108569

RECORD OF DECISION
LINDANE DUMP SITE

DECLARATION

SITE NAME AND LOCATION

Lindane Dump Site
Harrison Township, Allegheny County, Pennsylvania

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action plan for the Lindane Dump Superfund Site (the Site) in Allegheny County, Pennsylvania, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, (CERCLA), 42 U.S.C. §§ 9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300. This decision is based upon and documented in the contents of the Administrative Record. The attached index identifies the items which comprise the Administrative Record.

The Commonwealth of Pennsylvania concurs with the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

The remedial action plan in this document is presented as the permanent remedy for controlling the ground water contamination at the Site. This remedy comprises the following components:

1. Implementation of a combination clay and soil cap and multilayer cap on approximately 14 acres of the upper portion of the Site and approximately 4 acres of the lower portion of the Site to reduce the infiltration of water into the fill area, which in turn will reduce the migration of contaminants from the fill into the

aquifer of concern.

2. Upgrading the existing leachate collection and treatment system to provide better treatment of contaminated leachate and shallow ground water with the long-term goal of returning the ground water to its most beneficial use.

3. Providing additional protection by implementing institutional controls and installing a security fence around the lower portion of the Site in conjunction with the new cap to restrict the use of the Site, to prevent any possible direct human contact with contaminants at the Site, and to protect the integrity of the cap by preventing any intrusion which could compromise the cap.

4. Monitoring ground water and implementing a Site maintenance program.

STATUTORY DETERMINATIONS

Pursuant to duly delegated authority, I hereby determine that the selected remedy is protective of human health and the environment, complies with Federal and State requirements that legally are applicable or relevant and appropriate to the remedial action, and is cost-effective as required under Section 121(d) of CERCLA, 42 U.S.C. § 9621(d). With respect to the principal threat at the Site, the contaminated ground water and leachate, the remedy satisfies the statutory preference, as set forth in Section 121(b) of CERCLA, 42 U.S.C. § 9621(b), for remedial actions in which treatment that reduces toxicity, mobility,or volume is a principal element. Finally it is determined that this remedy utilizes permanent solutions and alternative technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of the remedial action to ensure that human health and the environment continue to be adequately protected by the remedy.

Bruce P. Smith for — 3/31/92

Edwin B. Erickson
Regional Administrator
Region III

Date

TABLE OF CONTENTS

FOR

DECISION SUMMARY

RECORD OF DECISION
LINDANE DUMP SITE

DECISION SUMMARY

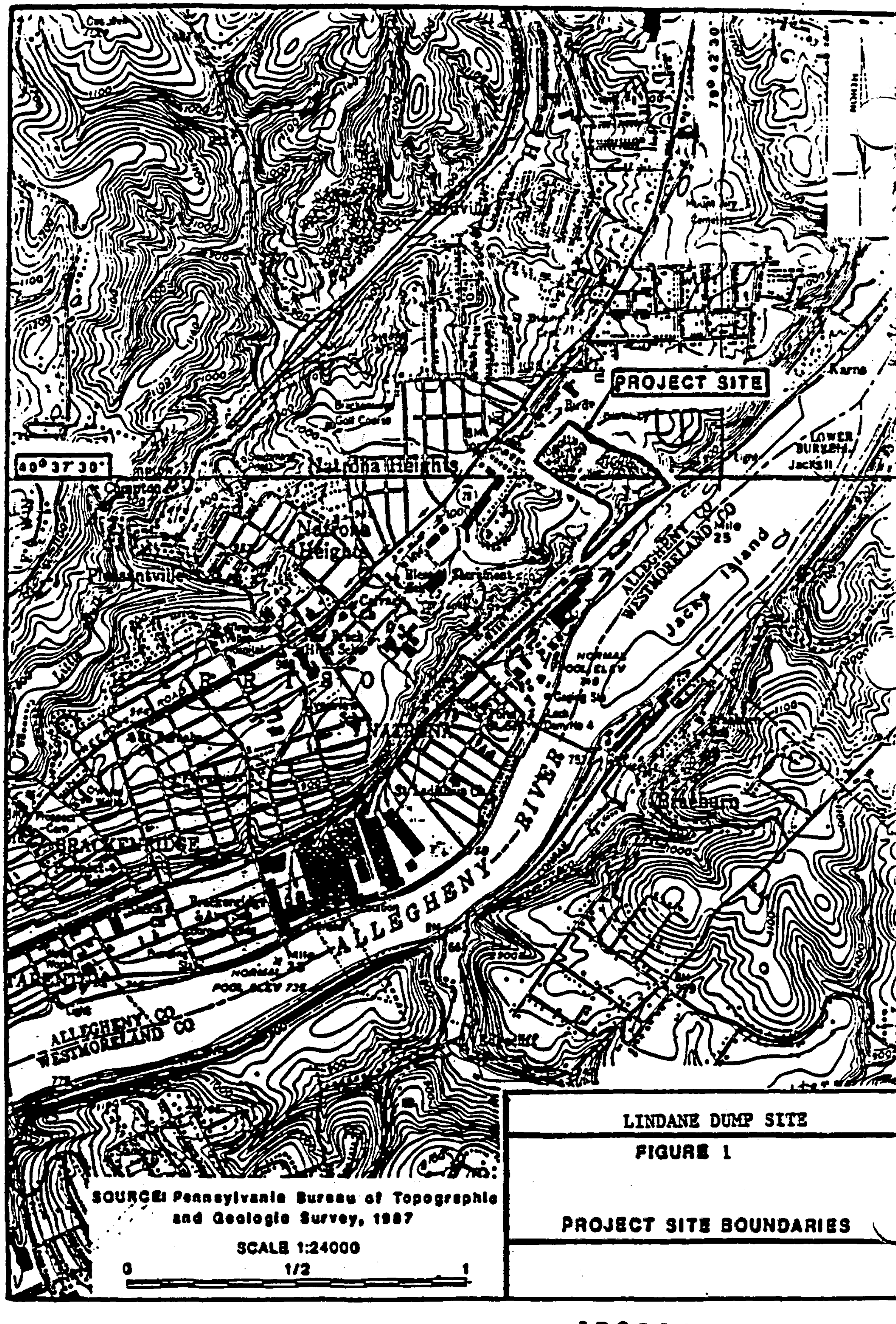
I. SITE NAME, LOCATION AND DESCRIPTION

The Lindane Dump Site is located in Harrison Township near Natrona, Pennsylvania, in the Allegheny River Valley (see Figure 1). Both Harrison Township and Natrona are located in Allegheny County on the northwestern side of the Allegheny River. The Site is located approximately at river mile 25, some 20 road miles northeast of downtown Pittsburgh. Land surfaces in this area are generally steeply sloping toward the Allegheny River.

The total Site area is approximately ± 61.8 acres. The Site can be described in terms of the upper project area and the lower project area. These areas are delineated on Figure 2. Alsco Community Park (designated as the upper project area) is a 14.3 acre recreational site owned and maintained by Harrison Township, Pennsylvania. This park is situated upon an area which, was formerly an industrial waste disposal site. Park facilities include a tennis court, baseball fields, picnicking and parking facilities. Residential areas are just north and east of the park. Population for Harrison Township was 13,252 in 1980, with a slight growth projected for 1990 (Allegheny County Department of Planning). The property immediately to the south of the Park (the lower project area) consists of approximately 47.5 acres, and is owned by the Allegheny Ludlum Corporation. Between the Site and the river is an industrialized area involving recycling and steel manufacturing. From the 1850 until the mid-1980s, portions of the 47.5 acre parcel of land (the lower project area) were also used for waste disposal. The land use zoning in the project area is a mix of residential, business, recreational, manufacturing and special use. Figure 3 shows the area zoning designations.

The majority of both the upper and lower areas have been graded and form terraces in the hillside extending from the residential areas, located north and northeast of the project Site, down to Karns Road. However, steeply sloping areas exist between the upper and lower project areas and along Karns Road in the lower project area.

The Site stratigraphy from top to bottom consists of an upper fill area made up of fill and waste materials mixed with terrace gravel deposits, an upper alluvium deposit which is intermixed with a series of thin coal seams, a layer of sandstones, shale and clay which are underlain by more coal



SOURCE: Pennsylvania Bureau of Topographic and Geologic Survey, 1987

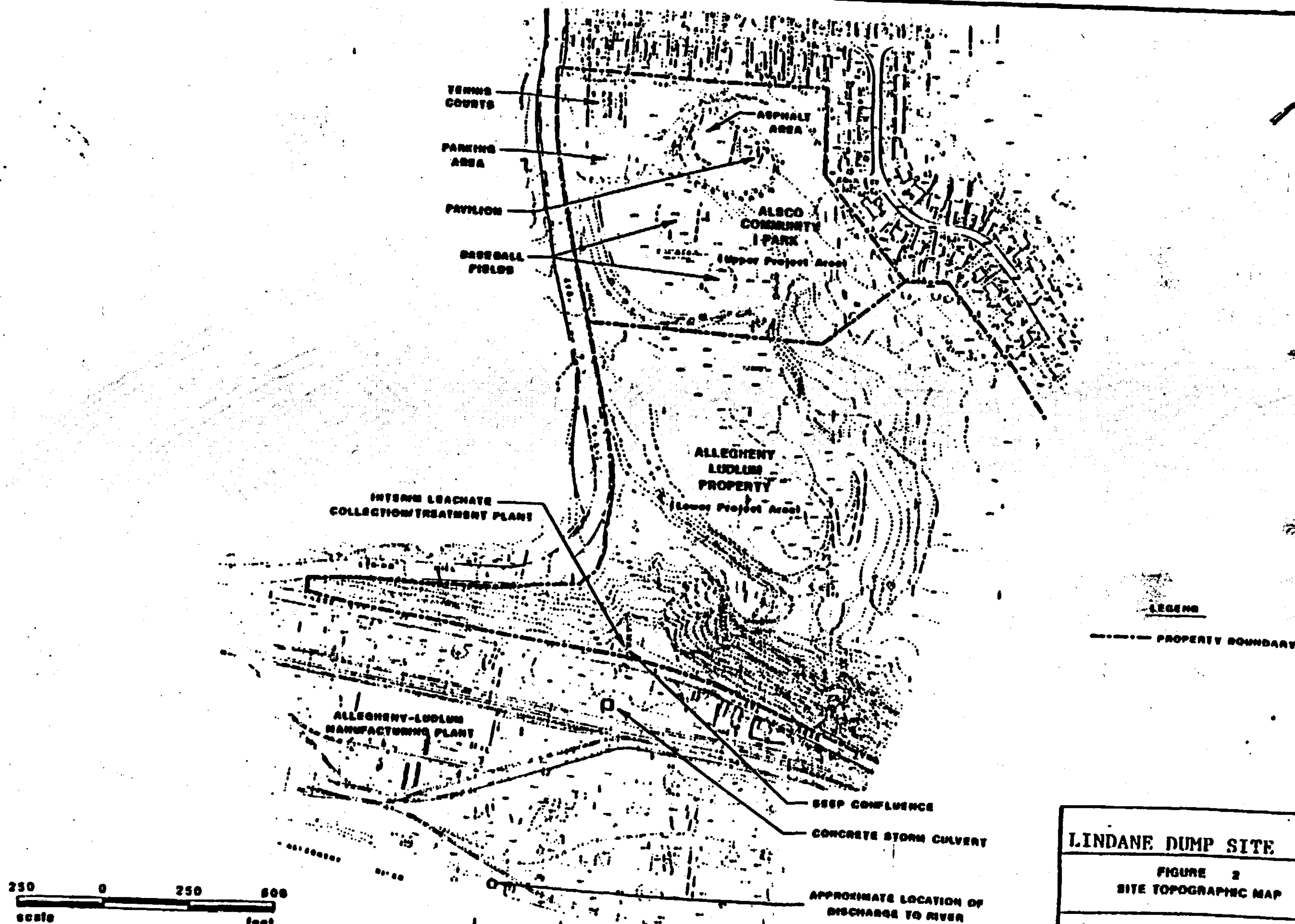
SCALE 1:24000

0 1/2 1

LINDANE DUMP SITE

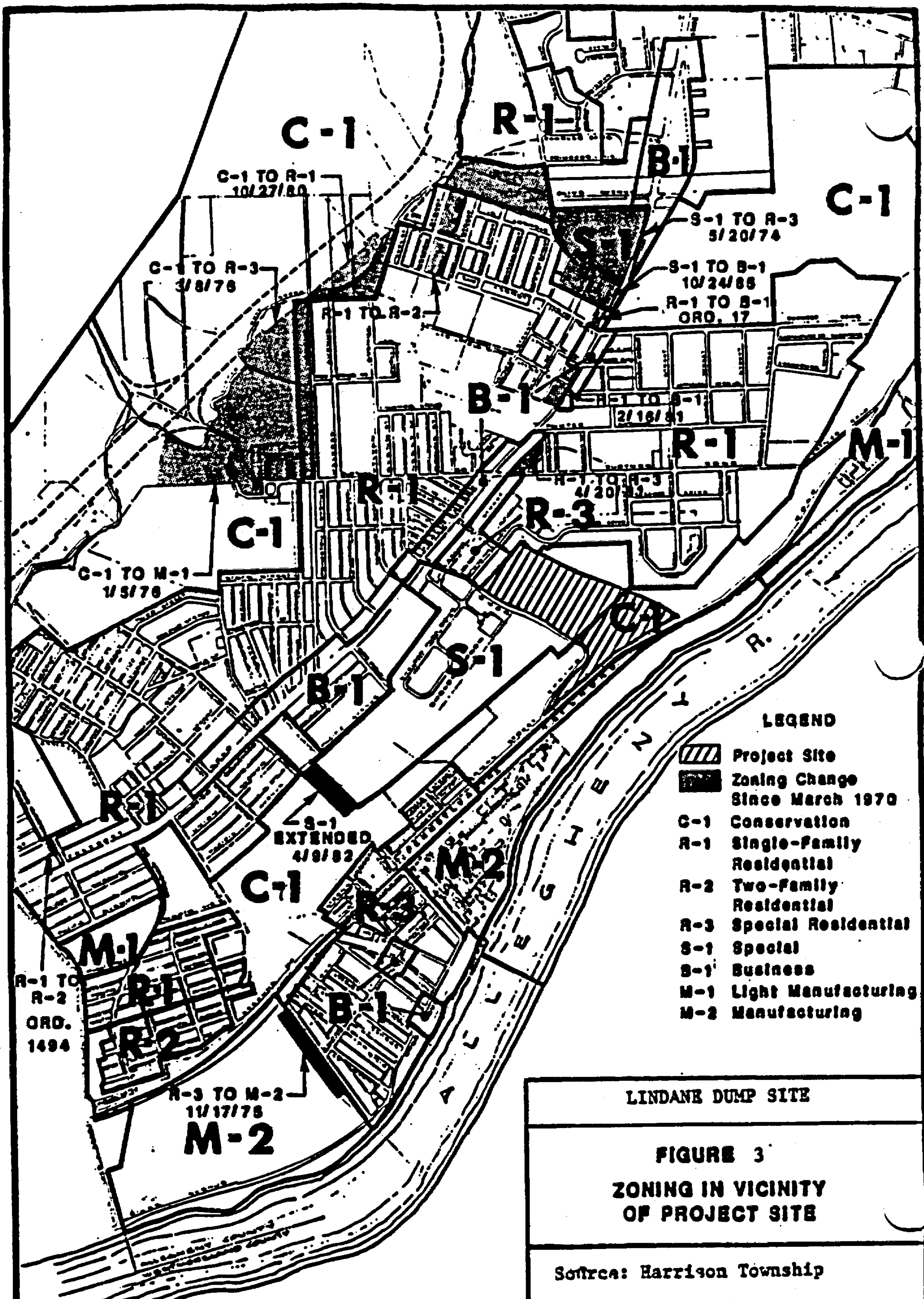
FIGURE 1

PROJECT SITE BOUNDARIES



LINDANE DUMP SITE

FIGURE 2
SITE TOPOGRAPHIC MAP



LINDANE DUMP SITE

FIGURE 3

ZONING IN VICINITY OF PROJECT SITE

Source: Harrison Township

deposits which were extensively mined during the 19th century and finally, a semi-confined bedrock zone which contains a number of discrete water bearing zones.

Ground water on the Site moves downward from the pop of the fill area into the alluvium zone and further into the coal mine and bedrock zones, while at the same time proceeding downgradient toward the Allegheny River. The coal mine intercepts a portion of the ground water flow and discharges at the base of the coal outcrop near Karns Road in the alluvium. A cross-section of the Site stratigraphy and ground water flow direction is shown on Figure 4.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

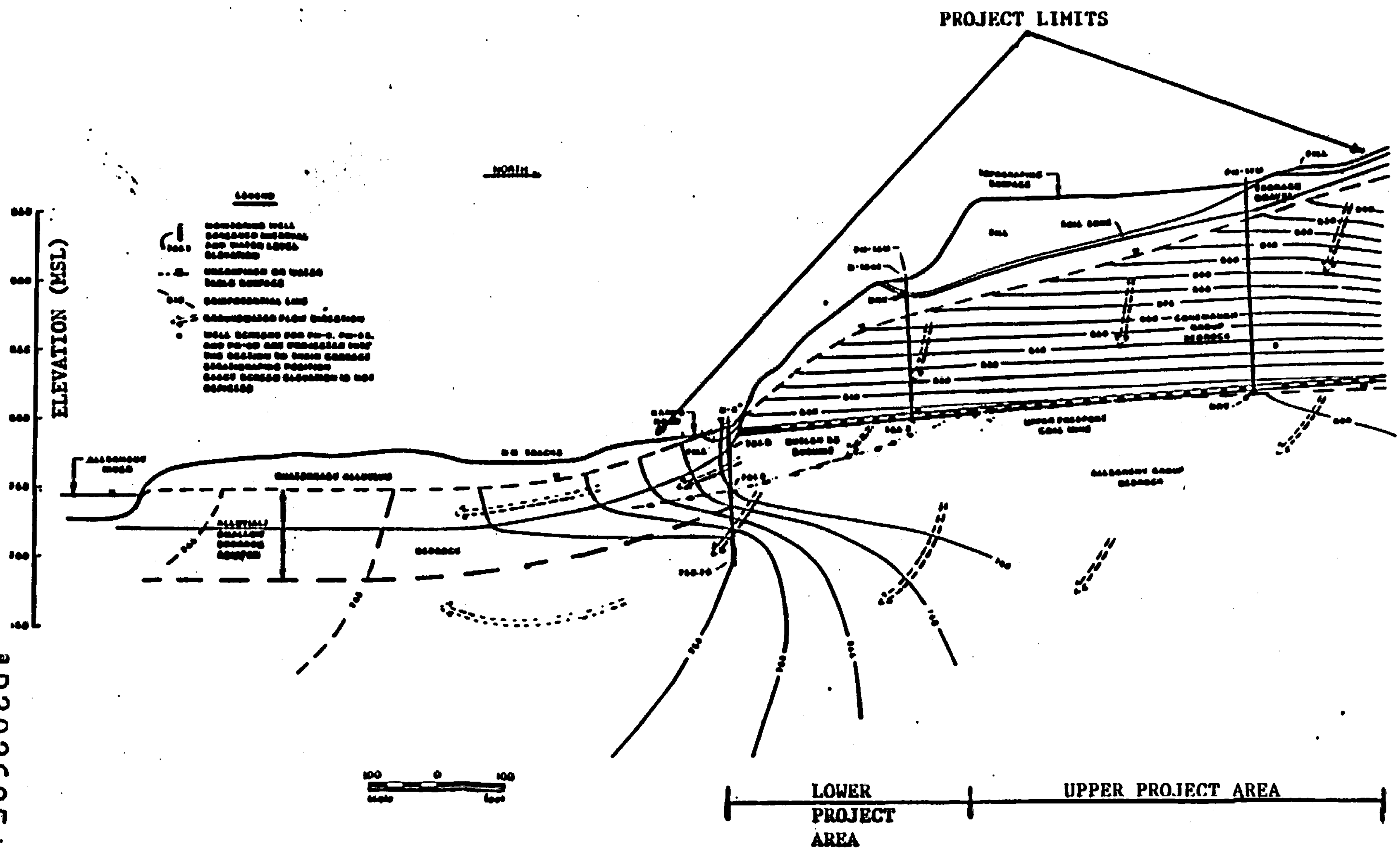
The history of waste disposal at the Site is summarized below:

In 1850, Pennsylvania Salt Manufacturing Company (the name was later changed to Pennsalt, then to Pennwalt and currently is known as Elf Atochem), began to manufacture chemicals in Natrona. The area beneath the Site was extensively mined for coal during the latter part of the nineteenth century and the first half of the twentieth century. Early topographic maps indicate that the land surface at the Site was originally comprised of a steeply sloping ravine which drained toward the Allegheny River. Tailings from the mining operations and cinders (bottom ash) from steam and electrical power generation at the plant were placed at the Site from the mid-1800s through the early 1900s. Sulfuric acid was one of the first chemicals to be produced at the Pennsalt plant. This operation was discontinued prior to 1920. The resultant cinder and slag from this operation were disposed at the Site. Cryolite ore was also refined at the plant and ore tailings were disposed at the Site.

