FOIA

R-585-10-8-23

PRELIMINARY ASSESSMENT OF
WILMINGTON AMTRAK RAILYARD - MAINTENANCE FACILITY
PREPARED UNDER

TDD NO. F3-8808-54
EPA NO. DE-170
CONTRACT NO. 68-01-7346

FOR THE

HAZARDOUS SITE CONTROL DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

FEBRUARY 23, 1989

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY	REVIEWED BY	APPROVED BY
LISA LILLIS PROJECT MANAGER	CHARLES MEYER SECTION SUPERVISOR	GARTH GLENN REGIONAL OPERATIONS MANAGER, FIT 3

Site Name: Wilmington Amtrak Railyard - Maintenance Facility
TDD No.: F3-8808-54

TABLE OF CONTENTS

SECTION 1

1.0 INTRODUCTION

1.1 Authorization

NUS Corporation performed this work under Environmental Protection Agency Contract No. 68-01-7346. This specific report was prepared in accordance with Technical Directive Document No. F3-8808-54 for the Wilmington Amtrak Railyard - Maintenance Facility, located in Wilmington, New Castle County, Delaware.

1.2 Scope of Work

NUS FIT 3 was tasked to conduct a preliminary assessment of the subject site.

1.3 Summary

The Amtrak Wilmington Maintenance Facility (WMF), in Wilmington, Delaware, is an active railyard. This 54-acre site is utilized for the maintenance, repair, and overhaul of locomotives and passenger railcars. Strict guidelines are adhered to for the maintenance of polychlorinated biphenyl (PCB)-contaminated transformers. In addition, a negative-pressure-sealed facility was constructed for asbestos abatement in railcars. No hazardous wastes, except for sulfuric acid, are continuously stored on site. All PCB-contaminated oils are drummed and removed by private recyclers and buyers. Asbestos waste is wetted, bagged, and removed to a sanitary landfill.

The WMF currently holds an NPDES permit for surface water runoff into Shellpot Creek and a tributary of Brandywine Creek. Both waterways are regularly analyzed and monitored for PCBs, trichlorethylene, surfactants, and other contaminants. In addition, the facility holds a wastewater discharge permit for releases from the site wastewater treatment system into the city of Wilmington sewer system. This effluent is also monitored for PCBs, as well as metals.

Due to concerns regarding spills of oil contaminated with PCBs onto site soils, over 400 samples of property soils were collected and analyzed between June 1980 and January 1984 by 2 private firms, under the direction of Amtrak. As a result, approximately 10,000 cubic yards of contaminated soils were removed from "hot spots" in the yard.

Currently, transformers do not utilize PCB-contaminated oils. Work on older transformers is completed in special shop areas and on a sealed maintenance track.

The site is located west of the ConRail Edgemoor Railyard along the Delaware River. All persons within the three-mile radius study area are believed to rely on public suppliers for drinking water. None of the public sources is threatened by the subject site.

SECTION 2

2.0 THE SITE

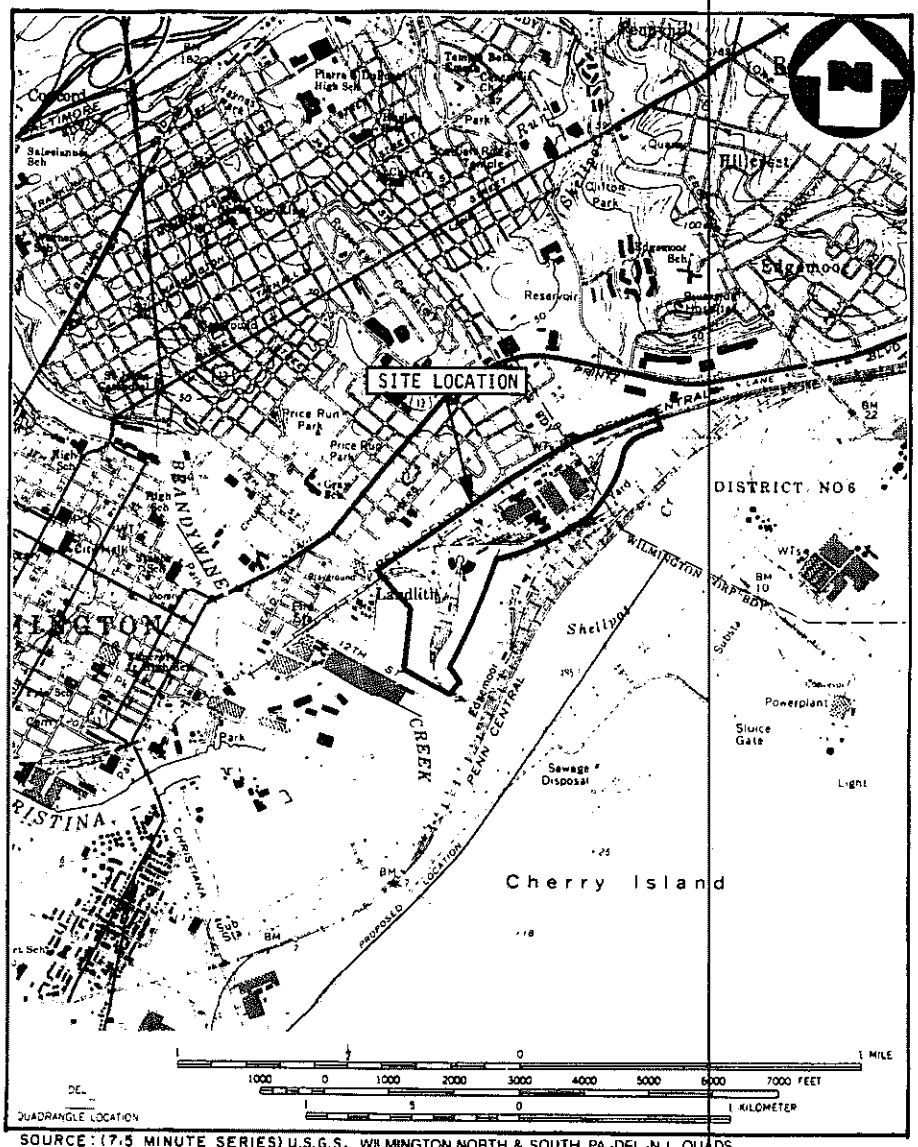
2.1 Location

The Amtrak WMF is located at the foot of Vandever Avenue in Wilmington, New Castle County, Delaware (see figure 2.1, page 2-2). The center of the site property can be located at latitude 39° 44' 49" north and longitude 75° 31' 20" west on the Wilmington South, Delaware - New Jersey 7.5 minute series United States Geological Survey (U.S.G.S.) topographic map. On the same quadrangle, the site center can be measured three inches west and 0.56 inch south from the northeastern corner.[1]

