fencing will serve to restrict site access, but does not address threats posed by fugitive dust. Long-term management of this alternative will require periodic site inspections to assess changes in site conditions and usage of the site by local residents or the owner. Five-year reviews, including sampling of wells, an assessment of risks posed by the site, and an inspection of the integrity of the fence will be required.

Remedial Action Alternative No. 4 - Institutional and Containment Actions

Alternative number four includes both institutional and containment actions to address risks posed by contaminated ground water and onsite contaminated materials. This alternative consists of six activities: expansion of an existing water supply system; ground water monitoring; fencing; property deed modifications; resource recovery; and capping. The first four activities were described previously for RAA No. 2.

The resource recovery activities may include, but will not be limited to, salvaging the items found on, or near the surface of the landfill such as cars, buses, appliances, storage tanks,

dumpsters, batteries, and tires. These items will be decontaminated, if necessary, and removed from the site by qualified salvaging subcontractors. The decontamination of the bulky items would be completed in a designated and specially constructed area on or near the site. Any water generated during the decontamination would be contained and sampled for analysis prior to properly disposing of it. The resource recovery activities include demolition of onsite buildings and the excavation and removal of underground storage tanks that may be present at the site. The purpose of the resource recovery action is to remove recoverable or salvageable materials from the site in a cost effective manner so that the landfill volume may be reduced, and the landfill surface may be graded and prepared for capping.

This alternative includes capping the landfill to reduce infiltration from precipitation and to prevent potential exposure to onsite contaminated materials. At a minimum, a multi-media landfill cap that meets the requirements of the Pennsylvania Municipal Solid Waste Regulations will be constructed at the site. In general, the municipal or multi-media cap consists of a soil cover having a topsoil component underlain by a thick soil layer, a drainage layer with a permeability greater than 1×10^{-3} cm/second, a high density polyethylene (HDPE) geomembrane, and a base soil layer over the landfill. The overall thickness of the municipal or multi-media cap is approximately four feet.

Prior to the design and construction of the landfill cap, it will be necessary to collect additional information to ensure that the cap is properly constructed for the site conditions. Upon completing these pre-design or investigatory activities, the information will be reviewed, and incorporated in the design documents for the landfill cap. Pre-design activities will include, at a minimum, the following:

- Survey property lines, landfill extent, surface topography of landfill and surrounding areas, power lines, easements and rights-of-way;
- Determine the contents of the landfill and landfill geotechnical parameters (i.e., moisture content, compactibility);
- Characterize site soils;

- Locate and characterize borrow soil properties; and

- Determine the potential for the landfill to generate methane or other gases, and measure VOC and methane levels in the landfill gas to determine the need for venting.

The information generated during the pre-design activities will be evaluated and incorporated into design documents for use during implementation of the remedy. If available, data to be generated during the focused ground water study for the site will also be considered in designing the landfill cap and surface water runoff control measures.

The landfill cap will be designed to cover an approximate surface area of 5.2 acres. The exact size of the surface area to be capped may be subject to change once the resource recovery action is completed, and the landfill area has been surveyed. The top slopes of the cap will be approximately three percent, minimum, and unbenched side slopes of a maximum of fifteen percent. When the side slopes are greater than 15 percent, a bench may be used for every 25-foot rise in elevation. Both top and side slopes will be vegetated, and gas vents may be installed pending a review of the information collected during the pre-design activities. In addition, surface water control measures will be implemented as part of the landfill cap. A fence will be constructed around the perimeter of the capped area to restrict site access.

This combination of institutional and containment actions is expected to provide both short- and long-term protection of human health and the environment. Long-term management of this alternative includes continued ground water monitoring and periodic inspections of site conditions. Five-year reviews, including an assessment of risks posed by the site, an inspection of the landfill cap's integrity, and an inspection of the integrity of the fence will be required. Limited repair and maintenance activities may be required on the cap and fence.

RAA No. 4 will address the principal threats posed by the site, and provides a permanent solution to the drinking water and landfill problems, as well as the nuisance issues associated with the continued junkyard operation. The extension of an existing water supply to service approximately 49 residential structures impacted by contaminated ground water employs well established

construction techniques and engineering practices. The water line extension is easily implementable, and should be completed within one year, thus providing rapid relief to those individuals who may be exposed to contaminants when bathing or washing with well water. The design and construction of the landfill cap also employs well established engineering and construction techniques, and is easily implementable, with an approximate completion time of 18 to 24 months. The total completion time for this alternative is approximately two years, with a phased approach planned in order to expedite the provision of safe drinking water. This alternative is likely to be consistent with the final, or ground water remedial action for this site.

Remedial Action Alternative No. 5 - Institutional and Containment Actions

This alternative is identical to RAA No. 4, except that bottled water will be provided as a source of potable water rather than extending an existing water supply system. As with alternative number four, the following activities will also be completed: ground water monitoring; fencing; property deed modifications; resource recovery; and capping. These activities are described in greater detail under RAA No. 2 and RAA No. 4.

Alternative number five is somewhat protective of human health; the threats to public health posed by the ingestion of contaminated ground water are addressed. However, the threats posed by the inhalation exposure pathway are not addressed. This alternative is not protective of human health, but was retained due to the community's expression of preference for this method of receiving safe drinking water.

This method of providing safe drinking water to the impacted residences is not preferred by EPA. The bottled water will be an effective remedy only as long as it is implemented. Providing bottled water also is not protective of human health due to the concerns with inhalation of volatile organic contaminants during bathing. Under this alternative, the State would be responsible for delivering bottled water to approximately 44 to 50 residential structures or households for an estimated period of at least 25 years. For this reason, it is not anticipated that the State would concur with this remedy.

Long-term management of this alternative includes continued monitoring of ground water in site and residential wells,

periodic inspections of site conditions, and possible repairs to the fence and landfill cap. Five-year reviews, including an assessment of risks posed by the site will also be required. The total implementation time for this alternative is approximately 18 to 24 months.

IX. COMPARATIVE ANALYSIS OF ALTERNATIVES

The five remedial action alternatives described above were evaluated under the nine evaluation criteria as set forth in the NCP 40 C.F.R. Part 300.430(e)(9) and as described in the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA, October 1988), EPA Directive 9355.3-02 "Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, and the Record of Decision Amendment" (EPA/540/G-89/007), July 1989 Interim Final. These nine criteria are organized according to the groups below and can be categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria.

THRESHOLD CRITERIA

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

PRIMARY BALANCING CRITERIA

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

MODIFYING CRITERIA

Community acceptance
State acceptance

These evaluation criteria relate directly to requirements in Section 121 of CERCLA, 42 U.S.C. Section 9621, which determine the overall feasibility and acceptability of the remedy.

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 remedies. State and community acceptance are modifying criteria formally taken into account after public comment is received on the Proposed Plan. The evaluations are as follows:

1) Overall Protection of Human Health and the Environment

A primary requirement of CERCLA is that the selected remedial action be protective of human health and the environment. A remedy is protective if it reduces current and potential risks to acceptable levels under the established risk range posed by each exposure pathway at the site.

Alternative No. 1, No Action, provides no protection for human health or the environment. Alternatives 2 and 3 provide some level of protection for human health and the environment. Alternatives 2 and 3 provide some level of protection for human health by reducing or eliminating potential ingestion of contaminated ground water. Alternative 2 is somewhat more protective than Alternative 3 in this respect because it also eliminates the inhalation exposure pathway through the use of an alternate water supply system as opposed to the use of bottled water for drinking purposes. Both of these alternatives provide a similar level of protection against exposure to onsite contaminated materials with the erection of a fence to limit access.

Alternatives 4 and 5 provide increased protection from on-site contaminated materials by the placement of a cap over the landfill in addition to a fence erected to limit access. Alternative 4 provides the highest level of protection by eliminating the risks posed by all exposure pathways identified for the site.

2) Compliance with Applicable or Relevant and Appropriate Requirements

Under Section 121(d) of CERCLA, 42, U.S.C. Section 9621(d), and EPA guidance, remedial actions at CERCLA sites must attain legally applicable or relevant and appropriate Federal and State environmental standards, requirements, criteria, and limitations ("ARARs"). Applicable requirements are those substantive

environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address hazardous material found at the site, the remedial action to be implemented, the location of the site, or other special circumstances. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law which, while not applicable to the hazardous materials at the site, the remedial action, site location, or other circumstances, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well suited to that site.

The remedy for the first operable unit will comply with all of the ARARs of other Federal and State environmental laws.

3) Reduction of Toxicity Mobility or Volume

This evaluation criterion addresses the degree to which a technology or remedial alternative reduces toxicity, mobility, or volume of hazardous substance. Section 121(b) of CERCLA, 42 U.S.C. Section 9621(b), establishes a preference for remedial actions that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances over remedial actions which will not result in such reduction.

Alternatives 1,2, and 3 do not reduce contaminant toxicity, mobility, or volume through treatment. Alternatives 4 and 5 reduce the volume of materials through the implementation of resource recovery activities to remove the bulky items present on the landfill surface. Resource recovery is considered to be physical treatment, and will address debris (appliances, vehicles, tanks, drums) present onsite. Alternatives 4 and 5 will also serve to reduce the mobility of contaminants, not through treatment, but through placing a cap over the landfill. The cap will reduce infiltration through the landfill and will thus reduce the quantity of contaminants that will leach to ground water. Alternatives 4 and 5 will not reduce the toxicity of contaminants that are present in the landfill.

