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REMEDIAL ACTION MASTER PLAN

**HAVERTOWN PCP SITE
HAVERFORD TOWNSHIP,
DELAWARE COUNTY, PENNSYLVANIA**

**EPA WORK ASSIGNMENT
NUMBER 01-3V54.0
CONTRACT NUMBER 68-01-6699**

NUS PROJECT NUMBER 0701.71

DECEMBER 1983

AR100001



Park West Two
Cliff Mine Road
Pittsburgh, PA 15275
412-788-1080

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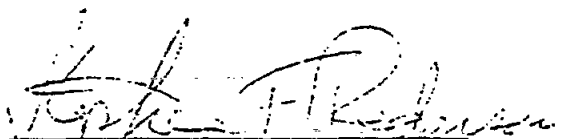
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SUBMITTED FOR NUS BY:

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RR100002

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EXECUTIVE SUMMARY

This Remedial Action Master Plan (RAMP) for the Havertown PCP Site will act as both a general planning document and a site management tool. It contains information necessary for planning a coherent strategy for assisting in the selection of an appropriate course of action.

Site Description

The Havertown PCP Site is located in Haverford Township, Delaware County, Pennsylvania, which is about 10 miles west of Philadelphia. The area is characterized by several commercial establishments surrounded by a mixture of homes, schools, recreation facilities, and industrial activities.

National Wood Preservers currently operates a wood treatment plant on site. This facility, which consists of a small plant with treatment and storage tanks, is located on approximately two acres of property. Present operating practices include the use of Pentachlorophenol (PCP) and possibly other water soluble salts i.e., sodium fluoride, sodium chromate, sodium arsenate, and di-nitrophenol as preservatives for treating wood. The process is carried out by loading preconditioned wood into vessels (treatment tanks), adding chemicals, and then applying pressure to force the preservatives into the wood cellulose. Excess chemicals are returned to storage tanks for reuse.

In 1947 National Wood Preservers, Inc., was founded by Mr. Samuel T. Jacoby, who leased the property from the owner, Mr. Clifford Rogers. In 1963 Mr. Jacoby sold National Wood Preservers (NWP) to Allan and Morris Goldstein, who have been tenants of the Rogers since the purchase.

Waste disposal activities occurred at the Havertown Site during the time that NWP was owned by Mr. Jacoby. Spent preservatives were dumped into a well approximately 25 to 35 feet deep, and consequent subsurface contamination of PCP and fuel oil occurred. The well was located on the portion of the Rogers' property that was leased to Shell Oil Company in 1967.

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In 1962, the Pennsylvania State Department of Health became aware of Contaminants in Naylor's Run, and linked the source of contamination with National Wood Preservers waste disposal practices. Mr. Jacoby was brought to trial by the Commonwealth of Pennsylvania in 1964, for the disposal activities that occurred at the Havertown PCP Site. He was found not guilty since the State had not complied with provisions of Section 309 (Act of May 3, 1945).

In 1972 the Pennsylvania Department of Environmental Resources (PADER) identified contaminated groundwater discharging from a storm sewer into Naylor's Run. PADER ordered NWP, Philadelphia Chewing Gum Company, Shell Oil Company, and Mr. Rogers to clean up Naylor's Run, since they occupy land where contaminated groundwater exists. The above parties appealed to the Environmental Hearing Board, and later to the Commonwealth Court of Pennsylvania. The court sustained Philadelphia Chewing Gum and Shell Oil Companies' appeals and ordered the cleanup to be executed by NWP and Mr. Rogers.

In 1976 the United States Environmental Protection Agency (USEPA) initiated cleanup activities under Section 311 of the Clean Water Act. Cleanup activities occurred in two phases. The first phase established containment operations at Naylor's Run. Filter fences were installed to remove PCP and oil from the surface water. These fences were located just downstream from the out-flows of a 24-inch storm sewer pipe and a 12-inch sanitary sewer pipe. The second phase was carried out by the Emergency Response Team from the USEPA. Groundwater collection and treatment, and cement grouting of the two sewer pipes was attempted. The sanitary sewer was successfully sealed; however, contaminated groundwater still exists and discharges into Naylor's Run from the 24-inch storm sewer pipe.

In 1982 the USEPA ended containment operations in Naylor's Run. National Wood Preservers agreed to maintain in-stream treatment measures following a CERCLA notice letter dated December 18, 1981.

The Havertown PCP Site is listed on the National Priorities List of 418 sites issued by the USEPA in December 1982.

Environmental Concerns

Analytical data indicates that high concentrations of PCP occur in soils (1000 parts per million or ppm) and groundwater (0.22 ppm to 31,200 ppm) in the vicinity of the Havertown PCP Site, with lower concentrations occurring in surface water (1 to 8 ppm). In addition to PCP, other potentially toxic substances such as flourides, chromates, arsenates, and zinc and copper compounds are found. There are insufficient data given to assess the concentrations of these compounds.

Air quality data detected low concentrations of PCP, however, survey crews working in the storm drain area reported eye, skin, and mucous membrane irritations.

Previous subsurface investigations have identified a contaminated plume on and off site. The plume is partially dewatered by the storm sewer, which drains into Naylor's Run. Contamination of Naylor's Run is a public concern because of direct contact with PCP and other possible contaminants.

Threat to public health at the Havertown PCP Site exists through exposure to three types of media: soils, surface water, and groundwater. Exposure to contaminated soil exists through stream beds and the storm sewer. Because of existing controls on PCP and oil in Naylor's Run, exposure to surface water should produce only an accute irritation. However, a more serious effect is possible near the filter fence area where higher concentrations of PCP and oil occur. Groundwater between National Wood Preservers operations and the storm sewer contains a maximum concentration (32,000 ppm) of PCP in the oil layer. This concentration can be lethal if 0.2 liters of water are ingested.. Since the high concentrations of PCP and oil is contained in the subsurface in the site vicinity and groundwater is not used for potable drinking water, there does not appear to be direct threat to public health.

Remedial Action Planning

Two types of remedial actions, initial remedial measures (IRMs) and long-term remedial responses, will be used in planning future actions at the Havertown PCP Site. IRMs are urgent measures implemented to prevent actual or potential exposure to a significant environmental problem. Long-term remedial responses are required, after initial hazards have been addressed, to systematically provide for a safe and economical site cleanup.

The IRMs identified for the Havertown PCP Site are:

- Construction of a security fence and signs to prohibit public access to the storm sewer outfall area.
- Construction of additional signs conveying the hazardous nature of suspected offsite contaminated areas.
- Construction of security locks on manhole covers to prohibit unauthorized access.
- Inspection of existing filter fences in Naylor's Run to determine their usefulness for in-stream treatment measures.

The IRMs will be implemented independent of the long-term measures.

The long-term remedial measures which should be investigated may include but are not limited to:

- Construction of groundwater barriers/diversions
- Leachate collection and treatment
- Groundwater collection and treatment
- Surface water collection and treatment

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- Removal of contaminated soils
- No action

Based on existing information and the above list of alternatives, the following two alternatives have been identified as prime candidates for long-term remedial actions applicable to this site at this time:

- Groundwater collection and treatment
- Construction of groundwater barriers/diversions
- No action

The remedial planning activities involve investigation, selection, and implementation of the long-term remedial measures. They are listed below in the sequence in which they will occur.

- Initial Activities
- Remedial Investigation
- Engineering Feasibility Studies
- Remedial Action Design
- Remedial Implementation (Construction)
- Post-Closure and Maintenance/Monitoring Program

Table ES-1 summarizes the range of costs and schedules for the Initial Remedial Measure (IRMs), Remedial Investigation (RIs), and Feasibility Study (FS) activities proposed for the Havertown PCP Site.

The costs and schedules for the initial activities are included under Remedial Investigation activities.

COST (1983 DOLLARS)	SCHEDULE (MONTHS)												
	1	2	3	4	5	6	7	8	9	10	11	12	
INITIAL REMEDIAL MEASURES _____ 56,600													
REMEDIAL INVESTIGATION _____ 215,600													
FEASIBILITY STUDY _____ 58,300													
TOTAL RI/FS AND IRM'S _____ 329,500 (EXCLUDING CONTRACT LABORATORY PROGRAM COST)													

ES-6

AR100012

TABLE ES-1



COST AND SCHEDULE SUMMARY
HAVERTOWN PCP SITE, HAVERFORD TWP., PA

1.0 INTRODUCTION

This Remedial Action Master Plan (RAMP) is prepared in accordance with the rules of the National Contingency Plan (NCP) (F. R. Vol. 47 No. 137, July 16, 1982) published pursuant to Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980. Remedial actions are those responses to sites on the National Priorities List that require long-term efforts consistent with permanent site remedy, to prevent or mitigate the migration of a release of hazardous substances. The specific aspects of remedial actions are presented as Phase VI, Section 300.68 of the NCP.

This RAMP will be the basis of a decision to be made by the EPA and DER for requesting funding for remedial actions, feasibility studies, and other onsite or offsite remedial actions. In addition, this RAMP and subsequent revision will serve as the basis of the workscope under the U. S. EPA -State agreements or contracts and as the primary planning document for all remedial action activities at the site and related enforcement activities.

Based upon the elements of work agreed upon in the final RAMP, a detailed work plan will be prepared for the next phase of work, i.e., the Remedial Investigation/Feasibility Study (RI/FS).

The RAMP contains three major sections: (1) compilation of existing data, contained in Section 2.0 through 6.0; (2) evaluation of data, Sections 7.0 through 9.0; and (3) remedial planning, Section 10.0. A site chronology appears in Appendix A.

The RI/FS Work Plan presented in Appendix B provides a task-by-task breakdown of the activities required in performing the Remedial Investigation and Feasibility Study. Detailed costs and manpower requirements are also provided, along with a weekly schedule of RI/FS activities.

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2.0 THE SITE

2.1 Location

The Havertown PCP Site is located in Haverford Township, Delaware County, Pennsylvania. This is a suburban area situated approximately ten miles west of downtown Philadelphia, with coordinates 40°59'05" latitude and 79°19'35" longitude. The site, shown in Figure 2-1, is approximately 0.7 miles north of West Chester Pike (Route 3), which is a major highway in the area. Conrail railroad tracks border the site to the north.

2.2 Site Description

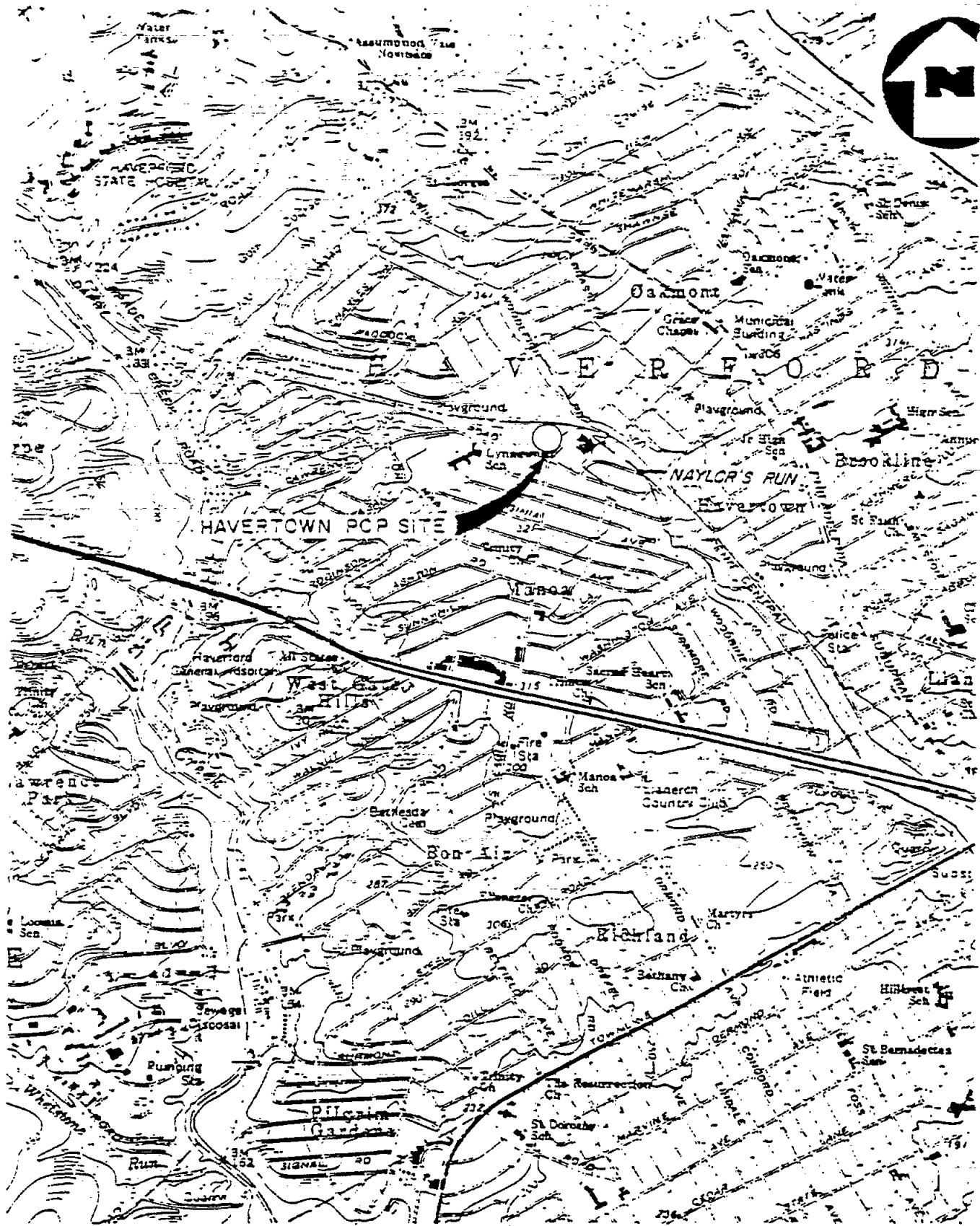
The site occupies approximately 2 acres of relatively flat land. A wood treatment facility owned by National Wood Preservers currently operates on site. The facility consists of a small plant with four large storage tanks and three pressurized treatment tanks. Treated wood is stockpiled on site. A fence has been constructed around the property. Figure 2-2 depicts the site layout.