2.2 Site Layout

The Amtrak WMF is a 54-acre railyard used for the repair of locomotives and passenger railcars. The facility site boundaries are as follows: The main rail line for Amtrak serves as the western border. Beyond these tracks to the west are a large commercial zone and Center City Wilmington. The main line proceeds north over Shellpot Creek, which marks the northern boundary. A paved road serves as the eastern boundary, as well as the line separating the Amtrak yard from the ConRail Edgemoor Yard. Twelfth Street and Brandywine Creek serve as the southern border of the facility.[2]

The maintenance shop, offices, and other site buildings are congregrated in the west central area of the site property. The locomotive shop, for descriptive purposes, will serve as the hub of the occupied area of the property. Within this shop are the maintenance tracks and the transformer repair center. One hundred feet west of the locomotive shop are the administrative offices. East of the locomotive shop are three buildings, the middle of which houses the drum staging area and a PCB transformer retrofill unit. Approximately 1/4 mile south of this area are an abandoned round house and an engine house. Also to the south of the locomotive shop are buildings for the track department (450 feet southeast), the buildings and bridges department, and the communication and safety departments (between 400 and 575 feet south, respectively).



SOURCE: (7.5 MINUTE SERIES) U.S.G.S. WILMINGTON NORTH & SOUTH, PA.-DEL.-N.J., QUADS

SITE LOCATION MAP

WILMINGTON AMTRAK RAILYARD MAINTAINENANCE FACILITY

SCALE 1: 24000

FIGURE 2.1

NUS CORPORATION

Moving north (railroad) from the locomotive shop are car shop no. 2, the transfer table, and car shop no. 1, respectively. Car shop no. 2, located 200 feet north, housed the electric shop and was used for storage only. Car shop no. 1, 625 feet north, was not in use. The western end of this shop was converted and fitted as an asbestos abatement room. The on-site wastewater treatment facility is west of car shop no. 2. A fill area of construction and demolition debris was located 1,300 feet northeast of the locomotive shop in the northeastern corner of the property (see figure 2.2, page 2-3).[2]

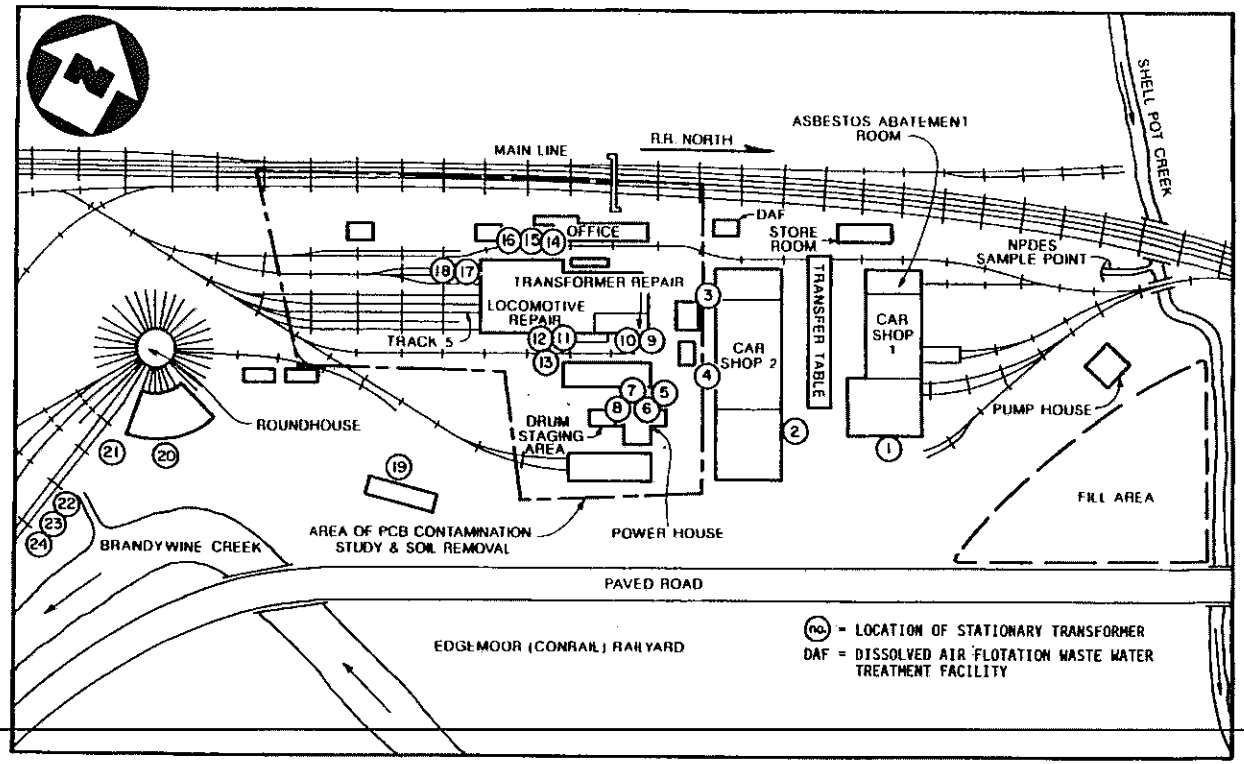
2.3 Ownership History

The site property is owned by the National Railroad Passenger Corporation, more commonly known as Amtrak. Amtrak Corporate offices are located in Washington, D.C. Amtrak took over the ownership and operation of the facility in 1976 from the Penn Central Railroad Company (currently ConRail).[3]

2.4 Site Use History

Since the original construction of the railyard on the subject property, the railyard has been utilized essentially for the same purpose: the maintenance, service, and overhaul of locomotives and railcars. Currently, the site also maintains an asbestos abatement facility for asbestos removal in passenger railcars.[2,3]

New locomotives no longer use PCB-contaminated transformers. Older locomotives in need of repair or overhaul, or identified as "leakers" and utilizing transformers containing PCB-contaminated oils, are inspected according to specific guidelines. The locomotives are inspected and repaired only on track no. 5 of the locomotive shop. A work pit beneath this track is sealed in order to collect any lubricants that may leak out. Transformers that are leaking or in need of repair are removed from the locomotive and taken to a designated area in the shop. Contained with this "caged" area, transformers are drained. All fluids are recycled. Trichlorobenzene is used to clean the transformers in a separate retrofill building. No PCB-contaminated fluids or oils are allowed to enter the sewer system or migrate from designated work areas.[2,3,4]



SITE SKETCH

WILMINGTON AMTRAK RAILYARD MAINTAINENANCE FACILITY

(NO SCALE)

FIGURE 2.2

NUS CORPORATION

In the past, PCBs have contaminated soils around the maintenance shops and tracks.[3,4] (See section 2.6 for information regarding the cleanup of the contaminated areas.)