4) Implementability

All remedial action alternatives are both technically and administratively feasible. The activities included in each alternative generally use standard construction techniques and are of relatively high reliability.

Alternatives 2 and 4 will require some coordination between state and federal agencies, the Honey Brook Borough Water Authority, Honeybrook Township, and the Chester County Health Department. Administrative issues associated with these alternatives include: cessation of on-site operations, issuance of property deed modifications and restrictions, and abandonment of the residential wells prior to connection to the water supply system.

5) Short-term Effectiveness

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

Alternatives 1,2 and 3 will not create additional short-term risks to the community or workers above those identified in the risk section of the ROD. Alternatives 4 and 5 will likely create some acute risks, primarily to onsite workers, which may be controlled by the use of personnel protective equipment.

6) Long-term Effectiveness and Permanence

Long-term effectiveness and permanence addresses the long-term protection of human health and the environment once remedial action cleanup goals have been achieved, and focuses on residual risks that will remain after completion of the remedial action. This section will address the long-term effectiveness of the limited scope of action for this ROD: landfill cap, alternate water supply, and institutional controls.

Alternatives 2 and 4 address current risks to human health posed by contaminated ground water. These alternatives provide for an alternate water supply to eliminate both ingestion and

inhalation exposure pathways for contaminated ground water. In contrast, alternatives 3 and 5 do not address the inhalation exposure pathway.

Alternatives 4 and 5 include provision for the construction of a landfill cap, and address current risks associated with exposure to onsite contaminated materials. The containment options (4 and 5) afford a higher degree of permanence than the institutional controls (2 and 3) due to the physical barriers to exposure provided by the cap. Alternatives 2 and 3 include fencing to restrict site access, but these actions will not necessarily provide long-term protection from exposure to on-site contaminated materials.

Long-term management for all remedial alternatives includes continued ground water monitoring with five-year reviews as well as periodic site inspections. Alternatives 2 through 5 will require periodic inspection and repair of the fence. Alternatives 4 and 5 will also require periodic inspection and repair of the landfill cap.

7) Cost

CERCLA requires selection of a cost-effective remedy that protects human health and the environment and meets the other requirements of the Statute. Project costs include all construction and operation and maintenance costs incurred over the life of the project. An analysis of the present worth value of these costs has been completed for each alternative described in this ROD and is summarized in Table ES-1. Capital costs include those expenditures necessary to implement a remedial action.

The costs of the five alternatives range from $1,258,000 to $3,601,000. The degree of protection provided by the alternatives also varies. Comparison of different levels of costs for different levels of protectiveness and permanence of treatment is a primary decision criterion in the cost-effectiveness evaluation.

Alternatives 2 and 4 are the highest in cost, yet offer a higher level of protection by providing a permanent source of safe drinking water to the affected residents. Alternative 4 is

the most costly, and is also the most protective of human health and the environment by providing permanent relief from exposure to contaminated soils and ground water. A detailed breakdown of the costs associated with Alternative 4 is provided in Table H.

The costs for the remedial alternatives are also subject to change based on several influences. All of the alternatives were sensitive to the cost of borrowed capital. Alternatives 1 and 3 were sensitive to the variation in O&M costs. The present values of alternatives 2 and 4 varied significantly with changes in the capital costs associated with the expansion of the existing water supply system. Alternatives 4 and 5 are sensitive to variations in the capital costs associated with capping.

8). Community Acceptance

A public meeting on the Proposed Plan was held on March 27, 1990 in Honey Brook, Pennsylvania. Comments received from the public at that meeting and during the comment period are discussed in the Responsiveness Summary attached to this ROD.

9). State Acceptance

The Commonwealth of Pennsylvania has concurred with this selected Remedial Action.

X. SELECTED REMEDY

Alternative 4: Institutional and Containment Actions- Extend Municipal Water Line, Landfill Cap, Access Controls.

Based on the findings in the RI/FS and the nine criteria listed above, the USEPA has selected Alternative 4. In the judgement of EPA, Alternative 4 represents the best balance among the evaluation criteria and satisfies the statutory requirements of protectiveness, compliance with ARARs, cost effectiveness, and the utilization of permanent solutions and treatment to the maximum extent possible. Alternative 4 is selected as the most appropriate remedy for meeting the goals of the initial operable unit at the Walsh Landfill Site.

This alternative is an operable unit measure to prevent human exposure (i.e., ingestion, inhalation, dermal contact) to

TABLE H

WELSH ROAD/BARKMAN LANDFILL SITE
COST SUMMARY FOR THE SELECTED REMEDY

Cost Component	Cost Estimate
Direct Capital Costs	
1. Groundwater Monitoring	$227,850
2. Expansion of Existing Water Supply System	787,310
3. Fencing	30,750
4. Resource Recovery	13,525
5. Municipal Cap	1,125,600
Total Direct Costs	**$2,185,035**
Indirect Capital Costs	
1. Engineering and Design (7% of Direct Cost)	152,952
2. Contingency Allowance (20% of Direct Cost)	437,007
Total Indirect Costs	**$589,959**
TOTAL CAPITAL COSTS	**$2,774,994**
Operation and Maintenance Costs	
1. Landfill Maintenance and Groundwater Monitoring Around Unit (Years 5, 10, 15, 20 and 25)	$63,090
2. Landfill Maintenance and Groundwater Monitoring Around Unit (Years 2 through 4, 6 through 9, 11 through 14, 16 through 19, and 21 through 24)	108,950
TOTAL COSTS (Net Present Value calculated using a 5% discount value)	**$3,768,000**

contaminated water and soils having concentrations of TCE, chloroform, ethylbenzene, arsenic, lead, mercury, and other constituents in excess of Federal, State, and local health-based ARARs. This alternative will remove the primary risks posed by the site, and will also be consistent with a final remedial action for this site. A summary of each of the major components of this selected remedy is described below:

- The extension of the Honey Brook Borough water supply system will be designed to include the following components. Specific parameters may be subject to change pending completion of design and coordination with local and State agencies.

- Construction of an approximate one mile extension of an eight-inch-diameter mainline along PA State Route 10 to a storage tank located near the top of Welsh Mountain. From the storage tank, 2-inch and 4-inch mainlines will be placed to distribute water by gravity flow to an estimated 50 households. The 50 households include those previously sampled and those presently receiving bottled water. The number and location of residences which will receive public water will be verified during the design of this remedial action.

- Approximately 6500 feet of 8-inch water main, 7500 feet of 4-inch and 3000 feet of 2-inch distribution lines will be installed along PA State Route 10 and Welsh Road. Service lines will be installed for each of the approximately 50 households.

- The current water supply system will be upgraded to provide sufficient capacity to service the impacted residents. This upgrade involves the installation of one water supply well and connection of this well to the current system. A booster pump and 120,000 gallon water storage tank are also included in the required system upgrade.

- Control of the new water lines and services will be transferred to the Honey Brook Borough Water Authority as soon as construction is completed.

- Ground water monitoring data will be collected to monitor the current contaminant levels and possible migration. Wells will be sampled as part of the focused ground water study to be completed for the second operable unit at the site, which is planned to occur in tandem with the water line design. A five year review will also include ground water monitoring of site wells, with analysis for the full list of CLP target parameters.

- At a mininum, a multi-media landfill cap that meets the requirements of the Pennsylvania Municipal Solid Waste Regulations will be designed to contain the contaminated soils and waste materials present at the site. The initial activities include resource recovery, or salvaging of bulky items (cars, appliances, dumpsters, tires) presently placed on top of the landfill, demolition of onsite buildings, and excavation and removal of underground petroleum storage tanks currently used to fuel vehicles used in the junkyard operation. Additional information will be collected in order to properly design the landfill cap, including : survey landfill extent, power lines, easements, and rights-of-way; characterization of the contents of the landfill, its potential to generate methane and other gases, and landfill geotechnical parameters; characterizing site soils; and locating borrow soils with appropriate characteristics. Results and findings from the focused ground water study will also be considered in designing the landfill cap, if available.

- A six-foot high fence topped with either barbed wire or razor ribbon will be constructed around the perimeter of the landfill in order to restrict unauthorized site access and the use of the property for continued or future waste disposal.

- Property deeds for the landfill area will be modified, where appropriate, to indicate the landfill presence, restrict future use and property development, and to restrict use of ground water by placing limitations on the installation of ground water wells.

Cost

The estimated capital and annual operation and maintenance costs for this alternative are summarized below. The present-worth cost estimate is $ 3,768,000 which includes construction of a multi-media landfill cap that at a minimum, meets the requirements of the Pennsylvania municipal solid waste management regulations.

Capital Cost ($ 1,000s)	O&M Cost ($1000s)	Present Worth Cost
2,775	63 (annual) 109 (5-years)	3,768

A more detailed breakdown of costs is presented in Table H.