2.3 Ownership History

For over 36 years the Rogers have owned a piece of land bordered by Eagle and Lawrence Roads in Haverford Township. In 1947 National Wood Preservers, a small wood preservative treatment plant, was incorporated by Samuel T. Jacoby. The property on which the plant is located was leased from Mr. Clifford Rogers, owner of the property. Jacoby continued operations of the plant through 1963.

National Wood Preservers was sold to Alan and Morris Goldstein in 1963. Following the purchase from Jacoby, the Goldsteins continued as tenants of the Rogers. However, on February 10, 1967, National Wood Preservers released the leasehold interest on a portion of the property located at the northwest corner of Eagle and Lawrence Roads. Subsequently, Shell Oil Company began leasing this portion of land from Rogers. Shell filled this site and constructed a gasoline station.

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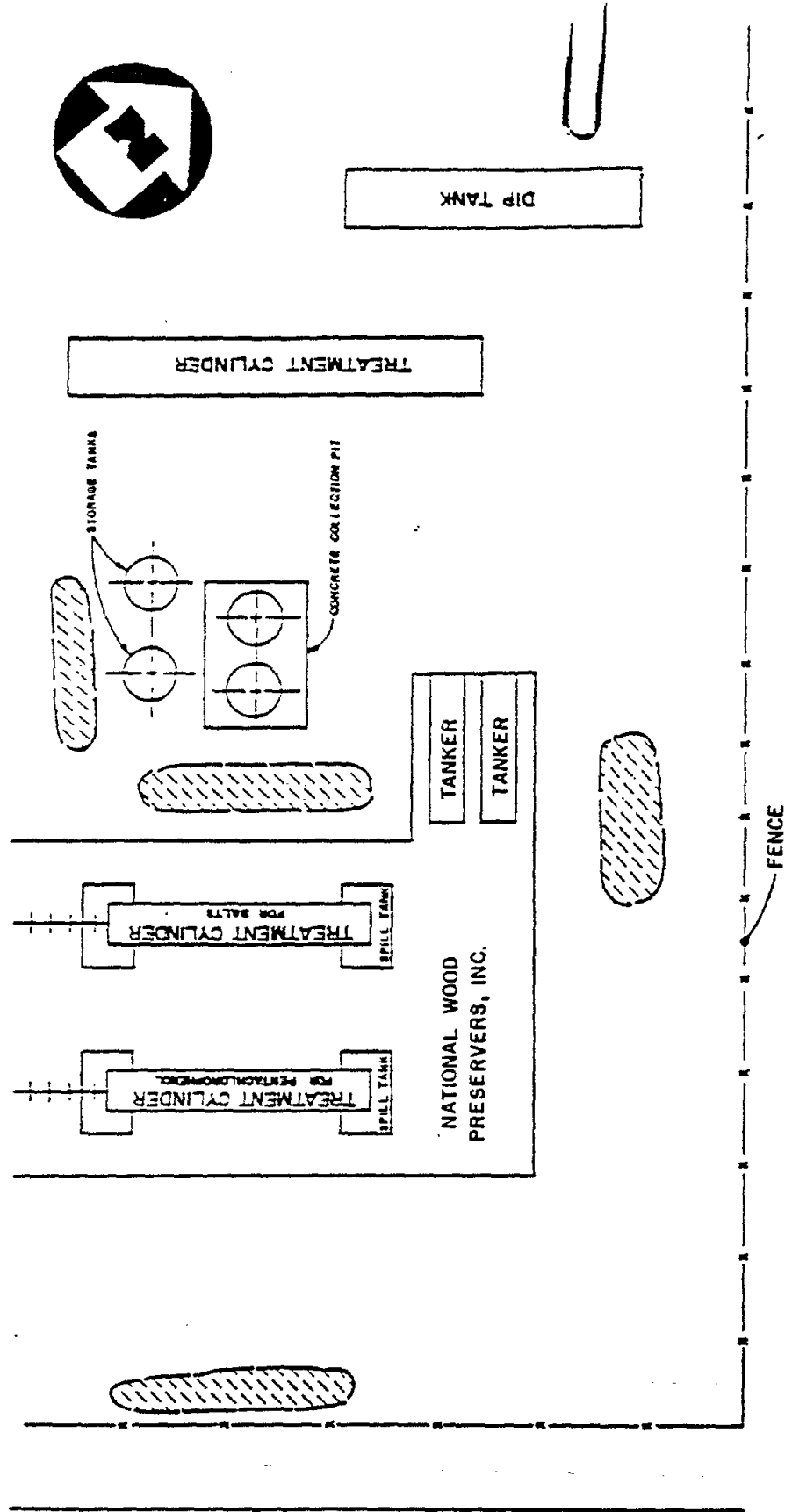
BASE MAP IS A PORTION OF THE U.S.G.S. LANSDOWNE, PA. QUAD R180015 (7.5 MINUTE SERIES, 1967, PHOTOREVISED 1973). CONTOUR INTERVAL 10'

R180015

FIGURE 2-1

LOCATION MAP
HAVERTOWN PCP SITE, HAVERFORD TWP., PA
 SCALE 1" = 2000' 2-2





910001AR
EAGLE ROAD

2-3

LEGEND



TREATED WOOD STORAGE AREA

NOTE: PLAN REPRODUCED FROM PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES (1973)

FIGURE 2-2

GENERAL ARRANGEMENT
HAVERTOWN PCP SITE, HAVERFORD TWP., PA
NOT TO SCALE



Philadelphia Chewing Gum Company owns the property across Eagle Road from the Shell and National Wood sites. Since December 1944, Philadelphia Chewing Gum Company has been engaged in the manufacture of chewing gum products at this location.

2.4 Site Use History

Present operations at National Wood Preservers, Inc., involve the treating of various types of wood in large pressure/vacuum vessels. Preconditioned wood is loaded into these vessels, chemicals are added, and the vessels are sealed. Pressure is applied to force the preservatives into the cellulose matrix. After a prescribed time the vessel is evacuated to remove the excess chemicals. These are recovered and returned to storage tanks for future reuse. Any chemicals remaining in the vessels are contained in concrete catch basins and also recovered for reuse. The processing areas are made of concrete.

The majority of the activities resulting in pollution occurred during the operations conducted by the previous owner. Between the years 1947 and 1963 approximately 1 million gallons of spent preservatives were dumped into a 25 foot well on the property (Lamp'l, 1976). This resulted in pentachlorophenol (PCP) contamination of a shallow groundwater flow system. In all probability not only PCP but other wood preservatives may have contaminated this flow system.

This disposal practice and the use of PCP, which was employed to preserve the wood used for railroad ties, telephone poles, and planks for boardwalks, was discontinued when the present owners and operators assumed operation of the plant.

2.5 Permit and Regulatory History

In 1972 residents of Haverford Township notified the Pennsylvania Department of Environmental Resources (PADER) of a foul-smelling, oily substance continuously

seeping into Naylor's Run. The State conducted an investigation, and in July 1973, ordered National Wood Preservers, Rogers, Philadelphia Chewing Gum Company, and Shell Oil Company to clean up Naylor's Run at their expense. All parties appealed and five years of litigation ensued. On May 24, 1978 Commonwealth Court sustained appeals of Shell Oil and Philadelphia Chewing Gum, and ordered the cleanup to be executed solely by Rogers and National Wood Preservers.

Meanwhile in 1976 the Environmental Protection Agency (EPA) declared a federal removal activity for the Havertown PCP Site cleanup. The cleanup operations were funded under Section 311 of the Clean Water Act and maintained until January 31, 1982.

In October 1980, the U. S. Supreme Court refused to hear an appeal by National Wood Preservers and Rogers based on the allegation that PADER had abused its authority in ordering National Wood Preservers to clean up Naylor's Run. National Wood Preservers claimed that the pollution had occurred prior to their ownership of the business. The State then proceeded to order National Wood Preservers and Rogers to submit proposals to perform studies to determine the extent of the contamination under their properties.

National Wood Preservers assumed responsibility for operation and maintenance of the containment operations in Naylor's Run on February 1, 1982, as a result of negotiations following receipt of a CERCLA notice letter dated December 18, 1981.

At present, the U. S. Department of Justice has a U. S. Coast Guard claim against National Wood Preservers to recoup some of the containment costs. The Coast Guard administers the Section 311 fund for environmental emergencies.

2.6 Remedial Actions to Date

At DER's request, an EPA Region III oil spill removal project was initiated. Clean-up began in September of 1976 with the installation of filter fences in Naylor's Run

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to contain and remove surface contamination. The filter fences were made from 1/4 inch hardware cloth and retained sorbent materials to collect PCP and oil.

Investigations of the area by Region III personnel revealed that the PCP was entering Naylor's Run at two locations, from a 24-inch storm pipe and a 12-inch discharge pipe located approximately 1/2 mile downstream (Lamp'L, 1976). The 12-inch line was an abandoned terra-cotta sanitary pipe which passed through the highly contaminated soils in the vicinity of the 24-inch culvert and received groundwater seepage from this area. The problem of seepage and discharge was eliminated by drilling a hole in the ground close to the terra-cotta pipe at the contaminated area and plugging the pipe with concrete.

Subsequently, the services of the Environmental Emergency Response Unit (EERU) were requested from the EPA Division of Oil and Special Materials Control in Washington D. C. and the EPA Oil and Hazardous Materials Spills Research Group in Edison, New Jersey. After pilot testing of activated carbon filters at the Edison Laboratories and the treatment design were completed, the Mobile Physical-Chemical Treatment System and Mobil Spills Laboratory were moved to the cleanup site in Haverford Township. The cleanup process consisted of the following steps:

- Contaminated groundwater was pumped from the wells and trenches by a Vacuum Truck employing low-shear diaphragm pumps, the recovered material was transported from the site of origin to the treatment site in tank trucks. The transport trucks were allowed to stand undisturbed for a minimum of two hours and when possible, overnight. Gross quantities of oil that surfaced in the tanks were separated from the bulk of the water by draining the water in the truck from a bottom port into settling tanks, shutting off the flow when oil was reached, and then draining the oil layer into an oil storage tank.
- The water layer containing water, oil, and PCP was allowed to stand undisturbed in either a 3,000-gallon or a 12,000-gallon portable, field-erected settling/surge tank. Free oil on the surface of the tanks was

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removed using a small Lockheed air-operated rotating disc skimmer; the oil was pumped into the oil storage tank.