In a former car shop, car shop no. 1, an asbestos abatement room has been set up. The room has been sealed and is under negative pressure conditions. Workers operate in Tyvek dermal protection and self-contained breathing apparatus. The removed asbestos is soaked with a wetting agent, bagged, and removed to an authorized solid waste disposal facility. No asbestos waste remains on site.[3]

Prior to the railroad occupation, use of the site land is unknown.

2.5 Permit and Regulatory Action History

The WMF holds small-quantity generator EPA Hazardous Waste Identification No. DE D0600580062.[5] The site possesses no RCRA permits and it is not considered a treatment, storage, and disposal (TSD) facility. WMF holds three permits for effluent discharges.[6] State Permit No. WPCC 3089/85, in conjunction with NPDES Permit No. DE 0050962, allows for discharges to the Brandywine Tributary and Shellpot Creek (see appendix A). These permits, effective September 17, 1985, expire on September 16, 1990.

Sample location 001, an outfall adjacent to Dam B in the tributary of Brandywine Creek, is analyzed monthly for the following parameters: oil and grease, PCBs, surfactants, trichloroethylene, and pH. The first and last parameters are grab samples; the remaining are composite samples. Sample location 002A, the outfall of a 42-inch storm sewer into Shellpot Creek, is analyzed monthly for the following parameters: oils and grease, PBCs, surfactants, trichloroethylene, dieldrin, and pH. The first and last parameters are by grab sampling; the remaining are composite samples.[7] Analysis is completed by RMC Laboratories, in Pottstown, Pennsylvania, and submitted to the state. Discharges to these waters are excess storm waters that do not contain any sanitary waste.[3,4]

In addition to the above permits, WMF was granted permit number W-85-04 for the discharge of facility wastewaters to the city of Wilmington's sewer system. The permit became effective January 1, 1988 and will expire on December 31, 1993. Sampling reports are submitted to the Department of Public Works every six months. Sampling of the release to the city sewer system after pretreatment on site is conducted every six months for PCBs, nickel, copper, zinc, and total chromium (see appendix B).[8]

Currently, the only hazardous material continuously on site is sulfuric acid. Hazardous notification of this compound was made to the state and city in October 1987. Hazard communications were provided to all affected persons at that time.[5,6]

By Amtrak's initiative, approximately 400 soil samples of suspected PCB-contaminated areas were collected and analyzed by 2 private firms during the period from 1980 to 1984. In 1984 and 1985, with the assistance of federal and state agencies, 10,000 cubic yards of contaminated soil were removed from the WMF yard. Additional information regarding this removal can be found in section 2.6 of this report.[3,9]

A preliminary assessment of a 1/4-acre drum storage area associated with the WMF and located off-site, under Interstate 95, was completed by the Delaware Department of Natural Resources and Environmental Control (DE DNREC) preliminary assessment/site inspection group in August 1987.[10]

2.6 Remedial Action to Date

Over a four-year period, Amtrak completed an extensive study of PCB concentrations in on-site soils at the WMF. Samples were collected throughout the railyard and along its perimeter by two different consultants. Throughout June and July 1980, samples were collected and analyzed by Woodward-Clyde Consultants. Forty-one samples, ranging in concentration from 0 to 894 mg/kg PCBs, were collected in back-filled soils along the roadways and mainline tracks and in marshes and puddles throughout the yard (see appendix C for sample results). An additional 35 samples, ranging in concentration from 0 to 1.68 mg/kg, were collected in split spoon samples at depths from 2 to 35 feet in 18 wells located along the perimeter and throughout the yard (see appendix C for sample results). Except for one sample in a drum storage area of 894 mg/kg, PCB concentrations in all of the 1980 samples were below the accepted action level of 50 ppm PCBs.[11]

On June 23 and 24, 1982, 64 samples were collected by Radiation Management Corporation and analyzed for oil and grease and PCB concentrations. Samples were obtained from one- and two-foot cores, predominantly from areas bordering Brandywine Creek, its tributary, and on-site drainage areas. Concentrations of PCBs (Aroclor 1260) ranged from less than 0.10 mg/kg to 473 mg/kg. One sample contained 1,475 mg/kg of the PCB Aroclor 1254. This concentration was detected along railroad tracks near the blacksmith shop (see appendix D for sample results).[12]

A third sampling was completed in late 1983. Radiation Management Corporation obtained samples on November 4, 1983, November 14, 1983, and December 1, 1983 through January 9, 1984. Samples were collected at depths of 6 or 12 inches. A total of 304 samples were gathered from locations along the perimeter of the site, in the yard, and especially in the area around the locomotive shop. PCB concentrations ranged from less than 1 mg/kg to 5770 mg/kg. Concentrations were highest along railroad tracks and in areas near transformer work or oil storage. Concentrations were generally below the action level in areas along the perimeter or off site (see appendix E for sample results).[13]

Working with EPA Toxic Substances Control Act (TOSCA) representatives, as well as other federal and state agencies, Amtrak decided to complete a removal of soils deemed PCB "hot spots." During 1984 and 1985, approximately 10,000 cubic yards of PCB-contaminated soils were removed from the facility (see appendix F). The clean-up area included soils in and around the locomotive shop and oil drum staging area, as well as along the mainline tracks and track area south of the locomotive shop. The total cost was approximately three million dollars. Most of the affected area is currently paved or refilled.[3,4,9]

No other remedial action has occurred at the site.

SECTION 3

3.0 ENVIRONMENTAL SETTING

3.1 Water Supply

The potable water supply for the study area is supplied by the city of Wilmington, the Artesian Water Company, and the Wilmington Suburban Water Company. The city of Wilmington utilizes a surface water intake located approximately 1 mile west of the site for its water source and serves a population of approximately 125,000 people. The Artesian Water Company utilizes 43 wells, none of which lie within the study area, to supply an approximate 125,000 people (not all 125,400 live within the study area). The Wilmington Suburban Water Company serves approximately 79,800 people (only a very small fraction of this population is within the service area) utilizing 3 surface water intakes, none of which are within 3 miles of the site. These three systems are interconnected and water is transferred between the systems according to demand.[14,15,16]

3.2 Surface Waters

A relatively flat surface across the site precludes any significant site runoff. Pudding is common throughout the yard area. Excessive runoff apparently enters either Shellpot Creek, located on the northern border of the site, or into a tributary of Brandywine Creek, which flows from the roundhouse 2,600 stream feet to its confluence with Brandywine Creek. Both are perennial waters.[1,2,17]

Brandywine Creek, 3,800 feet southwest of the locomotive shop (site center), flows 3,200 stream feet from the tributary junction until its confluence with the Christina River. Brandywine Creek is a perennial stream used both as a potable source and recreationally.[1,17]

The Christina River is located 1.15 miles south by southwest of the site center. The river is used as a drinking water source, as well as for recreational uses. The Christina River flows 1.9 stream miles south by southeast from its confluence with Brandywine Creek to empty into the Delaware River. The Delaware River is 1.25 miles due east of the subject site. No surface water intakes are located downstream of the site on Brandywine Creek or the Christina River.[1,14,15,16,17]

Many tidal flats, marshes, and wetlands are located within the eastern and southern portions of the site's three-mile radius, as associated with the Delaware River and its many tributaries. The closest of these, a freshwater palustrine open water, is located on Amtrak property, approximately 1/4 mile south of the locomotive shop and east of the roundhouse.[1,17]

3.3 Hydrogeology

The geologic and hydrogeologic conditions in the study area were researched as part of the site inspection. A preliminary literature review was conducted to determine surface and subsurface geologic conditions, soil character, and the status of groundwater transport and storage.