XI. STATUTORY DETERMINATIONS

The selected remedy which was outlined in Section X satisfies, in part, the remedy selection requirements of CERCLA and the NCP. The remedy provides protection of human health and the environment, achieves compliance with ARARs, utilizes permanent solutions to the maximum extent practicable, and is cost effective. The statutory preference for using treatment as a principal element is not applicable to this operable unit. This requirement will be addressed in the second operable unit which will consider ground water remediation alternatives.

Of the five balancing criteria used in selecting the remedy for the site, the long-term effectivess and permanence factor were found to be the most important during the screening process. Due to the history and continuing status of site operations, and the apparent lack of environmentally sound practices, selection of a permanent source control and alternate water supply remedy was made to ensure protection of human health and the environment.

The selected remedy for the first operable unit will be protective of human health and the environment by reducing the

principal threats posed by the current site situation. By extending the Honey Brook Borough municipal water supply, the affected residents will be offered a permanent source of safe drinking water. The landfill cap and site access controls will prevent contact with contaminants present in site soils and sediments. The cap will also reduce the mobility of contaminants which may flow into site ground water. This action therefore reduces and controls the risks posed by the air pathway (fugitive dust, shower inhalation), the soil pathway (dermal contact and ingestion), and the ground water pathway (ingestion, dermal contact, and inhalation).

The selected remedy provides the highest level of protection utilizing permanent solutions for the position of the site which poses the principal threats to human health and the environment. This remedy is likely to be consistent with the selection of a final, or ground water remedy for the site, and is cost-effective. The resource recovery activities will reduce the volume of contaminated materials and allow for preparation of the landfill surface for capping. The remaining alternatives were quite costly in proportion to their ability to provide protection of public health with regard to the site conditions.

Implementation of the selected remedy should not pose any short-term risks to local residents. The remedy will be designed to include air monitoring around the site perimeter or work area, and measures to limit the generation of dust during the use of heavy equipment. A health and safety plan will be developed to protect onsite workers or visitors from exposure to hazardous substances during implementation of the remedy.

The selected remedy for this operable unit does not satisfy the statutory preference for including treatment that reduces toxicity, mobility, or volume as a principal element. The Feasibility Study evaluated incineration as a remedial alternative for the landfill materials in the initial screening. While incineration is a viable process option, the conditions under which the landfill contents were disposed of (mixed municipal, industrial and construction wastes) may pose severe difficulties to the implementation of incineration as a cleanup alternative. Sorting and separation of the landfill contents prior to incineration of any hazardous substances would pose

extreme safety and health hazards to the onsite workers. In addition, potential health risks may be posed to the local community from generation of fugitive dusts during implementation of incineration activities. For these reasons, as well as consideration of the cost effectiveness of incineration, EPA did not select this treatment option for the landfill wastes. EPA will consider treatment technologies for the contaminated ground water as the second operable unit for the site.

Compliance with ARARs

Applicable or relevant and appropriate requirements (ARARs) pertaining to this remedy will be attained. The selection of this alternative has generated a limited number of ARARs, due to common and accepted engineering and construction practices associated with the installation of water mains and water service connections. These requirements consist of State/local plumbing and fire codes which are to be considered for the installation of water mains, service connections, and fire hydrants. Also, the residences targeted herein, are to be connected to the public water system which must be in compliance with the National Drinking Water Regulations, the Pennsylvania Water Quality Standards, and the requirements of the Chester County Health Department and Honey Brook Borough Water Authority.

The ARARs and other nonpromulgated advisories and guidances issued by Federal, State and local governments (TBCs, or "to-be-considered" items) for the remedial action are discussed below. It should be noted that due to the limited nature of this operable unit, ARARs that apply to ground water cleanup will be addressed in the final ROD for this site.

SDWA Maximum Contaminant Levels (40 CFR Part 141, Subpart B, Sections 141.11(b), 141.12, and 141.61(a))

The substances arsenic, benzene, cadmium, lead, total mercury, trichloroethylene, tetrachloroethylene, and total trihalomethanes have Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs). These substances correspond to the arsenic, benzene, cadmium, lead, mercury, trichloroethylene, tetrachloroethylene, and chloroform detected in samples collected at the site. These MCLs typically apply to public water systems having at least 15 service connections or serving an average of

at least 25-year-round residents as well as to non-transient, non-public water systems regularly serving at least 25 of the same persons over six months per year. Because ground water affected by the site is extracted by the wells of residents and not a community system, the SDWA MCLs are not applicable. However, they are relevant and appropriate requirement as in-situ cleanup levels for ground water that is used for drinking water. The alternatives that include provision of alternate water will comply with the SDWA MCLs. Alternatives 2 and 4 will include the provision of a municipal water supply line, which undergoes routine testing to ensure compliance with MCLs.

Acceptable Intakes Chronic (AICs) and Potency Factors (PFs)

These are TBCs (to-be-considered) requirements that were identified in the Public Health Evaluation Report as providing the best available health standards for indicator chemicals detected at the site. These criteria are detailed in Table D for the contaminants of concern at the site. These standards are the best available to ensure protectiveness of the remedy and compliance with ARARs. Of specific concern at the site is the inhalation pathway for potential exposure to contaminants. Limiting access to the site, as provided in alternatives 2 and 3, will potentially comply with inhalation TBC criteria by reducing the potential for exposure to fugitive dust generation. These alternatives would leave the onsite soils, sediments and solid waste unaddressed, and thus they would remain as a source of fugitive dust generated by the wind.

Alternatives 4 and 5 fully comply with this TBC though capping the contaminant bearing media. These alternatives also comply with the TBC criteria for the dermal contact and incidental ingestion exposure routes, because the landfill cap will prevent contact with the contaminants.

Municipal Waste Management\Landfill Regulations for Pennsylvania
(25 PA Code Chapter 75)

These regulations pertain to the operating and applications requirements for persons and municipalities that operate municipal waste landfills in Pennsylvania. Chapter 75, Sections 75.21 through 75.38 of the Pa. Code of regulations establishes

provisions for the management of municipal and residual waste. These regulations are relevant and appropriate for the site conditions, and may be considered applicable once additional field work has been completed. While Mr. Barkman never received a permit from the State for the operation of a municipal landfill, upon completion of the field tasks required to properly design a landfill cap, we may find that only municipal and construction wastes were disposed of at the site. If so, these requirements will be ARARs, and the landfill cap will be designed to comply with the State's requirements. Based on our knowledge of past site operations, it is assumed that we will find mostly municipal and construction debris within the landfill, and thus this ROD calls for a landfill cap that meets the requirements of the municipal waste management regulations.

Resource Conservation and Recovery Act - (40 CFR Part 264.310(a), 264.117(c), 264.310(b))

The RCRA regulations pertaining to capping and closure with waste in place are considered to be relevant and appropriate for the site conditions. These requirements are applicable if a RCRA hazardous waste was placed at the site after November 8, 1986; or if placement of a hazardous waste occurred in another unit when the waste is being covered for the purpose of leaving it behind after a remedy is completed. The Walsh Landfill operated from 1963 through 1976, and according to the site owner, strictly junkyard activities occurred at the site from approximately 1976 to the present. State and EPA records do not indicate any official closure date for the landfill, and it is assumed that during the history of site operations, a mixture of solid and listed hazardous waste was disposed of on the site. Since the RI/FS did not include sampling of the landfill materials, we presently have no documentation of the presence of RCRA hazardous wastes within the landfill. During the design work required for the landfill cap, sampling of the landfill will be completed. The results of this work will be used to properly design a landfill cap that is appropriate for the site conditions, and the nature of the waste materials found therein. The land disposal restrictions ("land ban") will not be an issue since placement of wastes will not occur with this remedy.

In addition, associated requirements for operation and maintenance (40 CFR 264.310) and Surface Water Control (40 CFR 264 .301(c)(d)) will be relevant and appropriate for the landfill capping action at the site. These requirements may be considered ARARs based on the findings of field investigation work required to properly design the landfill cap.

Underground Storage Tanks: Final Rule (40 CFR Parts 280 and 281, Subpart E, Section 280.52(b), Subpart F, Sections 280.62(a), 280.63(a), and 280.64

The Underground Storage Tank program pertains to the regulation of petroleum and hazardous substance storage tanks, and includes appropriate measures for leak detection, leak prevention, corrective action, and sampling and closure requirements. These requirements will be ARARs for the sampling and removal of the underground petroleum tank present onsite. Due to the presence of a gasoline pump adjacent to the onsite garage, we have assumed that at least one underground petroleum storage tank is present. The pre-design activities associated with the implementation of the selected remedy will include confirming the tank's presence, and sampling the tank contents. All activities associated with the onsite underground petroleum storage tank will be completed in compliance with the UST regulations.

Schedule

The anticipated schedule is for the design to begin in the late summer of 1990. Once the design is completed, a construction period of three to four months will be required for the extension of the water supply lines and service connections to the individual homes. Construction of the landfill cap and the associated resource recovery activities are expected to last from 18 to 24 months.