Alumina from bauxite was also produced at the plant until 1940. The resultant red mud residual, a very fine-grained material with a high iron content (30 to 60 percent Fe_2O_3), is contained in the Site.

Between 1947 and 1959, various organic and inorganic products were produced at the Pennwalt plant, including hexachlorocyclohexane (technical BHC) which was produced at the plant between 1947 and 1955. Also, for a one-year period during this time interval, p,p'-dichloro-diphenyl-trichloroethane (DDT) was produced at the plant (production ceased in the early 1950s). BHC filter cake residuals containing lindane and waste sulfuric acid containing DDT were disposed on the Site.

From 1959 to 1965, the Lindane Dump Site was not utilized. No known filling operations occurred during this time period. In 1965, Pennwalt sold the property to Allegheny Ludlum. From the



LINDANE DUMP SITE

mid-1960s to the mid-1980s, Allegheny Ludlum continued to use the Site for disposal of wastes including construction wastes, industrial waste treatment plant sludge, coke, rubber tires, and slag.

During 1976 and 1977, the Alsco Community Park was constructed on the 14.3 acre tract, by Harrison Township on the upper Site area, which was donated to Harrison Township by Allegheny Ludlum in 1972. Park construction included grading the entire upper project area and placement of slag over portions of the graded area. In addition, fill material (from an unknown source) was placed and graded onto the areas of the present-day tennis courts and ball diamond areas. The Park facilities also include a sheltered picnic area and parking lot.

RESPONSE ACTIONS

In October 1981, the EPA proposed the Site on the National Priorities List (NPL) under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The NPL listing was promulgated in September 1983. Between 1980 and 1985, several investigations, monitoring events, and interim remedial measures were completed at the Site by the Pennwalt Corporation.

In 1985, EPA and the Pennsylvania Department of Environmental Resources (PADER) requested that further site investigations be conducted. Pennwalt was invited and agreed to implement the investigatory work. Specifically, EPA and PADER requested that a Supplemental Remedial Investigation and Feasibility Study (RI/FS) to supplement the previous remedial investigations, which were done by Pennwalt independently, be conducted for the Site, and that the results of all previous studies and remediation efforts be combined with this new project work in an RI/FS report.

In 1987, Pennwalt entered into a Consent Order (CO) with PADER to conduct a Supplemental RI/FS for the project Site. The CO also called for Pennwalt to comply with specified effluent limits for the interim leachate collection/ treatment system, which was installed in 1984. The Supplemental RI was completed in January 1990. The FS Report was completed in March, 1992.

During the course of the RI/FS, EPA undertook an exhaustive Potentially Responsible Parties ("PRP") investigation to determine those parties which would be responsible under CERCLA for undertaking the Remedial Design/Remedial Action ("RD/RA"). This investigation included reviewing documents in EPA, State and local governmental agency files, interviewing former and current employees of Pennsalt, Allegheny Ludlum and Harrison Township Water Authority, sending and reviewing CERCLA 104(e) information request letters, reviewing title search documents and researching corporate history and status. As of the issuance date of this ROD, EPA has identified several parties whom it believes to be PRPs for the Lindane Dump Site. After issuance of this ROD, EPA intends to issue Special Notice Letters to the parties currently identified as PRPs to invite them to enter into negotiations with EPA to conduct the RD/RA.

III COMMUNITY RELATIONS SUMMARY

In accordance with Sections 113 and 117 (k) (2) (B) (i-v) of CERCLA, 42 U.S.C. §§ 9613 and 9617, EPA, in conjunction with the PADER, issued a Proposed Plan to present the preferred remedial alternative. The Proposed Plan and the Supplemental RI and Draft FS reports were made available to the public in the copies of the administrative record maintained at the EPA Region III offices and at the information repository listed below:

Harrison Township Municipal Building
Municipal Drive
Natrona Heights, Pennsylvania 15065

EPA held a public comment period from December 17, 1991 to January 16, 1992 for the purpose of soliciting public participation in the decision process. As part of the public comment period, a public meeting was held on January 8, 1992 to present information and to accept oral and written comments and to answer questions from the public regarding the Site and remedial alternatives. A transcript of the meeting was maintained in accordance with Section 117(a)(2) of CERCLA, 42 U.S.C. § 9617(a)(2). Responses to the oral and written comments received during the public comment period are included in the attached Responsiveness Summary. This decision document presents the selected remedial action for the Lindane Dump Site, in Natrona, Pennsylvania, chosen in accordance with CERCLA, as amended by SARA and to the extent practicable, the National Contingency Plan. The decision for this Site is based upon the Administrative Record

An announcement of the public meeting, the comment period, and the availability of the RI/FS was published in the Valley News Dispatch, on December 17, 1991.

All documents considered or relied upon in reaching the remedy selection decisions contained in this Record of Decision are included in the Administrative Record for the Site and can be reviewed at the information repositories.

IV. SCOPE AND ROLE OF THIS REMEDIAL ACTION

There were no principal threats identified at this Site based on the EPA criteria (Principal Threats are those source materials considered to be highly toxic or highly mobile that generally cannot be contained or would present a significant risk to human health or the environment should exposure occur). The scope and role of this final remedial action is to address the MCL exceedences and the threat at the Site, which is the contaminated ground water and leachate. The source materials contained within the fill area are only considered to pose a low level threat due to their low concentration. The purpose of the cap is to further reduce the risk posed from incidental contact with any contaminants contained within the soil and to also reduce the migration of contaminants from the fill area into the ground water which in turn will reduce or eliminate the MCL violations in the ground water which now occur. A more detailed discussion is contained at Section IX. The upgraded treatment plant will result in the effluent meeting the new discharge requirements of the Commonwealth of Pennsylvania.

V. SUMMARY OF SITE CHARACTERISTICS

A. Regional Climate

Data collected from the weather stations in Pittsburgh provide the most complete data available for the Natrona Heights area. The climate in this area is humid continental modified slightly by the close proximity of the Atlantic Seaboard and the Great Lakes. Precipitation is well distributed throughout the year; during the winter months about one-fourth occurs as snow. The first snowfall usually occurs in late November and the last occurrence of snowfall is generally in early April. The annual rainfall amount is approximately 36.30 inches per year. The annual normal temperature for Pittsburgh region is 50.3 F. Rainfall intensity is projected to be 0.97 inches for a one hour, one year rainfall event and 5.13 inches for a 24 hour, 100 year event.

B. Surface Water Hydrology

Surface water bodies in the vicinity of the Site include the Allegheny River and two tributaries, Bull Creek and Little Bull Creek (See figure 5). The Allegheny River is the major surface water stream in the Natrona, Pennsylvania area. The river drainage basin upstream of Natrona (River Mile 24) encompasses 11,410 square miles River flow at Natrona is regulated by the Allegheny Reservoir, Chautaugua and Tionista Lakes, Union City Reservoir, Woodcock Creek, east branch Clarion River, Mahoning Creek, Crooked Creek, Yellow Creek, Conemaugh River, Loyalhanna Lakes, and fifteen smaller reservoirs. The average flow of the Allegheny river at Natrona for 47 years of record is 19,580 cubic feet per second (cfs). A maximum flow of 238,000 cfs was recorded on december 30, 1942. A minimum flow on record is 895 cfs on October 22, 1963.

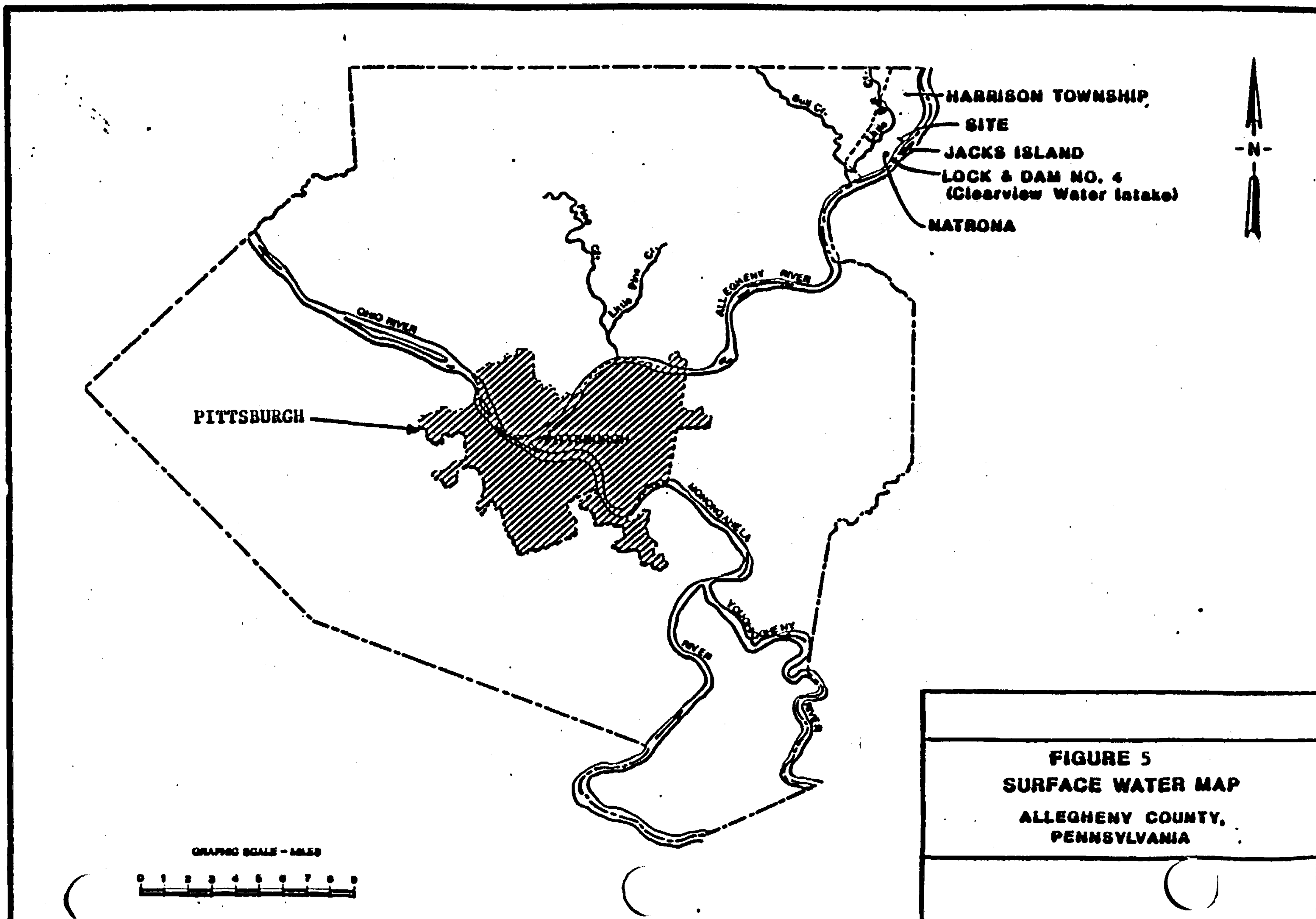


FIGURE 5
SURFACE WATER MAP
ALLEGHENY COUNTY, PENNSYLVANIA

The Allegheny River provides the public drinking water supply for Harrison Township as well as recreation and transportation for the area. Harrison Township Water Authority intakes an average of 1.8 million gallons of water per day from the Allegheny River immediately upstream from Lock and Dam No. 4, which approximately is 4000 feet downstream from the Site. Water treatment consists of prechlorination, sedimentation with alum and lime addition, filtration, fluoridation, and post chlorination. An estimated population of 13,000 is served with average water sales of 1.6 million gallons of water per day.

On Site Surface Water Drainage

The project Site can be divided into two areas: the Alsco Community Park (upper portion) and the lower portion (owned by Allegheny Ludlum). The majority of both areas have been leveled to form terraces in the hillside extending from the residential areas north and northeast of the project Site down to Karns Road.

In the upper portion of the Site, stormwater flows along natural drainage swales and manmade ditches from the residential areas to the north. The majority of the stormwater flow is diverted around the terraced portion of the park and eventually reaches a ditch along Spring Hill Road. The surface water runoff from a portion of Spring Hill road is conveyed through a former mine air shaft which transverses through a portion of the lower project area and discharges into a man-made channel at Karns Road. There is some runon over the flat areas of the park, part of which probably infiltrates while the remainder runs off. In the lower portion of the Site, the majority of the stormwater flows through natural drainage ditches and down the steep slopes to Karns Road. Some stormwater may also run onto the terraced portion of the lower project area and quickly infiltrates.

C. Geology

The project Site is situated in the Freeport Quadrangle in western Pennsylvania. Regionally, the geologic setting consists entirely of sedimentary rocks of Devonian to Pennsylvanian age, with unconsolidated alluvial deposits of Quaternary age bordering the Allegheny River and its tributaries. The prevalent lithology consists of shale and sandstone, with minor amounts of limestone, clay, coal, and impure iron ore. General stratigraphic horizons are fairly constant, but variability of the beds can be extreme in localized instances.

The individual units in the quadrangle include, in ascending order, the Portage group, the Chemung Group, and the Venango-Catskill group, all of Devonian age; the Pocono Series of Mississippian age; and the Pottsville Series, the Allegheny Group, the Conemaugh Group, and limited outcrops of the

Mononqahela Group , all of Pennsylvanian age. The Conemaugh Group outcrops extensively. Quaternary alluvial deposits, including fluvial and glaciofluvial terrace deposits and unconsolidated alluvium, outline the major rivers and streams that drain the area. The generalized geologic column for the area is shown on figure 6.

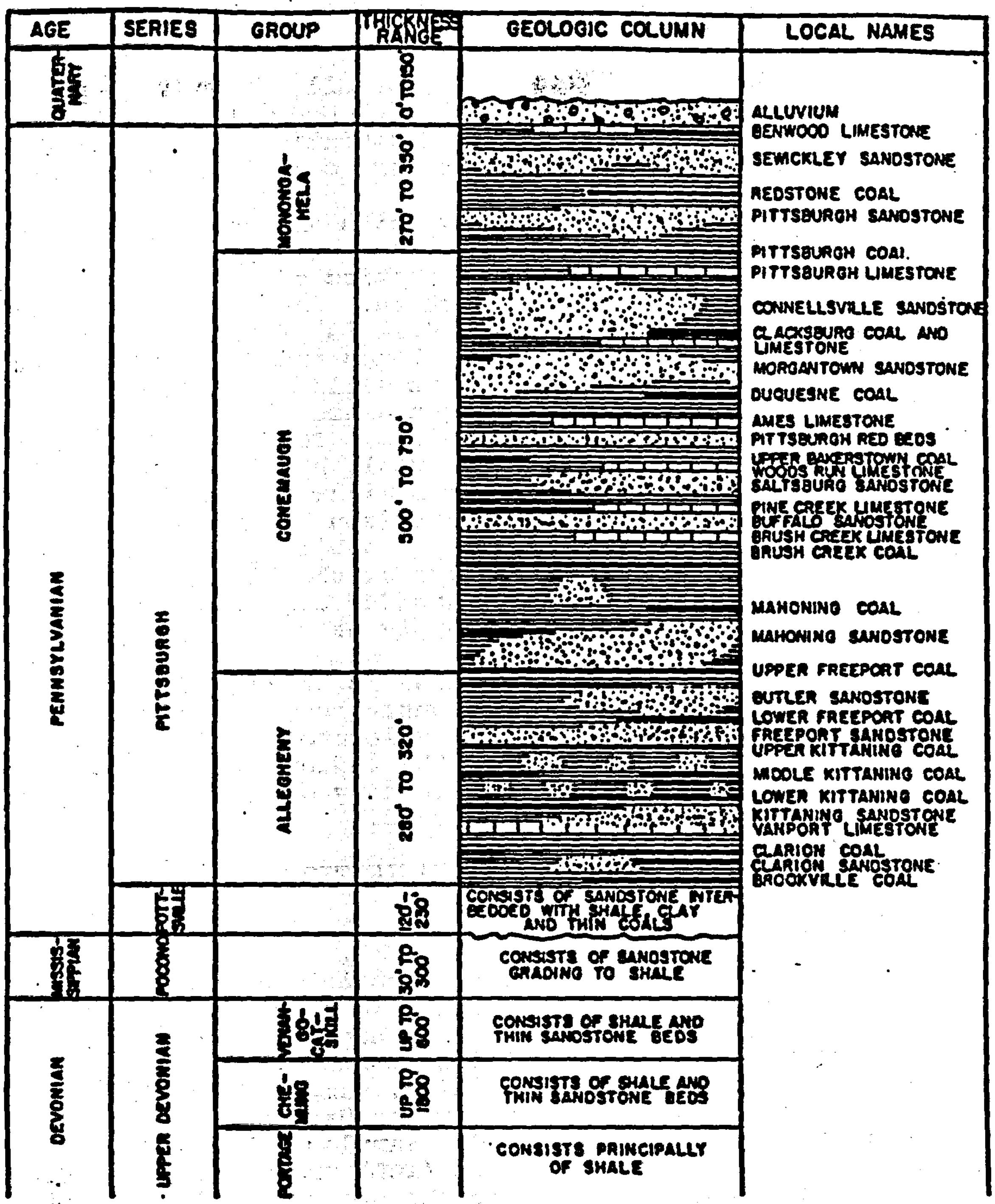
The unconsolidated Quaternary deposits in the area are identified either as recent alluvial deposits or as terrace deposits of glacial or non-glacial origin. It consists mainly of interbedded layers of sand, gravel, and clay in the stream beds and silty loam in the flood plains and river flats. Igneous pebbles can be found in the alluvium bordering the Allegheny River; these were transported from reworked glacial deposits. Terraces of fluvial origin can be found throughout the area, but are not clearly differentiated from the present alluvium. Gravel and sand are predominant in the terraces with local deposits of silt and sand.

Terraces of glaciofluvial origin lie approximately 200 to 250 feet above the alluvia flats. These terraces originated through the overloading of rivers and streams with glacial debris and subsequent deposition during the Pleistocene Era of glaciation. The glaciation covered the upper reaches of Pennsylvania but did not reach the Freeport Quadrangle area.