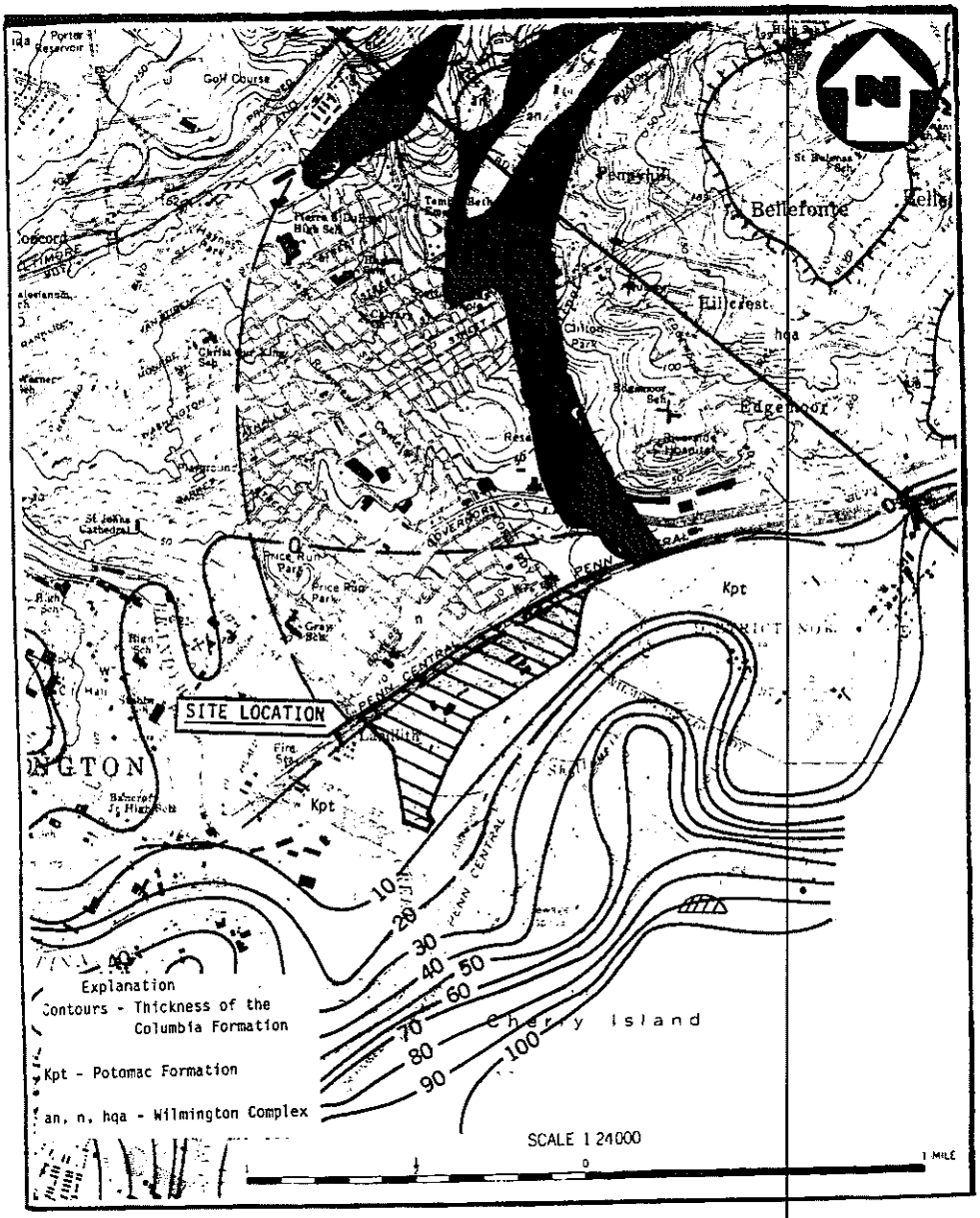
3.3.1 Geology

The Amtrak WMF site lies within the Atlantic Coastal Plain Physiographic Province. This province consists of unconsolidated sediments that form very gently rolling or flat plains. The regional drainage pattern is dendritic.[18]

The site is underlain by the Quaternary age Columbia Formation (see figure 3.1, page 3-3). The Columbia Deposits consist of gravelly and coarse sands with some interbedded silts. These deposits are up to 10 feet thick in the site area.[18,19]

The Cretaceous age Potomac Formation underlies the Columbia Formation and consists of variegated red, gray, purple, yellow, and white silts and clays. These silts and clays contain interbeds of white, gray, and rust brown quartz sands and gravels. The Potomac Formation pinches out along the northwestern edge of the site, so the thickness of the Potomac Formation is expected to be thin beneath the site.[18,19]

The Precambrian age Wilmington Complex subcrops beneath the Columbia Formation along the northwestern border of the site and crops out approximately 0.1 mile north of the site. In the site area, the Wilmington Complex consists of norite, hyperstene-quartz-andesine gneiss, noritic anthrosite, and anorthosite. These crystalline basement rocks are often weathered to a depth of several tens of feet. The resulting regolith is as much as 70 feet thick in some areas.[18,19]



Source: Geology of the Wilmington Area, Delware

NUS CORPORATION

Geologic Map: Wilmington Amtrak Railyard Maintenance Facility
New Castle County, Delaware

Figure 3.1

3.3.2 Soils

The soil mantling the site is mapped as Othello-Fallsington-Urban land complex. This unit consists of poorly drained, nearly level Othello and Fallsington soils that have been used for residential, commercial, and industrial development. About 75 percent of this complex has been covered with more than 18 inches of fill material. Some areas have been covered with more than 28 inches of fill material. In only a few areas has the original soil profile been entirely removed. The original soils consisted of approximately two-thirds Othello soils and one-third Fallsington soils. Othello soils consist of poorly drained soils developed in highly silty material underlain by sand. The soil reaction of Othello soils ranges from strongly acid to very strongly acid (pH 5.5 to 4.5). The permeability of Othello soils ranges from 0.2 to two inches per hour. Fallsington Series soils consist of poorly drained soils developed on sandy deposits containing moderate amounts of silt and clay. These soils are strongly acid to very strongly acid (pH 5.5 to 4.5). The permeability of Fallsington soils is moderate (0.6 to two inches per hour).[20]