TABLE ES-1

WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY OF DETAILED EVALUATION OF THE REMEDIAL ACTION ALTERNATIVES

Evaluation Criteria	RAA No. 1	RAA No. 2	RAA No. 3	RAA No. 4	RAA No. 5
Overall Protectiveness of Human Health and the Environment					
Ingestion of Groundwater by Residents	No risk reduction	Protects against existing risk by providing alternate water supply	Partial protection against existing risk by providing bottled water	Protects against existing risk by providing alternate water supply	Partial protection against existing risk by providing bottled water
Ingestion of Groundwater by Future Users	No risk reduction	No protection for future users unless water supply system is expanded	No protection for future users unless bottled water distribution is expanded	Cap will reduce leachate generation; providing some protection to future users	Cap will reduce leachate generation; providing some protection to future users
Protection from Dermal Contact/Inhalation Risks from Groundwater for Residents	No risk reduction	Alternate water supply system protects against existing and potential future risks	Bottled water protects against current risks posed by groundwater ingestion; does not provide protection against inhalation exposure pathway	Alternate water supply system protects against existing and potential future risks	Bottled water protects against current risks posed by groundwater ingestion; does not provide protecti against inhalatio.. exposure pathway
Protection from Dermal Contact/Inhalation Risks from Groundwater for Future Residents	No risk reduction	No protection for future users unless water supply system is expanded	No protection for future users	Cap will reduce leachate generation providing some protection. Water supply system expansion will provide additional protection	Cap will reduce leachate generation providing some protection
Protection from Dermal Contact/Ingestion of On-Site Contaminated Materials	No risk reduction	Fence will provide protection only as long as it is maintained	Fence will provide protection only as long as it is maintained	Cap will be protective of human health	Cap will be protective of human health
Protection from Inhalation of On-Site Contaminated Materials	No risk reduction	Fence will restrict vehicle access and reduce dust generation	Fence will restrict vehicle access and reduce dust generation	Cap will be protective of human health by eliminating dust generation	Cap will be protective of human health by eliminating dust generation
Environmental Protection	Allows continued contamination of the groundwater	Allows continued contamination of the groundwater	Allows continued contamination of the groundwater	Reduces leachate generation although continued contaminant migration is allowed	Reduces leachate generation although continued contaminant migration is all

TABLE ES-1
(Continued)
WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY OF DETAILED EVALUATION OF THE REMEDIAL ACTION ALTERNATIVES

Evaluation Criteria	RAA No. 1	RAA No. 2	RAA No. 3	RAA No. 4	RAA No. 5
Compliance with ARARs					
Chemical-Specific ARARs	None complied with	Groundwater ARARs regarding human health met; ones regarding groundwater clean-up are not	Groundwater ARARs regarding human health partially met; ones regarding groundwater clean-up are not	Groundwater ARARs regarding human health met; ones regarding groundwater clean-up are partially addressed	Groundwater ARARs regarding human health partially met; ones regarding groundwater clean-up are partially addressed
Location-Specific ARARs	No location-specific ARARs identified	No location-specific ARARs identified	No location-specific ARARs identified	No location-specific ARARs identified	No location-specific ARARs identified
Action-Specific ARARs	No action-specific ARARs identified	No action-specific ARARs identified	No action-specific ARARs identified	State ARARs concerning capping complied with; RCRA ARARs will be complied with pending completion of design	RCRA ARARs concerning capping complied with
TBC Criteria	None complied with	TBCs involving ingestion of contaminants met; those involving inhalation are partially addressed	TBCs involving ingestion of contaminants met; those involving inhalation are partially addressed	TBCs concerning ingestion and inhalation of contaminants are complied with	TBCs involving ingestion of contaminants met; those involving inhalation are partially addressed
Long-Term Effectiveness and Permanence					
Magnitude of Residual Risks Posed by Groundwater	Existing risk will remain	Current risk reduced or eliminated - potential future risk possible	Current risk due to ingestion is reduced; risks due to inhalation are not reduced - potential future risk due to dermal contact or inhalation is possible	Current risk is reduced or eliminated. Cap reduces potential future risk	Current risk due to ingestion is reduced; risks due to inhalation are not reduced. Cap reduces potential future risk although future risk due to dermal contact or inhalation is possible
Magnitude of Residual Risk Posed by On-Site Material	Existing risk will remain	Current risk is reduced, potential future risk is controlled only if fence is maintained	Current risk is reduced, potential future risk is controlled only if fence is maintained	Current risk is eliminated. Future risk is reduced if cap is maintained, although waste will remain on site	Current risk is eliminated. Future risk is reduced if cap is maintained, although waste will remain on site

TABLE ES-1
(Continued)
WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY OF DETAILED EVALUATION OF THE REMEDIAL ACTION ALTERNATIVES

Evaluation Criteria	RAA No. 1	RAA No. 2	RAA No. 3	RAA No. 4	RAA No. 5
Adequacy and Reliability of Controls	No controls considered	Alternate water supply is effective in controlling risk from groundwater; fence is of limited effectiveness	Bottled water is effective in reducing risk from groundwater ingestion, but not inhalation; fence is of limited effectiveness	Alternate water supply is effective in controlling risk from groundwater. Cap is effective in controlling risk from on-site material	Bottled water supply is effective in reducing risk from groundwater ingestion, but not inhalation. Cap is effective in controlling risk from on-site material
Five Year Reviews	Five year reviews are required	Five year reviews are required	Five year reviews are required	Five year reviews are required	Five year reviews are required
Reduction of Toxicity, Mobility, or Volume Through Treatment					
Treatment	None used	None used	None used	None used	None used
Residuals from Treatment	None	None	None	None	None
Statutory Preference for Treatment	Not satisfied	Not satisfied	Not satisfied	Not satisfied	Not satisfied
Short-Term Effectiveness					
Community Protection	Risks remain unchanged	Community protected from contaminated groundwater; on-site materials remain undisturbed	Community protected from contaminated groundwater ingestion, although potential threats posed by groundwater due to inhalation are still present; on-site materials remain undisturbed	Community protected from contaminated groundwater; on-site materials remain undisturbed	Community protected from contaminated groundwater ingestion, although potential threats posed by groundwater due to inhalation are still present; on-site materials remain undisturbed
Worker Protection	No significant risk to workers	No significant risk to workers	No significant risk to workers	Worker protection required during cap construction	Worker protection required during cap construction

TABLE ES-1
(Continued)
WELSH ROAD/BARKMAN LANDFILL SITE
SUMMARY OF DETAILED EVALUATION OF THE REMEDIAL ACTION ALTERNATIVES

Evaluation Criteria	RAA No. 1	RAA No. 2	RAA No. 3	RAA No. 4	RAA No. 5
Implementability					
Ability to Construct and Operate	No construction or operation	Conventional construction and operation	Conventional construction and operation	Conventional construction and operation	Conventional construction and operation
Ability to Monitor Effectiveness	Groundwater will be monitored	Monitoring will provide indication of an increase in groundwater contamination	Monitoring will provide indication of an increase in groundwater contamination	Monitoring will provide indication of an increase in groundwater contamination	Monitoring will provide indication of an increase in groundwater contamination
Approvals, Permits, Coordination	None necessary	Coordination with Honey Brook Borough Water Authority and Chester County Health Department likely to be necessary	None necessary	Coordination with Honey Brook Borough Water Authority and Chester County Health Department likely to be necessary	None necessary
State Acceptance	State acceptance to be addressed in the ROD	State acceptance to be addressed in the ROD	State acceptance to be addressed in the ROD	State acceptance to be addressed in the ROD	State acceptance to be addressed in the ROD
Community Acceptance	Community acceptance to be addressed in the ROD	Community acceptance to be addressed in the ROD	Community acceptance to be addressed in the ROD	Community acceptance to be addressed in the ROD	Community acceptance to be addressed in the ROD
Estimated Time for Implementation of Design and Construction Phases	--	1 year	0.5 years	2 to 2.5 years	1.5 to 2 years
Cost ($)*					
Capital Cost	289,000	1,328,000	328,000	2,775,000	2,312,000
Annual Operation and Maintenance Cost	32,000	57,000	50,000	63,000	55,000
Operation and Maintenance Cost During Five-Year Reviews	228,000	103,000	245,000	109,000	251,000
Present Worth Cost	1,258,000	2,242,000	1,538,000	3,768,000	3,601,000
Worst-Case Present Value	1,886,000	3,026,000	2,208,000	4,970,000	4,623,000
Best-Case Present Value	825,000	1,865,000	992,000	3,180,000	3,002,000

All costs are rounded to the nearest $1,000.00.

WELSH ROAD/BARKMAN LANDFILL SITE
HONEYBROOK TOWNSHIP, PENNSYLVANIA

RESPONSIVENESS SUMMARY
JUNE 1990

This Responsiveness Summary documents public concerns and comments expressed during the public comment period. The summary also provides EPA's and PADER's responses to those comments. The information is organized as follows:

1. Overview
2. Summary of Community Involvement
3. Summary of Comments Received During the Public Comment Period and Agency Responses
4. Responses to Potentially Responsible Party's Comments

1.0 OVERVIEW

The public comment period for the Walsh Landfill Site (a.k.a. Welsh Road/Barkman Landfill Site) began on March 18, 1990 and extended until May 18, 1990. To facilitate commenting, EPA and PADER held a public meeting at the Honey Brook Fire Hall on March 27, 1990.