- Oil accumulated in the oil storage tank was periodically sent to a local disposal company for incineration. Sludge in the settling tanks was manually removed at the end of the operation.
- Water from the storage tank was pumped through the mixed-media and carbon filters of the EPA Mobile Physical-Chemical Treatment System; the flow rate was normally 100 gpm providing approximately 50 minutes of retention time during the carbon adsorption step. The effluent was held in portable pillow tanks or clean tank trailers while awaiting final analysis.
- The available storage for treated water was 18,000 gallons, providing 3 hours in which to obtain a PCP analysis by gas chromatography in the onsite Mobile Spills Laboratory (Lamp'L 1976).

Three 8-inch-diameter steel casing wells ranging from 30 to 50 feet deep were placed on the NWP site and interceptor trenches were dug at the 24-inch culvert and 12-inch pipe locations (Lamp'l, 1976). It was decided to use a physical-chemical treatment on the fluid removed from these wells and trenches.

Cleanup operations using the mobil treatment equipment were completed on December 17, 1976. The EPA on-scene coordinator decided then that the initial problem of stream contamination had been addressed and that the procedure of pumping out and treating material from the contaminated zone on site was no longer appropriate. Preparations were then made for long-term corrective work (Lamp'L, 1976).

Two 36-inch diameter recovery wells were drilled in the vicinity of the larger culvert in the zone of groundwater thought to have the highest levels of contamination. These wells were periodically pumped by the DER and the fluids disposed of properly. In addition, the joints in the larger culvert were sealed with

cement grout to prevent further groundwater intrusion and pollution of Naylor's Run (Lamp'L 1976).

In December of 1980, EPA issued a scope of work for a contamination recovery feasibility study for the PCP and oil contamination problem at the Havertown PCP Site (Massey, 1981). The consulting engineering firm SMC Martin, Inc., of King of Prussia, Pennsylvania was awarded the above contract in March 1981.

Based on the results of this work SMC Martin concluded that a contaminated plume exists on and off site which contained approximately 400,000 to 600,000 gallons of oil. SMC Martin, Inc. recommended a two well recovery program to remove oil from the subsurface in the site vicinity.

In June of 1982, at EPA's recommendation, National Wood Preservers posted warning signs along Naylor's Run.

3.0 ENVIRONMENTAL SETTING

3.1 Landforms

The Havertown PCP Site is located within the Piedmont Physiographic Province, very close to the fall zone, which is the divide between the Piedmont and the Coastal Plain Physiographic Provinces.

In general, the Piedmont is characterized by gently rolling uplands with occasional low hills and ridges. Elevations at the project site range from approximately 270-300 feet (USGS Landsdowne 7.5" Quadrangle).

3.2 Surface Waters

Naylor's Run Creek receives all surface runoff from the Havertown PCP Site and vicinity. It is a small stream that meanders for approximately 4 miles through residential communities west of Philadelphia, Pennsylvania (Lamp'L, 1976). Naylor's Run headwaters begin approximately 750 feet northeast of the site and flows in a southeasterly direction. Approximately four miles east-southeast of the site, Naylor's Run discharges into Cobbs Creek, which in turn flows south where it joins Darby Creek. The confluence of Cobbs Creek with Darby Creek is about six miles down stream from the site. Darby Creek flows through an ecologically sensitive area called the Tinicum National Wildlife Refuge, which is a freshwater marsh.

3.3 Geology and Soils

Geologic formations in Delaware County range in age from Pleistocene to Precambrian (Hall, 1973). Pleistocene deposits are terrace deposits of sand and gravel, which have a combined thickness of 20 feet or less. Underlying unconsolidated rock are strata occurring in the Wissahickon Formation, which has been described as a heterogeneous stratigraphic unit made up of schist and gneiss.

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Site-specific geologic data has been obtained from 21 test borings that were drilled on and around the site. Test boring logs from James A. Humphreville, a consultant to National Wood Preservers, Inc., and SMC Martin, Inc., a consultant to the United States Coast Guard, are contained in the Final On Scene Coordinators' Report (OSC).

The drilling logs indicate that fill material consists of fine sand and silt, and ranges in thickness from 2 feet to 15 feet. This material thickens westward from National Wood Preservers' property to Philadelphia Chewing Gum Company property. Underlying the fill material is an extremely weathered bedrock rock zone called a mica schist saprolite, which is 2 feet to 14 feet thick. Below this zone is weathered bedrock containing quartz gneiss, mica schist, and pegmatites. Fresh unweathered bedrock was encountered only in one test boring (NW1). At a depth of 23 feet a quartz biotite gneiss was penetrated.

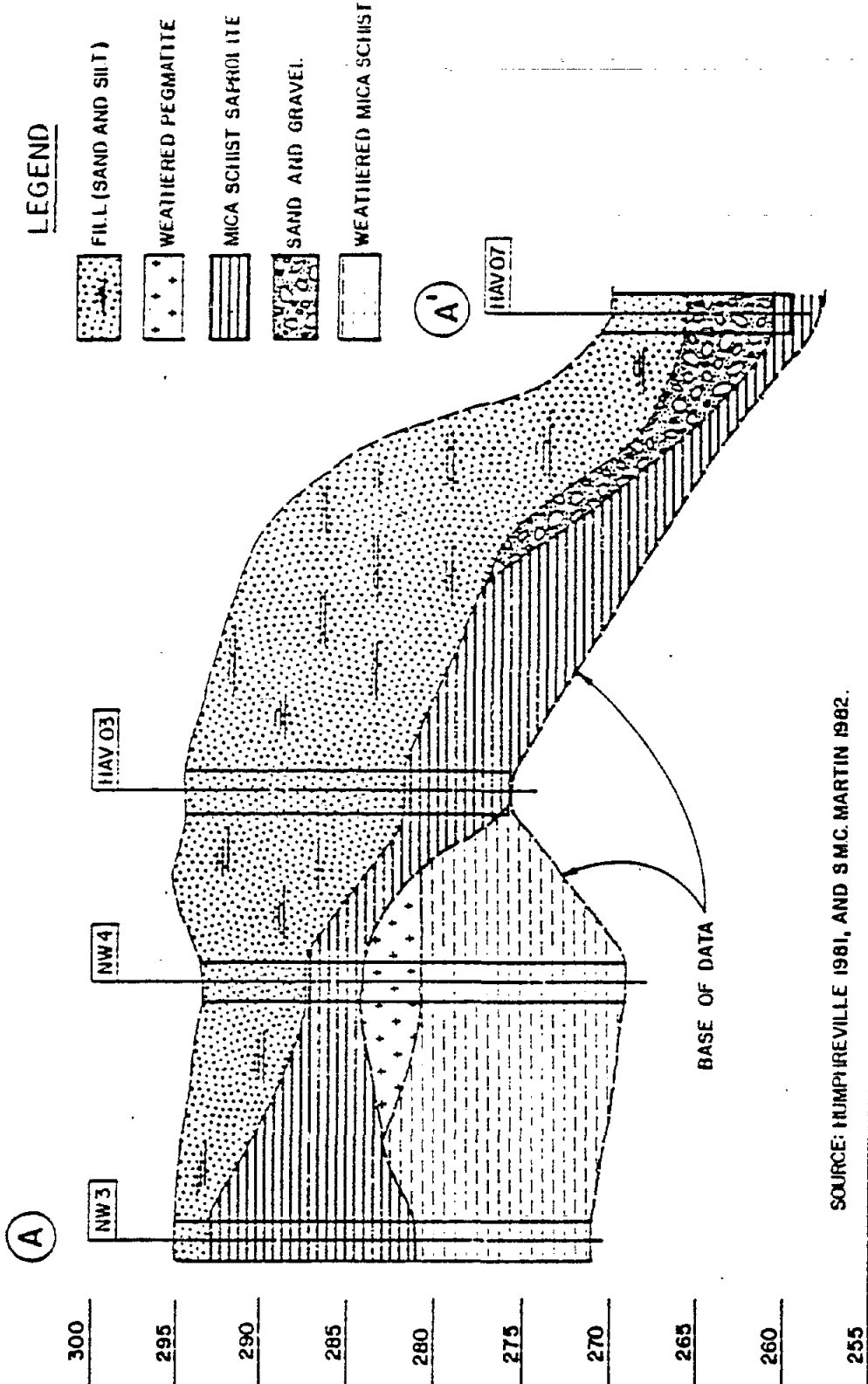
A few test borings drilled by SMC Martin, Inc., may have encountered remnants of the Pleistocene terrace deposits. Sand and gravel containing rounded pebbles and cobbles were encountered in test borings HAV05, HAV06, HAV07, HAV08, and HAV10. Cross Section A-A (Figure 3-1) illustrates the subsurface conditions. Its location is shown in Figure 3-2.

The Soil Conservation Service has mapped several different soils in the project area. The Glenville Silt Loam has been mapped adjacent to the site and along Naylor's Run Creek. West and south of Naylor's Run Made Land consisting of silt and clay materials, and Made Land containing schist and gneiss materials have been mapped.

Glenville soils are described as deep, moderately well-drained soils on uplands, developed from material weathered mainly from granite, schist, and gneiss.

The Glenville Silt Loam has slopes ranging from 3 to 8 percent. Permeabilities range from 0.63 to 2.0 inches per hour. These soils have also been described as having a seasonal high water table (Kunkle 1963).

AR100023



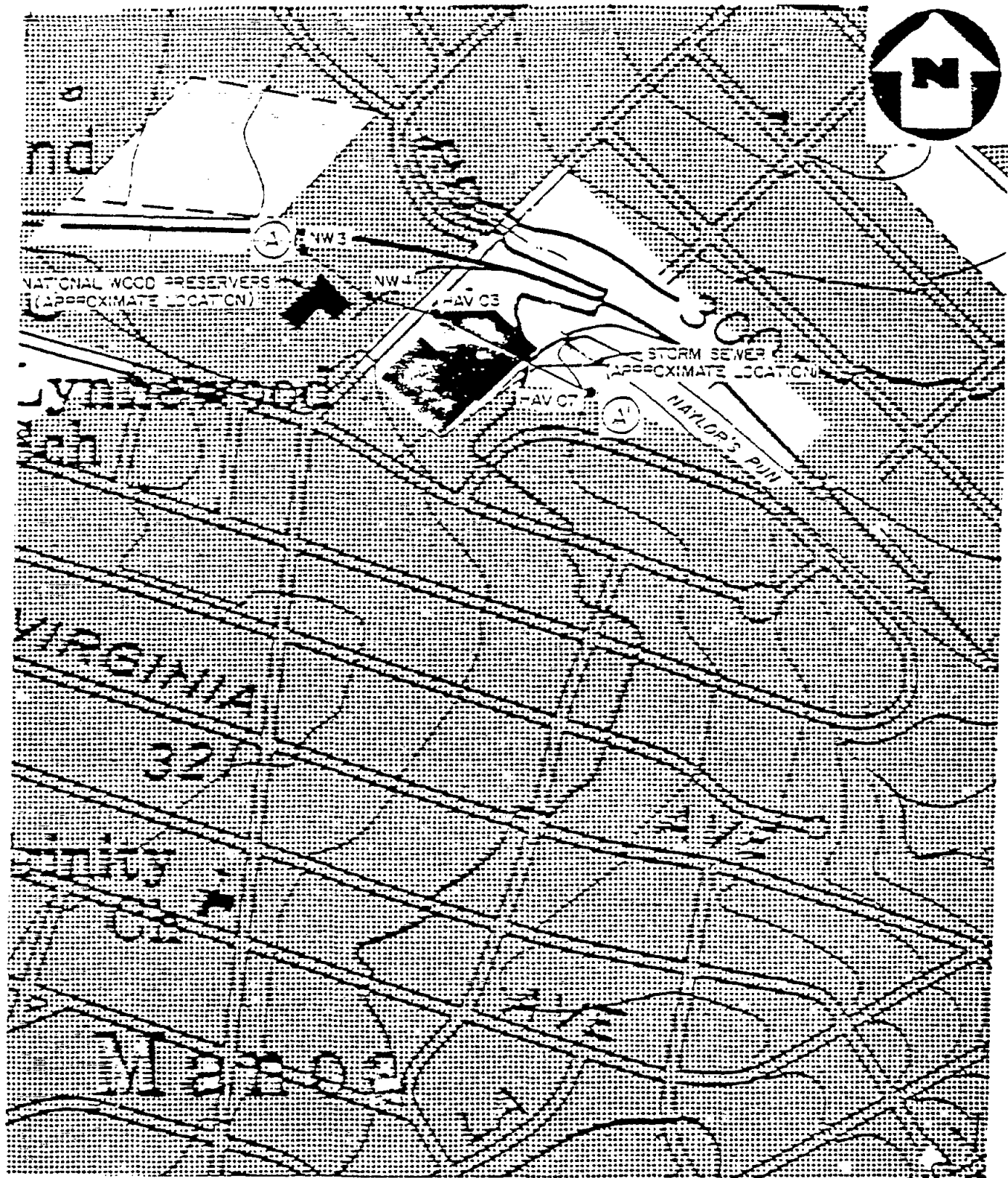
SOURCE: HUMPHREVILLE 1981, AND S.M.C. MARTIN 1982.