3.3.3 Groundwater

The Columbia Formation, which underlies the site, forms the water-table aquifer within the study area and is expected to be hydraulically interconnected with the Potomac Formation and the Wilmington Complex. Because this formation is only 10 feet thick in the study area, its use as an aquifer is limited.[18,19]

The Potomac Formation is also thin and of little use as an aquifer in this area; however, this area is part of the recharge belt for the Potomac Formation.[18,19]

The Wilmington Complex stores and transmits groundwater almost entirely within fractures. These dense igneous rocks yield small quantities of groundwater, usually less than 10 gallons per minute.[18,19]

Shallow groundwater beneath the site is expected to flow south toward an unnamed tributary of Brandywine Creek and south toward Brandywine Creek.[18,19]

3.4 Climate and Meteorology

According to climatological data obtained for Wilmington, Delaware, based on the period from 1951 to 1980, the average annual temperature is 54.0°F; the coldest month is January with a mean temperature of 31.2°F, and the hottest month is July with a mean temperature of 76°F.[21]

The average annual precipitation is 41.38 inches. The month with highest precipitation is August, with 4.03 inches; the lowest is October with 2.89 inches.[21] A 1-year, 24 hour rainfall will produce 2.75 inches of rain. The mean annual lake evaporation for the area is 35 inches.[22,23] The net moisture gain is 6.38 inches. Moisture deficiencies affecting crops do occur occasionally, but severe droughts are rare. The streams and rivers of northern Delaware are not subject to major flooding, although heavy rains do occasionally cause minor flash flooding.[2,22]

The proximity of Wilmington to large water areas and the inflow of southerly winds maintain a high relative humidity all year. During the summer months, the average relative humidity is approximately 75 percent. Fog is frequent. Light southeast winds over the Delaware Bay favor the formation of fog. Light north-northeast winds migrate smoke from the heavy industrial areas along the Delaware River around Philadelphia into Wilmington.[21]

3.5 Land Use

The Amtrak WMF is located on the eastern edge of Center City Wilmington. The surrounding land use is an urban commercial and residential zone. Directly east of the subject site is the ConRail-operated Edgemoor Yard. The site is slightly more than one mile west of the Delaware River, a major industrial and transportation waterway.[1,2,17]

3.6 Population Distribution

The Amtrak WMF is located close to populated Center City Wilmington. Wilmington had a 1980 Census population of 70,195. Using census data, approximately 10,718 persons reside within a 1-mile radius of the site. An estimated 44,454 people live within a 2-mile radius and approximately 74,852 people live within the complete 3-mile radius of the facility.[24]

3.7 Critical Environments

According to information obtained from the United States Fish and Wildlife Service for the subject site, one federally listed endangered species, the shortnose sturgeon (Acipenser brevirostrum) may occur in the Delaware River within one mile of the site.[25]

SECTION 4

4.0 WASTE TYPES AND QUANTITIES

The only hazardous waste currently stored on site is sulfuric acid.[5,6] Quantities vary and an exact total quantity was not available for this report.

Liquid wastes on site are treated via a dissolved air flotation wastewater treatment system located west of car shop no. 2. The treated effluent from this system is released to the city of Wilmington sewerage system. The effluent discharge is permitted by the city. A monthly analysis for metals and PCBs is completed of the discharge as part of the permit requirements.[3,4] Waste levels generally are as follows: total chromium of less than 0.05 mg/l; nickel of less than 0.05 mg/l; copper of 0.05 mg/l or less; zinc of 0.1 mg/l or less; and PCBs of 5 or 10 ppb.[26] (See appendix G for the most recent sample results.)

Solid and asbestos wastes are removed to the Twelfth Street Solid Waste Authority, a sanitary landfill in Wilmington.[3]

Waste oils are stored in a 4,000-gallon tank on site. The unhydrated oil is sold to recyclers where possible.[3]

Approximately 10,000 cubic yards of PCB-contaminated soils were removed from the railyard during a 1985 cleanup. The soil was landfilled in facilities in Niagara Falls, New York, and Williamsburg, Ohio.[9] (Details of the removal are contained in section 2.6.)

SECTION 5

5.0 FIELD TRIP REPORT

5.1 Summary

On Tuesday, August 16, 1988, FIT 3 personnel Lisa Lillis and Charles Meyer visited the Wilmington Amtrak Railyard - Maintenance Facility in Wilmington, Delaware. The purpose of the site visit was to conduct a preliminary assessment. FIT was accompanied on site by Paul Racette, EPA Region 3, Brad Smith and Jamie Hackney, of DE DNREC, Fulton Williams, environmental supervisor of Amtrak - Wilmington Maintenance Facility, and Charles Lin, manager of Environmental Control, Amtrak-Washington, D.C. The weather was sunny and clear, with temperatures in the high 80s. Photographs were taken on site (see figure 5.1, page 5-6, and the photograph log, section 5.4).

5.2 Persons Contacted

5.2.1 Prior to Field Trip

B.J. Tripoli
General Manager
National Railroad Passenger Corporation (Amtrak)
Wilmington Maintenance Facility
Foot of Vandever Avenue
Wilmington, DE 19801
(302) 429-6367

Fulton Williams
Environmental Supervisor
National Railroad Passenger
Corporation (Amtrak)
Wilmington Maintenance Facility
Foot of Vandever Avenue
Wilmington, DE 19801
(302) 429-6399

Paul Racette
U.S. EPA
841 Chestnut Building
Ninth and Chestnut Streets
Philadelphia, PA 19107
(215) 597-1073

Brad Smith
DE DNREC
715 Grantham Lane
New Castle, DE 19720
(302) 323-4549

5.2.2 At the Site

Fulton Williams
Environmental Supervisor
National Railroad Passenger Corporation
Wilmington Maintenance Facility
Foot of Vandever Avenue
Wilmington, DE 19801
(302) 429-6399

Charles Lin
Manager
Environmental Control
National Railroad Passenger
Corporation
400 North Capitol Street, N.W.
Washington, D.C. 20001
(202) 383-2599

5.2.2 At the Site (continued)

Paul Racette
U.S. EPA
841 Chestnut Building
Ninth and Chestnut Streets
Philadelphia, PA 19107
(215) 597-1073

Jamie Hackney
Brad Smith
DE DNREC
715 Grantham Lane
New Castle, DE 19720
(302) 323-4549

5.2.3 Post Site Visit

Fulton Williams
Environmental Supervisor
National Railroad Passenger Corporation
Wilmington Maintenance Facility
Foot of Vandever Avenue
Wilmington, DE 19801
(302) 429-6399

Charles Lin
Manager
Environmental Control
National Railroad Passenger
Corporation
400 North Capitol Street, N.W.
Washington, D.C. 2000
(202) 383-2599

5.2.4 Water Supply Well Information

The majority of residents and businesses in the surrounding site vicinity rely on public suppliers for their potable source of water. No home wells were identified by FIT during this investigation. The site is located within the Wilmington, Delaware corporate boundary.