At the meeting, EPA and PADER discussed the Remedial Investigation (RI), Feasibility Study (FS) and Public Health Evaluation Reports performed for the site and presented the Proposed Plan for eliminating/mitigating public health and environmental threats posed by contamination detected in environmental media in the area. EPA explained that the plan addresses the first Operable Unit (OU), which consists of replacing contaminated potable water supplies and proper closure of the landfill; a plan for addressing the second OU, contaminated groundwater, will be developed after a forthcoming areawide groundwater study is completed. The preferred remedial action alternative for the first OU involves extending a municipal waterline to service affected residences, constructing a multi-media cap over the landfill and implementing land use/access restrictions on the property of concern.

Local residents and officials offered minimal objections to the proposed plan; some public meeting attendees did express preference to excavation and off-site disposal of the landfill contents. The majority of concerns dealt with administrative issues regarding the service area of the proposed waterline extension, payment of water bills, well abandonment procedures and deed restriction issues. Technical concerns focussed primarily on possible effects on the current municipal water supply by contaminated groundwater detected in the vicinity of the site. Also, during the public meeting a number of local residents expressed serious concerns regarding ongoing operations being conducted at, and in the general area of, the Welsh Road/Barkman Landfill Site. However, this Responsiveness Summary is limited to those comments in the proposed remedial action plan and any other portion of the Administrative Record detailing the Welsh Road/Barkman Landfill NPL Site. Current site operations are not addressed as they are within the realm of local and state enforcement concerns.

2.0 SUMMARY OF COMMUNITY INVOLVEMENT

Community relations activities associated with the Welsh Road/Barkman Landfill Site were initiated by PADER in 1979. PADER served as the lead response agency during the sampling of residential wells that occurred from 1979 through 1989. Throughout the duration of the well sampling program and site investigation (RI/FS), the State maintained contact with residents from approximately 43 to 49 homes in the site area. The State forwarded correspondence with sampling results to the residents during this period, and updated interested citizens, local government officials and the site owner on the status and findings of the RI/FS.

On February 16, 1990, EPA and PADER placed the Administrative Record in a repository located in the Honey Brook Library, Honey Brook, PA. On March 18, 1990, EPA and PADER placed a quarter page advertisement in the West Chester Daily Local and the Lancaster New Era, announcing the 30-day comment period on the Proposed Plan for the first operable unit of the Welsh Road/Barkman Landfill Site. Also announced was the availability of the Proposed Plan, RI/FS, and Public Health Evaluation reports, as part of the Administrative Record in the site repository.

The public comment period began March 18, 1990, and ended May 18, 1990. EPA received a timely request for an extension of the comment period, and thus granted the minimum 30-day extension, in accordance with the revised provisions of the National Contingency Plan (NCP). A public meeting was conducted on March 27, 1990 as was described previously in Section 1.0.

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

Comments provided during the Welsh Road/Barkman Landfill Site public comment period on the Remedial Investigation/Feasibility Study, Public Health Evaluation and Proposed Plan are summarized briefly as follows. The comment period extended from March 18 to May 18, 1990. The comments are categorized by relevant topic.

Remedial Action Preferences

1. Several commenters expressed a preference for excavation of the landfill contents and off-site disposal, rather than constructing a cap over the landfill. Their concerns were related to the potential for the landfill to continue to serve as a source of contamination even after the remedial action is implemented.

   Agency Response: Excavation and off-site disposal was considered and evaluated as part of the Feasibility Study. However, it was judged to be too costly, difficult to implement given the undefined nature of the landfill contents and to have the potential to expose local residents to unacceptable health risks during implementation. Furthermore, under the Superfund Amendments and Reauthorization Act (SARA), this alternative is considered undesirable since it merely transfers contaminated materials rather than reducing the mobility or toxicity of hazardous wastes.

2. One commenter asked if consideration is being given to pumping and treating groundwater from residential wells to alleviate the potential for contaminating the Honey Brook Borough Water Authority's municipal wellfield.

   Agency Response: Possible options for dealing with contaminated groundwater will be considered under the second OU. A groundwater study of the area will be

implemented and the results will be evaluated, with the focus on developing a cost-effective remedial action for renovating contaminated groundwater.

3. One commenter inquired whether individual home treatment units were considered instead of extending the waterline or supplying bottled water.

Agency Response: Yes, individual units were considered, but were rejected because each unit would have to be routinely monitored to ensure it was performing adequately. The frequency of these monitoring activities could not be defined since the levels and types of contaminants varies considerably at each residence and also because it would depend on the usage rate of each resident. Thus, there would be an ongoing concern that the treatment systems were not performing as intended.

Administrative Concerns Regarding Remedial Alternatives

1. A number of questions were raised about the extension of the Honey Brook Borough Water Authority waterline. Specifically, residents asked who would be responsible for paying for water used once the hookups to the municipal supply were completed, who would be provided with hookups and has EPA and the Honey Brook Borough Water Authority signed an agreement to implement this option?

Agency Response: Once each hookup has been completed, the individual residents will be responsible for paying for water used, just as the current customers must pay for water. No final decision has been reached on specific residences to be included as part of the waterline extension. This determination will be based on the results of the upcoming groundwater study, which will focus on better defining the extent of contamination and the rate and direction of contaminated groundwater flow. Those residences affected or anticipated to be affected before groundwater remediation is completed in the area will be provided with hookups to the waterline extension. Honey Brook Borough Water Authority has been consulted regarding extension of the waterline and will continue to have input during the design and implementation of this portion of the remedial action. However, no agreement has been signed to date with the Authority since the waterline extension is only proposed at this time.

2. Residents were concerned about residual contamination that may exist in their plumbing and fixtures and what steps are necessary to ensure that municipal water is not contaminated by residual contamination.

Agency Response: No special precautions other than thoroughly flushing the lines initially is all that will be necessary since the contaminants of concern do not have a strong affinity for accumulating within the plumbing or fixtures.

3. The question was raised regarding providing hookups from the extended waterline to undeveloped properties. Also, a concern was expressed about the area losing its rural flavor if the municipal water supply is extended into the area.

Agency Response: It is EPA's policy under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) not to encourage development as a result of implementing a remedial action.* Therefore, undeveloped properties will not receive a connection to the waterline. However, this does not prevent future connections if the local authorities permit such an occurrence and the landowner pays for the connection.

* The National Environmental Policy Act (NEPA) requires that EPA consider secondary impacts of remedial actions that are to be taken using federal funds. The extension of a municipal water line could foster growth and development, however, the local municipalities have expressed a desire to maintain low density development in the site area.

4. Several commentators asked if farms will be connected to the waterline and will sufficient water be provided to water livestock and allow irrigation activities to be conducted.

Agency Response: Farms will be provided with the same connections as other residences (i.e., for domestic consumption). Ponds located on one of the farms were sampled and the results indicated that the water was not contaminated, so their use of the ponds to water livestock and to irrigate can continue. Depending on local water authority policy regarding well abandonment, groundwater from existing wells may continue to be used for nonpotable purposes such as irrigation.

5. One commenter reported that he cannot develop his property because he is unable to obtain a well drilling permit from the Chester County Health Department reportedly due to the problem at the Welsh Road/Barkman Landfill Site. If bottled water is the selected option and wells are prohibited in the area, will he be supplied with bottled water if he develops his land?

Agency Response: EPA and PADER do not have authority to interfere with Chester County Health Department policy regarding issuance of well permits. Since bottled water is not the preferred alternative, determination of who will receive bottled water has not been made. However, as stated previously, CERCLA policy is not to encourage growth in an area, so properties not developed at the time of remedial action implementation likely will not be eligible for bottled water.

6. Numerous questions and opinions were expressed in regard to possible abandonment of existing wells once the waterline is extended and hookups are provided to this new supply. Both positive and negative statements on the issue of mandatory well abandonment were made during the public meeting. Commentators in favor of mandatory well abandonment were concerned about possible contamination of the municipal water supply from contaminated groundwater and the possibility that continued pumping of local domestic wells may accelerate migration of contaminated groundwater to unaffected areas. Negative responses focused on the additional expenses that would be incurred by homeowners who paid to have wells installed and now would be unable to use them even for nonconsumptive purposes (laundry, washing cars, watering lawns, etc.).

Agency Response: EPA and PADER do not have the authority to institute an mandatory well abandonment policy. This requirement likely would be a condition imposed by the Honey Brook Borough Water Authority to protect the municipal supply. However, EPA and PADER would encourage the Authority to require proper well abandonment as a sound public health measure. Also, it is possible that continued pumping may further spread groundwater contamination to areas not previously affected.

7. The issue of deed restrictions was addressed by several commentators. The concern was expressed that mandatory deed restrictions could have an adverse impact on property values. Also, a commenter asked what the wording of the deed restrictions would be.

Agency Response: Mandatory deed restrictions would be confined to the property(ies) on which the landfill cap is placed to prevent disturbance of the cover and to advise any future landowner of the presence of the landfill. Voluntary deed restrictions could be placed on surrounding properties advising future purchasers of the possibility of contaminated groundwater underlying affected parcels. The exact wording of the

mandatory deed restrictions has not yet been developed, but will be in accordance with state and local requirements for landfills containing hazardous materials/wastes. Wording for voluntary deed restrictions will be at the discretion of the current landowners.