Underlying these unconsolidated sediments is Paleozoic bedrock ranging in age from Devonian to Pennsylvanian. The uppermost Pennsylvanian age units are the outcrops of the Monongahela group which are exposed only in the southeastern corner of the quadrangle. This group is made up entirely of sandstones and shales. The Conemaugh Group, the most extensively outcropping unit throughout the quadrangle is composed almost entirely of shales with numerous sandstone beds and limited coal and clay layers. The rock in this unit underlies the project Site. The Allegheny Group, underlying the Conemaugh Group, consists of shale, sandstone, limestone, and limited coal and clay. This unit outcrops in the precipitous cliffs found along major stream channels. The lowermost Pennsylvanian age unit is the Pottsville series, represented by sandstones with shale and conglometric interlayers. Each of the previous units is differentiated regionally by marker beds of coal.

D. Hydrogeology

The two ground water aquifers in the vicinity of the project Site are the stream channel alluvial deposits and the consolidated bedrock units. These aquifers are both class 2 aquifers, suitable for drinking water supply. Ground water occurs in the intergranular spaces in the alluvial deposits and is generally under water table conditions. In the consolidated



FROM HUGHES, 1933 AND WAGNER et. al., 1975

FIGURE 6

GENERALIZED REGIONAL GEOLOGIC COLUMN FOR THE NATRONA AREA

bedrock, the ground water is generally found in bedding planes, joints, fractures and interstitial openings and may be under either water table or confined conditions. The majority of the monitoring wells for this Site are contained within this unit.

The consolidated bedrock units are generally sandstones and shales but there are thin limestone beds, clay beds, and coal seams. The water-bearing properties of the consolidated bedrock vary with lithology and structure. The Conemaugh Group, directly overlying the Upper Freeport Coal is generally composed of shales, sandy shales and sandstones and have low permeabilities and yield little or no water at wells. Such ground water as occurs within this group is contained within bedding planes, joints, and interstitial openings. The Allegheny Group directly underlying the Upper Freeport Coal, has lithologic and hydrogeologic characteristics similar to the Conemaugh Group. There are no known wells in Harrison Township screened within this unit. The observed low permeability and the expected increase in salinity with depth of the Allegheny Group bedrock at the Site indicates the poor aquifer characteristics of the bedrock interval for water supply usage.

Bedrock in the Natrona area is affected by the Amity Anticline which strikes northeast-southwest and dips to the southeast. The Natrona area is located on the eastern limb of this anticline. Faulting in the region is minimal. Numerous evidences of fracturing and crushing of the lithology without displacement have been discovered.

E. NATURE AND EXTENT OF CONTAMINATION

Site Characterization

The nature and extent of chemical contamination at the Lindane Dump Site was characterized through extensive sampling of surface and subsurface soils, ground water monitoring wells, surface water, including leachate seeps, sediments, and air monitoring on-site. In addition, sample data from residential wells and the water intake for the Harrison Township water Authority were also reviewed. Samples taken were analyzed for U.S. EPA Target Compound List (TCL) and Target Analyte List (TAL) constituents initially. For the organic analyses, this also included searches for non-target compounds. In later sampling rounds, the list of constituents tested for were reduced to those which were previously detected or were suspected to be present. The data, with required sampling and analysis procedures, underwent a rigorous quality assurance review to ensure compliance, validity, and usability of the results.

All analytical data obtained in the course of the remedial investigation were compiled, sorted by environmental medium, evaluated with respect to analytical qualifiers (including sample specific minimum quantification limits), analyzed statistically to generate upper 95 percent confidence limits of the average concentration of each chemical in each medium; and examined in comparison to naturally occurring background levels in accordance with U.S. EPA guidelines. Environmental media evaluated individually include surface water, sediments, surface and subsurface soils, water from seeps, and ground water. The following summarizes the results of the investigation and lists the various chemicals of concern which were identified during the investigation of the various media.

Surficial Soil Contamination

- Exploratory trenching was conducted at several locations in the lower project area to obtain information on the horizontal and vertical variability of fill. Compounds detected were BHC isomers, including the isomer Gamma-BHC (Lindane), DDT, DDE, DDD, and the inorganics; arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc.

- Exploratory borings drilled in the upper project area detected isomers of BHC and 4,4'-DDT at varying depths in each of the borings through the fill along with the same inorganics that were identified in the lower project area exploratory borings.

- Surficial soil samples were taken in the lower project area. Samples were analyzed for phenols; benzene; chlorobenzene; dichlorobenzene; 4,4'-DDT and its metabolites; the BHC isomers and the inorganic parameters arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. Each of these constituents were discovered in one or more samples with the exception of chlorobenzene, dichlorobenzene, and gamma-BHC, which were not detected in any of the surficial soil samples.

- Surficial soil samples were taken in the upper project area including several locations along the perimeter of the Park which defines the legal property boundary between the Park and adjacent residential properties. The following compounds were detected in one or more samples taken during several sampling events; alpha BHC, beta-BHC, delta-BHC, gamma-BHC, 4,4'-DDT, 4,4'-DDE, 4,4'-DDD along with the inorganics; arsenic, chromium, copper, lead, nickel, zinc, mercury, silver and phenol.

A summary of contaminants detected in the soil samples and their range of concentrations is shown in Tables 1 thru 8.

A summary of contaminants detected in the soil samples and their range of concentrations is shown in Tables 1 thru 8.

TABLE 1
SUMMARY OF SURFICIAL SOIL AREAL COMPOSITES SAMPLE ANALYSES
UPPER PROJECT AREA FEBRUARY 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Alpha BHC	6/15	5.86 - 342
Gamma BHC	3/15	8.45 - 52.8
Delta BHC	3/15	6.33 - 46.3
4,4'- DDT	7/15	24.4 - 73,800

TABLE 2
SUMMARY OF SURFICIAL SOIL ZONE COMPOSITES SAMPLE ANALYSES
UPPER PROJECT AREA FEBRUARY 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Aldrin	1/6	46.1
Alpha BHC	4/6	15.6 - 57.4
Beta BHC	6/6	64.2 - 1,200
Delta BHC	1/6	11.1
Gamma BHC	0/6	-
4,4'- DDT	5/6	72 - 24,200
4,4'- DDE	4/6	21.8 - 335
4,4'- DDD	1/6	423
		(mg/kg)
Phenol	1/6	6.1
Arsenic	6/6	22.4 - 32.7
Chromium	6/6	9.4 - 173
Copper	6/6	31.2 - 114
Lead	6/6	92.3 - 558
Mercury	1/6	.4
Nickel	6/6	15.1 - 434
Silver	1/6	1.1
Zinc	6/6	121 - 490

TABLE 3
SUMMARY OF CONSTITUENTS DETECTED IN EXPLORATORY TRENCH COMPOSITES
MARCH 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent[b]	Frequency of Detection	Range of Concentrations Detected (mg/kg)
Volatile Organic Compounds		
Acrolein	8/10	10.1 - 23.2
Benzene	1/10	0.2
Chlorobenzene	2/10	0.3 - 2.4
Chloroform	1/10	0.4
Ethylbenzene	2/10	2.8 - 5.5
Methylene Chloride	8/10	0.1 - 0.3
1,2-Dichlorobenzene	2/10	0.3 - 0.4
1,4-Dichlorobenzene	2/10	0.4 - 0.8
Pesticide/PCB Compounds		
Aldrin	3/10	0.6 - 2.4
Aroclor-1242 (PCB)	1/10	11.8
Aroclor-1254 (PCB)	1/10	4.2
Alpha-BHC	8/10	1.3 - 409
Beta-BHC	6/10	0.2 - 82.7
Delta-BHC	5/10	0.1 - 33.3
Gamma-BHC	6/10	0.2 - 165
4,4'-DDT	10/10	0.1 - 8,520
4,4'-DDE	9/10	0.2 - 680
4,4'-DDD	5/10	1.4 - 82.5
Endrin	1/10	5.6
Base Neutral Compounds		
Anthracene	2/10	16.0 - 66.6
Benzo(a)anthracene	1/10	33.3
Benzo(a)pyrene	1/10	76.7
Benzo(ghi)perylene	1/10	17.2
Benzo(k)fluoranthene	1/10	66.6
Bis(2-ethylhexyl)phthalate	5/10	10.4 - 30.5
Chrysene	1/10	22.4
2,4-Dinitrotoluene	2/10	10.7 - 66.7
Fluoranthene	1/10	63.3
Fluorene	1/10	11.3
Indeno(1,2,3-cd)pyrene	1/10	66.7
Napthalene	1/10	10
Phenanthrene	1/10	17.2
Pyrene	2/10	10.7 - 50

TABLE 3 (Continued)
SUMMARY OF CONSTITUENTS DETECTED IN EXPLORATORY TRENCH COMPOSITES
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent[b]	Frequency of Detection	Range of Concentrations Detected (mg/kg)
Wet Chemistry and Inorganics		
Cyanide	2/10	1.9 - 3.7
Phenol	3/10	4.3 - 31.2
As	10/10	17.4 - 32.1
Cd	8/10	1.1 - 9.9
Cr	10/10	242.0 - 4,960
Cu	10/10	108.0 - 826
Pb	10/10	147.0 - 4,880
Hg	10/10	0.3 - 5.8
Ni	10/10	264.0 - 4,220
Se	6/10	0.7 - 3.2
Ag	8/10	1.3 - 28.8
Zn	10/10	313.0 - 3,230

[a]Composites are representative of the proportions of each of various materials encountered in the trenches.

[b]A complete propriety pollutant scan was conducted; only constituents detected are reported.

TABLE 4
SUMMARY OF EXPLORATORY TRENCH SAMPLE ANALYSES
FIVE-FOOT INTERVAL COMPOSITES
MARCH 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Alpha BHC	26/36	18.0 - 2,240,000
Gamma BHC	24/36	6.8 - 291,000
Delta BHC	16/36	12.2 - 108,000
4,4'- DDT	36/36	37.9 - 5,820,000

TABLE 5
SUMMARY OF SURFICIAL SOIL SUPPLEMENTAL DISCRETE SAMPLE ANALYSES
UPPER PROJECT AREA
MAY 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Alpha BHC	8/9	9.6 - 4,240
Gamma BHC	9/9	6.0 - 39.7
Delta BHC	6/9	10.2 - 127
4,4'- DDT	9/9	61.3 - 5,680

TABLE 6
SUMMARY OF EXPLORATORY BORING SAMPLE ANALYSES[a]
DECEMBER 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Alpha BHC	30/37	8.0 - 517,000
Gamma BHC	23/37	10.2 - 206,000
Delta BHC	24/37	20.4 - 296,000
4,4'--DDT	24/37	12.2 - 236,000
Arsenic	36/37	1.2 - 145
Lead	32/37	15.3 - 7,600
Chromium	36/37	4.8 - 2,730
Zinc	37/37	5.9 - 11,900

[a] Exploratory borings were also analyzed for volatile organic compounds; none were detected.

TABLE 7
SUMMARY OF ADDITIONAL DISCRETE SURFICIAL SOIL SAMPLE ANALYSES
UPPER PROJECT AREA DECEMBER 1989
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Alpha BHC	4/11	15.4 - 466
Beta BHC	9/11	10.1 - 1,320
Delta BHC	3/11	8.4 - 106
Gamma BHC	3/11	17.7 - 149
4,4'- DDT	7/11	22.9 - 13,500
4,4'- DDD	2/11	474 - 3,620
4,4'- DDE	5/11	23.6 - 1,930

TABLE 8
SUMMARY OF SURFICIAL SOIL SAMPLE ANALYSES
LOWER PROJECT AREA JULY 1990
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Benzene	10/16	249 - 623
Chlorobenzene	0/16	-
1,2-Dichlorobenzene	0/16	-
1,3-Dichlorobenzene	0/16	-
1,4-Dichlorobenzene	0/16	-
4,4'- DDD	9/16	117 - 2,260
4,4'- DDE	16/16	34.2 - 4,580
4,4'- DDT	15/16	103 - 17,400
Alpha BHC	3/16	16.6 - 25.4
Beta BHC	7/16	49.4 - 227
Delta BHC	1/16	81.1
Gamma BHC	0/16	-
		(mg/kg)
Phenolics	2/16	2.84 - 3.95
Arsenic	14/16	1.22 - 36.7
Cadmium	16/16	0.46 - 26.2
Chromium	16/16	182 - 1,380
Copper	16/16	166 - 707
Lead	16/16	128 - 1220
Mercury	9/16	0.28 - 1.51
Nickel	16/16	171 - 11,800
Silver	16/16	0.70 - 4.73
Zinc	16/16	244 - 3,680

Surface Water and Sediment Contamination

- Sediment samples, collected from drainage ditches in the upper project area, during the RI detected alpha-BHC, delta-BHC, gamma-BHC and 4,4'-DDT in one or more of the ditch samples.

- River and sediment samples were taken from the Allegheny River. None of the constituents of concern were found in the water samples except delta-BHC which was found in one sample taken from just downstream of the interim leachate collection/treatment plant discharge. Sediment samples taken from the river detected alpha-BHC, beta-BHC, delta-BHC, gamma-BHC, 4,4'-DDT, 4,4'-DDD and 4,4'-DDE. In addition, the inorganics; arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc were detected .

- Storm runoff samples were collected from six locations in the upper project area and analyzed. Only alpha-BHC and gamma-BHC were present above detection limits.

- Water intake sample data from the Harrison Township Water Authority was reviewed as a part of the investigation. The samples taken from a water intake downstream of the Site were analyzed for both organic and inorganic parameters. None of the samples exceeded the corresponding Safe Drinking Water Maximum Contaminant Level (MCL) with the exception of mercury on one occasion.

A summary of contaminants detected in the surface water, sediments and stormwater runoff and their range of concentrations is shown in Tables 9 thru 12.

TABLE 9
SUMMARY OF STORMWATER RUNOFF SAMPLE ANALYSES
SEPTEMBER 1982
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Alpha BHC	5/6	0.15 - 124
Beta BHC	0/6	-
Delta BHC	0/6	-
Gamma BHC	5/6	0.14 - 11.4
DDT	0/6	-
Benzene	0/6	-
Chlorobenzene	0/6	-
Dichlorobenzene	0/6	-
Trichlorobenzene	0/6	-

TABLE 10
SUMMARY OF DRAINAGE DITCH SEDIMENT SAMPLE ANALYSES
FEBRUARY 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Alpha BHC	1/5	307
Gamma BHC	1/5	361
Delta BHC	2/5	110 - 627
4.4'- DDT	2/5	1420 - 1680

TABLE 11
SUMMARY OF ALLEGHENY RIVER SEDIMENT SAMPLE ANALYSES
MAY 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/kg)
Organics		
Alpha BHC	3/6	5.3 - 15.6
Gamma BHC	3/6	4.1 - 13.6
Delta BHC	2/6	9.6 - 10.0
4,4'- DDT	2/6	8.0 - 241
4,4'- DDD	1/6	8.3
4,4'- DDE	1/6	82.0
Benzene	0/6	-
Chlorobenzene	0/6	-
1,2 -Dichlorobenzene	0/6	-
1,3 -Dichlorobenzene	0/6	-
1,4 -Dichlorobenzene	0/6	-
Trichlorobenzene	0/6	-
Tetrachlorobenzene	0/6	-
Pentachlorocyclohexane	0/6	-
Trichlorophenol	0/6	-
Phenolics	0/6	-
Inorganics		mg/kg
Arsenic	6/6	4.4 - 11.3
Cadmium	1/6	1.6
Chromium	6/6	15.7 - 49.1
Copper	6/6	22.2 - 206
Lead	4/6	15.5 - 710
Mercury	1/6	.54
Nickel	6/6	18.7 - 69.8
Silver	2/6	.72 - 2.4
Zinc	6/6	94 - 398

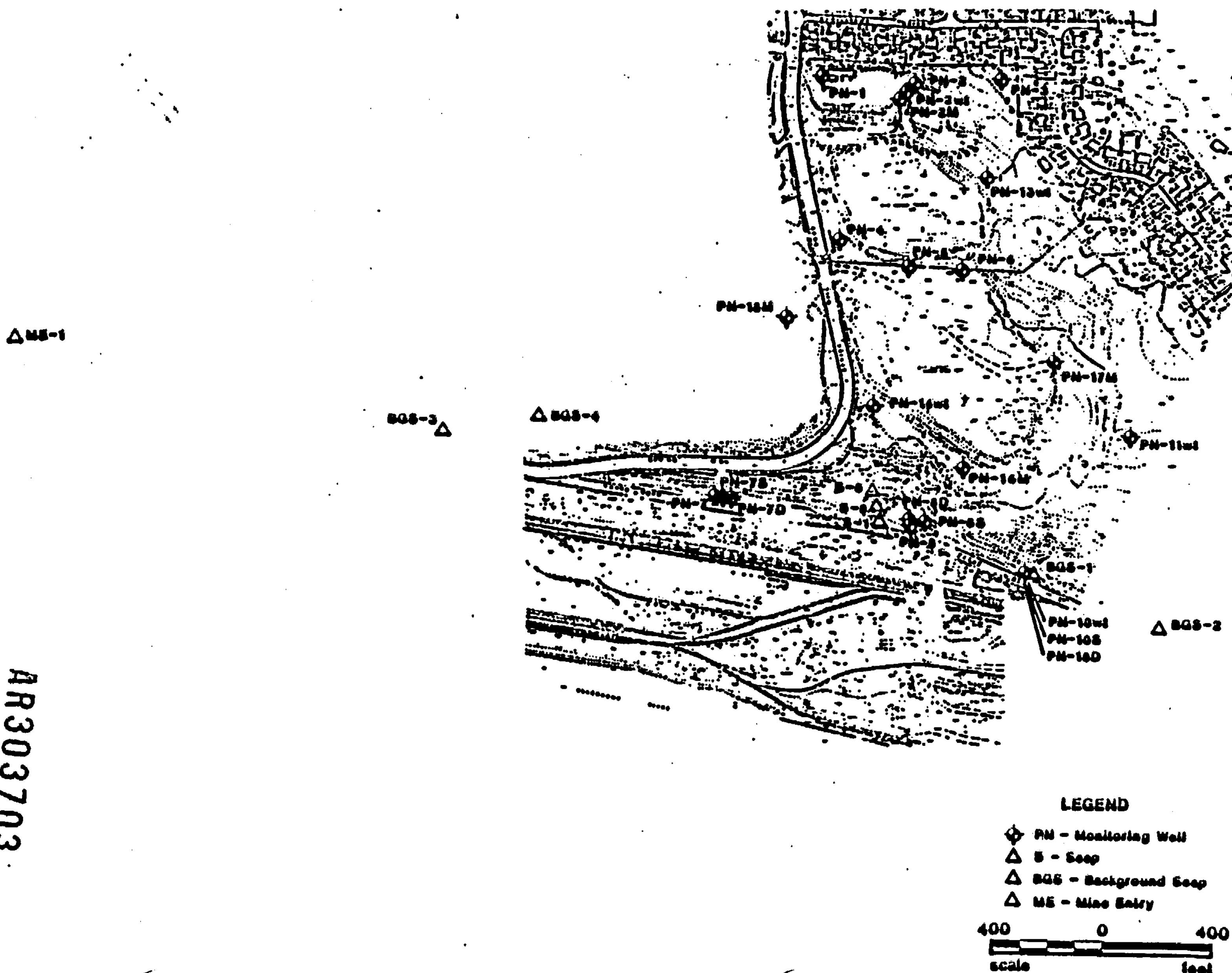
TABLE 12
SUMMARY OF ALLEGHENY RIVER WATER SAMPLE ANALYSES
MAY 1988
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/l)
Alpha BHC	0/3	-
Gamma BHC	0/3	-
Delta BHC	1/3	.14
Benzene	0/3	-
Chlorobenzene	0/3	-
1,2-Dichlorobenzene	0/3	-
1,3-Dichlorobenzene	0/3	-
1,4-Dichlorobenzene	0/3	-

Ground Water Contamination

- Ground water samples were taken from selected shallow water table, and upper bedrock wells and seeps located downgradient of the Site. The samples contained alpha-BHC, beta-BHC, delta-BHC, gamma-BHC, 4,4'-DDT, benzene, chlorobenzene and dichlorobenzene. In addition, low levels of chromium, nickel, zinc and phenol were also detected.