5.3 Site Observations

- The HNU background reading was 0.2 ppm. One reading above background, 0.6 ppm, was detected above a sludge located on the eastern bank near the Shellpot Creek monitoring point. No other readings above background were recorded during the site visit.

- The radiation mini-alert was set on the X1 position; no readings above background were recorded during the site visit.

- Shellpot Creek serves as the northern boundary of the site. A concrete pipe, approximately 42 inches in diameter, surrounded by a steel cage was located just off the creek. The cage facilitates sampling of the waters for NPDES parameters.

- A two-feet-diameter pile of an unidentified sludge was located on the bank east of the concrete pipe.

- A second pipe discharged into Shellpot Creek downstream of the concrete pipe. The source of the pipe was unknown.

- Effluent from the second pipe was clear. A slight chlorine odor was detected. Iron deposits were observed on rocks below the outfall.

- A fill area was located east of a pumphouse. Three stick-up pipes, one of polyvinyl chloride (PVC), two of asbestos, marked the entrance to the fill. Fill consisted of construction, demolition, and road debris.

- Native grasses were still evident in the fill area. The area was unlined and unfenced.

- Water had settled in puddles among the tracks located between car shop no. 1 and Shellpot Creek.

- Car shop no. 1 was used for storage only. The westernmost end of the building had been fitted as an asbestos abatement room. The room was sealed and under negative pressure. Asbestos is removed to an authorized landfill.

- A drum storage area was located along the northwestern facade of car shop no. 1. Drums contained spent gear oils.

- A paved road followed the eastern border of the 54-acre site. The road also served as the line between Amtrak and ConRail's Edgemoor Railyard.

- Brandywine Creek and Twelfth Street mark the southern boundary of the site property. Access to a tributary of the creek was via a dirt road off the paved boundary road.

- Three outfalls were observed in the tributary. The middle discharge is monitored by Amtrak. The tributary flows below Twelfth Street to Brandywine Creek.

- The water of the tributary was heavily silted and very enriched. Booms went across the surface to collect debris and oil. The stream had an iron color.

- Facility buildings were congregated in the west-central area of the property.

- A drum staging area for oil-containing drums was located behind the powerhouse in the center of the site property.

- Drums were observed upside-down over a collection basin approximately four inches deep. A sump removed excess oil and waste that were pumped to an above-ground 4,000-gallon storage tank.

- Located across a gravel path from the drum staging area were diked, 10,000-gallon tanks, for the storage of trichlorobenzene, and a PCB transformer retrofill building. The retrofill operation was inactive during the site visit.

- Two drums of PCB-contaminated oil were located next to the retrofill building on a sloped pad. Runoff from the pad flowed into the diked basin around the 10,000-gallon tanks. The drums were labeled to indicate that they were PCB contaminated.

- The locomotive repair shop was in the center of the site property.

- The northeastern corner of the locomotive shop was caged off and used for transformer draining. Fluids were recycled and self-contained in this area.

- Track no. 5, in the locomotive shop, was the only track on which transformer work could be conducted. A pit under the track collected any released fluids. The pit was sealed. No drain pipes were in the pit.

- Absorbant pads were placed in the track no. 5 pit. The pads are put into drums for disposal and treated as solid waste.

- Leaking transformers were drained and stored in the transformer cage.

- Locomotives were being repaired and overhauled in the locomotive shop. Track no. 6 was for inspection. No locomotives with leaking transformers were allowed on this track, or outside. "Leakers" were allowed on track no. 5 only.

- A wastewater treatment plant was located west of car shop no. 2. A dissolved air flotation system was in use. Treated effluent is released to the Wilmington sewage system.

- Car shop no. 2 was used for the storage of maintenance equipment and the location of the electric shop.

- The areas where PCB-contaminated soils were removed in 1985 had been paved with asphalt or covered with gravel at the time of the FIT visit.

- The engine house and roundhouse in the southern portion of the property were abandoned and in disrepair.

- Access to the property was via Vandever Avenue to the west or an unnamed paved access road off Twelfth Street to the east.

- The property was not fenced in most areas. Railroad tracks, particularly the heavily used Main Line, prohibited public access.

- The facility is manned 24 hours every day.