NOTE: TEST BORINGS NW 3 AND NW 4 DRILLED BY JAMES A. HUMPHREVILLE. TEST BORINGS HIAV 03 AND HIAV 07 DRILLED BY S.M.C. MARTIN, INC.

FIGURE 3-1

CROSS SECTION A-A'
HAVERTOWN PCP SITE, HAVERTOWN TWP., PA
 SCALE: 1" = 200' H., 1" = 10' V





SELECTED TEST BORINGS FROM OSC FINAL REPORT. LOCATIONS APPROXIMATED FROM SMC MARTIN, INC. REPORT.

BASE MAP IS AN ENLARGEMENT OF A PORTION OF THE U.S.G.S. LANSDOWNE, PA QUADRANGLE (7.5 MINUTE SERIES, 1967, PHOTOREVISED 1973), CONTOUR INTERVAL 10'

AR100025
LOCATION OF CROSS SECTION A-A
HAVERTOWN PCP SITE, HAVERFORD TWP, PA
 SCALE 1" = 400' 3-4

FIGURE 3-2



Made land consists of areas in which the soil has been covered by other materials or from which the soil has been moved about or removed to provide materials for urban or industrial development (Kunkle 1963).

Made land silt and clay materials are soils where in most places the exposed materials consist of silt and clay, but small areas of sand and gravelly materials are intermingled with the silt and clay (Kunkle 1963).

Made land, schist, and gneiss materials are soils that consist of a grayish-brown surface layer, silt loam subsoil, and partially weathered micaceous schist and gneiss rocks. These soils are highly variable and, therefore permeability values have not been recorded (Kunkle 1963).

3.4 Groundwater

The major aquifer in this area is the Wissahickon Formation. This formation is a good source of water for domestic wells (Hall 1977). Rock units in the Wissahickon Formation are dense and lack porosity; therefore, groundwater storage is usually concentrated along joint planes. Also, this formation has been faulted in many areas. These fault planes provide additional storage for water. Other sources of groundwater storage are planes of schistosity in the schist rock units.

The weathered portions of this formation are a potential source of larger volumes of water. In this zone the joints are more numerous and the planes of schistosity have become wider due to weathering. Records indicate that many of the older dug wells and newer drilled wells obtain all or part of their supplies from this zone.

Wells in the Wissahickon Formation range in depth from 35 to 825 feet, averaging 187 feet. Yields in these wells range from less than 1 gallon per minute (gpm) to 170 gpm. The average yield of this formation is approximately 23 gpm.

Other sources of groundwater occur in the unconsolidated and terrace deposits overlaying the Wissahickon Formation.

AR100026

In the project area a shallow aquifer has been identified by previous subsurface investigations. This aquifer is unconfined (water table conditions) (SMC Martin, 1983). Flow direction in the project area should be to the southeast. Other hydrogeologic properties such as permeability and storage coefficient have not been investigated.

Earlier studies have attempted to generate a watertable contour map from static water level elevations in monitoring wells on and off site. The well data used is questionable. Some of the wells on National Wood Preservers property may have interconnected shallow aquifers, thus causing a composite static water level in these wells. The method for oil thickness determination needs to be verified, such that potential errors therein can be eliminated. This necessitates the screening of the water level data before constructing potentiometric head contour maps.

The groundwater flow system in weathered bedrock may be separated by the saprolite unit from a flow system in the fill material. This unit was not investigated to determine if it serves as a semi-confining layer or confining layer.

A contaminant plume consisting of PCP and oil exists in the shallow subsurface. The maximum thickness of the plume occurs on the eastern portion of the site and extends to the western portion of Philadelphia Chewing Gum Company's property. The plume extends over 4.5 acres of the study area (SMC Martin Inc.). It has migrated to and beyond the storm sewer line. Wells east and downgradient from the storm sewer line (HAV05, HAV06, HAV07, HAV09, and HAV10) contain PCP and oil ranging in concentration from .22 ppm to 20 ppm. The occurrence of PCP and oil in these wells suggests that the storm sewer line does not entirely intersect the contaminated plume.

3.5 Climates and Meteorology

Delaware County has a humid, temperate climate, with both the Appalachian Mountains to the west and the Atlantic Ocean to the east having a moderating effect. Precipitation is evenly distributed throughout the year, with maximum amounts occurring in the late summer months.

AR100027

During the summer months the prevailing wind direction is from the southwest, while during the winter months it is from the northwest.

The average monthly temperatures and precipitation for Philadelphia, located approximately 10 miles east of the site, are summarized below:

<u>Month</u>	<u>Temperature (°F)</u>	<u>Precipitation (in.)</u>
January	32.8	3.24
February	33.6	3.08
March	41.7	3.53
April	52.3	3.31
May	63.0	3.36
June	71.8	3.64
July	76.6	4.11
August	74.8	4.52
September	68.5	3.39
October	57.3	2.82
November	46.2	3.08
December	<u>36.1</u>	<u>3.20</u>
	54.6*	41.28**

* (Average Annual Temperature)

** (Total Average Annual Precipitation)

3.6 Land Use

The project site is presently active. Land use in the vicinity of the site includes heavy and light residential, commercial, and industrial use that includes a railroad and related activities.

AR100028

4.0 POTENTIAL RECEPTORS

4.1 Population Distributions

The Havertown PCP Site is located in Haverford Township, Pennsylvania with an estimated population of 36,000 (1979, based on last census). Haverford Township is about ten miles west of Philadelphia. Metropolitan Philadelphia is estimated to have a population of over three million. The contamination source (National Wood Preservers) is located among several commercial establishments and surrounded by the typical urban mix of homes, schools, recreation facilities, and industrial activity.

4.2 Water Users

Recreational use of the surface water in this area is minimal because aquatic life in the creek is either nonexistent or severely stressed. Present data indicate no drinking water intakes in the area of known surface water contamination (Naylor's Run).

Groundwater is intercepted by a storm sewer and Naylor's Run upgradient of any drinking water wells. The contamination is, therefore, intercepted prior to any public use. Conditions may change if groundwater flow or elevation changes or if drinking water wells are placed between the sewer and National Wood Preservers.

4.3 Land Use

Local land use includes private homes, light industry, recreation, commercial, railroad right-of-way, schools, Haverford State Hospital, and Haverford General Hospital.

AR100029

5.0 HAZARDOUS SUBSTANCES

5.1 Location on Site

Early investigations of the Havertown PCP Site have identified several sources of pentachlorophenol (PCP) and occasionally other organic compounds as well. The principal source of hazardous substances is in the shallow groundwater which has been contaminated by past well disposal of the wood-treating chemicals, mainly PCP dissolved in oil (Massey, 1983). It is also stated by other investigators that wood treatment pits and facilities may have allowed PCP/oil solutions to infiltrate the surface soils down to the saturated zone (SMC Martin 1982, Fountain et al., 1975). Oily liquids floating on nearby Naylor's Run, a tributary of Cobbs Creek which enters the Delaware River, drew the attention of local residents. In 1972, representatives of the Pennsylvania Department of Environmental Resources collected samples from the Run and determined that PCP with oil was the major constituent (Zampogna, 1973). Additional samples were taken from ponded water and Naylor's Run in 1974 by PADER; several samples were identified as containing PCP (Feola, 1974).

Osgood (DER) in 1976, reported further on the groundwater contamination problem and dispersion of a plume. Primarily, the contamination lies beneath the site, in the soil, and possibly on the surface of the water table.

5.2 Physical, Chemical, and Hazardous Characteristics

5.2.1 Form

Both the oil and PCP identified as contaminants from the wood treatment process are normally found as free flowing liquid and, except for use during the preservation process, are stored in tanks on site.

AR100030

5.2.2 Physical State

PCP is a dark colored crystalline solid having a density of 1.973 mg/L, a melting point of 190-191° C, and a vapor pressure of 40 mm at 211° C. It has a characteristic odor described as very pungent only when hot. PCP is slightly soluble in water, 8 mg/100 ml (80 mg/l) according to one source and 14 mg/l from another. These differences may be due to the purity of the material. It is rarely used in a pure form and contains a variety of related chlorinated aromatic compounds and by-products depending on the mode of synthesis. The solubility of PCP is high in most organic solvents such as alcohol, ether, or benzene. The sodium salt of PCP, sodium pentachlorophenate, is very soluble in water (EPA 1980).

The oils found associated with PCP on the Havertown PCP Site were described as similar to No. 2 diesel or fuel oil. No 2-D (diesel) has a flash point of 52° C, distillation temperature of 282° C, kinematic viscosity of 1.9 centistokes (CS) at 40° C. Burner grade fuel oil (No. 2) has a flash point of 38° C, distillation temperature of 282° C, viscosity of 2.0 (CS) at 38° C, 1.9 at 40° C, and a specific gravity of 0.88. Waste oil/PCP from the treatment process is caught in a sump and removed by a local hauler-disposer.

5.2.3 Chemical Compounds

The chemical compounds identified at the site include:

- Pentachlorophenol: insecticide, fungicide, herbicide, defoliant.
- Oil: Fuel/diesel - solvent or vehicle for PCP.

In 1974, PADER collected samples from a tanalith dip tank which were not similar to those from PCP tanks. Tanalith is a trade name for wood preservation, similar to Wolmanizing. The Tanalith or Wolmanizing processes use water soluble salts such as:

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- sodium fluoride (NaF) 25% by wt.
- sodium chromate (Na₂CrO₄) 37.5% by wt.
- sodium arsenate (Na₂A₂O₃) 25% by wt.
- di-nitrophenol (12.5%) by wt.

Analytical evidence for the presence of these other chemicals has been established. Analyses for zinc, chromium, copper, fluoride were performed. The analytical results are 0.02 to 0.6 ppm for zinc, 0.0 to 0.02 ppm for chromium, 0.11 ppm for copper, and 0.3 ppm for fluoride.

Air quality studies have indicated the presence of volatile compounds such as xylene, benzene and mineral spirits. (Allen 1982)

5.2.4 Hazardous Characteristics

Table 5-1 depicts the hazardous characteristics of the compounds found on the site or in the vicinity.

5.3 Source, Quantity and Concentrations

The source of the PCP and oil is the residual from wood impregnation. None of the storage tanks have been reported as analyzed. Estimates of quantities dumped in the well were approximately 1,000,000 gallons of PCP and oil. Other potentially hazardous substances on site generated by other wood treatment processes may be fluorides, chromates, arsenates, zinc and copper compounds. There are insufficient analytical data given to assess the concentration of these compounds at the site or in the site environs.

TABLE 5-1

HAZARDOUS CHARACTERISTICS

<u>Compound</u>	<u>Concentration Range</u>	<u>Flammability/ Reactivity</u>	<u>Toxicity/ Carcinogenicity</u>
Pentachlorophenol	air <0.05 mg/m ³ - groundwater 0.22 mg/l to 3.2% surface water 10 µg/l - 6200 mg/l soil/sediment 0.5 to 3.4 mg/kg	Non-flammable	0.5 mg/m ³ TLV (8 hr) (PCP) Non-reactive LD ₅₀ - 78 mg/kg (parts) NOPEL - 0.02 mg/l in drinking water acute - 5.5 µg/l chronic - 3.2 µg/l Not considered to be carcinogenic
Benzene, xylene	air <0.17 µg/m ³ to 8.51 mg/m ³	Benzene FP = 12 °F	TLV 30 mg/m ³ uncharacterized Xylene FP = 81 °F TLV 435 mg/m ³ organics groundwater - N/A Mineral Spirits TLV 1150 mg/m ³ (mineral spirits) FP = 102 - 110 °F surface water 12 µg/l to 460 µg/l (petroleum fractions)

AR100033

FP = Flash point NOAEL = No action exposure level
 LD₅₀ = Lethal dose 50% - the dose level at which 50% of test organisms will not survive.
 TLV = Threshold limit value.
 Source: USEPA October 1980.
 Massey, 1983.