Commentators at the public meeting were concerned about declining property values and difficulties experienced in selling homes in the area. Their question basically centered on what relief could be provided under CERCLA.

Agency Response: Although EPA and PADER sympathizes with local residents, there are no regulatory provisions for monetary compensation for diminished property values or reduced salability of homes under CERCLA. However, there may be legal remedies available to affected residents. EPA and PADER suggest those who believe that they have suffered economic losses consult their attorneys for possible relief through the courts.

Several people at the public meeting asked who would own the site once remediation was completed and who would prevent future occurrences like the ones that initiated the problems at this site.

Agency Response: Technically, the current property owner would continue to own the land once the remedial actions have been completed. Future incidents can be avoided by local and state agencies maintaining enforcement of existing laws and ordinances.

One commenter asked what options were available to local residents who had consumed contaminated groundwater and experience adverse health effects.

Agency Response: EPA and PADER suggest consulting an attorney to determine what legal recourses exist for residents that believe they have site-related health effects.

Technical Questions/Concerns Regarding Remedial Alternatives

Several questions were raised regarding the landfill cap. These concerns included the purpose of the cap, runoff controls to be provided to prevent adverse off-site effects and responsibilities for maintaining the cover.

Agency Response: The purpose of the cap is to reduce/eliminate percolation of precipitation through wastes contained in the landfill, thereby limiting the amount of leachate generated. The cap will be designed to promote positive drainage and prevent ponding of water on the surface of the landfill, which also will reduce generation of leachate. The design of the cap will include control of surface runoff and erosion to minimize potential of adverse off-site effects to adjacent properties. Maintenance of the cap and associated facilities initially will be assumed by EPA; continued maintenance will be provided by the State.

An attorney representing several adjacent landowners asked what health risks were associated with implementation of the alternative presented in the Proposed Plan.

Agency Response: The remedial action alternative presented in the Proposed Plan is intended to prevent the health risks identified at the site by eliminating the link between receptors (i.e., the local residents) and contaminated environmental media (i.e., surface soil and groundwater). The links, or pathways, that currently exist include direct contact with contaminated soil and groundwater, ingestion of soil and

groundwater and inhalation of these media. The remedial action would prevent direct contact by covering contaminated soils and eliminate ingestion or inhalation of contaminants by providing an alternate water source for drinking, cooking and bathing/showering.

3 Numerous comments during the public meeting addressed the effects that the site was having on the existing municipal wellfield and the current quality of the municipal supply (i.e., is the present source safe to drink?).

Agency Response: There is no evidence of any near term impact on the Honey Brook Borough Water Authority's water supply from contamination originating from the site. The municipal supply is regulated under the Safe Drinking Water Act (SDWA) and is routinely sampled and tested to ensure compliance with all applicable drinking water regulations. EPA will be conducting an areawide groundwater study to determine the rate and direction of contaminated groundwater migration off site and will advise residents of the findings as soon as they are available. A major focus of this study will be to determine if the municipal supply is threatened and what steps must be taken to prevent degradation of the municipal supply.

4. On a related issue, the question was raised regarding the direction of groundwater flow in the vicinity of the site and the effects of local quarrying operations on flow conditions.

Agency Response: Groundwater flow in this area is complex due to existence of varying geologic features underlying the site. The forthcoming groundwater study will be designed to better characterize the hydrogeologic setting so that an accurate portrayal of groundwater conditions can be developed and appropriate measures implemented to remediate groundwater in the area. Currently, it appears that in general, groundwater in the vicinity of the site flows from the northwest to southeast, following the topography of the area. Any effects caused by blasting at local quarries have not been documented presently, but will be examined as part of the groundwater study.

5. Questions arose about the time to implement the measures outlined in the Proposed Plan.

Agency Response: EPA hopes to extend the waterline and provide connections to affected residents within one year of signing of the Record of Decision. The groundwater study would be conducted concurrently with design of the waterline extension to determine what residents will be included in the service area. Overall, the remedial action is estimated to require 24 to 36 months to implement from the time that the Record of Decision is signed and a contractor is selected to initiate final design of the action.

6. Several commentators asked about the residential well sampling program. Specifically, residents wondered how homes were selected for sampling and how far along Quarry Road were residences sampled?

Agency Response: Several rounds of residential well sampling have been conducted by PADER in past years. Attempts were made to include all homes in the general vicinity of the site. Many times repeated attempts were made with local homeowners to sample on specific dates, but due to varying reasons these contacts were unsuccessful. In general, most of the homes believed to be affected were sampled and the residents provided with the results. The upcoming groundwater study also will include another

round of residential well sampling and local residents will be contacted regarding specific dates that sampling activities will be performed.

7. One commenter expressed concern regarding the groundwater study and the potential for the installation of additional monitoring wells to introduce contaminants into currently unaffected aquifers, most notably the Honey Brook Borough Water Authority wellfield aquifer.

Agency Response: Installation of additional wells likely will be necessary to adequately characterize groundwater conditions in the area. Every effort will be made to drill and install wells in an environmentally safe manner, thereby minimizing the potential for introducing contaminants into any unaffected aquifer in the area.

8. The question was raised about the potential for the ongoing operation to continue to affect groundwater and other environmental media in the area. Of primary concern is the possible effects of contaminants (gasoline, oils, lubricants, antifreeze, etc.) from the large number of automobiles currently present onsite. Also, even if these vehicles are moved to another location, won't they still pose a threat to the environment?

Agency Response: Yes, it is likely that contaminants typically associated with abandoned vehicles such as gas and oil could be adversely affecting groundwater. During the remediation vehicles located in the area to be capped will have to be removed before the cap is installed. EPA and PADER recognize that simply moving the vehicles will not eliminate the problem of continued contributions to groundwater contamination. However, it will be the responsibility of state and local agencies to enforce zoning codes and laws governing any ongoing operations that are outside of the areas to be remediated under the Proposed Plan.

9. The question arose regarding sampling of the contents of the landfill during the Remedial Investigation. In addition it was noted that a discrepancy was reported in the local newspaper about the size of the landfill (property was reported to be 8 acres, landfill cap size in the Feasibility Study is 5.2 acres).

Agency Response: Sampling of the landfill contents was not performed during the Remedial Investigation due to a number of factors including the inability to gain access to most of the landfill surface because of the extensive amount of junked vehicles, appliances and other materials covering most of the area. However, before final design of the landfill cover proceeds, a predesign investigation will be conducted. This investigation will include sampling of the landfill contents to better define the types of wastes contained therein and the extent of the landfill (i.e., how much of the property actually comprises the landfill verses areas that contain junked vehicles and other materials, but are not underlain by landfilled materials).

10. One commenter noted that the Proposed Plan calls for a 120,000-gallon storage tank as part of the alternate water supply and inquired as to whether this would be sufficient to handle peak demand for the residents to be served.

Agency Response: The alternate water supply system described in the Proposed Plan represents the initial engineering estimate and is based on preliminary calculations for sizing the storage tank. During the final design stage, when the number of homes to be serviced is determined, peak demand requirements will be recalculated and the size of the storage tank revised as necessary.

11. The question of whether it is safe to grow food in the ground overlying contaminated groundwater was raised in a letter received by EPA.

Agency Response: Due to the nature and level of contaminants found to date in the groundwater, it is very unlikely that crops would uptake and concentrate contaminants to a level that would be considered harmful for consumption. Moreover, the depth to groundwater in the affected area precludes the possibility that plant root systems are in direct contact with contaminated groundwater.

Public Participation Process

1. At the conclusion of the initial portion of the public meeting the question was raised as to whether copies of the public meeting transcript will be made available to Honey Brook Borough and Honeybrook Township supervisors for comment.

Agency Response: Yes, transcripts of the public meeting will be included as part of the Administrative Record and will be placed in the public information repository at the Honey Brook Public Library.

Cost/Funding Issues

1. Several people attending the public meeting asked why the current site owner shouldn't pay for cleanup of the site and be responsible for water use bills associated with the waterline extension.

Agency Response: Current activities associated with investigating the site have been funded with CERCLA monies. However, enforcement activities are going on concurrent with the investigation, therefore responsibility for payment of the remedial action and maintenance items has not yet been determined. EPA identifies Potentially Responsible Parties (PRPs), and requests that they undertake the selected remedial action. If the PRPs do not choose to participate in the cleanup, EPA attempts to recover costs and has the statutory authority to assess a penalty on the PRPs of up to three times the cost incurred.

2. A commenter asked if the cleanup is funded with taxpayer's money.

Agency Response: Funding for the Superfund Program primarily is generated from taxes levied on the petrochemical industry (87 percent). Only 13 percent of funding used under Superfund comes directly from general revenues collected via personal income taxes.

Enforcement

1. Many people attending the public meeting were concerned about how future pollution incidents could be prevented at the site and at other properties owned by the site owner.

Agency Response: Prevention of future environmental pollution incidents at the site primarily is the responsibility of state and local enforcement agencies. Persons attending the meeting were provided with the 24-hour telephone number of the local PADER office so that observed incidents or problems could be reported to the appropriate officials and action taken in a timely manner.

2. Several people inquired as to why the situation at the site has been allowed to continue for so many years apparently without attempts by enforcement agencies to correct and/or cease disposal operations.