A summary of contaminants detected and their range of concentrations found in the ground water and seep samples is shown in Tables 13 - 18. Figure 7 shows the locations of the monitoring wells sampled during the Remedial Investigation.



LINDANE DUMP SITE

FIGURE 7
MONITORING WELL AND
SEEP LOCATIONS

TABLE 13
SEEP CONFLUENCE 1982 PRIORITY POLLUTANT ANALYSIS
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

	Detection Limit	Confluence Concentrations[a]
Zinc	10 ug/l	140 ug/l
Nickel	50 ug/l	90 ug/l
Chromium	20 ug/l	48 ug/l
Phenol	50 ug/l	220 ug/l
Cyanide	0.02 mg/l	BDL[b]
Copper	0.02 mg/l	20 ug/l
Thallium	0.06 mg/l	BDL
Beryllium	0.01 mg/l	BDL
Cadmium	0.01 mg/l	BDL
Antimony	0.10 mg/l	BDL
Lead	0.06 mg/l	BDL
Mercury	0.001 mg/l	BDL
Selenium	0.01 mg/l	BDL
Silver	0.01 mg/l	BDL
Arsenic	0.03 mg/l	BDL
<u>Volatile Organics</u>		
Benzene	100 ug/l	800 ug/l
Chlorobenzene	100 ug/l	410 ug/l
Methylene Chloride	100 ug/l	200 ug/l
All others	---	BDL
<u>Acid Extractables</u>	---	All BDL
<u>Base-Neutral Extractables</u>		
1,2-Dichlorobenzene	10 ug/l	46 ug/l
1,4-Dichlorobenzene	10 ug/l	60 ug/l
1,2,4-Trichlorobenzene	10 ug/l	120 ug/l
All Others	----	BDL
<u>Pesticides</u>		
BHC-Alpha	10 ug/l	150 ug/l
BHC-Beta	10 ug/l	23 ug/l
BHC-Gamma	10 ug/l	390 ug/l
BHC-Delta	10 ug/l	350 ug/l
All Others	----	BDL

[a]Analysis of samples taken 4/7/82.
Confluence included all seeps except #1.

[b]BDL: Below Detection Limit.

TABLE 14
SUMMARY OF SEEP CONFLUENCE, AND SEEP SAMPLE ANALYSES
APRIL 1982 TO MAY 1982
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/l)
Metals		
Chromium	0/6	-
Nickel	2/6	116 - 422
Zinc	6/6	14 - 863
Organics		
Alpha BHC	8/13	0.33 - 378
Beta BHC	0/13	-
Gamma BHC	7/13	0.87 - 781
Delta BHC	7/13	0.064 - 942
DDT	0/13	-
Benzene	2/14	270 - 1,320
Chlorobenzene	2/14	400 - 429
Dichlorobenzene	2/14	143 - 148
Trichlorobenzene	0/13	-
Methylene Chloride	0/6	-

TABLE 15
SUMMARY OF GROUND WATER SAMPLE ANALYSES FOR MONITORING WELLS
PN-7 AND PN-8
APRIL 1982 TO MAY 1982
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/l)
Metals		
Chromium	0/6	-
Nickel	1/6	70
Zinc	6/6	47 - 185
Organics		
Alpha BHC	5/6	0.062 - 2.26
Beta BHC	0/6	-
Gamma BHC	5/6	0.048 - 1.6
Delta BHC	5/6	0.100 - 2.4
DDT	0/6	-
Benzene	0/6	-
Chlorobenzene	2/6	18 - 19
Dichlorobenzene	0/6	-
Trichlorobenzene	0/6	-
Methylene Chloride	0/2	-

TABLE 16
SUMMARY OF GROUND WATER SAMPLE ANALYSES FOR MONITORING WELLS
PN-1, PN-2, PN-3, PN-4, PN-5, AND PN-6
APRIL 1982 TO MAY 1982
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/l)
Metals		
Chromium	2/17	20
Nickel	5/17	81 - 230
Zinc	15/17	16 - 11,600
Organics		
Alpha BHC	9/17	0.028 - 338
Beta BHC	0/17	-
Gamma BHC	8/17	1.6 - 373
Delta BHC	11/17	0.044 - 1,545
DDT	0/17	-
Benzene	7/16	980 - 17,100
Chlorobenzene	8/17	2.6 - 3,630
Dichlorobenzene	1/17	723
Trichlorobenzene	3/17	196 - 515
Methylene Chloride	0/4	-

TABLE 17
SUMMARY OF GROUND WATER SAMPLE ANALYSES FOR MONITORING WELLS PN-1, PN-2, PN-3, PN-7, PN-8, AND SEEP CONFLUENCE 1984-1985 ALSCO COMMUNITY PARK SITE NATRONA, PENNSYLVANIA

Constituent	Range of Concentrations Detected (ug/l)
Alpha BHC	0.034 - 343
Beta BHC	BDL[a] - 0.6
Gamma BHC	0.064 - 873
Delta BHC	0.078 - 1,690
Benzene	BDL - 1,780
Chlorobenzene	BDL - 420
Dichlorobenzene	BDL - 515

[a] Below Detection Limit

TABLE 18
SUMMARY OF MONITORING WELL AND SEEP SAMPLE ANALYSES FEBRUARY 1988 TO FEBRUARY 1989 ALSCO COMMUNITY PARK SITE NATRONA, PENNSYLVANIA

Constituent	Frequency of Detection	Range of Concentrations Detected (ug/l)
Alpha BHC	15/28	0.08 - 1,240
Gamma BHC	14/28	0.05 - 1,150
Delta BHC	16/28	0.06 - 4,220
4,4'- DDT	1/21	2.02
Benzene	9/29	1.1 - 10,800
Chlorobenzene	8/29	3.9 - 1,920
1,2-Dichlorobenzene	1/29	331
1,3-Dichlorobenzene	0/29	-
1,4-Dichlorobenzene	2/29	4.2 - 763

Air Contamination

- Air quality monitoring in the upper project area was undertaken and only alpha-BHC was detected above detection limits in one sample.

Contamination Migration Paths

Based on the information developed during the Remedial Investigation, it can be stated that the only significant pathway for the movement of the contaminants is the migration of the contaminants from subsurface soils and the fill area into the shallow ground water in the alluvial layer below the site. In addition, a small portion of the contaminants are migrating below the shallow aquifer and reaching the deeper aquifer, located in the bedrock zone.

Estimated Contaminant Quantity

Based on an analysis of historical photographs of the Site, it was estimated that approximately 1.2 million cubic yards of fill material were placed at the Site over the period of record. Based on the analysis, it is estimated that of the 1.2 million cubic yards of fill, approximately 40 percent of the fill is composed of red mud and/or red cinder from the cryolite ore processing. The remaining 60 percent is believed to be made up of unoxidized ore tailings, slag, construction debris, gravel and terrace deposits from the hillside north of the lower project area. There was insufficient information available from the historical records to determine the actual quantities of other wastes such as Lindane or DDT that have been deposited at the Site and mixed in with the other fill materials.

VI. SUMMARY OF SITE RISKS

A. Human Health Effects of Site Contamination

As part of the Remedial Investigation performed for the Lindane Dump Site, a risk assessment was conducted to evaluate the potential impacts of the Site on human health and the environment. In the risk assessment, a set of chemicals of potential concern were selected for detailed evaluation based on the RI sampling results. Contaminants of concern were selected separately for four environmental media; ground water, surface water, sediments and soil.

The risk assessment then evaluated the potential human health risks associated with exposure to these chemicals of concern for each media.

Exposure Analysis

Exposure pathways considered for the purpose of evaluating site risks include: (1) incidental ingestion and dermal absorption from direct contact with contaminated surface soils, surface waters and sediments; (2) future consumption of contaminated ground water which may be utilized as a potable supply; and (3) incidental ingestion of seep waters emanating at the base of the Site. Other potential pathways of exposure such as inhalation of dust and uptake of contaminants into garden vegetables were judged to be insignificant relative to exposure resulting from direct contact with contaminated soils or not applicable as soils tested in residential yards were found to only have low levels of contaminants which would not pose a threat to human health at any time period.

The next step in the exposure analysis process involved quantification of the magnitude, frequency and duration of exposure for the populations, and exposure pathways selected for evaluation. Generally, exposure point concentrations of chemicals of concern were based upon the 95 percent upper confidence limit of the average, so as to produce an estimate of reasonable maximum exposure. A summary of the upper 95 percent confidence limit average for the various contaminants is shown in Tables 19A and 19B. Intake factors (e.g., amount of soil ingestion, rate of dermal contact, exposure frequency, and duration) were selected in accordance with EPA risk assessment guidance so that the combination of all variables conservatively results in the maximum exposure that can reasonably expected to occur at the site.

TABLE 19A
SUMMARY OF WATER CONCENTRATIONS OF CONSTITUENTS OF INTEREST (UPPER 95TH PERCENT VALUES) TO WHICH CURRENT AND FUTURE POPULATIONS MAY BE EXPOSED VIA INCIDENTAL INGESTION

Constituent	Recreational, Lower Project Area Seeps (Current and Future)[b]	Recreational, Allegheny River (Current and Future)[c]
Benzene	0.002	ND[d]
alpha-BHC	0.005	ND
beta-BHC	NA[d]	NA
delta-BHC	0.024	0.00014
gamma-BHC	0.012	ND
Chlorobenzene	0.005	ND
4,4'-DDD	NA	NA
4,4'-DDE	NA	NA
4,4'-DDT	ND	NA
1,2-Dichlorobenzene	ND	ND
1,4-Dichlorobenzene	0.001	ND
Arsenic	NA	ND
Cadmium	NA	ND
Chromium	NA	ND
Copper	NA	NA
Lead	NA	ND
Mercury	NA	0.0001
Nickel	NA	NA
Phenol	NA	NA
Silver	NA	ND
Zinc	NA	NA

[a]All values in mg/1.

[b]Assumed contract with seep water in lower project area by children only.

[c]Assumed contact with River water while swimming.
Organic results from May 1988 sampling. Inorganic results from 1989 sampling of finished water at HTWA.

[d]ND = Analyzed, but not detected. NA = Not analyzed in most recent sampling programs.

TABLE 19B
SUMMARY OF SOIL AND SEDIMENT CONCENTRATIONS
OF CONSTITUENTS OF INTEREST
(UPPER 95TH PERCENT VALUES)
TO WHICH CURRENT AND FUTURE POPULATIONS
MAY BE EXPOSED VIA INCIDENTAL INGESTION

Constituent	Recreational/ Residential, Upper Area (Current and Future[b]	Occupational, Upper Area (Current and Future)[b]	Occupational, Upper Area (Future only)[c]	Recreational, Lower Area (Current and Future)[b]	Occupational, Allegheny River Sediment (Current and Future)[d]
Benzene	ND[e]	ND	ND[f]	0.339	ND
alpha-BHC	0.281	0.281	1.08	0.013	0.007
beta-BHC	0.313	0.313	0.313[f]	0.084	NA[e]
delta-BHC	0.025	0.025	0.103	0.030	0.009
gamma-BHC	0.021	0.021	0.066	ND	0.010
Chlorobenzene	ND	ND	ND[f]	ND	ND
4,4'-DDD	0.452	0.452	0.452[f]	0.592	0.005
4,4'-DDE	0.378	0.378	0.378[f]	1.13	0.043
4,4'-DDT	7.25	7.25	19.9	4.06	0.105
1,2-Dichlorobenzene	ND	ND	ND[f]	ND	ND
1,4-Dichlorobenzene	ND	ND	ND[f]	ND	ND
Arsenic	29.9	29.9	44.5	20.3	13.6
Cadmium	ND	ND	ND[f]	8.67	0.67
Chromium	105	105	984	771	58.6
Copper	87.4	87.4	87.4[f]	390	146
Lead	330	330	1,713	512	397
Mercury	0.30	0.30	0.30[f]	0.77	0.37
Nickel	240	240	240[f]	3,597	138
Phenol	4.31	4.31	4.31[f]	3.17	ND
Silver	0.65	0.65	0.65[f]	2.64	0.57
Zinc	392	392	1,949	1,465	346

[a]All values in mg/kg. All concentrations and exposure scenarios were assumed to be the same for current and future populations, except as noted.

[b]Assumed contact with surficial soils only.

[c]Assumed contact with surficial and subsoils up to 6 ft (collectively) only.
Constituents found common to both surficial and subsoils reported, except as noted.

[d]Assumed contact with River Sediments.

[e]ND = Analyzed for but not detected. NA = Not analyzed in most recent sampling programs.

[f]Constituent not measured in borings, therefore, surficial soil concentrations only were assumed.

Toxicity and Risk Characterization

Projected intakes for each risk scenario and each chemical were then compared to acceptable intake levels for carcinogenic and non-carcinogenic effects. With respect to projected intake levels for non-carcinogenic compounds a comparison was made to risk reference doses (RfDs). RfDs have been developed by EPA for chronic (e.g. lifetime) and/or subchronic (less than lifetime) exposure to chemicals based on an estimate that is likely to be without an appreciable risk of deleterious effects. The chronic RfD for a chemical is an estimate of an acceptable lifetime daily exposure level for the human population, including sensitive subpopulations, without an appreciable risk of deleterious effects. The potential for non-cancer health effects is evaluated by comparing an exposure level over a specified time period with the RfD derived by the EPA for a similar exposure period. This ratio of exposure is called the hazard quotient.

The non-cancer hazard quotient assumes that there is a threshold level of exposure (i.e. RfD) below which it is unlikely for even the most sensitive populations to experience adverse health effects. If the exposure level exceeds the threshold, (i.e., the hazard quotient exceeds a value greater than 1.0) there may be concern for potential non-cancer health effects. The more the value of the hazard quotient or hazard index exceeds one, the greater the level of concern for potential health impacts.

To assess the overall potential for non-cancer effects posed by multiple chemicals, a hazard index (HI) is derived by summing the individual hazard quotients. This approach assumes additivity of critical effects of multiple chemicals. This is appropriate for compounds that induce the same effect by the same mechanism of action. EPA considers any Hazard Index exceeding one to be an unacceptable risk to human health.

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential human carcinogen. The EPA's Carcinogen Assessment Group has developed carcinogen potency factors (CPFs) for suspected and known human carcinogens which are used to convert daily intake averaged over a lifetime of exposure directly to incremental risk. The CPF is generally expressed in units of risk per milligram chemical per kilogram body weight per day of exposure (i.e., risk units per mg/kg/day). The CPF or slope factor is the upper 95th percentile confidence limit of the extrapolation (slope) from high-dosed animal data to very much lower doses in humans. The use of the upper limit produces a risk estimate that has a 95 percent probability of exceeding the actual risk, which may actually be zero. For exposure to multiple carcinogens the upper limits of cancer risk are summed to derive a total cancer risk. Cancer risks beyond the generally acceptable risk range of 1×10^{-4} to 1×10^{-6} (i.e. a 1.0×10^{-6} level indicates one additional chance in 1,000,000 that an individual will develop cancer) are considered an unacceptable risk to human health.

The following summarizes the risk evaluation for the ingestion pathways that were done. It was determined that the ingestion pathway was the only pathway where significant exposure could occur. Dermal contact and inhalation are not considered significant pathways for exposure given the Site conditions. These tables show, for each media, population targeted, and land use, the chemicals of concern (chemicals which posed a increased cancer risk of 10^{-6} or greater or an individual hazard index greater than 1), their upper 95th percentile confidence limit of their average concentration, the base risk posed by the chemicals of concern, a clean-up level (based on a health-based standard) and the residual risk level remaining after attaining that clean-up level.

Media/Population/Land Use: Upper Area Surficial Soils/ Adults/ Future Recreational-Residential

Chemical	Concentration in Units/Basis[a] mg/kg	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
Arsenic	RME/29.9	3.9×10^{-6}	N/A[1]	N/A[2]

a/ RME = 95% CI of the mean unknown.
1/ No clean level exists for this contaminant in soils.
2/ No clean-up level residual risk determined as no clean-up level designated.

Media/Population/Land Use: Upper Area Surficial Soils <u>Adults/Future Occupational</u>

Chemical	Concentration in Units/Basis[a] mg/kg	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
Arsenic	RME/44.5	2.1×10^{-6}	N/A[1]	N/A[2]

a/ RME = 95% CI of the mean unknown.
1/ No clean level exists for this contaminant in soils.
2/ No clean-up level residual risk determined as no clean-up level designated.

Media/Population/Land Use: Lower Area Surficial Soils <u>Adults/Future Recreational</u>

Chemical	Concentration in Units/Basis[a] mg/kg	Base Risk/ HI	Clean-up Level mg/kg	Clean-up Risk/ HI
Arsenic	RME/20.3	1.9×10^{-6}	N/A[1]	N/A[2]
Lead	RME/390	1.1×10^{-6}	500	N/A[3]

a/ RME = 95% CI of the mean unknown.
1/ No clean level exists for this contaminant in soils.
2/ No clean-up level residual risk determined as no clean-up level designated.
3/ No clean-up residual risk determined as the RME is less than the clean-up level.

Media/Population/Land Use: Allegheny River Sediments/ Adults/Future Occupational

Chemical	Concentration in Units/Basis[a] mg/kg	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
Arsenic	RME/13.6	8.0×10^{-6}	N/A[1]	N/A[2]
Lead	RME/397	5.2×10^{-6}	N/A[1]	N/A[2]

a/ RME = 95% CI of the mean unknown.
1/ No clean level exists for this contaminant in sediments.
2/ No clean-up level residual risk determined as no clean-up level designated.

Media/Population/Land Use: Allegheny River Water/ Adult/Future Recreational

Chemical	Concentration in Units/Basis[a] mg/l	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
----[1]	-----	--	--	--

1/ No chemicals of concern exceeded a cancer risk of 10^{-6} or a hazard index greater than 1.

Media/Population/Land Use: Upper Area Surficial-Subsoils/ Adults/Future Occupational

Chemical	Concentration in Units/Basis[a] mg/kg	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
----[1]	-----	--	--	--

1/ No chemicals of concern exceeded a cancer risk of 10^{-6} or a hazard index greater than 1.

Media/Population/Land Use: Upper Area Surficial Soils/ Children/Future Recreational-Residential

Chemical	Concentration in Units/Basis[a] mg/kg	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
Alpha BHC	RME/.281	1.08×10^{-6}	N/A[1]	N/A[2]
Arsenic	RME/29.9	3.20×10^{-5}	N/A[1]	N/A[2]

a/ RME = 95% CI of the mean unknown.
1/ No clean level exists for this contaminant in soils.
2/ No clean-up level residual risk determined as no clean-up level designated.

Media/Population/Land Use: Lower Area Seep Water/ Children/Future Recreational

Chemical	Concentration in Units/Basis[a] mg/l	Base Risk/ HI	Clean-up Level ug/l	Clean-up Risk/ HI
Gamma-BHC	RME/.012	2.41×10^{-5}	.2[1]	N/A[2]
Alpha-BHC	RME/.005	4.86×10^{-5}	-	N/A[2]

a/ RME = 95% CI of the mean unknown. 7E-5 total HI=0.3
1/ MCL
2/ No clean-up level designated as the cancer risk does not exceed 10^{-4}.