6.0 ENVIRONMENTAL CONCENTRATIONS

6.1 Air

The United States Environmental Protection Agency (USEPA) took air samples during May and June of 1981 and April of 1982. As can be seen in Table 6-1, the only contaminant present above the limit of detection in the 1981 samples was benzene at 0.5 ppm. One of the 1982 samples contained xylene (1.97 ppm) and mineral spirits (7.19 ppm), while the other 1982 samples contained pentachlorophenol (up to 3.7 $\mu\text{g}/\text{m}^3$).

6.2 Soil

Two soil samples were collected from drill cuttings and analyzed by the Pennsylvania Department of Environmental Resources (PADER) in 1972. Fuel oil and an estimated 1,000 ppm pentachlorophenol was found in the drill cuttings. The USEPA took soil samples from the stream bed in Naylor's Run in 1982. Analyses revealed up to 3.4 ppm of pentachlorophenol. The results of both samplings are presented in Table 6-2.

The USEPA also analyzed a sample for PCBs in February 1981. None were found as shown in Table 6-2.

6.3 Groundwater

Qualitative analyses of the groundwater at the Havertown PCP Site was performed by PADER during 1972. Fuel oil, pentachlorophenol, and naphtha were determined to be present as can be seen in Table 6-3.

During 1976 and again in 1981, PADER performed quantitative analysis of groundwater in the study area. The samples were extracted from existing wells on and off site. A map showing the monitoring well locations can be seen in the SMC Martin Report. Pentachlorophenol (up to 31,200 ppm) was detected in the oil layer

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TABLE 6-1
 AIR ANALYSIS
 HAVERTOWN PCP SITE
 PAGE TWO

	6/25/81 Same location as 2) from 5/18/81	6/25/81 Same location as 2) from 5/18/81	6/25/81 Same location as 3) from 5/18/81	6/25/81 Same location as 3) from 5/18/81	6/25/81 Same location as 4) from 5/18/81	6/25/81 Same location as 4) from 5/18/81
	10.9 VS Solid Sorbent SD	207 VS Impinger SD	84.3 VS Solid Sorbent SD	220 VS Impinger SD	7.4 VS Solid Sorbent SD	225 VS Impinger SD

Parameter

Benzene

Toluene

Chloroform

Xylene

Pentachlorophenol

Benzene	<0.03	<0.003	<0.003	<0.003	<0.04	<0.003
Toluene	<0.01	<0.01	<0.02	<0.02	<0.2	<0.003
Chloroform	<0.14	<0.03	<0.03	<0.03	<0.2	<0.003
Xylene	<0.2	<0.003	<0.03	<0.003	1.0	<0.003
Pentachlorophenol	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

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TABLE 6-3

GROUNDWATER ANALYSIS - QUALITATIVE
HAVERTOWN PCP SITE

6/13/72	9/26/72	9/26/72	9/26/72
Hole By	Area of	Skimmed Off	Water
3rd Beam	Sewer Injector	Top of Mud	Dripping From
From Front	System		Drill
SN 003913	SN 003916	SN 680999	SN 681000
			SN 681001
			Well - 25 Feet From Building And 30 Feet From Fence

PARAMETER

Oil	F.O.	F.O.	F.O.	F.O.
Pentachlorophenol	Detected	Detected	1000-Estimate*	Detected
Naptha				Detected

Results are given in ppm
 F.O. = Fuel oil was determined to be present qualitatively
 Analyses were performed by the Pennsylvania Department of Environment Resources.
 NA = Not analyzed.
 SN = Sample number.
 * The quantitative value given is an estimate. The limit of detection is unknown.
 Source: Chapman, 1974

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of several samples. The groundwater also contained pentachlorophenol, although at lower concentrations (up to 21.6 ppm). The results are presented in Table 6-4.

6.4 Surface Water

Samples analyzed in 1962 and 1963 by the Pennsylvania Department of Health (PADOH) contained alkalinity (up to 70 ppm), chloride (up to 1,100 ppm), BOD (up to 29 ppm), and oil (up to 95%). The high oil results indicate that some of these samples were apparently puddles of oil with some water trapped underneath. Lesser amounts of fluoride (0.3 ppm), zinc (0.6 ppm), and phenol (0.11 ppm) were also found. The results are presented in Table 6-5.

During 1970, PADOH took surface water samples. In 1972, PADER also took water samples. The results are shown in Table 6-6. Analysis revealed the presence of alkalinity (190 ppm), total solids (1,380 ppm), suspended solids (280 ppm), suspended volatile solids (200 ppm) suspended fixed solids (80 ppm), total volatile solids (280 ppm), total fixed solids (2,100 ppm), BOD (212 ppm), ammonia (20 ppm), chloride (75 ppm), and phenol (0.05 ppm). The results given are the maximum concentrations found. Pentachlorophenol was also determined to be present but was not quantified.

During January of 1974, PADER performed qualitative analyses on 25 surface water samples. Pentachlorophenol was detected in the majority of the samples, and one sample contained mineral spirits. The results are shown in Table 6-7.

In November of 1974, PADER again analyzed surface water samples. Chemical constituents which were present above 10 ppm included alkalinity (up to 125 ppm), COD (up to 670 ppm), BOD (up to 130 ppm), total solids (up to 520 ppm), suspended solids (up to 104 ppm), total dissolved solids (up to 416 ppm), and chloride (up to 11,800 ppm). Pentachlorophenol was again determined to be present but was not quantified. Table 6-8 presents the results.

PADER also analyzed samples taken during 1975 and 1976. Pentachlorophenol (up to 8 ppm) was present in most of the samples, while BOD (>850 ppm) was present in

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TABLE 6-4

GROUNDWATER ANALYSIS - QUANTITATIVE
HAVERTOWN PCP SITE

<u>PARAMETER</u>	11/11/76 Old Well	9/30/81 Well IIAV01	9/30/81 Well IIAV02	9/30/81 Well IIAV03	9/30/81 Well IIAV04	9/30/81 Well IIAV05	9/30/81 Well IIAV06	9/30/01 Well IIAV07
	*	SN 21097	*	*	*	*	SN 21091	SN 21093
Pentachlorophenol	4.9	4.4	21,000	1.3	31,200	20	1.0	0.22
Oil & Grease		<2	>10	<2	>25		<2	<2
Oil (%)			8.1		6.1			

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TABLE 6-4
 GROUNDWATER ANALYSIS - QUANTITATIVE
 HAVERTOWN PCP SITE
 PAGE TWO

PARAMETER	9/30/81 Well HIAV08 SN 21094	9/30/81 Well HIAV09	9/30/81 Well HIAV10	10/6/81 Well 3	12/10/81 Well 2 Top	12/10/81 Well 2- Middle	12/10/81 Well 2- Composite	11/19/76 DER Hole At 449 Rittenhouse
	*	*	*	*	*	*	*	*

Pentachlorophenol	0.7	8.8	1.3	0.8	12,500	21.6	9.5	1.16
Oil & Grease	<2	<2	<2	<2				

φ
1
φ

Results given in ppm. Pentachlorophenol (PCP) results are given as NaPCP. The Pennsylvania Department of Environmental Resources performed all the analysis except that the 11/11/76 sample was analyzed by an unknown laboratory.

Note: Existing well locations are shown in the SMC Martin report.

*Sample number is unknown

SN: Sample Number

Source: Commonwealth of Pennsylvania, 1976; Foote, 1981; Commonwealth of Pennsylvania, 1981.

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TABLE 6-5

SURFACE WATER ANALYSIS
HAVERTOWN PCP SITE

PARAMETER	SN 969190	SN 969199	SN 969533	SN 969534	SN 970735	SN 970736	SN 970737	SN 973738
	12/7/62 Storm Sewer Below 441 Rittenhouse Circle	12/10/62 Storm Sewer Before Discharge To Naylor's Run, 441 Rittenhouse	1/8/63 East Side of National Wood Preservers Plant	1/8/63 Rear of 307 Virginia Ave.	3/26/63 Storm Sewer, Rear of 441 Rittenhouse Circle	3/26/63 Naylor's Run, Rear of 301 Harrington Road	3/26/63 Storm Sewer, Rear of 441 Rittenhouse Circle	3/26/63 50 feet Below Storm Sewer

pH	6.5							
Alkalinity	70							
BOD	29							
Chloride	1,100							
Fluoride	0.3							
Chromium	0							
Zinc	0.6							
Arsenic	<0.05							
Phenol		0.11						
Oil		9	95%	36%	0.20	5%	64	11%

Results are given in PPM unless otherwise indicated
The Pennsylvania Department of Health performed the analysis.
SN - Sample number
Source: Commonwealth of Pennsylvania, 1962; Thompson, 1963.

one sample. Low levels of chromium (0.01 ppm) and copper (0.11 ppm) were also detected as can be seen in Table 6-9.

A pentachlorophenol study conducted during November and December of 1976 revealed up to 5,800 ppb of the chemical present in Naylor's Run. The results are presented in Table 6-10.

Surface water samples of Cobbs Creek were taken by PADER in August 1978. Constituents present above 10 ppm included suspended solids (up to 28 ppm), total dissolved solids (up to 327 ppm), hardness (up to 126 ppm), fecal coliform (>6,000 ppm), and fecal streptococcal coliform (up to 830 ppm). Table 6-11 presents the results.

During February and March of 1981, the USEPA and Ecology and Environment, Inc., analyzed samples for PCBs and pentachlorophenol. No PCBs were detected, while up to 10 percent pentachlorophenol was found. The results are shown in Table 6-12.

The USEPA analyzed samples taken in April of 1982. As can be seen in Table 6-13, the samples contained pentachlorophenol (up to 4.4 ppm), benzene (up to 160 ppb), toluene (up to 15 ppb), and xylene (up to 460 ppb).

6.5 Biota

The PADER sampled biota during March 1975 and August 1978. Tables 6-14 and 6-15 present the results in terms of a count of the species found. Taxa counted included Annelida, Isopoda, Trichoptera, Ephemeroptera, Coleoptera, Amphipoda, Diptera, and Gastropoda. The 1975 data showed a depression in the aquatic community downstream of the suspected PCP discharge point. The 1978 survey revealed that Cobbs Creek and its tributaries exhibit poor water quality, not all of which can be attributed to the PCP contributed by Naylor's Run. The USEPA analyzed biota samples taken in April of 1982. Pentachlorophenol was present at levels up to 70 mg/kg as can be seen in Table 6-14.

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7.0 PUBLIC HEALTH RISK

7.1 Air Pollution

Air quality data collected on May 18 and June 24, 1981 did not show PCP in any of the samples. The sampling method used a limit of detection that was apparently more than ten times the TLV level (0.5 mg/m^3). However, in 1982 USEPA detected low levels of PCP in the air at the storm sewer outfall and at a location approximately 31 meters downstream. Air readings at the above two locations were 3.7 ug/m^3 and 1.4 ug/m^3 , respectively.

At twice the TLV, painful irritation can be expected. The crew conducting a biological monitoring survey in June of 1981 reported eye, skin and mucous membrane irritation in the storm drain area.

These reports suggest that public health is threatened by airborne PCP. At the least, acute irritation can be expected in the areas where PCP is concentrated in the air during calm weather conditions. Control of access to the storm drain and its outfall will prevent exposure.

Additional monitoring for PCP and other toxic contaminants found in the oil should be performed to characterize the current situation, as previous air quality data was collected in 1981.

7.2 Soil Contamination

PCP has been found in soil cores from monitoring wells, (about 1,000 ppm), at the wooden bridge over Naylor's Run (0.95 and 3.4 ppm), and in Washington Park (0.46 ppm). Fuel oil was also qualitatively identified in the soil cores from the wells. PCB (Aroclor 1232 and 1242) in one soil sample, location unknown, was found to be less than 5 and 6 ppm, respectively.