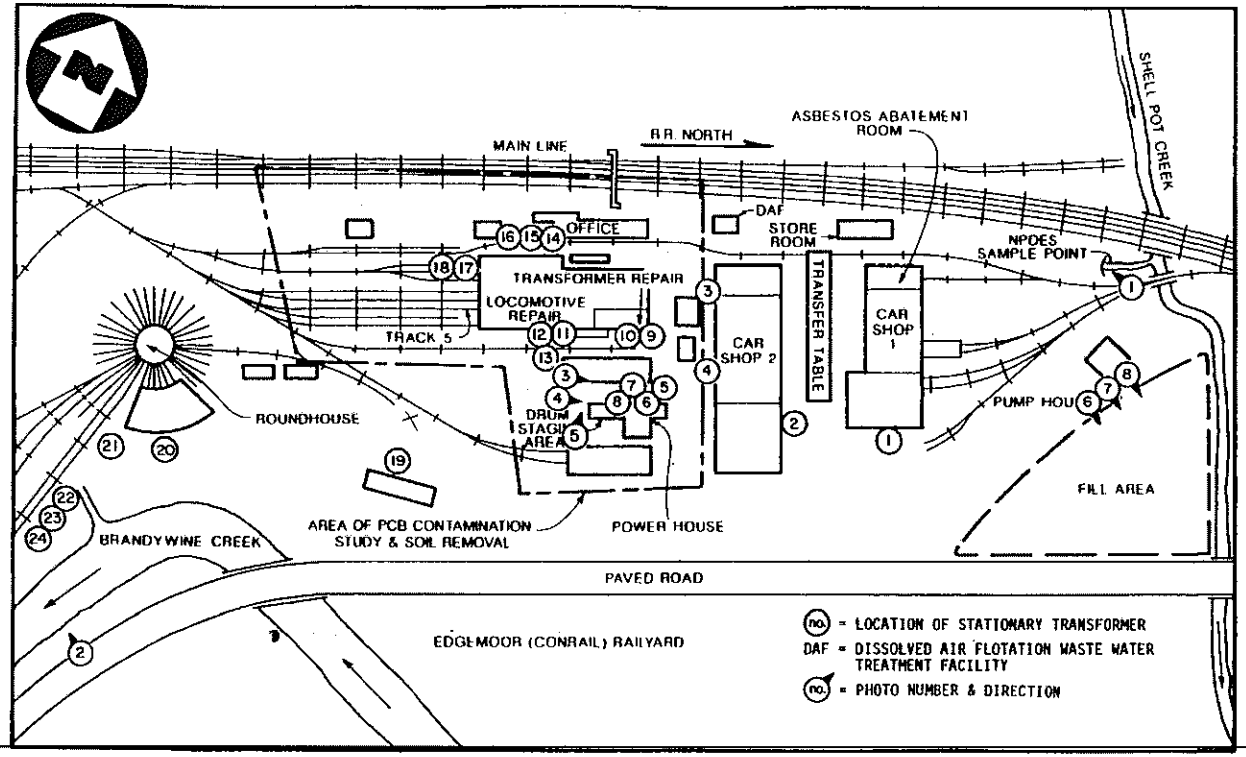


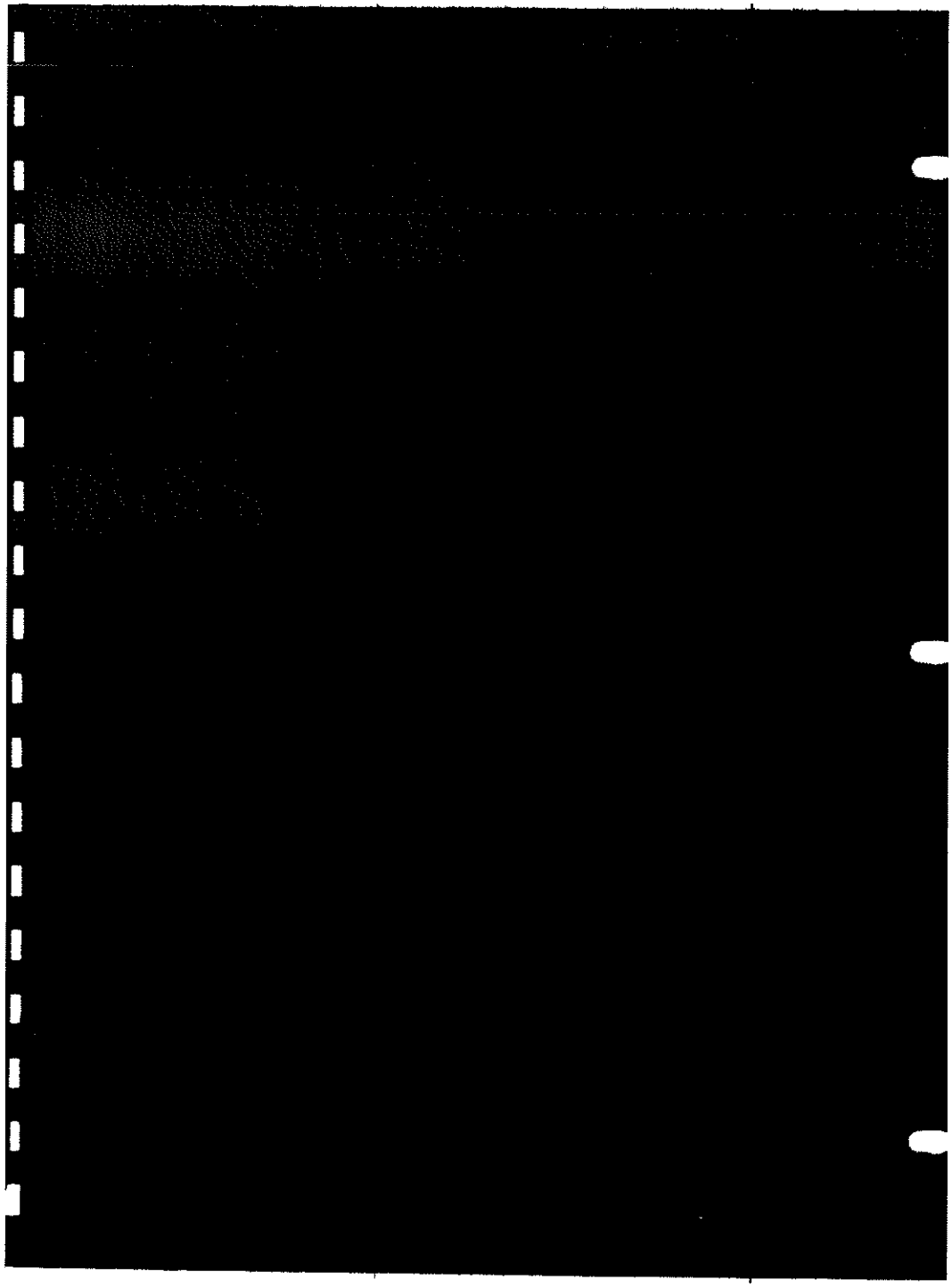
PHOTO LOCATION MAP

WILMINGTON AMTRAK RAILYARD MAINTAINENANCE FACILITY

(NO SCALE)

FIGURE 5.1

NUS CORPORATION



F3-8808-54

EPA — POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE: DE | 02 SITE NUMBER: 170

II. SITE NAME AND LOCATION

01 SITE NAME	02 STREET, ROUTE NO. OR SPECIFIC LOCATION IDENTIFIER				
Wilmington Amtrak Railyard-Maintenance Facility	Vandever Avenue				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CO DIS**
Wilmington	DE	19801	New Castle	003	DEC

09 COORDINATES — LATITUDE: 39° 44' 49" N | LONGITUDE: 075° 31' 20" W

10 DIRECTIONS TO SITE (Starting from nearest public road)

From U.S. Route 495 South, take the 12th Street exit. Proceed north on 12th Street to Vandever Avenue Go east on Vandever Avenue, over railroad tracks to the Amtrak facility.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
National Railroad Passenger Corporation	Vandever Avenue		
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 TELEPHONE NUMBER**
Wilmington	DE	19801	(302) 429-6440
07 OPERATOR (If known and different from owner)	**08 STREET (Business, mailing, residential)**		
Same as above.			
09 CITY	**10 STATE**	**11 ZIP CODE**	**12 TELEPHONE NUMBER**
			( )

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: _____ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED _____ (MONTH DAY YEAR) ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE 8/16/88 (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)
☐ A. EPA ☒ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): NUS Corporation

02 SITE STATUS (Check one)	03 YEARS OF OPERATION	
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN	1976 (BEGINNING YEAR) | present (ENDING YEAR)	☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

An area of PCB-contaminated soils was removed from the site in 1985. The possibility of additional oil spill areas exists but is minimal. Trichloroethylene was detected in a sample from Shellpot Creek.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

No immediate hazard from any PCB-contaminated soils to the environment and/or population exists. A slight concern continues for surface and groundwater contamination from solvents and oil wastes.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☐ C. LOW (Inspection on time available basis) ☒ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)			03 TELEPHONE NUMBER
Paul Racette	EPA Region 3			(215) 597-107
04 PERSON RESPONSIBLE FOR ASSESSMENT	**05 AGENCY**	**06 ORGANIZATION**	**07 TELEPHONE NUMBER**	**08 DATE**
Lisa Lillis	NUS Corp.	FIT 3	(215) 687-9510	9/23/88 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
DE	170