Media/Population/Land Use: Allegheny River Water/ Children/Future Recreational

Chemical	Concentration in Units/Basis[a] mg/l	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
----[1]	-----	--	--	--

1/ No chemicals of concern exceeded a cancer risk of 10^{-6}.

Media/Population/Land Use: Ground Water/ Adults/Future Occupational

Chemical	Concentration in Units/Basis[a] mg/l	Base Risk/ HI	Clean-up Level	Clean-up Risk/ HI
Alpha-BHC	RME/.00151	5.3×10^{-6}	N/A[1]	N/A[2]
Gamma-BHC	RME/.00195	8.8×10^{-6}	.2[3]	N/A[2]

a/ RME = 95% CI of the mean unknown.
1/ No clean-up level exists for this contaminant in water.
2/ No clean-up level designated as the cancer risk does not exceed 10^{-4}.
3/ MCL

The risks posed by the Lindane Dump come from potential exposure to contaminated soils, ground water, and leachate from the seeps via ingestion. The total risks from each media are discussed in the following paragraphs. All risks numbers discussed below include the cumulative risk from all contaminants, (even those with an associated increased cancer risk less than 10^{-6} or hazard index less than 1), which were found in each media

Surficial Soil Risks

The increased risk for cancer for an adult exposed to surficial soils or subsoils by ingestion under current and future conditions, ranged from 6×10^{-7} to 4×10^{-6}. For a child, under the same exposure scenarios the increased risk ranged from 2×10^{-5} to 4×10^{-5}. For adults, the hazard index ranged from 0.008 to 0.1. For children, the hazard index was 0.2.

Surface Water and Sediment Risks

The increased risk for cancer for an adult exposed to river sediments by ingestion under current and future conditions is 8×10^{-6}. The hazard index is 0.03, the same for both the current and future exposure scenarios.

For adults and children ingesting Allegheny River water adjacent to the Site under current and future conditions, there is no increased risk for cancer and the hazard index ranged from 0.000009 for adults to 0.00005 for a child.

Ground Water and Seep Water Risks

The increased risk for cancer for a child ingesting seep water under current and future conditions is 7×10^{-5}. The hazard index is 0.3 for this exposure scenario.

For an adult in the future using ground water as drinking water from a well on or downgradient of the Site during working periods, the increased risk of cancer is 4.2×10^{-5} and the hazard index is 0.077 for this exposure scenario.

A summary of all exposure scenarios and risks posed by the Site for adults is shown in Table 20. The cumulative increased risk for cancer for adults for the upper portion of the Site is 4.6×10^{-6}, with the cumulative increased risk of cancer for adults for the lower portion of the Site being 1.48×10^{-5}.

TABLE 20
POTENTIAL CARCINOGENIC RISKS AND NONCARCINOGENIC HAZARD INDICES VIA SOIL/SEDIMENT/WATER INGESTION ROUTES FUTURE POPULATIONS (ADULTS)

	Upper Area Surficial Soils Recreational/Residential	Upper Area Surficial Soils Occupational
Cancer Risk	4×10^{-6}	6×10^{-7}
Hazard Index	0.01	0.008

	Lower Area Surficial Soils Recreational	Allegheny River Sediments Occupational
Cancer Risk	2×10^{-6}	8×10^{-6}
Hazard Index	0.05	0.03

	Allegheny River Water Recreational	Upper Area Surficial/Subsoils Occupational
Cancer Risk	6×10^{-7}	———
Hazard Index	0.1	0.000009

	Bedrock/Alluvial Ground Water Occupational
Cancer Risk	4.2×10^{-6}
Hazard Index	0.077

Total Cancer Risk Upper Area	4.6×10^{-6}	Total Cancer Risk Lower Area	1.48×10^{-5}

A summary of all risk scenarios and risks posed by the Site for children is shown in Table 21. The cumulative increased risk for cancer risk for children for the upper portion of the Site is 5×10^{-5}, with the cumulative increased risk of cancer for children for the lower portion of the Site being 7×10^{-5}.

TABLE 21
POTENTIAL CARCINOGENIC RISKS AND NONCARCINOGENIC HAZARD INDICES VIA SOIL AND WATER INGESTION ROUTES FUTURE POPULATIONS (CHILDREN)

	Upper Area Surficial Soils Recreational/Residential	Lower Area Seep Water Recreational
Cancer Risk	4×10^{-5}	7×10^{-5}
Hazard Index	0.2	0.3

	Allegheny River Water Recreational
Cancer Risk	------
Hazard Index	0.00005

Total Cancer Risk Upper Area	5×10^{-5}	Total Cancer Risk Lower Area	7×10^{-5}

Based on the risk assessment analysis for increased risk for cancer and the hazard index, there is no current risk scenario which would warrant EPA to trigger a remedial action at the Lindane Site. Under the worst case scenario, the greatest increased risk for cancer at the Site is for a child who ingests water from the seep flows at the Site, which has a corresponding risk of 7×10^{-5}. This risk scenario does not exceed the lowest acceptable risk level which is 1×10^{-4} which EPA generally uses when determining if a remedial action should be undertaken.

However, if at any Superfund Site, it is determined that there is increased risk of cancer which falls between 1×10^{-6} and 1×10^{-4} and human health could be threatened by any contaminants which exceed other health based criteria, then EPA may determine that a remedial action is warranted at a Site. For the Lindane Site, potential health based threats to humans could occur as a result of the Maximum Contaminant Levels (MCLs) exceedences that were found in the ground water. MCLs are promulgated standards for drinking water under the Safe Drinking Water Act. During the Remedial Investigation, MCL exceedences were observed in the ground water for benzene and lindane (gamma-BHC). Table 22 contains a summary of the ground water data which was used in the risk assessment. The MCL for lindane is 0.2 parts per billion (ppb) and the MCL for benzene is 5 ppb. Based on these thresholds there were a total of nine exceedences of MCLs for the two contaminants observed during these sampling events. Based on these MCL exceedences, which EPA believes could pose a threat to human health sometime in the future, a remedial action at the Lindane Site is considered warranted by EPA to remediate the threat.

TABLE 22
GROUNDWATER DATA SUMMARY (1988 - 1989)[a]
ALSCO COMMUNITY PARK SITE
NATRONA, PENNSYLVANIA

Well No.[b]	Sample Date	Concentration (ppb) Alpha-BHC	Gamma-BHC	Delta-BHC	4,4'-DDT[c]	Benzene	Chloro-benzene	1,2-DCB[c]	1,4-DCB[c]
PN-7	2/88	0.01	0.01	0.01	0.02	0.2	0.2	0.2	0.2
PN-8	2/88	1.83	2.18	3.07	0.02	0.2	41	0.2	0.2
PN-7	1/89	0.13	0.10	2.00	0.02	9.4	3.9	0.2	0.2
PN-7S	1/89	0.09	0.08	1.71	0.02	0.2	0.2	0.2	0.2
PN-8S	1/89	0.80[d]	0.63[d]	2.16[d]	0.02[d]	1.0[d]	17.0[d]	0.2[d]	0.2[d]
PN-10wt	1/89	0.05	0.05	0.05	0.02	0.2	0.2	0.2	0.2
PN-10S	1/89	2.36	2.98	3.74	0.02	12.5	24.9	0.2	0.2
PN-7S	2/89	0.01	0.05	0.01	0.02	0.2	0.2	0.2	0.2
PN-8	2/89	2.48	3.74	4.53	0.02	2.2	51.6	0.2	0.2
PN-8S	2/89	0.52	2.24	2.99	0.02	1.1	31.0	0.2	0.2
PN-10wt	2/89	0.05	0.16	0.11	0.02	0.2	0.2	0.2	0.2
PN-10S	2/89	2.29	2.53	4.04	0.02	10.2	41.8	0.2	0.2
Average		0.97	1.23	2.03	0.02	3.1	17.7	0.2	0.2
Standard Deviation		1.05	1.39	1.68	0.00	4.7	19.6	0.0	0.0
Upper 95 Percent Limit		1.51	1.95	2.90	0.02	5.5	27.9	0.2	0.2
Number of Samples		12	12	12	12	12	12	12	12
Maximum		2.48	3.74	4.53	0.02	12.5	51.6	0.2	0.2

[a] For purposes of averaging, data reported as BMDL were assumed to be equal to method detection limit; ND data were assumed to be equal to 1/5 of the detection limit.
[b] Wells were determined to be representative of alluvial/shallow bedrock groundwater discharge from the Site.
[c] All data were ND.
[d] Average of duplicate sample results.

It is important to note that a public water line exists at the Site. The public water supply line supplies water to the residential areas north and west of the Site, to three homes along Karn's Road, and to Allegheny Ludlum's manufacturing plant. However, no public water exists at the Alsco Community Park. There are no currently known receptors using the contaminated ground water as a source of drinking water; however, there still exists a threat for possible human health risks if at sometime in the future, development occurs downgradient of the Site or a change in the use of the park occurs which could lead to the potential use of the ground water as a drinking water source.

B. Environmental Impact of Site Contamination

An ecological assessment of the Site was done in conjunction with the Remedial Investigation. During the assessment, there was no observed impact on the terrestrial or aquatic life at the Site. It was determined that, because the Site is surrounded by highly developed residential, commercial and industrial areas, it is unlikely that habitats are present that would be suitable for significant numbers and varieties of terrestrial or avian wildlife. There are no known wetlands near or influenced by the Site. No known populations of rare or endangered plant or animal species or significant biological communities are present within, or in close proximity to the Site boundaries. Environmental exposure points of concern at the Site include surface soils, stream sediments, and stream water. The seeps are potential sources of chemicals of concern to the streams; however, the existing interim leachate collection and treatment system is currently collecting an estimated 97 percent of all leachate produced as a result of the Site and the treatment system is removing an estimated 99 percent of the contaminants prior to the effluent being discharged to the Allegheny River.

C. Uncertainty in the Risk Characterization

In order to quantitatively estimate the potential risks to human health which may occur as a result of exposure to contaminants in ground water at the Site, numerous assumptions regarding exposure parameters were required. Within each exposure parameter there is an inherent uncertainty. For example, although 71.8 kilograms was used as a mean weight for the entire population, actual body weights vary over a wide range. Other uncertainties include ground water ingestion rates, exposure frequencies, analytic results and toxicity numbers.

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

VII. DESCRIPTION OF ALTERNATIVES

The Superfund process requires that the alternative chosen to clean up a hazardous waste site meet several criteria. The alternative must protect human health and the environment, be cost-effective, and meet the requirements of environmental regulations. Permanent solutions to contamination problems should be developed whenever possible. The solutions should reduce the volume, toxicity, or mobility of the contaminants. Emphasis is also placed on treating the wastes at the site, whenever this is possible, and on applying innovative technologies to clean up the contaminants.

The FS studied a variety of technologies to see if they were applicable for addressing the contamination at the Site. The technologies determined to be most applicable to these materials were developed into remedial alternatives. These alternatives are presented and discussed below.

Other alternatives not listed below but examined during the FS included both on-site and off-site encapsulation of the fill material and also on-site and off-site treatment and disposal of residuals left after treatment in an approved disposal facility. Capital costs for these alternatives ranged from $ 360,000,000 for on-site encapsulation to $ 575,000,000 for off-site encapsulation and $ 1,500,000,000 for excavation, on-site incineration and on-site disposal to $ 2,000,000,000 for excavation, off-site incineration and disposal at an off-site disposal facility. These alternatives were not analyzed in greater detail as were the other alternatives due to their associated high costs, the large volume of material (approximately 1,200,000 cubic yards) that would have to be handled and treated, the lack of discernable hot spots at the Site, and the marginal risk reduction which results if they were to be implemented.

All costs and implementation timeframes specified below are estimates based on best available information. All operation and maintenance costs shown are for an annual basis.

COMMON ELEMENTS: All of the alternatives with the exception of "No Further Action" would include common components. Each of them include (1) a restrictive covenant to be put in place that would prohibit any further development of the Site for uses other then those currently in use and prevent the use or development of surface water or ground water on or beneath the property; (2) the leachate/shallow ground water collection and treatment system will be upgraded to replace the existing interim system; (3) security fencing will be built to limit access to the lower portion of the project Site; (4) implementation of a long term ground water monitoring program to assess effectiveness of the remedy on the ground water in the alluvial and bedrock and to measure site-related contaminants over time; (5) an EPA review of the Site every five years will be done to ensure continued protection to human health and the environment (the 5 year review would also be applicable to the "No Further Action Alternative").

ALTERNATIVE 1: NO ACTION

Capital Cost:	$ 0
Operation and Maintenance:	$ 240,000
Present Worth:	$ 2,262,500
Months to Implement:	0

The National Contingency Plan (NCP), EPA's regulations governing the Superfund program, requires that the "no-action" alternative be evaluated at every site to establish a baseline for comparison with the other alternatives. Under this alternative, no remedial action would be taken at the Site.

However, at the Lindane Dump Site, remedial actions have already been taken. Thus a true "no action" is not possible. The best approximation of a no-action is ceasing current actions, that is shutting off the current interim leachate collection and treatment system. However, since these remedial actions will not cease, as the existing leachate collection and treatment system must continue to be operated and maintained under the existing State of Pennsylvania Order, this alternative has been termed "no action". Under this alternative the interim leachate collection and treatment system will remain in service and the Site would be left in its current condition.

Under this alternative EPA would still review the Site within five years in accordance with CERCLA to assure that changes have not occurred which would pose a risk to human health or the environment.

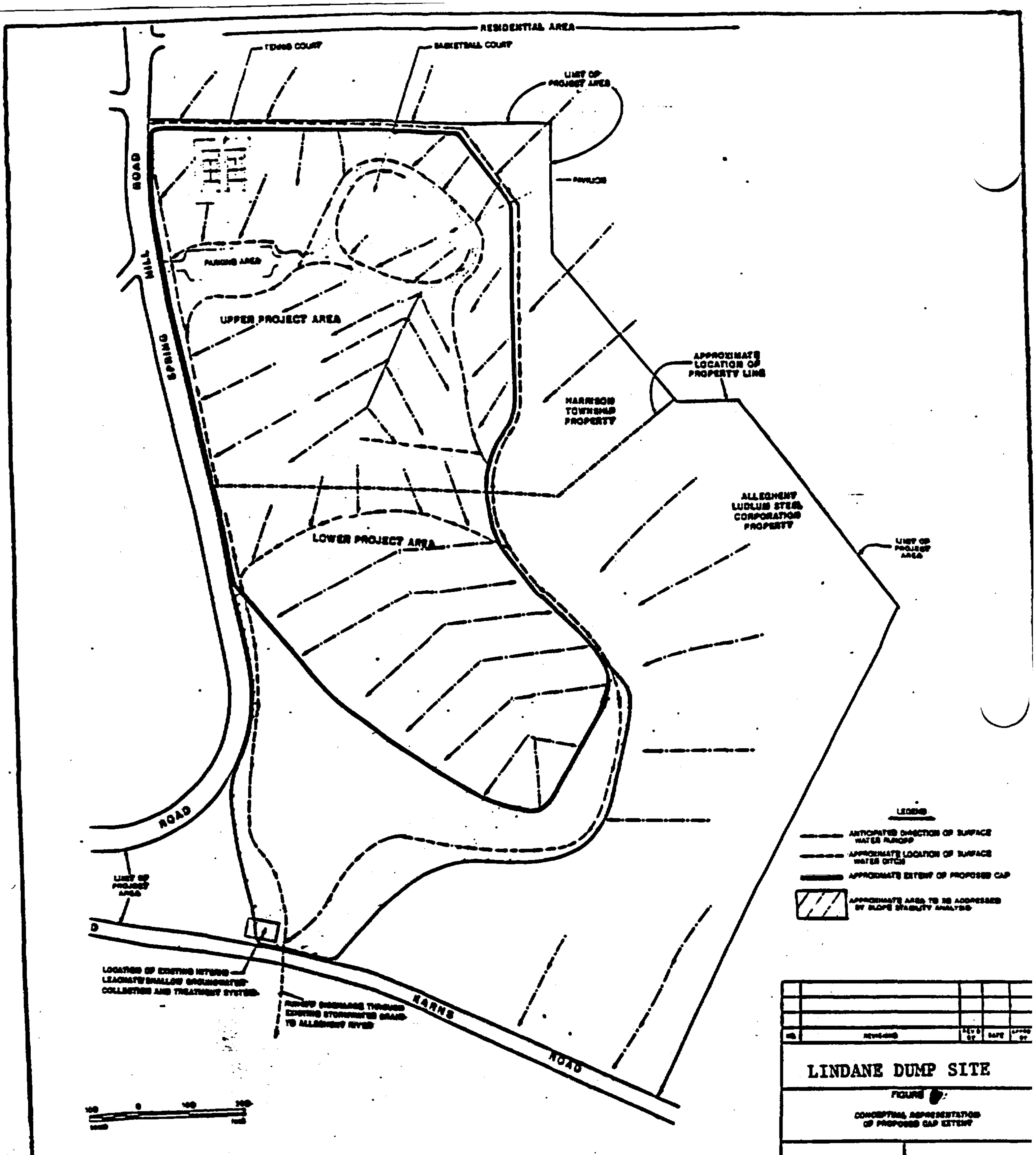
As this is the "No Action" Alternative, No ARARs would be applicable for this alternative as there is no Remedial Action being implemented.

ALTERNATIVE 2 CLAY AND SOIL CAP, UPGRADED LEACHATE COLLECTION AND TREATMENT SYSTEM, DEED AND ACCESS RESTRICTIONS AND GROUND WATER MONITORING

Capital Cost:	$ 8,162,700
Operation and Maintenance:	$ 634,700
Present Worth:	$ 14,146,000
Months to Implement:	24 months

This alternative essentially consists of two remedial elements: engineering controls which include a clay soil cap (along with appurtenant alternative components, i.e. storm drainage culverts) and optimization of the existing interim leachate collection and treatment system (ILCTS). Institutional controls will include deed and access restrictions.

The proposed cap would cover approximately 18 acres of the Site. Most of the upper area of the Site now occupied by the Natrona Alsco Community Park and approximately 7.3 acres of the lower area of the Site would be capped. The cap would be placed over those areas where waste was previously disposed of. Based on currently available information, the cap would not extend onto any residential properties. Figure 8 shows the approximate boundaries of the proposed cap. The cap would consist of a 2



RESIDENTIAL AREA
TENNIS COURT
BASKETBALL COURT
LIMIT OF PROJECT AREA
PAVILION
PARKING AREA
UPPER PROJECT AREA
LOWER PROJECT AREA
SPRING MILL ROAD
ROAD
APPROXIMATE LOCATION OF PROPERTY LINE
HARRISON TOWNSHIP PROPERTY
ALLEGHENY LUDLUM STEEL CORPORATION PROPERTY
LIMIT OF PROJECT AREA
LOCATION OF EXISTING INTERIM LEACHATE/SHALLOW GROUNDWATER COLLECTION AND TREATMENT SYSTEM
RUNOFF DISCHARGE THROUGH EXISTING STORMWATER DRAIN TO ALLEGHENY RIVER
KARNS ROAD
LEGEND
ANTICIPATED DIRECTION OF SURFACE WATER RUNOFF
APPROXIMATE LOCATION OF SURFACE WATER DITCH
APPROXIMATE EXTENT OF PROPOSED CAP
APPROXIMATE AREA TO BE ADDRESSED BY SLOPE STABILITY ANALYSIS
100 0 100 200
LINDANE DUMP SITE
FIGURE
CONCEPTUAL REPRESENTATION OF PROPOSED CAP EXTENT

AR303725

foot clay layer, a drainage layer, 2 feet of fill material and 1 foot of topsoil, the cap would then be revegetated. Figure 9 shows a typical cross-section of the cap layer. The cap will have a slope of approximately 3.5 percent in the lower area and 4 percent in the upper area. Because of the new cap, the park facilities would have to be reconstructed with the exception of any trees within the capped area which could not be replaced as their root systems would compromise the integrity of the new cap.