PCP is readily absorbed through the skin with the fatal dose for laboratory animals ranging from 30 to 100 mg/kg via this route (EPA, 1980). Commonly, technical

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grade PCP is contaminated with toxic polychlorinated dibenzodioxins and dibenzofurans. Analytical testing for either of these was not done.

7.3 Groundwater Contamination

Groundwater samples taken from the existing monitoring wells in the vicinity of the site indicate that PCP concentrations ranged from 0.22 to 31,200 ppm. Three of these samples were over 10,000 ppm and the remaining samples were less than 20 ppm. Contaminated groundwater is intercepted by the sewer and Naylor's Run before exposure to the public can occur. As long as this occurs, there does not appear to be a direct threat to public health.

7.4 Surface Water Contamination

Dr. H. L. Allen of the USEPA performed an assessment of the surface water data prior to October 1981. Samples taken in April 1982 supplement and confirm the previous PCP data. Two of the 1982 samples also contained benzene (160 and 12 mg/l), toluene (15 mg/l in one sample only), and xylene (460 and 30 mg/l). Dr. Allen's assessment is still valid and is presented in the succeeding paragraphs.

Biological surveys and in-situ bioassays conducted in Naylor's Run documented the presence of conditions toxic to aquatic life. The biological data are supported very well by pentachlorophenol data taken under comparable conditions. Bioassays conducted on snails (physa) in 1975 showed 100% killed within 24 hours up to about 1/2 mile downstream of the point of entry of contamination. Chemical analysis showed the instream PCP concentration to be 780 ppb at this point. Other data taken in 1976 showed a PCP concentration at this location to range from 120-720 ppb. A biological survey in 1981 showed this location to be devoid of benthic aquatic life. An oily sheen was also observed during this survey.

Downstream about 4.5 miles near the mouth of Naylor's Run, a 1975 stream survey demonstrated the presence of seven taxonomic groups of invertebrates, a living but stressed community within the ecosystem. The PCP concentration was 100 ppb. The PCP concentration at this location in 1976 ranged from 6.1-51 ppb, the latter

value following a storm flow period. Dry weather maximum values ranged from 21-24 ppb. The 1981 field survey yielded essentially the same observations as that conducted in 1975: a low number of stress-resistant invertebrates was found.

Two intermediate stations, about 2 and 3.5 miles downstream from the source, were surveyed in 1981. Evidence of recovery from acute toxicity was apparent, although communities were still depressed. PCP data were not available.

The EPA "Ambient Water Quality Criteria for Pentachlorophenol" (EPA 440/5-80-065, October 1980) cites data including an acute effect of complete chlorosis of green algae in 72 hours at 7.5 ppb and a flathead minnow chronic toxicity level of 57 ppb. PCP levels on the order of 100-1000 ppb were rapidly lethal to nearly all organisms tested. Two very germane pieces of data cited for saltwater benthic macrofauna are probably appropriate to fresh water as well. These are significantly reduced numbers of individuals at 76 ppb and significantly reduced numbers of molluscs at 7 ppb after 9 weeks' exposure to PCP.

An important aspect of the pollution associated with National Wood Preservers operations is that PCP has a much stronger affinity for oil than water. PCP and oil may be observed in the retention pool behind the filter fence. This material was found 1/2 mile downstream from the site but not at the two mile site. One sample taken from this oil in February 1981 showed it to contain PCP at 6200 ppm (0.62%). Samples in March 1981 showed the oil to contain 475 ppm (0.0475%). Contrasting to these values, a water sample taken from the pool area in March 1975 which apparently contained quantities of floating oil, tested at 18.5 ppm PCP (solubility at 20° C is 14 ppm). In addition, water samples collected in 1976 1/2 mile downstream average 34.0 ppb of PCP. It is evident that the majority of the PCP is contained in the oil layer which floats on the water surface in Naylor's Run.

Retention of this oil layer is perhaps the key step in controlling contamination of Naylor's Run, and by extension, contamination of the downstream human and aquatic environment, for at least two reasons. First, PCP is a skin irritant. Immersion of hands for 10 minutes in a 0.4 percent (4000 ppm) solution is reported to cause pain and inflammation. Contact with PCP in oil is likely to cause some

irritation at lower concentrations, particularly in sensitive individuals. There are several areas in the vicinity of the site where children have access to Naylor's Run. The sampling station 1/2 mile downstream, where an oil sheen was observed, is adjacent to a playground.

Second, because PCP does not degrade or evaporate readily, its mass loading is somewhat conservative, and it will dissolve or mix with suspended or sedimentary solids either along with its oil carrier or after the oil evaporates. Since it does not decompose even though its concentration in water may appear to decrease, PCP will continue to leach back into the water column or move downstream as part of the sediment load of the waterway.

Ecologically Sensitive Areas: Tincum Wildlife Preserve is the principal ecologically sensitive area of concern. No data exist to demonstrate an impact of the leachate in Naylor's Run on the Tincum Marsh, but some impact is possible. The normal pentachlorophenol discharge rate is approximately two pounds per day (observed range 0.48-6.72 lb/day) at the average flow of 1.72 cfs). The average dilution of this loading at Tincum is roughly 54:1; that is, the average flow of Naylor's Run is 1.83% of the flow of Darby Creek at Tincum (range 0.92%-2.79%). Thus, in the absence of pentachlorophenol losses in transit, the concentration at Tincum would be about 3.9 ppb. The EPA has found in developing "Ambient Water Quality Criteria for Pentachlorophenol," cited above, chronic toxicity levels for freshwater and saltwater aquatic life to be as low as 3.2 ppb and 34 ppb, respectively. Acute toxicity levels are 55 ppb for freshwater and 53 ppb for saltwater aquatic life, reported in the same EPA source.

It would be misleading, however, to state unequivocally that chronic toxicity will occur at Tincum as a result of this source, because steady-state transport, as is assumed by the mass balance technique, does not occur with slightly soluble materials such as pentachlorophenol or oils. Even within Naylor's Run, more than 90% of the pentachlorophenol load drops out prior to reaching Cobbs Creek. Since it neither vaporizes nor is biochemically degraded, it undoubtedly accumulates in the sediments and is transported downstream in the sediment load. The water column concentration attributable to Naylor's Run would be about 0.35 ppb at

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Tinicum, that is from 1-10% of a chronic toxicity level. Thus, acute toxic effects would be unlikely at Tinicum.

On the other hand, there are three factors that could exacerbate the effect of low levels of soluble pentachlorophenol. First, aquatic life can bioconcentrate pentachlorophenol from 10 to nearly 4000 times its water concentration. Oyster bioconcentration factors are reported to range from 41-78; blue mussel bioconcentration factors range from 304-326. Mussel tissue from the Tinicum area could thus contain about 0.1 mg/kg of pentachlorophenol, a small but possibly organoleptically-active level. "A maximum whole fish residue concentration of 0.1 mg/kg of chlorinated hydrocarbon insecticides" (DDT, et al) was recommended by the National Academy of Science (Water Quality Criteria-1972) to prevent their accumulation in the food chain. Thus, 0.1 ppm is a good indicator value if not an estimate of genuine hazard.

The second factor is the reservoir of nondegradable pentachlorophenol adsorbing onto the upstream sediments and moving towards the marsh with each storm flow. The observed data show that this migration is occurring in Naylor's Run as mass loadings of pentachlorophenol increase dramatically, coincident with increases in daily average flow. These sediments will eventually be deposited in the natural settling areas of the marsh, where they will accumulate with an unknown effect. Therefore, chronic toxicity and bioaccumulation cannot be ruled out.

A third factor has long been recognized by those concerned with Tinicum Marsh: there is a combination of ecological stresses constantly threatening its existence. Rather than make an issue of the nature of the area around the preserve, it should nevertheless be recognized that continuing low-level contamination by pentachlorophenol could have a detrimental synergistic effect on an already stressed ecosystem.

In short, while the data do not show imminent hazard to humans from the air and from potable water supply vectors, they do indicate toxicity to aquatic life in Naylor's Run, a significant hazard potential for human contact by people having

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access to Naylor's Run and a likelihood of chronic toxicity and bioaccumulation in the Tinicum Marsh.

7.5 Fire and Explosion

Potential for fire and explosion does not exist at this site. PCP is not flammable and the oil in which it is found should be weathered to the extent that threat of fire is not a realistic concern.

7.5 General Risk Assessment

Public health risk at the Havertown PCP Site stems from three exposures: soil, surface water, and groundwater. Exposure to contaminated soil is possible in the stream beds, in trenches, during well drilling, or in the storm sewer. The potential for such exposure is low and the effects most likely would be acute irritation. Controlling access to the sewer and its outfall area, along with the use of protective gear during drilling operations, should minimize the risk of contact.

Groundwater between National Wood Preservers and the sewer line contains PCP levels as high as 31,200 ppm. Ingestion of 0.2 liters of water with PCP at this concentration would be lethal ($LD_{10} = 29$ mg/kg for 160 kg man as per the Registry of Toxic Effects of Chemical Substance). Groundwater in the contaminated area should not be used without treatment.

Surface water is sufficiently contaminated to kill or stress biological activity near the sewer outfall to at least the mouth of Naylor's Run. This is a mixed blessing as the water does not support enough life to make it attractive to recreational users (i.e. fishermen), yet at least 4.5 miles of the stream appears to be attractive to adults and particularly children. Control of the oil/PCP entering the creek should limit surface water concentrations of PCP to levels where acute irritation would be the only public health effect expected. Use of water or ingestion of aquatic life in Naylor's Run should not be permitted from the sewer outfall to Cobbs Creek as PCP may bioaccumulate and has already been found at 70 mg/kg in some biota samples.

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8.0 EVALUATION OF EXISTING DATA

8.1 Adequacy of Analytical Results

This subsection presents an evaluation of the adequacy of the analytical data available to the authors of this RAMP.

The analytical data can be assessed on the basis of currency, consistency, completeness, representativeness, accuracy, and comparability, in addition to professional engineering and scientific judgment.

Specific criteria which should be considered include document control, sample chain-of-custody, calibration, sampling, sample preservation, testing procedures, reporting, and other QA/QC factors. It is strongly emphasized, however, that the adequacy determination presented in this section, is a technical evaluation, not a legal one. A legal evaluation of evidentiary information with respect to admissibility, relevancy, expert witness testimony, hearsay, authentication, and other judicial factors fall within the province of the rules of evidence, and not within the scope of this RAMP.

8.1.1 Environmental Sampling and Analysis at the Havertown PCP Site

The Pennsylvania Department of Environmental Resources (PADER) has performed the majority of the analytical work done in conjunction with the Havertown PCP Site. The analytical report on soil samples taken September 26, 1972 contained no data adequacy information. Groundwater samples were taken in September 1972, November 1976, September 1981, October 1981, and December 1981. The September 1981 analytical report contained chain-of-custody forms (although it lacked some of the necessary signatures), shipping bills, and legal seal numbers but did not give the lab numbers for several samples. The October 1981 report also contained legal seal numbers and the December 1981 report included completed chain-of-custody forms.

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The Pennsylvania Department of Health took surface water samples in December 1962, January 1963, March 1963, January 1970, and April 1970. There is no data adequacy information in any of the analytical reports.

The PADER analyzed surface water samples taken in February 1972, June 1972, January 1974, November 1974, May 1975, September 1976, November 1976, and August 1978. None of the analytical reports contain any data adequacy information. Biological samples were taken by the PADER in March 1975 and August 1978. They also contained no data adequacy information.

The United States Environmental Protection Agency analyzed air samples taken in May 1981, June 1981, and April 1982, soil samples taken in February 1981 and April 1982; surface water samples taken in February 1981, March 1981, and April 1982, and biota samples taken in April 1982. None of the analytical reports from any of these samplings contained any data adequacy information.

Surface water samples taken in February, 1981, were analyzed by Ecology and Environment, Inc. No data adequacy information is included in the analytical report.

Unknown laboratories analyzed a groundwater sample taken in November 1976 and surface water samples taken in November and December of 1976. These reports contained no data adequacy information.

The above described data adequacy information is summarized in Table 8-1.