Agency Response: PADER has undertaken a number of enforcement actions over the years, but has been unsuccessful in persuading the property owner to conduct operations in accordance with environmental regulations either voluntarily or through legal action. Such enforcement actions will continue to be pursued either through negotiations or via the courts.

3. During the public meeting a number of people expressed concerns about other possible operations in the area that may be contaminating the environment.

Agency Response: State enforcement officials requested that suspected polluters be reported to them and that appropriate followup actions will be taken.

4.0 RESPONSES TO POTENTIALLY RESPONSIBLE PARTY'S COMMENTS

The following are paraphrased comments and agency responses to the May 18, 1990 letter from Mr. Stephen W. Miller, Attorney, with Clark, Ladner, Fortenbaugh & Young representing Mr. Ernest Barkman, owner of the Welsh Road/Barkman Landfill on the National Priority List (NPL) in Honey Brook Township, Chester County.

1. EPA and PADER have not formally requested comments on the Public Health Evaluation Report.

Agency Response: Contrary to this comment, the Environmental Protection Agency (EPA) and Pennsylvania Department of Environmental Resources (DER) have invited comment on the Administrative Record, as well as the Proposed Plan. Included in the Administrative Record is the "Final Public Health Evaluation - Welsh Road/Barkman Landfill Superfund Site, Chester County, Pennsylvania" prepared by Baker/TSA, Inc., dated January 1990, (Public Health Evaluation). This Public Health Evaluation replaces Chapter 6, Risk Assessment, in the "Remedial Investigation Report for the Welsh Road/Barkman Landfill Site, Honey Brook, Pennsylvania" prepared by SMC Martin, Inc., dated December 8, 1988 (RI). Also replaced by the Public Health Evaluation are any conclusions which were developed in the RI, based on the previous Risk Assessment in Chapter 6. As work began on the Feasibility Study it became evident that the Risk Assessment did not address all of the exposure pathways and exposure receptors, as required by the EPA guidance documents. A thorough Public Health Evaluation, following EPA guidance, was necessarily conducted by Baker/TSA in order to appropriately define the remedial action objectives, a preliminary stage in the development of Remedial Action Alternatives. The Public Health Evaluation was developed using samples collected during the RI, but it was also supplemented with data collected by PADER during April/May 1989. This Public Health Evaluation was the decision-making document used for the purpose of evaluating human health risk, and conclusions of this Public Health Evaluation assert that there is a significant risk to human health posed by soils and groundwater in the vicinity of the Welsh Road/Barkman Landfill NPL Site. The preliminary risks posed by the site are through contaminated drinking water supply, and the landfill soils and sediments. The primary routes of exposure are through dermal contact, inhalation and ingestion of either the soils or groundwater.

2. Based on results of the RI, the site does not pose risks to public health or the environment and, therefore, the site should be removed from the National Priorities List (NPL).

Agency Response: The results of the investigation and conclusions from the Public Health Evaluation do reach the conclusion that there is a significant threat to human health. As stated in 1. above, the Public Health Evaluation was used for the decision making. The listing of this site on the National Priorities List "NPL" was based on the Hazardous Ranking Score available in EPA's docket. The RI was not used to list the site on the NPL.

3. Previous PADER inspections indicate that the landfill was used solely to dispose of municipal and residential refuse and currently the property is operating as a licensed junkyard.

Agency Response: The comments neglect to mention that the inspection reports document numerous violations of the PA Solid Waste Management Act, for which fines were levied against Mr. Barkman for unacceptable landfill practices. Additionally, in 1973, criminal charges were filed against Mr. Barkman by DER, with respect to operating a waste facility without a permit, and for the burning of solid waste at the site. In 1976, the Department requested that Mr. Barkman file a closure plan, and properly cover the site in accordance with State Regulations. The closure plan was approved in December 1976; however, Mr. Barkman has failed to properly close the site, and landfilling practices have continued at the site to date. Further inspections after 1977 by EPA and DER document the presence of hazardous substances on site. Observations of these substances were evident during drum sampling on site, as well as during the sampling of residential and monitoring wells in the site vicinity.

Mr. Barkman has never been issued a permit for landfilling at the Welsh Road/Barkman NPL Site. The junkyard license issued by Pennsylvania Department of Transportation (PADOT) is for visual purposes, and requires primarily that a visual barrier be maintained between the junkyard and Pennsylvania's highways. The license is not an authorization to violate state and federal environmental laws, and Mr. Barkman has continued to violate the PA Solid Waste Management Act and Federal Air Quality Regulations.

4. No documented evidence was presented in the RI to indicate that hazardous substances as defined under CERCLA have been disposed of at the site, nor has any funding been presented that supports the allegation that a "release" of hazardous substances has occurred at the site.

Agency Response: Numerous inspections were conducted at the site through the early 1980s by the Chester County Health Department, PADER and the Federal EPA. As part of these investigations, monitoring wells were installed around the landfill by DER and sampling was conducted on these wells. The comparison of sampling data from residential and monitoring wells shows that contaminants present in the wells were and still are in the higher concentration at the toe of and near the landfill, and decrease in concentration with distance from the landfill. Further, the 1984 sampling of drums on site indicate the presence of toluene, ethylbenzene, 1,1-dichloropropane, chlorobenzene and methylene chloride and provided evidence that Mr. Barkman was continuing to handle hazardous materials on site, without a permit. Based on these observations, the landfill was indicated to be providing the source for groundwater

degradation in the vicinity of the site, and the site was placed on the NPL list in September 1984.

5. The RI sampling plan was deficient in that no sampling of the contents of the landfill was conducted. This is in direct contradiction to investigatory procedures outlined in the NCP.

Agency Response: The NCP does not direct EPA on where to collect discrete samples. In numerous sites it is not the accepted procedure to sample through the landfill material due to the possibility of introducing another flow path for the contaminants to migrate through the waste material into the underlying natural environment. There is the additional complication of Barkman having an ongoing junkyard operation on the site. The task of the RI was to characterize the landfill, not the junkyard. Also, Mr. Barkman did not agree to allow sampling on the property until an access order was obtained.

Appropriate procedures and techniques were used in developing and carrying out the sampling and analysis for soils, sediments, surface water and groundwater while investigating the site for the RI. Groundwater monitoring wells were located based on review of existing hydrogeologic data, aerial photography evaluation, fracture trace analysis, and field accessibility in order to locate downgradient locations as well as provide an off-site location not influenced by the site for comparison. Similarly standard procedures were used to locate appropriate sample locations for sediment and soil samples.

Direct sampling of the landfill materials will be completed during the design of the landfill cap. Such sampling and analysis is typically deferred until remedial design due to health and safety considerations for the nearby residents. The additional complication induced by Barkman's current junkyard operation on top of and beyond the landfill served to defer this direct sampling to the design phase.

6. The RI field studies failed to delineate the landfill's actual boundaries as directed by the NCP.

Agency Responses: The RI served to assess the physical characteristics of the site; however, an accurate definition of the landfill boundaries was deferred until remedial design, due once again to the complication posed by the junkyard activities. Proper closure of the landfill was never completed by Mr. Barkman; therefore, the landfill proper has continued to expand in size. Mr. Barkman has proceeded to operate his junkyard contiguous with and on top of the previously existing landfill, thus making the limits of the landfill difficult to define. The size of the debris, waste and construction material on site has continued to grow even during the time of the RI. Current operations attest to the fact that the landfill operations have continued to date and, therefore, the landfill boundaries have continued to expand.

Two drawings attached to Mr. Miller's comments dated 1981 and 1985 show the landfill as a portion of the property. The second drawing, 1985, shows the location of seep and drums sampled were outside the area designated by the preliminary site 1981 map as the landfill. The preparation of those sketch maps was not done with the availability of accurate site topographic mapping. The limits of the landfill shown were determined by a short field visit in 1981. Mr. Barkman has continued to conduct all sorts of disposal, burning and junkyard activities on this and adjacent property. Upon the supposed ceasing of landfill operation in 1976, junkyard activities began and continue to the present.

The continuous movement of materials on the property and adjacent properties prevent accurate measurement. The 5.2 acres used for the cost estimate are from what appeared to be the landfill area regardless of the junkyard material as of July 1989 when the consultant, Baker/TSA conducted a field investigation for the "Feasibility Study Report for the Welsh Road/Barkman Landfill Site" prepared by Baker/TSA, Inc. This area was based on best engineering judgment to prepare an adequate, conservative cost estimate. The 5.2 acres was established to develop costs for comparison of the different alternatives. An accurate landfill delineation based on topographic mapping and sampling of the landfill material will be completed during the design phase.

7. Groundwater flow characteristics have not been adequately defined to date and several wells, including site monitoring wells that showed contamination are hydraulically upgradient from the landfill.

Agency Response: The Groundwater Unit will be further investigated during the Second Operable Unit (OU). Data gaps in the groundwater sections will be addressed in the Second Operable Unit and subsequent studies.

The locations of the monitoring wells for this RI were selected for numerous reasons. MW-1 should be a logical place for a monitoring well considering contamination had been detected in a residential well, No. 23, near the location of MW-1. The presence of pumping well, such as a residential well, can induce the movement of contaminated groundwater toward the well. This can direct groundwater movement in a direction different than the naturally occurring groundwater flow.