The optimization of the ILCTS will include construction of a new treatment facility which would meet or exceed the required effluent discharge limits that would be established for this Site. The treatment components for the leachate to be implemented will include water conditioning, neutralization, air stripping, solids filtration, granular activated carbon absorption, backwash, solids thickening and dewatering. The sludge created by the treatment process which will be considered hazardous will be disposed in an approved disposal facility.

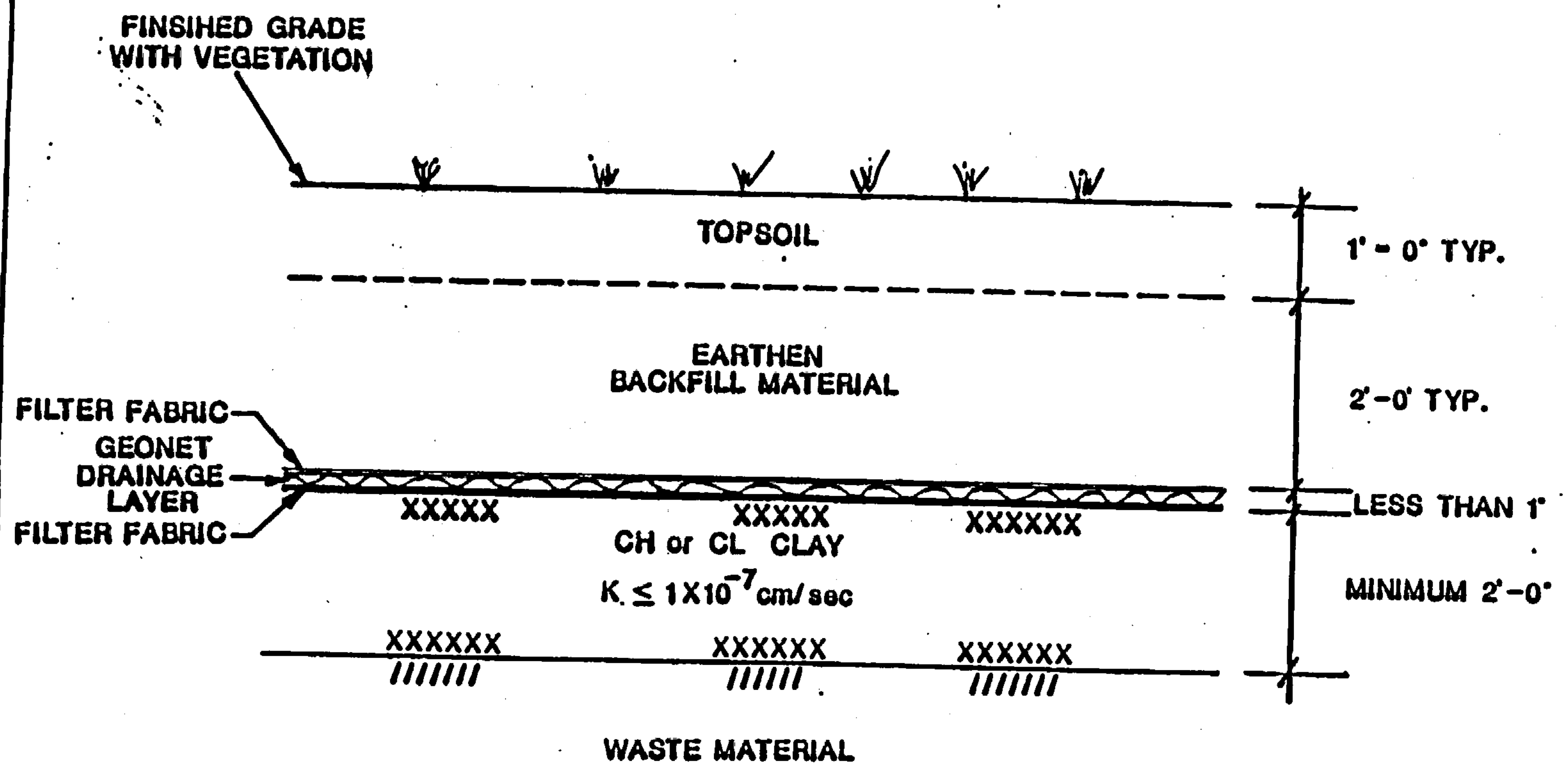
The new leachate/shallow ground water collection and treatment system will handle approximately an estimated 35,700 gallons of leachate per day and will remove approximately 97 percent of all contaminants contained in the leachate. The capping will also reduce the amount of contaminants which are currently released from the soil as a result of erosion and stormwater runoff by 96 to 99 percent.

In addition to the above components, monitoring wells would be installed to monitor the alluvial and shallow bedrock aquifer downgradient of the Site to ensure that human health and the environment are adequately protected.

The following ARARs have been identified for this alternative; for the airstripping operation at the leachate collection and treatment system, Section 7401 of the Clean Air Act, 42 U.S.C. § 7401; and Chapter 127, § 127.1 of the Pennsylvania Air Pollution Control Act; For the effluent discharge form the treatment plant, 35 P.S. §§ 691.1 <u>et. seq.</u> of the Pennsylvania Clean Stream Law; For the cap, and its operation and maintenance, Title 25, Article VI, Chapters 260 thru 270 and Chapter 75.38 of the Pennsylvania Hazardous Waste Management Regulations; For clean-up of the contaminated leachate and shallow ground water, §§ 300f to 300j-26 of the Safe Drinking Water Act, 42 U.S.C. and for the cap; its operation and maintenance; for any leachate treated and residual waste which is created as the result of the treatment process, 40 C.F.R. § 264 of the Resource Conservation and Recovery Act.

<u>ALTERNATIVE 3 CLAY AND SOIL CAP, UPGRADED LEACHATE COLLECTION AND TREATMENT SYSTEM, GROUND WATER EXTRACTION AND DISCHARGE, DEED AND ACCESS RESTRICTIONS, AND GROUND WATER MONITORING</u>

Capital Cost:	$ 8,745,900
Operation and Maintenance:	$ 677,900
Present Worth:	$ 15,136,500
Months to Implement:	24 months



TYPICAL CAP SECTION

LINDANE DUMP SITE

FIGURE 9

TYPICAL CAP SECTION
CLAY AND SOIL CAP

NOT TO SCALE

This Alternative is the same as Alternative 2 except for the addition of an additional engineering control consisting of implementing a ground water extraction component from the alluvial/shallow bedrock zone at the base of the Site and the direct discharge of the extracted ground water to the Allegheny River.

The ground water would be extracted through the use of pumping wells at the Site. Approximately 24 wells would be needed to effectively meet the required pumping rate.

It was assumed during the FS that the extracted ground water would then be discharged directly to the Allegheny River without treatment as the ground water now meets the current PADER water quality effluent limits for the Site. All quantities of waste treated in this alternative would be the same as in alternative 2.

The following ARARs have been identified for this alternative; for the airstripping operation at the leachate collection and treatment system, Section 7401 of the Clean Air Act, 42 U.S.C. § 7401; and Chapter 127, § 127.1 of the Pennsylvania Air Pollution Control Act; For the effluent discharge form the treatment plant, 35 P.S. §§ 691.1 <u>et. seq.</u> of the Pennsylvania Clean Stream Law; For the cap, its operation and maintenance, and the treatment and clean-up of the contaminated leachate and shallow ground water, Title 25, Article VI, Chapters 260 thru 270 and Chapter 75.38 of the Pennsylvania Hazardous Waste Management Regulations; For clean-up of the contaminated leachate and shallow ground water, §§ 300f to 300j-26 of the Safe Drinking Water Act, 42 U.S.C. and for the cap; its operation and maintenance; for any leachate treated and residual waste which is created as the result of the treatment process, 40 C.F.R. § 264 of the Resource Conservation and Recovery Act; for the ground water extraction and discharge, 35 P.S. §§ 691.1 <u>et. seq.</u> of the Pennsylvania Clean Stream Law.

<u>ALTERNATIVE 4 MULTI-LAYER CAP, UPGRADED LEACHATE COLLECTION AND TREATMENT SYSTEM, DEED AND ACCESS RESTRICTIONS, AND GROUND WATER MONITORING</u>

Capital Cost:	$ 8,131,300
Operation and Maintenance:	$ 634,700
Present Worth:	$ 14,114,600
Months to Implement:	24 months

This Alternative is the same as Alternative 2 with the exception of the cap design. The layout of the cap is the same as Alternative 2, but the cap construction would consist of a 1 to 2 foot thick impervious clay layer overlain by a 50 mil (minimum thickness) impervious geomembrane, a drainage layer with filter fabric, 2 feet of earthen backfill material and a 1 foot layer of topsoil with vegetation.

The difference between the cap design (clay and soil) in Alternative 2 and this alternative is the additional reduction of infiltration which the multi-layer cap would provide. It is estimated that the additional reduction in infiltration provided by the multi-layer cap would be approximately 14 percent greater than the clay and soil cap.

All other components contained in Alternative 2 would be implemented in conjunction with this Alternative.

The following ARARs have been identified for this alternative; for the airstripping operation at the leachate collection and treatment system, Section 7401 of the Clean Air Act, 42 U.S.C. § 7401; Chapter 127, § 127.1 of the Pennsylvania Air Pollution Control Act; For the effluent discharge form the treatment plant, 35 P.S. §§ 691.1 et. seq. of the Pennsylvania Clean Stream Law; For the cap, and its operation and maintenance, Title 25, Article VI, Chapters 260 thru 270 and Chapter 75.38 of the Pennsylvania Hazardous Waste Management Regulations; For clean-up of the contaminated leachate and shallow ground water, §§ 300f to 300j-26 of the Safe Drinking Water Act, 42 U.S.C. and for the cap; its operation and maintenance; for any leachate treated and any residual waste which is created as the result of the treatment process, 40 C.F.R. § 264 of the Resource Conservation and Recovery Act.

ALTERNATIVE 5 MULTI-LAYER CAP, UPGRADED LEACHATE COLLECTION AND TREATMENT SYSTEM, GROUND WATER EXTRACTION AND DISCHARGE, DEED AND ACCESS RESTRICTIONS AND GROUND WATER MONITORING

Capital Cost:	$ 8,714,500
Operation and Maintenance	$ 677,900
Present Worth:	$ 15,105,100
Months to Implement:	24 months

This Alternative is the same as Alternative 4 (Multi-layer Cap) except for the addition of the ground water extraction and discharge to the Allegheny River which is the same as the ground water extraction component described in Alternative 3.

The following ARARs have been identified for this alternative; for the airstripping operation at the leachate collection and treatment system, Section 7401 of the Clean Air Act, 42 U.S.C. § 7401; Chapter 127, § 127.1 of the Pennsylvania Air Pollution Control Act; For the effluent discharge form the treatment plant, 35 P.S. §§ 691.1 et. seq. of the Pennsylvania Clean Stream Law; For the cap, and its operation and maintenance, Title 25, Article VI, Chapters 260 thru 270 and Chapter 75.38 of the Pennsylvania Hazardous Waste Management Regulations; For clean-up of the contaminated leachate and shallow ground water, §§ 300f to 300j-26 of the Safe Drinking Water Act, 42 U.S.C. and for the cap; its operation and maintenance; for any leachate treated and any residual waste which is created as the result of the treatment process, 40 C.F.R. § 264 of the Resource Conservation and Recovery Act; for the ground water extraction and discharge, 35 P.S. §§ 691.1 et. seq. of the Pennsylvania Clean Stream Law.

ALTERNATIVE 6 COMBINATION MULTI-LAYER AND CLAY AND SOIL CAP, UPGRADED LEACHATE COLLECTION AND TREATMENT SYSTEM, DEED AND ACCESS RESTRICTIONS AND GROUND WATER MONITORING

Capital Costs:	$ 8,139,200
Operation and Maintenance:	$ 634,700
Present Worth:	$ 14,122,500
Months to Implement:	24 months

This Alternative, though not discussed in the Feasibility Study was developed by EPA, upon review of the alternatives proposed in the FS. Because of concerns about construction of a multi-layer cap over portions of the Site which have steep side slopes, a combination of alternatives 2 and 4 was developed which would provide for a multi-layer cap over those portions of the Site where side slopes are not considered a problem and a clay and soil cap over those portions where slope stability may make it infeasible for the multi-layer cap to be placed. It is currently estimated that a multi-layer cap could be utilized on over 75 percent of the capped area. The determination of the final areas to be covered by either type of cap will be determined during project design. The rest of this alternative would incorporate all other components as previously described in alternatives 2 and 4.

The following ARARs have been identified for this alternative; for the airstripping operation at the leachate collection and treatment system, Section 7401 of the Clean Air Act, 42 U.S.C. § 7401; Chapter 127, § 127.1 of the Pennsylvania Air Pollution Control Act; For the effluent discharge form the treatment plant, 35 P.S. §§ 691.1 et. seq. of the Pennsylvania Clean Stream Law; For the cap, and its operation and maintenance, Title 25, Article VI, Chapters 260 thru 270 and Chapter 75.38 of the Pennsylvania Hazardous Waste Management Regulations; For clean-up of the contaminated leachate and shallow ground water, §§ 300f to 300j-26 of the Safe Drinking Water Act, 42 U.S.C. and for the cap; its operation and maintenance; for any leachate treated and any residual waste which is created as the result of the treatment process, 40 C.F.R. § 264 of the Resource Conservation and Recovery Act.

VIII. COMPARATIVE ANALYSIS OF ALTERNATIVES

Each of the seven remedial alternatives has been evaluated with respect to the nine evaluation criteria set forth in the NCP, 40 C.F.R. § 300.430(e)(9). These nine criteria can be categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria.

Threshold Criteria

1. Overall Protection of Human Health and the Environment
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARS)

Primary Balancing Criteria

3. Reduction of Toxicity, Mobility, or Volume through Treatment
4. Implementability
5. Short-term Effectiveness
6. Long-term Effectiveness
7. Cost

Modifying Criteria

8. Community Acceptance
9. State Acceptance

These evaluation criteria are in accordance with the requirements of Section 121 of CERCLA, 42 U.S.C. § 9621 which measure the overall feasibility and acceptability of the alternatives. Threshold criteria must be satisfied in order for an alternative to be eligible for selection. Primary balancing criteria are used to evaluate the performance of each of the alternatives relative to the others. State and community acceptance are the modifying criteria formally taken into account after public comment is received on the Proposed Plan. The evaluations are as follows:

THRESHOLD CRITERIA

1. Overall Protection of Human Health and the Environment

All of the alternatives would provide varying degrees of protection to human health and the environment by eliminating, reducing or controlling risk through treatment, engineering controls, or institutional controls. Alternatives 2, 3, 4, 5, and 6 would reduce the risk to human health from exposure to contaminated ground water and seeps through the implementation of the leachate/shallow ground water collection and treatment system. The implementation of a cap in all of the alternatives would reduce the risk of potential exposure to any receptor from direct contact with any contaminants on the surface or within the near surface of the Site. Transportation of contaminants by erosion will also be reduced or eliminated by the installation of the cap. The amount of leachate produced will also decrease as a result of the reduced infiltration which will result from implementation of the cap.

2. COMPLIANCE WITH ARARS

The following applicable or relevant and appropriate requirements (ARARs) have been currently identified: Section 7401 of the Clean Air Act, 42 U.S.C. § 7401; Chapter 127, § 127.1 of the Pennsylvania Air Pollution Control Act; 35 P.S. §§ 691.1 et seq. of the Pennsylvania Clean Stream Law; Title 25, Article VI, Chapters 260 thru 270 and Chapter 75.38 of the Pennsylvania Hazardous Waste Management Regulations; §§ 300f to 300j-26 of the Safe Drinking Water Act, 42 U.S.C. and 40 C.F.R. § 264 of the Resource Conservation and Recovery Act.

Alternatives 2, 3, 4, 5, and 6 will attain compliance with

NPDES requirements for the effluent discharge, under 25 Pa. Code Chapters 16, 93, and 97 of the Pennsylvania Water Quality regulations, from the leachate/shallow ground water collection and treatment system. The cap design, construction and subsequent maintenance will meet the appropriate and relevant requirements of landfill closure and maintenance under 25 Pa. Code §§ 271.0 - 273.0. The air emissions from the leachate treatment system will attain the ARAR under the National Emissions Standards for Hazardous Air Pollutants (NESHAPS) set forth at 40 C.F.R. §61.64 and Chapter 127, § 127.1 et seq. of the Pennsylvania Air Quality regulations for such operations. In alternatives 3 and 5, the ground water discharge to the Allegheny River will attain the required effluent discharge parameters as established by the Commonwealth regulations and laws as specified under Chapters 93, 16 and 97 of the Pennsylvania Water Quality regulations. It is believed that none of the alternatives can attain the Commonwealth of Pennsylvania ARAR as specified by 25 Pa. Code §§ 264.90 - .100., Pa. Code 264.97(i)(j) and 264.100(a)(9) for remediating ground water to background levels. It is believed that this cleanup level may be unattainable at this Site due to potential stability problems created by the previous mining operations which took place at the Site. Extraction and treatment of ground water in the vicinity of Karns Road may be impracticable due to the close proximity of the mining area. Subsidence problems could result if such a technique were undertaken. Additionally, the downgradient portion of the plume has only low levels of contaminants. It is highly unlikely that implementing a pump and treat system at a substantial financial cost would substantially reduce these levels. In addition, it is anticipated that with the implementation of the cap over the Site, the level of contaminants reaching the lower aquifer will be substantially reduced.

PRIMARY BALANCING CRITERIA

3. LONG TERM EFFECTIVENESS AND PERMANENCE

While none of the alternatives provides a permanent remedy, Alternatives 3 and 5 provide the highest level of long-term effectiveness practicable at the Lindane Dump Site. Both alternatives extract the ground water and prevent potential migration of contaminants, while preventing further contamination of the aquifer with the use of the cap. Alternatives 2, 4, and 6 would provide long-term effectiveness by reducing or eliminating further contamination through the implementation of the cap. The implementation of the optimized leachate/shallow ground water collection and treatment system in all of the alternatives will provide a long-term and effective means of controlling and eliminating contamination contained in the seeps and shallow ground water. Under all of the alternatives there would remain a residual of risk as the source material would continue to exist underneath the cap. If the cap should prove to be ineffective or fail sometime in the future or the leachate collection and treatment system fail, the long-term monitoring of the Site would identify any changes in the risks posed by the Site prior to any receptors being adversely affected.

4. <u>REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT</u>

All of the alternatives would collect and treat the contaminants in the leachate and shallow ground water, through a leachate/shallow ground water collection and treatment system. Alternative 1 would also collect and treat the contaminants; however, the resulting effluent discharges would not meet the new effluent discharge standards that have been established by PADER for the new system under Chapters 16, 93, and 97, 25 Pa. Code 25 Chapters 16, 93, and 97 of the Pennsylvania Water quality regulations due to the continued use of the existing leachate collection system. All of the alternatives will reduce the toxicity, volume and mobility of contaminants contained in the ground water and leachate through the treatment process. Through the implementation of the cap in alternatives 2, 3, 4, 5, and 6, the mobility of the contaminants in the fill layer would be reduced due to the reduction of infiltration of water through the fill layer. The use of ground water extraction in alternatives 3 and 5 would reduce the mobility of the contaminants in the deeper aquifer, but would not reduce the volume or toxicity of the contaminants as the ground water would not be treated. None of the alternatives would permanently reduce the toxicity, mobility and volume of hazardous wastes which is the preferred remedial action pursuant to Section 9621 of CERCLA, 42 U.S.C. § 9621. However, it has been shown during the FS screening process that for the alternatives considered, permanent reduction of toxicity, mobility and volume of hazardous substances would be technically impracticable from an engineering and economic perspective.