8.1.2 Assessment of Groundwater Contaminated by Pentachlorophenol; Naylor's Run and Vicinity, Haverford Township, Delaware County, Pennsylvania - SMC Martin, Inc., 1982

This report provides a general description of the shallow subsurface adjacent to the Havertown PCP Site; however, soils were not logged using a standard classification, i.e., unified soils classification system. Test boring logs lack consistency with soil descriptions. Monitoring wells may have poor construction (i.e., insufficient thickness of cement seals, and improper placement of well

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TABLE 8-1

ANALYTICAL DATA ADEQUACY INFORMATION
HAVERTOWN PCP SITE

<u>Laboratory</u>	<u>Sampling Date</u>	<u>Sample Type</u>	<u>Data Adequacy Information</u>
Pennsylvania Department of Environmental Resources	9/25/72	Soil	None
	9/26/72	Groundwater	None
	11/19/76	Groundwater	None
	9/30/81	Groundwater	Chain of custody forms (without signatures), shipping bills, legal seals are referenced
	10/6/81	Groundwater	Legal seals are referenced
	12/10/81	Groundwater	Chain of custody forms included
	2/8/72	Surface Water	None
	6/12/72	Surface Water	None
	1/23/74	Surface Water	None
	11/12/74	Surface Water	None
	5/12/75	Surface Water	None
	9/18/76	Surface Water	None
	11/19/76	Surface Water	None
8/30/78	Surface Water	None	
	3/24, 25/75	Biota	None
	8/30/78	Biota	None
Pennsylvania Department of Health	12/10/62	Surface Water	None
	1/8/63	Surface Water	None
	3/26/63	Surface Water	None
	1/26/70	Surface Water	None
	4/30/70	Surface Water	None

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TABLE 8-1
 ANALYTICAL DATA ADEQUACY INFORMATION
 HAVERTOWN PCP SITE
 PAGE TWO

<u>Laboratory</u>	<u>Sampling Date</u>	<u>Sample Type</u>	<u>Data Adequacy Information</u>
United States	5/19/82	Air	None
Environmental	6/25, 25/81	Air	None
Protection Agency	4/15/82	Air	None
	4/15/82	Soil	None
	2/22/81	Surface Water	None
	3/3/81	Surface Water	None
	4/15/82	Surface Water	None
	4/15/82	Biota	None
	2/22/81	Soil	None
Ecology and Environment, Inc.	2/12, 17/81	Surface Water	None
Unknown	11/11/76	Groundwater	None
	11, 12/76	Surface Water	None

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screens). Water level measurements from existing monitoring wells are questionable, since composit water levels may exist and oil thickness determination is unknown.

8.1.3 Groundwater Contouring and Oil Recovery Maps - James A. Humphreville, 1981

This report gives qualitative analysis of soils and bedrock. However, the results of the groundwater investigation are questionable. Static water level elevations were based on an assumed oil density calculations. A potential for error exist for determining groundwater flow directions and oil thickness determination.

Also, improper well construction might have connected two groundwater flow systems. The report lacks detailed descriptions for geologic and hydrogeologic properties of the subsurface.

8.2 Identification of Additional Data Needs

Additional data to be obtained during the remedial investigation to be used for feasibility studies of disposal alternatives will be outlined in detail in Section 10.4, Scope of Remedial Investigations, and Appendix B, Work Plan Outline for Remedial Investigations. The information will include but not be limited to:

- Topographic and boundary survey data
- Geologic conditions
- Groundwater Characteristics
- Groundwater Quality
- Surface Water Quality
- Soil Characteristics

9.0 HEALTH AND SAFETY PROTECTION

9.1 Personal Health and Safety Procedures

Low levels of PCP have been detected in the ambient air at this site. These levels were below the the threshold limit value (TLV) for an eight-hour exposure. However, until additional analysis is performed using a more accurate technique, respiratory protection using cartridge respirators and pesticide cartridges should be used when working near known PCP-contaminated areas. Dermal protection (appropriate coveralls, gloves, boots, etc.) should be used as well.

9.2 Health and Safety Monitoring

Air monitoring for PCP should be repeated using an analytical technique able to detect PCP at least to the TLV (9.5 mg/m^3). Areas of known PCP contamination should be sampled. Since the PCP is contained in an oil base, additional analytical work to characterize the oil for other toxic contaminants is warranted. Any other contaminants found should then be included in the air scan.

Although radiation is not expected, an initial scan using a survey meter should be performed to make certain the site area contains no radiation hazards.

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10.0 REMEDIAL PLANNING ACTIVITIES

10.1 Objectives and Criteria

The objectives for selecting initial remedial measures (IRMs) at the Havertown PCP site were the elimination of the potential for human contact with offsite contaminated surface water and with offsite contaminated soils.

Groundwater contamination also exists and is consequently a possible threat to human health through consumption of this contaminated groundwater. Long-term remedial responses were chosen to provide an economically and technically sound approach for eliminating the threat to public health and the environment posed by hazardous substances that were discharged into the groundwater flow regimes at the Havertown PCP Site. Both initial remedial measures and long term remedial measures are necessary to alleviate environmental problems at the site; the difference, however, is in the scheduling of these responses.

10.2 Identification of Remedial Responses

The remedial responses identified for the Havertown PCP site are as follows.

10.2.1 Initial Remedial Measures

- Construction of a security fence and signs to prohibit public access to off-site contaminated areas.
- Construction of additional signs along Naylor's Run conveying the hazardous nature of potential contaminated areas.
- Construction of security locks on manhole covers to prohibit unauthorized access to the storm sewer.
- Inspection of existing filter fences in Naylor's Run to determine their usefulness as in-stream treatment.

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10.2.2 Long-Term Remedial Responses

The long term remedial measures which should be investigated may include but are not limited to:

- Leachate collection and treatment
- Construction of groundwater barriers/diversions
- Groundwater collection and treatment
- Surface water collection and treatment
- Removal of contaminated soils
- No action

Each of these responses will be discussed in greater detail in the remaining subsections of Section 10. Work plan outlines for the following remedial responses are included in Appendix B.

- Initial remedial measures
- Remedial investigations
- Feasibility study

10.3 Initial Remedial Measures

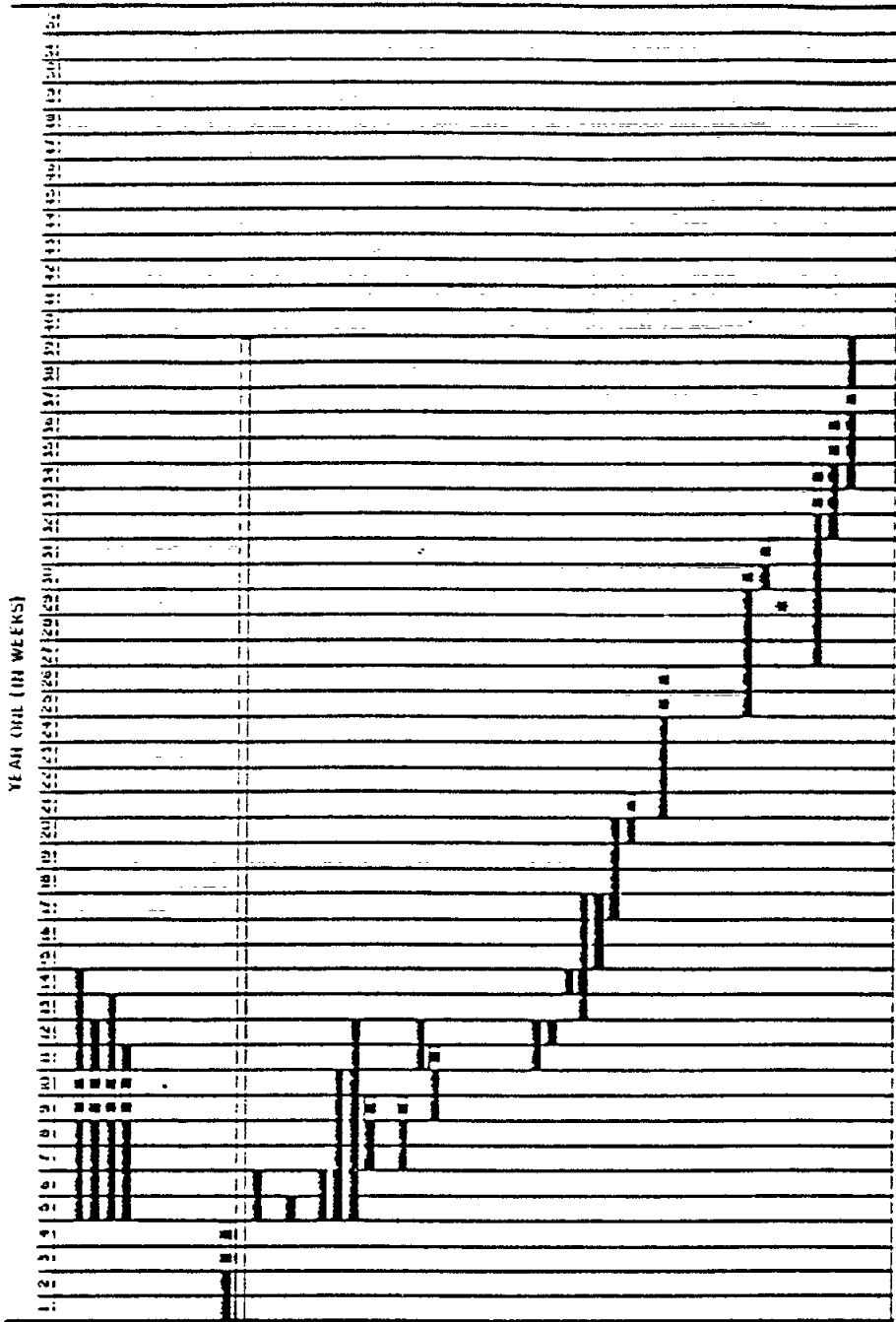
10.3.1 Security Fence and Signs

Objective

A security fence will be used as an offsite measure to protect the public from a known contaminated area. PCP and oil in water discharging to Naylor's Run from the storm sewer outfall poses a threat to public health.

To remedy this situation, construction of a security fence, along with signs conveying the hazardous nature of the site, is recommended.

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YEAR ONE (IN WEEKS)

INITIAL REMEDIAL MEASURES

- A. SECURITY FENCE
- B. SIGN CONSTRUCTION
- C. MAN HOLE COVER LOCKS
- D. FILTER FENCE INSPECTION

I. INITIAL ACTIVITIES

- TASK 1 - PREPARATION OF THE REMEDIAL INVESTIGATION WORK PLAN
- TASK 2 - COMMUNITY RELATIONS SUPPORT FUNCTIONS
- TASK 3 - COLLECTION AND EVALUATION OF EXISTING DATA
- TASK 4 - HEALTH SAFETY AND GENERAL SITE RECONNAISSANCE
- TASK 5 - PERMITS, RIGHTS OF ENTRY, AND OTHER AUTHORIZATION REQUIREMENTS
- TASK 6 - PROCUREMENT OF SUBCONTRACTORS
- TASK 7 - TOPOGRAPHIC MAP
- TASK 8 - SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS
- TASK 9 - SITE-SPECIFIC QUALITY ASSURANCE AND SAMPLING REQUIREMENTS
- TASK 10 - SITE OPERATIONS PLAN
- TASK 11 - MOBILIZATION OF FIELD EQUIPMENT

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II. REMEDIAL INVESTIGATION

- TASK 12 - UNDISTURBED FIELD RECONNAISSANCE AND PRELIMINARY GROUNDWATER AND SURFACE WATER SAMPLING
- TASK 13 - GROUNDWATER SURVEY
- TASK 14 - SURFACE WATER/SEDIMENT SAMPLING
- TASK 15 - SUBSURFACE INVESTIGATIONS
- TASK 16 - GROUNDWATER SAMPLING
- TASK 17 - DATA REDUCTION AND EVALUATION
- TASK 18 - IDENTITY PRELIMINARY REMEDIAL TECHNOLOGIES
- TASK 19 - PREPARE REMEDIAL INVESTIGATION REPORT AND REVISE FEASIBILITY STUDY WORK PLAN

III. FEASIBILITY STUDY

- TASK 20 - DEVELOPMENT OF ALTERNATIVES
- TASK 21 - INITIAL SCREENING OF ALTERNATIVES
- TASK 22 - LABORATORY AND FIELD STUDIES
- TASK 23 - REMEDIAL ALTERNATIVES EVALUATION AND PRELIMINARY REPORT
- TASK 24 - DEVELOP CONCEPTUAL DESIGN
- TASK 25 - FINAL REPORT

LEGEND

- CONTRACTOR ACTIVITY
- PERIODIC CONTRACTOR ACTIVITY
- ◻ AGENCY REVIEW (EPA / PADER)
- * WORK TO BE CONDUCTED FOR TASK 23 WILL BE ADDRESSED IN THE REMEDIAL INVESTIGATION REPORT, SEE TEXT

FIGURE 11-1

REMEDIAL ACTION SCHEDULE

UNIDENTIFIED DOG SITE INVESTIGATION TWO DA



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APPENDIX A
HAVERTOWN PCP SITE CHRONOLOGY

<u>DATE</u>	<u>EVENT</u>
December 7, 1947	Philadelphia Chewing Gum purchases the property across Eagle Road from the Shell Oil and National Wood Preservers and has been engaged in the manufacture of chewing gum products
1947	National Wood Preservers was incorporated by Samuel T. Jacoby. Property was leased from Clifford and Virginia Rogers.
1947-1963	During this period the National Wood Preservers Facility in Haverford Township, Pennsylvania, deposited waste material into a 25-foot-deep well. The wastes contained Pentachlorophenol (PCP) and oil used in treating wood products.
1963	National Wood Preservers Company was sold to the Goldsteins. The property was owned by the Mr. Clifford Rogers and leased to the Goldstein family.
1963	The Goldsteins discontinued this disposal practice when they took over the operations.
October 14, 1964	Commonwealth of Pennsylvania vs. Samuel T. Jacoby. Jacoby was found not guilty for previous waste disposal activities at the Havertown PCP Site because the State had not complied with provisions of Section 309 (Act of May 3, 1945).