8. The RI fails to adequately explain the rationale for the selection of the background soil sampling location (SS-1).

Agency Response: The location of SS-1 is logical location for a background soil sample. A background sample is typically located in an area off site that is not directly influenced by site conditions (in this case the landfill material and the junkyard).

9. None of the soil samples collected during the RI can be related to specific areas of the landfill since the RI did not delineate landfill boundaries.

Agency Response: The RI soil samples locations were selected in areas chosen to represent or define the extent of contamination as best as could be done with the debris and junkyard materials on the site. The conditions on Barkman's property at the time of RI sampling can no longer be observed due to significant changes as a result of ongoing operation of the junkyard. Also, Mr. Barkman was opposed to any sampling on his property. An access order was necessary to obtain access to his property.

10. The locations of the surface water and sediment samples collected during the RI are not representative of conditions on or in the landfill.

Agency Response: Surface water and sediment samples were taken in areas were surface water and sediments existed. It is standard procedure to sample up and downgradient for comparison purposes and to define the extent of contamination and evaluate impacted media for remedial screening and selection. Location of the surface water and sediment samples are site specific, and they are determined by the physical characteristics that exist at the site at the time of the sampling (i.e., visual evidence of contamination, drainage paths that exist at the time of the sampling).

11. The commenter questioned the validity of the RI monitoring well locations to represent groundwater contamination emanating from the landfill.

Agency Response: It is standard procedure to locate monitoring wells in areas upgradient or off site not influenced by the site and downgradient from a contamination source. Upgradient wells generally characterize the uncontaminated aquifer. Downgradient wells are used to evaluate migration of contaminants (concentration and flow rates) for the purpose of assessing risks and screening remedial alternatives. Additional wells are then placed in order to assist in evaluation of groundwater extraction and treatment as a cleanup method, when appropriate. The selection of locations for the monitoring wells for this site used proper hydrogeologic procedures and techniques such as aerial photo interpretation, fracture trace analysis, and available geologic information of the site before the monitoring wells were installed.

As discussed previously, monitoring wells are not usually constructed through landfill materials because of health and safety considerations (drillers and nearby residents). The RI/FS goal is to define and evaluate the problems existing in the contaminated media, the groundwater, surface water, sediments and soils to consider cleanup approaches.

The second OU will expand on the information and data generated during this RI and will then define the full extent of the groundwater contamination and screen alternatives to address the groundwater contamination.

12. The RI Risk Assessment states that risks to human health and the environment are negligible and thus no remedy is required.

Agency Response: As discussed earlier in 1., the Risk Assessment used for this site was the Public Health Evaluation conducted by Baker/TSA. Baker's work meets EPA requirements and was used for decision-making purposes during the FS, for the development of the Remedial Action Objectives.

13. The RI results for metals were interpreted improperly and inconsistently because values that were within the normal range for uncontaminated soils were considered as "contaminants" while other metals exceeding background were not addressed.

Agency Response: The metals detected in the soils, arsenic, chromium, copper, lead and zinc were elevated with respect to background and regional soil concentrations. The levels detected for the metals listed as contaminants were shown to pose an unacceptable health risk in Baker's Public Health Evaluation at the levels detected. Again refer back to 5. for the discussion on sampling. The elevated metals on Bellman's property also were detected off site. Generally, the samples close to the property and landfill had high metal concentrations, while samples collected at distance from the site had lower concentrations. This shows a pattern of contaminants occurring near the site.

14. The occurrence of organic compounds in area groundwater cannot be attributed to the landfill since no sampling of the landfill contents has been performed, nor have the landfill boundaries been established in order to construct a cap.

Agency Response: The landfill is logically the source of the area groundwater contamination, since wells located in the proximity and downgradient of the landfill

are more highly contaminated than those located distant from the landfill. It is logical to identify the only operation in the area as the source of the contamination. There were drums found on site and the residential wells samples showed similar chemical characteristics. The RI adequately defined the landfill as the source of contamination The landfill contents will be additionally characterized during the remedial design. The hydraulic relationship is to be fully defined during the work on the Second OU Cap construction will be in accordance with results of the data obtained during site characterization.

15. No discernible plume of groundwater contamination has been defined, with only infrequent detection of contaminants documented at many of the residential wells.

Agency Response: Pumping of the local residential wells has an effect on the natural groundwater movement. The residential wells draw groundwater from various directions. The contaminated water moves toward the wells as pumping takes place. The Second Operable Unit as discussed above will further define the groundwater environment and the limits of contamination.

16. The FS did not further define conditions at the site and ignored the RI Risk Assessment findings.

Agency Response: The FS is not done to independently assess the landfill. The FS screens the Remedial Alternatives based on the RI data and the Risk Assessment, (Public Health Evaluation). Baker's Public Health Evaluation determined unacceptable risks posed by the ingestion of, inhalation of, and dermal contact with contaminated landfill soils, and risks posed by the ingestion and/or inhalation of contaminated groundwater.

17. The FS arbitrarily assumed an acreage of 5.2 for the landfill boundaries without sufficient information to make this judgment.

Agency Response: Refer to the determination of the acreage of the landfill discussion in 6. As stated before, the 5.2 acres was an estimate for costing alternatives. This estimate was based on best engineering judgment during a field investigation July 1989. During the design phase the landfill will be defined and the estimate revised accordingly. Mr. Barkman's continuing disruption of the site with salvage material and other debris causes uncertainty as to the landfill size.

18. The FS confirms that no sampling of the landfill wastes has been conducted.

Agency Response: As discussed above in 5., sampling of on-site waste will be done during the design phase.

19. The FS does not integrate information from the RI report as required by the NCP.

Agency Response: The FS was done based on results from the RI sampling and data gathering. The Public Health Evaluation was done using results from the RI sampling and data gathering. Therefore, the FS is integrated with the site characterization.

20. The FS emphasizes the concern that groundwater in the area has not been adequately characterized.

Agency Response: As stated previously, the groundwater flow and limits of groundwater contamination will be more accurately defined when additional data are gathered during the Second Operable Unit investigation.

21. The FS discusses potential risks to receptor populations rather than actual risks and, does not provide a water balance to indicate the potential of the landfill to generate leachate.

Agency Response: The RI showed the presence of elevated levels of hazardous substances. The Public Health Evaluation showed that these levels pose an unacceptable risk to receptors by several pathways. The selection of the Remedial Action Alternative is based on protecting against existing and potential risks in accordance with EPA guidance. The immediate threat of residential well contamination was addressed by rapid response (i.e., bottled water). The remedy selection through the FS process screens alternatives for long-term effectiveness. This pertains to the protectiveness of the remedy for both actual and potential future problems. The second Operable Unit (OU) or groundwater study will evaluate the potential for the landfill to generate leachate.

22. No justification is provided in the FS to determine that 5.2 acres is an appropriate size for a landfill cap.

Agency Response: This again discusses the question of the acreage of the landfill. The selection of the acreage used, 5.2 acres was discussed in a number of sections above.

23. Since the RI Risk Assessment does not identify any risks posed by the site, there is no justification for selecting a landfill cap.

Agency Response: The Public Health Evaluation showed unacceptable risks. It was discussed in 1. and 16. above that the Public Health Evaluation replaces Chapter 6, the Risk Assessment portion of the RI.

24. The selection of the proposed remedy did not give sufficient weight to the cost criterion (one of the nine criteria required to be evaluated under the NCP).

Agency Response: Based on the findings of the RI and using the nine criteria required under the National Contingency Plan for the FS, Alternative 4 is the best alternative. Cost is a balancing criteria and must be weighed against protectiveness, permanence and the other criteria. Alternative 4 may be more costly than Alternative 3, but offers the highest level of protection for human health and the environment. Alternative 3, while less costly, is not protective, nor does it provide permanent relief from exposure to the contaminated groundwater and soils. The people will be exposed to inhalation during showering and air exposures from the windblown dust from the surface of the landfill.

25. The Public Health Evaluation report is flawed because it is based on data from the RI, which itself is defective due to study design deficiencies; and, because of conservative assumptions inherent to this type of evaluation.

Agency Response: As stated previously, the Public Health Evaluation is part of the RI/FS and the public record on this NPL Site. The Public Health Evaluation is not flawed. The EPA guidance was utilized for conducting the Risk Assessment in the Public Health Evaluation. The statement on "conservative assumptions" as to the extent of human exposure and the sources of uncertainty in any risk assessment are

standard caveats that are included in any good risk assessment. The information used is the best available under present technology. It is standard to consider health risks conservatively in order to assure the protection of public health.

26. The commenter summarizes his letter by indicating that there is no factual basis for implementing a remedial action at the Welsh Road/Barkman Landfill Site and that the site should be delisted from the NPL.

Agency Response: EPA stands by its position that Alternative 4 is the best choice for the contamination that exists from the Welsh Road/Barkman Landfill NPL Site.

As stated in the response to comment number 2, the results of the site investigation, and the conclusions from the Public Health Evaluation do reach the conclusion that there is a significant threat to human health posed by the site. These conclusions thus justify the selection of remedial action for the Walsh Site.