5. <u>SHORT-TERM EFFECTIVENESS</u>

Alternatives 2, 3, 4, 5 and 6 could present short-term risks to workers and the community due to increased truck and construction traffic during the installation of the additional soil cover or construction of a multi-layer cap. Fugitive dust emissions from the Site may occur during construction activities. Risks to onsite workers could be minimized by the use of proper operating procedures, personal protective gear and the continual monitoring for on-site emissions during construction. Precautions would also be taken to ensure that these emissions would not impact the community.

Alternatives 2, 3, 4, 5 and 6 could also present short-term risks to workers who might come in contact with contaminated ground water resulting from maintenance activities on the leachate treatment and ground water extraction systems, recovery wells, or associated piping. The health risks associated with such short-term exposures is considered minimal. Risks to onsite workers could be minimized by the use of proper operating procedures and personal protective gear and monitoring.

The various components of the Preferred Alternative could be constructed within 24 months following issuance of the ROD. The leachate collection and treatment system would be fully operational at that time and would be collecting approximately 97 percent and treating 99 percent of all contaminants in the ground water and leachate at the Site. The Site cap would also be completed but residual contaminants remaining in the ground water would not be remediated until such time that the contaminants migrate downgradient and are captured and treated by the leachate collection and treatment system.

6. **IMPLEMENTABILITY**

Each of the alternatives under consideration would be implemented at the Site using conventional construction practices. Alternatives 2, 3, 4, 5, and 6 may pose some implementation problems during construction due to the Site restrictions which limit construction Site access and would affect sizing of the plant for the construction of the new leachate/ shallow ground water collection and treatment system. If any of the Alternatives should ever fail or if additional Site risks are ever identified, additional response actions could easily be implemented to address any new risks which may be posed by the Site. Any of the capping components can be easily implemented. Capping is a proven and reliable technology with needed materials and contractors readily available. The leachate collection and treatment component has already been proven at the Site and the components to rebuild the system to its new operating standard again is readily available. Approvals from other governmental agencies to construct and operate any of the alternatives is not expected to be difficult to obtain. Monitoring wells for the long-term monitoring program can be easily installed downgradient of the Site to monitor the ground water in the shallow bedrock and alluvium areas.

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. The capital and the annual operation and maintenance (O&M) costs for these alternatives, as calculated on a present worth basis are similar in cost range. Costs have been developed for direct and indirect capital costs and O&M costs. The present worth of each alternative has been calculated for comparative purposes.

Direct capital costs include the following:

- Remedial action construction
- Equipment
- Building and services
- Waste disposal costs

Indirect capital costs include:

- Engineering expenses
- Environmental permit compliance
- Startup and shakedown

- Contingency allowances

Annual O&M costs include the following:

- Operating labor and material cost
- Maintenance materials and labor costs
- Chemical, energy and fuel costs
- Administrative costs and purchased services
- Monitoring costs
- Costs for periodic site review (every five years)
- Insurance, taxes, and license costs

The remedial action alternative cost estimates have an accuracy of +50 percent to -30 percent. For the purpose of the present worth calculations, all Alternatives have a performance period of 30 years. Costs for the alternatives considered are shown in Table 23.

TABLE 23
DETAILED COST ESTIMATE ANALYSIS

ALTERNATIVE	PRESENT WORTH CAPITAL COST	ANNUAL O&M COST	TOTAL PROJECT COST [1/]
1	$ 0	$ 240,000	$ 2,262,500
2	$ 8,162,700	$ 634,700	$ 14,146,000
3	$ 8,745,900	$ 677,900	$ 15,136,500
4	$ 8,131,300	$ 634,700	$ 14,114,600
5	$ 8,714,500	$ 677,900	$ 15,105,100
6	$ 8,139,200	$ 634,700	$ 14,122,400

1/ Total Project Costs Based On Present Worth at 10 percent interest for 30 years

MODIFYING CRITERIA

8. STATE ACCEPTANCE

The Commonwealth of Pennsylvania has concurred with selection of Remedial Alternative 6 for implementation at the Site.

9. COMMUNITY ACCEPTANCE

A public meeting on the Proposed Plan was held on January 8, 1992 in Natrona Heights, Pennsylvania. Comments received at that meeting and during the comment period are discussed in the Responsiveness Summary to this Record of Decision

IX. SELECTED REMEDIAL ALTERNATIVE

The remedial alternative selected for implementation ("Selected Remedy") at the Lindane Dump Site is Alternative 6, **Combination Multi-Layer and Clay and Soil Cap, with an Optimized Leachate/Shallow Ground water Collection System, Deed and Access Restrictions, and Long-Term Monitoring.**

While the use of a multi-layer cap, with a synthetic liner over the entire 18 acre area of the Site to be capped would be preferred, the use of a combination cap would address possible construction and stability problems on portions of the Site where the steep side slopes may pose problems for placement of the synthetic liner which could act as a slippage plane for the overlying layers of soil.

The implementation of the combination cap will reduce or eliminate the infiltration of water through the fill area in the upper portion of the Site and a part of the lower portion of the Site. This in turn will reduce or eliminate the movement of the contaminants from the fill area to the aquifer below the Site, which will help to eliminate the current MCL violations in the ground water and the seeps. The addition of the cap will also eliminate any potential exposure to Site contaminants which may be present in the surface or near-surface soils of the Site. As a part of the capping operation the existing park facilities would be reconstructed.

The new optimized leachate/shallow ground water collection and treatment system will eliminate any exposure to contaminants contained in the leachate from the seeps. The effluent from the treatment process will meet or exceed the new Commonwealth of Pennsylvania water quality criteria standards.

The use of deed and access restrictions will prevent any intrusion or activity which may compromise the integrity of the new cap and limit access to any area which is not capped.

Long-term monitoring of the surface and ground water in the alluvial and shallow bedrock will also be implemented to ensure the effectiveness of the cap and the leachate/shallow ground water collection and treatment system and to monitor for MCL exceedences. If during the course of the monitoring, it is determined that MCL exceedences are continuing to occur or begin to reoccur, additional action will be implemented to remediate the threat.

Five year reviews of the Site will also be conducted to insure that the remedy selected was being protective of human health and the environment.

Performance Standards

(1) Construction of Clay and Soil and Multi-layer Cap

The surface area to be capped shall include those areas where there is historical evidence of waste materials. In addition, an analysis shall be done to determine the upper 95 percent confidence limit (UCL), the coefficient of variation, along with a statement of statistical confidence and power, for any contaminants in the remaining soils outside the area proposed to be capped. For those areas where the 95% UCL for any contaminant exceeds a health-based standard which was used in the Site risk assessment, the cap shall be extended to cover those areas.

The clay and soil cap portion of the overall cap shall consist of a 2-foot clay layer, a drainage layer, 2-foot of clean earthen backfill material and a 1-foot layer of topsoil. The 3 feet of cover material shall be sufficient to protect against freezing in the area. The depth of the layers required to protect against freezing shall be confirmed during the design phase of the cap. The maximum slope for the cap shall be between 3 to 5 percent with a minimum slope which will provide for adequate site drainage without causing potential erosion problems. Adequate measures shall also be taken to insure the slope stability.

The clay selected for the clay and soil cap construction shall meet the classification of CH or CL under the criteria for the Unified Soil Classification as determined by the provisions of the American Society for Testing and Materials (ASTM) D2487, Latest Edition. The clay shall have an overall permeability coefficient of 1.0×10^{-7} cm/sec or less following placement and compaction.

The drainage layer shall consist of a minimum 1-foot thick layer of well draining soil having a minimum hydraulic conductivity value of 1×10^{-3} cm/sec or an alternate drainage method with an equivalent flow capacity. A geonet material may be substituted for the well-draining soil if during the design phase, cost studies show it to be more economical and that design studies show it will meet or exceed the comparable performance criteria of the soil drainage layer. If the geonet material is selected, a filter fabric shall be installed above and below the geonet material to prevent fines from entering and blocking the void spaces.

The multi-layer cap portion of the overall cap shall consist of a 1 to 2 foot impervious clay layer, overlain by minimum 50 mil impervious geomembrane, a drainage layer with filter fabric, 2 foot of clean earthen backfill material, a 1 foot layer of topsoil. The 3 feet of cover material will be sufficient to protect against freezing in the area. This depth of the layers required to protect against freezing shall be confirmed during the design phase of the cap.

The clay selected for the multi-layer cap construction shall meet the classification of CH or CL under the criteria for the Unified Soil Classification as determined by the provisions of the American Society for Testing and Materials (ASTM) D2487, Latest Edition. The clay shall have an overall permeability coefficient of 1.0×10^{-7} cm/sec or less following placement and compaction.

The geomembrane shall be placed directly on top of the clay layer to act as an additional seal to further minimize infiltration by incidental precipitation. The geomembrane shall have a coefficient of permeability that is equal to or less than that of the underlying clay material used in the cap as described above.

The drainage layer shall consist of a minimum 1-foot thick layer of well draining soil having a minimum hydraulic conductivity value of 1×10^{-3} cm/sec or an alternate drainage method with an equivalent flow capacity. A geonet material may be substituted for the well-draining soil if during the design phase, cost studies show it to be more economical and that design studies show it will meet or exceed the comparable performance criteria of the drainage soil layer. If the geonet material is selected, a filter fabric shall be installed above and below the geonet material to prevent fines from entering and blocking the void spaces.

The cap construction shall be conducted in such a manner that will minimize all potential risks and hazards associated with the Site and constituents of concern. Dust suppression and control shall be implemented as part of the construction plan. An air monitoring plan to ensure the safety of on-site workers and nearby residents levels shall also be developed and implemented during construction.

A surface water control plan shall be developed and implemented during the cap construction to prevent the off site migration of any contaminated water, soil, or sediments.

The cap shall be maintained to ensure the permeability coefficient of 1×10^{-7} cm/sec. Routine inspection and maintenance shall be performed on a regular basis for a period of 30 years. Maintenance shall include, but shall no be limited to repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, animal intrusion, etc., and the cultivation of natural vegetation (grasses and weeds) on the clay and topsoil portion of the cap to prevent erosion. As this is a containment only remedy, it may be required that cap maintenance be continued beyond the 30 years period to insure the cap integrity until no hazardous substances remain on site which may pose a threat. Because the selected remedy will result in contaminants remaining on-site, 5-year site reviews under Section 121(c) of CERCLA, 42 U.S.C. § 9621 (c) shall be required.

The areas where the multi-layer cap or clay and soil cap will be placed will be determined by EPA based a slope stability analysis to be done as a part of the Remedial Design phase and on the design specifications of the synthetic liner and the manufacturers recommended maximum allowable slope for its placement. Based on this analysis, the multi-layer cap will be used over the maximum portion, of the area to be capped, shown feasible.

The final cap design and construction shall meet the relevant and appropriate requirements of Commonwealth of Pennsylvania Municipal Landfill Closure Standards as contained in 25 Pa. Code 264 §§ 301-310.

(2) Installation of Surface Drainage

Surface drainage for the entire Site shall be designed and constructed in such a manner so as to control and minimize the amount of overland drainage which will occur in order to minimize any surface erosion and to lessen potential infiltration through the cap. The drainage system for the entire Site shall also be designed in such a manner so as to avoid impacting upon the existing surface drainage from any adjacent land owner. The drainage system shall be able to carry a discharge based on the 24 hour, 25 year, rainfall event.

(3) Vegetation of Cap Area

Vegetation shall be established on the newly capped area upon its completion. Revegetation shall provide for an effective and permanent vegetative cover of the same seasonal variety as vegetation native to the Site and capable of self regeneration. Revegetation shall provide a quick germinating, fast growing vegetative cover capable of stabilizing the soil surface from erosion. Mulch shall be applied to newly vegetated areas to control erosion and promote germination of seeds and increase moisture retention of the soil.

(4) Leachate/Shallow Ground Water Collection and Treatment System

The selected remedy includes the continued collection and treatment of shallow ground water and leachate emanating at the base of the Site along Karns Road. The existing treatment system shall be modified so that the resulting discharge will meet or be lower than the PADER proposed final effluent discharge limits under NPDES. The treated effluent will then be discharged to the Allegheny River. The appropriate treatment system to meet the effluent discharge standards shall be designed and submitted to EPA for review. EPA in conjunction with PADER will have final approval authority on the final treatment system. The sludge generated by the treatment system which will be considered to be hazardous will be disposed of at an approved disposal facility.

The collection and treatment system shall be maintained for a 30 year period or longer if hazardous substances which pose a threat remain on site.

(5) Construction of a Perimeter Fence

A perimeter fence shall be constructed around the lower portion of the Site to prevent public access to this portion of the Site. The fence shall be maintained for 30 years or longer if hazardous substances remain on site.

(6) Ground Water and Surface Water Monitoring

Surface water (storm runoff and seeps) and ground water (monitoring wells) monitoring shall be conducted for 30 years. During the first five years, sampling shall be conducted quarterly. This data will be evaluated by EPA, in consultation with PADER, to determine the monitoring needs for the next 25 years. Parameters to be monitored include but are not limited to the following: volatile organic compounds, semi-volatile organic compounds, TAL inorganics (metals), pesticides, particle size, and leachate parameters. The number and placement of monitoring wells will be determined by EPA during the design phase to maximize the monitoring of the ground water migration from the Site.

(7) Restoration of Park Facilities

The park facilities located on the upper portion of the Site known as Alsco Community Park shall be reconstructed after completion of the Site cap so as to provide the same recreational facilities and supporting structures as existed prior to construction of the cap. The new park facilities, however shall be constructed in such a manner, so as to not compromise the integrity of the cap. In addition, no trees which are removed as a result of the capping will be replaced within the new cap area. This is to prevent the tree root systems from invading and compromising the integrity of the cap.

X STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at a CERCLA site is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, Section 121 of CERCLA, 42 U.S.C. § 9621, establishes several additional statutory requirements and preferences. One such requirement is that when complete, the Selected Remedy implemented at the Site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The Selected Remedy also must be cost-effective and utilize permanent solutions and alternative treatment

The Selected Remedial Alternative protects human health and the environment in the long term through the implementation of a cap which will reduce the infiltration of water through the fill area, which in turn will reduce the migration of contaminants from the fill into the ground water. In conjunction with the cap, the upgrading of the existing leachate/shallow ground water collection and treatment system will assure that any contaminants which are contained in the leachate or ground water will be removed prior to its discharge to the Allegheny River. In addition to the reduction in infiltration of water through the fill area, the cap will also prevent exposure to any contaminants which may exist in the surficial or near surface soils. Long-term maintenance of both the cap and leachate/shallow ground water collection and treatment system will ensure the continual protection provided by both elements.

The implementation of deed restrictions for the entire Site along with security fencing in the lower portion of the Site will further provide protection by preventing any intrusive activity which could compromise the cap's integrity.

There are no short-term risks associated with the Selected Remedy that cannot be readily be controlled. In addition, no adverse cross media impacts are expected from implementation of the selected remedy.

Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy will comply with all applicable or relevant and appropriate chemical-, location-, and action-specific ARARs except for the noted waiver. Those ARARS are as follows:

1. Chemical-Specific ARARs

   a. Relevant and appropriate Maximum Contaminant Levels (MCLS) promulgated under the Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-26, and set forth at 40 C.F.R. § 141.61(a) and 55 Fed. Reg. 30370 (July 25, 1990) are:

Contaminant	Concentration (ug/liter)
Gamma-BHC (Lindane)	.2
Benzene	5

   b. The Pennsylvania ARAR for ground water for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code §§ 264.90 - .100. Such background levels shall be attained as part of the Selected Remedy, unless it is demonstrated that attaining such levels is infeasible or otherwise waivable under CERCLA § 121(d), 42 U.S.C. § 9621(d).

b. The Pennsylvania ARAR for ground water for hazardous substances is that all ground water must be remediated to "background" quality as specified by 25 Pa. Code §§ 264.90 - .100. Such background levels shall be attained as part of the Selected Remedy, unless it is demonstrated that attaining such levels is infeasible or otherwise waivable under CERCLA § 121(d), 42 U.S.C. § 9621(d).

c. The National Emissions Standards for Hazardous Air pollutants (NESHAPs) set forth at 40 C.F.R. § 61.110 - .112 and promulgated under the Clean Air Act, 42 U.S.C. § 7401 contains an emission standard for benzene for equipment leaks which is relevant and appropriate to the air stripping if the airstripping produces 1000 megagrams of benzene per year or more.

d. Applicable discharge limits for the final effluent discharge from the leachate treatment system have been established under 25 PA Code §§ 93.1 - 93.9. They are as follows;

Parameter	Monthly Ave (mg/l)	Daily Max (mg/l)
Flow (MGD)	0.0304	-
Suspended Solid	20	40
Alpha-BHC	0.01	0.02
Beta-BHC	0.01	0.02
Delta-BHC	0.01	0.02
Gamma-BHC	0.01	0.02
Benzene	0.01	0.02
4,4-DDT	0.0003	0.0005
pH	between 6.0 and 9.0 S.U. at all times	

EPA is waiving the requirement in the Pennsylvania Hazardous Regulations [25 PA Code §§ 264.90 - 264.100 specifically 25 PA Code §§ 264.97 (i) and (j) and § 264.100(a) (9), which contain a requirement to remediate all ground water to background levels. EPA is waiving the requirement to remediate to background levels based on the technical impractibility of being able to extract all contaminated ground water from beneath the Site to treat it so as to meet background levels. It should be noted that the contaminated ground water in the deep aquifer already meets the Federal Drinking Water Standard and that shallow ground water will meet the Federal Standard once it has been treated. The authority to waive ARARS is found in CERCLA § 121(d)(4), 42 U.S.C. §9621 (d)(4) and the NCP §300.430(f)(1)(ii)(C). This ARAR is being waived for the technical impractibility of extracting all contaminated groundwater associated with the Site. The major reasons include; 1) Potential subsidence problems which could occur within the Site as a result of the pumping the deep aquifer. Subsidence could occur during pumping as the imcreased movement of the groundwater could contribute to potential instability of the waste material which makes up the majority of the fill area and the mineshafts which exist below the Site below the Site; and 2) The potential for additional migration of contaminants from within the fill area into the deep aquifer could be caused by the ground water extraction process. If this occurs, combined with the uncertainty of the ability to capture all contaminated ground water from the deeper aquifer due to the complex hydrogeologic conditions at the Site would work against the purpose of the selected remedy. The new cap and upgraded shallow ground water/leachate collection and treatment system, are being implemented to further reduce and/or prevent the migration of contaminants from the fill area into the ground water and to maximize the capture and treatment of those contaminants which have already reached the shallow ground water. The additional pumping action could compromise those goals.

2. <u>Location-Specific ARARs</u>

No location specific ARARs with respect to this Site, have been identified.