<u>DATE</u>	<u>EVENT</u>
December 31, 1964	An agreement was signed by the Goldsteins and Mr. Jacoby which released Jacoby from responsibility for the pollution.
February 10, 1967	Shell Oil Company obtained a leasehold interest in the portion of Clifford and Virginia Rogers' property located at the northwest corner of Eagle Road and Lawrence Road. Shell developed this portion of the Rogers property and constructed a gasoline station.
Spring 1972	Philadelphia Chewing Gum excavated part of its property in order to construct an addition to its building. In the course of digging, Philadelphia Chewing Gum Company intercepted a flow of the pollutant across its property.
1972	Citizens' complaints were made to the Department of Environmental Resources (DER) that an oily type material was being discharged into Naylor's Run.
June 12, 1972	Initial Inspection was made at the Philadelphia Chewing Gum Corporation by PADER, at the request of a health officer of the Haverford Township Board of Health. Site access was denied by the company president, who requested that the PADER return on another date with an appointment.
June 13, 1972	PADER returned to Philadelphia Chewing Gum Company with a search warrant. The warrant was served to J. Daly, Executive Vice President. He accompanied DER during sampling. Samples were analyzed by DER Laboratories, Harrisburg.

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DATE	EVENT
	Presence of Pentachlorophenol (PCP) in an oil base was confirmed by analysis of the samples.
June 5, 1972	Philadelphia Chewing Gum Company submitted a report from Site Engineers, Inc., of Morristown, New Jersey. This report was an attempt to determine the cause and source of pollution of the stream behind Philadelphia Chewing Gum Company's property.
September 22, 1972	Conference held in DER (Morristown) Office with Philadelphia Chewing Gum Company. At this conference PADER requested a concerted effort on the part of the parties involved to clean up this site. Nothing was resolved.
September 26, 1972	A test well was developed at National Wood Preservers by PADER with the cooperation of PennDOT. The test boring was located along the Eagle Road side of the plant building. Samples were collected and analyzed. PCP in fuel oil was found to be present in the well. A waste discharge inspection report was filed.
July 12, 1973	The PADER issued an order to National Wood Preservers, Inc., Philadelphia Chewing Gum Company and Shell Oil Company to take concerted action to correct a pollution condition which exists on lands occupied by them.
September 12, 1973	PADER issued an order to Clifford A. Rogers and Virginia M. Rogers, owners of the properties where National Wood Preservers, Inc., and Shell Oil Company

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DATE	EVENT
	are situated, to take concerted action to correct a pollution condition which exists on this land.
November 1, 1973	Timely appeals, from the orders issued on July 12, 1973 and September 12, 1973, were filed with the Environmental Hearing Board, which by order of November 1, 1973, consolidated all of the appeals for hearing.
January 23, 1974	An inspection was made and samples were collected at National Wood Preservers by PADER.
March 24-25, 1975	A 24-hour instream bioassay was conducted on Naylor's Run, Delaware County. The purpose of the investigation was to determine whether toxic concentrations of Pentachlorophenol (PCP) were present in the stream.
September 10, 1976	The PADER contacted Region III, Environmental Emergency Branch, and requested assistance with the continuing oil seepage problem in Naylor's Run.
September 15, 1976	Representatives of Environmental Protection Agency (EPA) and PADER conducted a joint inspection of the area. They observed oil discharging at two locations near the headwaters of the stream.
September 17, 1976	EPA declared a Federal Removal Activity for cleanup activities under Section 311 of the Clean Water Act. Cleanup was initiated with installation of filter fences in Naylor's Run to remove surface contamination.

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DATE	EVENT
1976	The Response Team from the U. S. Environmental Protection Agency (EPA), Region III, began clean-up procedures of the area surrounding the National Wood Preservers' facility. The mobil physical-chemical treatment system and the mobile spills laboratory were moved to the site. Successful cleanup of the effluents was accomplished. However, contaminated ground-water continued to leach out.
October 15, 1976	The Pennsylvania Commonwealth Court granted the parties (Landowners/Occupiers) a supersedeas pending the outcome of the appeals.
November 1-2, 1976	EPA had three recovery wells constructed at National Wood by Rulon and Cook, Inc., General Drilling Contractors who were sub-contracted by Underwater Technics, Inc. The wells were to pump the chemical to the surface to be treated and returned to the stream.
November 17, 1976	PADER personnel conducted a field investigation at Naylor's Run.
December 17, 1976	The Environmental Emergency Response Unit operations were secured after it was determined that the oil recovery from wells and trenches were not as successful as anticipated.
December 1976	Underwater Technics, Inc., was retained for maintaining filter fences, and storing and disposing of

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<u>DATE</u>	<u>EVENT</u>
February 16, 1977	Meeting between PADER, EPA, and Underwater Technics to discuss the progress in preventing any further discharges to Naylor's Run. A 20-foot-deep, 3-foot-diameter steel corrugated pipe has been placed in the ground behind the Philadelphia Chewing Gum property to intercept the two small pipes which were carrying the PCP to the Washington Avenue discharge point.
August 12, 1977	Underwater Technics, Inc., completed the grouting of the 24-inch storm drain.
February 20, 1978	Report "Laboratory Feasibility and Pilot Plant Studies on Novel Biodegradation Processes for the Ultimate Disposal of Spilled Hazardous Materials" was submitted to EPA by Atlantic Research Corporation. Summary: Two pilot-scale batch tests using organism 044 and PCP were completed. The tests were performed in order to evaluate sodium azide as a potential bacteriostatic agent.
April 20, 1978	Atlantic Research Corporation, under contract from the EPA Oil and Hazardous Materials Spills Branch, has conducted preliminary experiments to assess the feasibility of using selected pure cultures to treat the PCP/oil contaminated area in Haverford, Pennsylvania. Submitted results of these experiments in a report titled, "Microbiological Treatment of Soil Contaminated with Pentachlorophenol/Oil from the Haverford, Pennsylvania Spill Site."

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<u>DATE</u>	<u>EVENT</u>
May 24, 1978	After 5 years of litigation Commonwealth Court sustained appeals of Shell Oil and Philadelphia Chewing Gum, and ordered the cleanup to be executed solely by Rogers and National Wood.
August 30, 1978	An Aquatic Biology Investigation was conducted on Cobbs Creek and its tributaries to determine the extent of water quality.
October 1980	The U. S. Supreme Court refused to hear an appeal by National Wood Preservers and Rogers, that the State had abused their authority in ordering National Wood Preservers to clean up Naylor's Run as National Wood Preservers believed the damage was done prior to their ownership of the business.
December 1980	The U. S. Coast Guard Third District issued request for proposal for conduct of extent of contamination and recovery feasibility study for the PCP and oil contamination problem in Naylor's Run, Haverford Township, Pennsylvania. The scope of work was proposed under Section 311 of the Clean Water Act.
December 16, 1980	Cleanup proposal submitted by National Wood Preservers (NWP) was deemed inadequate; NWP instructed by DER to prepare a more comprehensive proposal.
January 23, 1981	A plan for monitoring wells was sent to National Wood Preservers Inc., by James Humphreville, Consulting Geologist. <u>The monitor wells would serve as observation points for the purpose of determining the</u>

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DATE	EVENT
	lateral extent and thickness of oil floating on the groundwater.
February 12, 1981	The EPA OSC served National Wood Preservers, Inc., with a notice of Federal interest in a pollution incident connected with the release of waste oil contaminated by Pentachlorophenol into Naylor's Run. The letter directed National Wood Preservers to initiate extent of contamination and recovery feasibility studies and to take over the maintenance of filter fences placed in Naylor's Run.
February 25, 1981	Sampling carried out by Ecology and Environment, Inc. (E & E), a consulting firm headquartered in Buffalo, New York, contacted by the EPA to provide technical assistance for the cleanup of soil and hazardous material spills.
February 26, 1981	National Wood Preservers, Inc., refused to comply with the OSC's directions issued February 12.
February 1981	The Technical Assistance Team conducted an inventory of drums from Naylor's Run cleanup stored at Underwater Technics' yard in preparation for disposal at Rollins Environmental Services.
March 1981	The consulting engineering firm of SMC Martin, Inc., King of Prussia, Pennsylvania was awarded the EPA Contract, (scope of work issued in December 1980) for an extent of contamination and recovery feasibility study for the PCP and oil contamination problem in Naylor's Run.

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<u>DATE</u>	<u>EVENT</u>
April 1981	Preliminary work began on the PCP project by SMC-Martin, Inc.
May 1981	Hand augering of several test wells was performed in the back yards of residences adjacent to Naylor's Run.
May 13, 1981	James Humphreville Associates, geologic consultants contracted by National Wood Preservers (NWP) to do an extent of contamination study on NWP and Rogers property.
May 19, 1981	The Environmental Response Team collected air samples in the area surrounding National Wood Preservers. 1 to 2 liters of air were collected at four different locations.
June 10, 1981	Environmental Response Team conducted a biological survey. Exposure to the vapor emanating from the storm drain while standing on adjacent private property was irritating to eyes, skin, and mucous membranes.
June 25-26, 1981	The Environmental Response Team collected air samples in the area surrounding National Wood Preservers. Samples were collected at the same four locations that were sampled on May 18, 1981.
July 27-30, 1981	The SMC Martin, Inc., monitoring network (Well Nos. HAV 01-10) was drilled. The network was divided between the Philadelphia Chewing Gum property (3 wells) and the residences along Rittenhouse Circle (7 wells).

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<u>DATE</u>	<u>EVENT</u>
October 26, 1981	Procurement request by EPA for removal of PCP/oil mixture from Naylor's Run, Haverford Township, Pennsylvania.
November 4-6, 1981	Five observation wells were drilled by Thomas G. Keyes, Inc., on the Clifford A. Rogers estate. Six observation wells were drilled on the National Wood Preservers properties.
November 5, 1981	Statement of work issued for construction of filter fences.
September 11, 1981	Contaminated soil from drilling project (7-30-81) disposed of at Grows Landfill, Morrisville, Pennsylvania. Liquid wastes and contaminated debris from in-stream cleanup of PCP/oil disposed of by Rollins Environmental Services of Bridgeport, New Jersey, by incineration.
January 31, 1982	EPA ended containment operations in Naylor's Run, thus terminating Section 311 funding activities.
February 1, 1982	National Wood Preservers assumed responsibility and maintenance of the containment operations in Naylor's Run as a result of negotiations following receipt of a CERCLA notice letter dated December 18, 1981.
March 24, 1982	A public informational meeting was held at the Lynnewood School regarding efforts of the EPA and the PADER to assess and deal with hazards posed by the release of waste wood preservative material in the vicinity of Naylor's Run.

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