3. <u>Action-Specific ARARs</u>

a. 25 Pa. Code §§ 123.1 and 123.2 are applicable to the Selected Remedy, and require that dusts generated by earthmoving activities be controlled with water or other appropriate dust suppressants.

b. To the extent that new point source air emissions result from the implementation of the remedial alternative, 25 Pa. Code § 127.12(a)(5) is applicable, requiring that emissions be reduced to the minimum obtainable levels through the use of best available technology (BAT), as defined in 25 Pa. Code § 121.1.

c. Treatment and discharge of contaminated leachate and ground water to the Allegheny River will need to comply with the requirements of Pennsylvania's NPDES program. Those requirements as set forth in 25 PA. Code §§ 93.1 through 93.9, include design, discharge, and monitoring requirements which will be met in implementing the Selected Remedy and will be examined during the Remedial Design phase.

d. 25 Pa. Code §§ 102.1 through 102.24 contain relevant and appropriate standards requiring the development, implementation, and maintenance of erosion and sedimentation control measures which effectively minimize accelerated erosion and sedimentation.

e. Relevant and appropriate design requirements for the cap are contained in 25 Pa. Code § 264.301.

f. 25 PA. Code § 264.310 contains standards for closure and post closure for landfills including final soil cover, grading, vegetation, maintenance and monitoring requirements, which are relevant and appropriate for the Selected Remedy.

g. 25 Pa. Code §§ 105.291 through 105.314, promulgated in part under the Pennsylvania Dam Safety and Encroachments Acts of 1978, set forth applicable design requirements relating to the leachate/ground water treatment discharge pipe/headwall construction.

h. The leachate and ground water collection and treatment operations at the Site will constitute treatment of hazardous waste (i.e., the leachate contains hazardous waste), and will result in the generation of hazardous wastes derived from the treatment of the contaminated leachate (i.e., spent carbon filters from the air stripping operation). The remedy to be implemented will comply with the applicable requirements of 25 Pa. Code Part 262 Subparts A (relating to hazardous waste determination and identification numbers), B (relating to manifesting requirements for off-site shipments of spent carbon or other hazardous wastes), C (relating to pretransport requirements; 25 Pa. Code Part 263 (relating to transporters of hazardous waste); and with respect to operations at the Site generally, with the substantive requirements of 25 Pa. code 264 Subparts B-E, F (in the event that hazardous waste generated as part of the Selected Remedy is managed in containers), J (in the event hazardous waste is treated or stored in tanks), and K (in the event hazardous waste generated as part of the Selected Remedy is treated or stored in surface impoundments).

i. The land disposal restrictions set forth at 40 C.F.R. Part 268 are applicable to the management of hazardous wastes (including spent carbon filters from the air stripping operation) generated as part of the Selected Remedy.

j. 29 C.F.R. § 1910.170 sets forth applicable requirements regarding worker safety in the handling of hazardous waste.

k. 49 C.F.R. § 171.1-171.16 sets forth applicable requirements regarding off-site transportation of hazardous wastes.

l. The requirements of Subpart AA (Air Emission Standards for Process vents) and BB (Air Emission Standards for Equipment leaks) of the federal RCRA regulations, 40 C.F.R. §§ 264.1032 and 264.1052, are relevant and appropriate for the air stripping operations under the Selected Remedy. These regulations require that total organic emissions from the air stripping process vents must be less than 1.4 kg/hr (3 lb/hr) and 2800 kg/yr (3.1 tons/yr).

m. Revised Procedures for Planning and Implementing Off-Site response Actions (OSWER No. 9834.11 November 13, 1987), although not an ARAR is a guidance developed by EPA which is to be considered (TBC) in implementing the remedy.

Cost Effectiveness

Alternative 6 is cost effective in remediating the Site, when compared to all other Alternatives. A detailed breakdown of costs for all components of the Alternative is shown in Table 24.

TABLE 24
DETAILED COST SUMMARY - PREFERRED ALTERNATIVE

Item	Cost
Cap/Drainage Structures	$ 3,979,600
Leachate/Shallow Ground Water Treatment System	842,700
Fence/Gate	90,900
Deed Restrictions	15,000
Subtotal-Capital Costs	$ 4,928,200
Geotechnical Studies	300,000
Treatability Study	200,000
Contingency (20%)	985,600
Engineering (20%)	985,600
Construction Management (10%)	492,800
Administration/Legal (5%)	247,000
Total Capital Costs	$ 8,139,200
Operation and Maintenance	
Mowing	$ 61,000
Ground Water Monitoring	49,300
Cap Inspections	6,400
Cap Repairs	3,000
O&M of Leachate/Shallow Ground Water Treatment System	409,100
Subtotal	$ 528,900
Contingency (20 %)	105,800
Total O&M Costs	634,700
30 Year Present Worth O&M[1]	$ 5,983,300
Total Present Worth Project Costs	$ 14,122,500

1/Thirty-year present worth at 10 percent interest.

Preference for Treatment as a Principal Element

The Selected Remedy satisfies the statutory preference for remedies that employ treatment as a principal element to permanently reduce the toxicity, mobility, or volume of hazardous substances. The Selected Remedy addresses the risks posed by the leachate and shallow ground water associated with the Site through the use of treatment technologies.

Utilization of Permanent Solutions and Alternative Treatment technologies to the Maximum Extent Practicable

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized while providing the best balance among the other evaluation criteria. Of the alternatives that are protective of human health and the environment, the selected remedy provides the best balance in terms of long-term and short-term effectiveness and permanence; cost; implementability; reduction in toxicity, mobility, or volume of hazardous substances through treatment; state and community acceptance; and the statutory preference for treatment as a principal element.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES FROM THE PROPOSED PLAN

The Proposed Plan for the Site was released for comment in December 1991. The Proposed Plan described in detail the alternatives studied in the Feasibility Study and identified Alternative 6 as the Preferred Alternative. EPA reviewed all written and verbal comments submitted during the comment period and at the public meeting. Upon review of these comments, it was determined that no significant changes to the remedy presented in the Proposed Plan were necessary.

RESPONSIVENESS SUMMARY

This community relations responsiveness summary is divided into the following sections:

Section I — **Overview.** A discussion of EPA's Preferred Alternative and the public response to this Alternative.

Section II — **Background of Community Involvement and Concerns.** A discussion of the history of community interest and concerns raised during remedial planning activities at the Lindane Dump Superfund Site.

Section III — **Summary of Major Comments Received During the Public Comment Period and Agency Responses.** A summary of comments and responses categorized by topic.

I. OVERVIEW

EPA's Preferred Alternative, Alternative 6, outlined in the Proposed Plan, involves construction of a combination multi-layer and clay and soil cap over approximately 18 acres of the Site, upgrading the existing leachate/shallow ground water collection and treatment system with discharge of the treated water to the Allegheny River, deed restrictions on the whole Site and access restrictions on part of the lower portion of the Site, long-term monitoring of the ground and surface water, and operation and maintenance of the new cap and leachate/shallow ground water collection and treatment system.

During the public comment period, the community supported the remediation of the Site.

II. BACKGROUND OF COMMUNITY INVOLVEMENT AND CONCERNS

Public interest in the Lindane Superfund Site began in 1987 during the initiation of the Remedial Investigation under the Consent Order between PADER and Pennwalt (now Elf Atochem). An initial public workshop was held in November 1987 to discuss the purpose of the Remedial Investigation and Feasibility Study and to solicit public questions and concerns. The majority of the public was concerned with potential impact to their drinking water supply and the potential exposure to any contaminants which were buried beneath the park area. After the public workshop, public interest remained at a low level until the Proposed Plan was released for public review in December 1991. A public hearing was held on January 8, 1992 at the Harrison Township Municipal Building. Approximately 50 residents along with representatives of the Harrison Township Government, Allegheny

Department PADER, EPA and Elf Atochem attended the hearing. The concerns raised at the hearing are summarized in the following section.

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

1. The Pennsylvania Department of Environmental Resources has concurred with the selection of Alternative 6 as the recommended remedy.

EPA Response: No response required.

2. One resident asked what were the chances that their children may develop cancer as the result of direct exposure to site contaminants prior to them being covered up during the park construction?

EPA Response: The current investigation did not examine previous potential exposure cases. Without specific information as to what substances were on the site prior to the park construction, their concentrations, and times of potential exposure, it would only be conjecture as to what probably exposure could have occurred. Therefore, for EPA to place an estimate on any potential chances of an increased risk of cancer or other health effects without reliable information would not be reasonable. In conjunction with this question, EPA has referred it to the Agency for Toxic Substances and Disease Registry (ATSDR) for their evaluation and possible response.

3. One resident questioned whether the EPA investigation determined if DDT tailings were disposed of throughout the Township?

EPA Response: The RI/FS done by Atochem under Pader and EPA's oversight only centered on the Lindane Dump Site itself and did not look beyond the known site. Our review of historical past disposal information did not indicate that any DDT tailings were taken to any other location.

4. One resident raised the question; if the RI/FS investigated the white sand-like substances at the park and other places?

EPA Response: The investigation did not look at the white sand-like substances as these were covered-up by the park construction prior to the undertaking of the RI/FS investigation. We were not aware of other locations during the RI/FS where these substances were alleged to be placed.

5. One resident asked what is the timetable for remediating the site?

EPA Response: Once the Record of Decision ("ROD") has been issued for the Site, EPA will issue Special Notice Letters to those parties EPA believes are liable for remediating the Site. These letters will ask the parties noticed to enter into negotiations to reach an agreement with EPA to undertake the Remedial Design/Remedial Action ("RD/RA") necessary as indicated in the ROD to remediate the Site. The issuance of the Special Notice letters will trigger a 60 day moratorium during which time EPA can take no action at the Site. If at the end of the 60 day moratorium no parties indicate their willingness to negotiate with EPA to do the RD/RA, EPA has the option of then issuing an administrative order to the parties to order them to peform the RD/RA or EPA can use Superfund money to do the work ourselves and then later seek reimbursement through a court action. If one or more viable partiws agrees to enter into negotiations, EPA will allow an additional 120 days for negotiations. If at the end of that time period no agreement has been reached, EPA will have the same options as above as if no negotiations had occurred. Following either a negotiated settlement, administrative order, or EPA using Superfund money, a design study will be done followed by preparation of plans and specifications and bid documents with appropriate EPA and PADER reviews during the process. The project would then be bid and construction started. Based on a best case scenario, the project construction could begin as early as late 1993 or early 1994 with about a 2-year period to complete all necessary construction phases.

6. One local citizen asked what will Pennwalt's (Elf Atochem) liability be once the cap is in place?

EPA Response: Pennwalt or any other responsible party that enters into an agreement with EPA or is ordered by EPA to remediate the Site will be responsible for maintaining the cap, operating and maintaining the new leachate collection and treatment system and monitoring the ground water for a time period of no less than 30 years after site construction is completed.

7. One resident's, question was; what actions will be taken to ensure that the liable parties maintain the Site after the cap is in place?

EPA Response: Under any settlement agreement reached or EPA administrative order issued, the liable parties will be legally bound to undertake whatever maintenance and operation activities are determined to be necessary at the Site to ensure continued protection of human health and the environment.

8. One resident asked if there would be a risk of soil contamination to the private residents after the cap is in place?

EPA Response: The results of the soil samples taken from the perimeter of the site during the remedial investigation did not indicate levels of contamination that would pose a health threat. Capping the site will greatly reduce the infiltration of precipitation which will prevent the migration of contaminants from wastes landfilled at the site. Therefore, properties bordering the site are not considered at risk for soil contamination.

9. One resident asked whether soil samples were taken from the residential area that borders the site, to what depth were samples taken, and what contaminants were found in these areas?

EPA Response: The soil sampling conducted at the Lindane Dump Site extended out to the site boundaries. Some of the bordering residential properties were sampled during the sampling activities. Generally only soil samples were collected but some samples were collected at depths up to three feet. No significant contamination was detected at the site boundary so there was no need to sample further into the residential areas.

10. One resident questioned what the project boundaries in relation to the surrounding neighborhood would be?

EPA Response: The project boundaries as currently defined would include the Alsco Community Park property defined as the upper portion of the site and the lower area belonging to Allegheny Ludlum below the park down to Karns Road. The project boundaries may extend further if additional contamination were to be found beyond the existing area currently identified. However, based on current information, this is unlikely.

11. A worker at the interim leachate collection and treatment plant asked whether air samples were taken at the plant area and did the air and surface soil samples results indicate that there is a risk of airborne contamination at the site?

EPA Response: Air samples were collected at the site to determine the presence and concentration of site-related organic compounds in the ambient air. No significant concentrations which could pose a threat to human health were detected. Soil samples taken at and near the treatment plant were analyzed and there were no significant concentrations of contaminants in the soils which could pose a threat to human health if they became airborne.

12. One resident raised the concern on what was the risk of exposure to contaminants during construction activities?

EPA Response: The construction activities will consist of implementation of the cap on the site which is the remedial alternative selected by EPA. The capping alternative will require a minimum amount of excavation and therefore would pose a minimal health risk to the residents. On-site air monitoring will be done throughout the construction phases to ensure the safety of local residents. In addition, contingency plans will be prepared to address minimize any potential situations which may pose health risks. Workers constructing the cap would also incur a minimal health risk because Federal regulations which will require them to have appropriate safety training, wear protective clothing, use appropriate air monitoring equipment and follow approved health and safety plans for all phases of the construction.

13. One resident asked what is the risk of ground water contamination in the area's residential wells?

EPA Response: Because the ground water from the Site flows out toward the Allegheny River, only wells between the Site and river would be at risk for ground water contamination. The Remedial Investigation indicated that there are no current wells within this area used for drinking water purposes. In 1990, the Allegheny County Health Department tested residential wells located upstream from the Site and the results indicated that no Site contaminants were occurring in any of the residential wells.

14. One adjoining resident asked that since EPA only sampled to a depth of three feet, is there a risk to residents whose homes were built lower than three feet from the ground surface?

EPA Response: Both EPA and PADER reviewed Site records and historical photographs of the Site area. There was no indication of any disposal in the areas now occupied by residential structures.

15. One concerned citizen asked if the placement of the cap would divert the ground water flow beneath the Site such that it would bypass the leachate collection and treatment system?

EPA Response: The placement of the cap on the Site will not change the direction of the ground water flow. Ground water will continue to flow in the same direction towards the river. The cap will only divert the precipitation from infiltrating the fill areas.

16. One resident asked if there was a method to determine if all the contaminated ground water is actually collected by the leachate collection system?

EPA Response: Leachate is currently and will continue to be collected by the existing subsurface drainage system that is channeled directly to the leachate collection/treatment system. Any contaminated ground water that is not collected by the drainage system and treatment plant is considered to be minimal.

17. One resident asked what is the fate of the water collected from the leachate collection system?

EPA Response: The water that enters the leachate collection/treatment is currently treated in the adjacent granular activated carbon treatment system. The carbon treatment system removes the contaminants from the leachate and then disposes of the cleaned water by pumping it to the Allegheny River. When the treatment process is upgraded as part of the implementation of the entire remedial alternative, the effluent released will meet the more stringent treatment standards which will be imposed by the Commonwealth of Pennsylvania.

18. One resident questioned whether the river sampling conducted by Harrison Township downstream of the Site at their water supply intake indicated any contamination?

EPA Response: EPA reviewed the Harrison Township sampling data as part of the Remedial Investigation and found that there were no Site related contaminants in any of the samples taken.

19. One resident asked if contaminants leak down into the underlying mineshafts and migrate to the river?

EPA Response: Based on the available information, it is possible for some of the contaminants to leak into the underlying mineshafts; however the majority of the contaminated ground water goes directly to the leachate collection system and is therefore treated prior to its release to the Allegheny River. Those contaminants which do reach the river do not pose a threat to anyone using the river either recreationally or as a drinking water source. This was confirmed during the risk assessment which took into account the contaminants that were found in both the river water and sediments.

20. One resident asked what is involved with the natural processes that will clean up the Site after the cap is in place?

EPA Response: The natural processes that will cleanup the ground water are basically a combination of dispersion, dilution and biodegradation.

As contaminant constituents move through the ground water, they will tend to spread out from the path they are expected to follow. This phenomenon is known as dispersion which dilutes the contaminants. Once dispersed, microorganisms in the ground water can then easily break down the diluted constituents via the process of biodegradation. With the cap in place, the ability of the contaminants to migrate into the ground water will be greatly lessened and therefore will allow the microorganisms to more readily biodegradate the existing contaminants in the ground water. This process will only address those contaminants which migrate from the fill into the ground water. Those contaminants which remain immobilized within the fill area will remain in place with no definite timeframe for them to degrade.

21. One resident raised the question; will the Site monitoring be continuous and will it include additional soil and water samples?

EPA Response: EPA will require that monitoring of the ground water downgradient of the Site be done on a regular basis to ensure that the selected remedy continues to be protective of human health and the environment. The monitoring program for the ground water will be developed during the Remedial Design Phase. However, no additional soil or surface water samples will be taken as these media pose no unacceptable threat to any receptors.

22. One resident asked how long will it take for the Site to be safe for building houses?

EPA Response: It is EPA's intent to not allow any new construction such as homes to be built on the Site. The purpose of the cap is reduce and eliminate infiltration of water into the fill area which will reduce or prevent migration of contaminants into the aquifer below the fill area. Construction of homes or similar structures over the cap would defeat the purpose of the cap by potentially compromising the integrity of the cap layer. As a part of the Remedial Action, EPA will require that deed restrictions be placed on the Site which would prohibit any type of construction or structures which would compromise the integrity of the cap once it is in place or any other type of activity such as excavation of other areas of the Site not capped which could potentially expose hazardous waste.

23. One resident asked if the subdivision contractor who built the homes could be contacted to determine where the fill material originated from that was placed as fill material in conjunction with the construction of the homes?

EPA Response: EPA and PADER could not locate the former contractor. Soils were tested in residential yards adjacent to the Site during the RI and the results indicated that the soils did not contain any contamination of any concern.

24. Atochem, previous Site owner and PRP for the Site, raised the question of why the Preferred Alternative is identified as only addressing ground water and leachate contamination and not other media?

EPA Response: EPA has determined, that based on the results of the RI and Risk Assessment, that the only health-based threat posed by the Site to potential future receptors is from ingestion of the ground water which contains the contaminants benzene and lindane which exceed their respective MCLs. The Preferred Alternative will address this threat through the implementation of the cap which in turn will reduce infiltration into the fill layer which should reduce or eliminate the MCL exceedences. The upgraded collection and treatment plant will treat the ground water and leachate which is already contaminated and this in turn will prevent the further migration of the contamination beyond the current Site.

25. Atochem questioned the description of the Site stratigraphy and ground water flow in the proposed plan as being insufficient.

EPA Response: EPA believes that the geological and hydrogeological descriptions contained therein were sufficient for describing the general conditions of the Site to the general public. The public was further directed in the Proposed Plan to review the Administrative Record at the Site repository if they needed additional information. The Administrative Record contains all documents which were prepared during the Site investigation and relied upon by EPA in making it's recommendation.

26. Atochem questioned the need for installation of additional wells installed downgradient of the Site as part of the long-term monitoring plan.

EPA Response: EPA believes the six wells already selected in the FS may not provide sufficient monitoring data on the deep aquifer to adequately address whether the selected remedy is completely protective of human health and the environment. Therefore, EPA believes that additional wells located further downgradient from the Site may be necessary to provide adequate monitoring. A final determination of well placement will be made during the design phase.

27. Atochem feels that the EPA rationale for the Preferred Alternative of the Combination Clay-Soil and Multi-layer Cap is not warranted and that a Multi-layer Cap for the entire area to be capped be constructed instead.

EPA Response: EPA believes that given the steep existing slope, that only a clay-soil cap will be stable enough to construct on the steeply sloped areas due to potential slippage planes which may occur as the result of the synthetic liner within the cap layer. However, EPA will consider Atochem's position on the use of the Multi-layer Cap for the whole area to be capped, if during design studies, it can be proven that the potential slope stability problems which could arise during and after the cap construction will not threaten the integrity of the cap structure after its implementation and that the multi-layer cap if implemented over the entire area to be capped will meet all required performance standards.

28. Atochem disagreed with the language in the Proposed Plan which indicated that the new treatment facility "would meet or exceed the required effluent discharge limits that would be established for this Site" Atochem contents that final proposed effluent limits have already been established by PADER in a letter to Atochem dated March 22, 1991.

EPA Response: EPA has conferred with PADER on this matter and has included the proposed effluent limits per the March 22, 1992 letter from PADER to Atochem as final in the ROD.