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)
- [ ] A SOLID
- [ ] B POWDER, FINES
- [ ] C SLUDGE
- [x] E SLURRY
- [x] F LIQUID
- [ ] G GAS
- [ ] D OTHER (Specify)

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)
- TONS
- CUBIC YARDS 10,000 of soils
- NO. OF DRUMS

03 WASTE CHARACTERISTICS (Check all that apply)
- [x] A TOXIC
- [ ] B CORROSIVE
- [ ] C RADIOACTIVE
- [x] D PERSISTENT
- [ ] E SOLUBLE
- [ ] F INFECTIOUS
- [ ] G FLAMMABLE
- [ ] H IGNITABLE
- [ ] I HIGHLY VOLATILE
- [ ] J EXPLOSIVE
- [ ] K REACTIVE
- [ ] L INCOMPATIBLE
- [ ] M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			10,000 cy of PCB-contaminated soils were
OLW	OILY WASTE	10,000	cy	removed in a 1984-85 cleanup at the site.
SOL	SOLVENTS	Unknown		Low levels of trichloroethylene have been
PSD	PESTICIDES			detected in samples obtained from Shellpo
OCC	OTHER ORGANIC CHEMICALS			Creek.
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OLW	Aroclor 1260	11096-82-5	spill	5770	mg/kg
OLW	Aroclor 1254	11097-69-1	spill	1475	mg/kg
SOL	trichloroethylene	79-01-6	unknown	151	ug/l

V. FEEDSTOCKS (See Appendix for CAS Numbers) N/A

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

U.S. EPA, Region 3. TOSCA file information for Amtrak-Wilmington Maintenance Facility.
NPDES Discharge Monitoring Report, May 29, 1987.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
DE	170

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION

The potential exists for localized adverse impacts to groundwater in the vicinity of the railyard. No groundwater users are known to exist within the study area. Public suppliers utilize surface water sources.

01 [X] B. SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION

The potential exists for localized adverse impacts to Shellpot and Brandywine Creeks. Neither waterway is utilized for a potable source downstream of the site. Oil booms prevent spills from entering the Brandywine, a recreational waterway.

01 [ ] C. CONTAMINATION OF AIR — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

No contamination of the air was reported or observed.

01 [ ] D. FIRE/EXPLOSIVE CONDITIONS — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

No fire or explosive conditions were reported or observed.

01 [X] E. DIRECT CONTACT — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: Amtrak employees — 04 NARRATIVE DESCRIPTION

A direct contact concern with oil-stained soils existed at the site. Contaminated soils were removed in 1984-85.

01 [X] F. CONTAMINATION OF SOIL — 02 [X] OBSERVED (DATE 1984-85) — [ ] POTENTIAL [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: 10,000 cy. (4047 sq. m) — 04 NARRATIVE DESCRIPTION

PCB-contaminated soils from oil spills along tracks and railyard buildings were sampled and removed in a cleanup completed in 1985. The affected areas have been filled and paved.

01 [ ] G. DRINKING WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

No drinking water contamination is reported or observed. All potable sources are upstream, more than one mile from the site.

01 [X] H. WORKER EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

The potential exists for worker exposure/injury through direct contact with PCB-contaminated soils. Cleanup procedures have minimalized this concern.

01 [ ] I. POPULATION EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION

No population exposure/injury has been reported or observed. The site is not easily accessible to the public.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
DE	170

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported or observed.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include names(s) of species)

None reported or observed.

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No contamination of the food chain is known or observed. However, the strong affinity for bioaccumulation of PCB and the location of fishing waterways raises a potential concern.

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

None reported or observed.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No damage to off-site property is known or observed.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported or observed.

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☒ OBSERVED (DATE: 8/16/88) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

An unauthorized fill area of construction debris was observed on site. No hazardous wastes are expected.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

No other known, potential, or alleged hazards were reported or observed on site.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 0

IV. COMMENTS

The extensive sampling and cleanup of PCB-contaminated areas, as well as the discontinuation of the use of PCB transformers, has minimized concerns for exposure to the environment and for population.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

U.S. EPA, Region 3. TOSCA file information for Amtrak-Wilmington Maintenance Facility.
Fulton Williams, with NUS FIT 3 personnel. Meeting. August 16, 1988.

EPA FORM 2070-12 (7-81)

SECTION 6

6.0 REFERENCES FOR SECTIONS 1.0 THROUGH 5.0

1. United States Geological Survey. Wilmington South, Delaware - New Jersey Quadrangle, 7.5 Minute Series. Topographic Map. 1967.

2. NUS Corporation, FIT 3. Preliminary assessment; site visit. TDD No. F3-8808-54, August 16, 1988.

3. Williams, Fulton, Environmental Supervisor, National Railroad Passenger Corporation Wilmington Maintenance Facility, with Lisa Lillis, NUS FIT 3. Meeting. August 16, 1988.

4. Lin, Charles, Manager, Environmental Control, National Railroad Passenger Corporation, with Lisa Lillis, NUS FIT 3. Meeting. August 16, 1988.

5. Williams, Fulton, Environmental Supervisor, National Railroad Passenger Corporation, with Lisa Lillis, NUS FIT 3. Telecon. September 1, 1988.

6. Lin, Charles, Manager, Environmental Control, National Railroad Passenger Corporation, with Lisa Lillis, NUS FIT 3. Telecon. August 30, 1988.

7. Brzozowski, T.W., Director, Environmental Control, National Railroad Passenger Corporation, to B.J. Tripoli, General Manager, National Railroad Passenger Corporation Wilmington Maintenance Facility. Correspondence (regarding NPDES Permit at Wilmington Maintenance Facility). October 4, 1985. (Information provided by F. Williams of Amtrak.)

8. City of Wilmington, Department of Public Works. Wastewater Discharge Permit. November 25, 1987. (Information provided by F. Williams of Amtrak.)

9. Brzozowski, T.W., Director, Environmental Control, National Railroad Passenger Corporation, to Ellen Teplitzky, Office of Regional Counsel, U.S. EPA, Region 3. Correspondence. March 17, 1987.

10. Delaware Department of Natural Resources and Environmental Control, Division of Air and Waste Management. Preliminary Assessment Report. Wilmington Train Yard. August 14, 1987.

11. Woodward-Clyde Consultants. Concentration of PCBs in soils collected at the Wilmington Maintenance Facility, Wilmington, Delaware. Sample Data. June and July 1980. (Data provided from U.S. EPA Region 3 files.)

12. Canberra/Radiation Management Corporation. Results of oil and grease and PCB determinations on soil samples obtained at the Amtrak Wilmington Maintenance Facility. Sample Data. June 23 and 24, 1982. (Data provided from U.S. EPA Region 3 files.)

13. Canberra/Radiation Management Corporation. Results of PCB Analysis performed on soil samples collected from Amtrak's Wilmington Maintenance Facility. Sample Data. November 4 and 14, 1983 and December 1983 through January 1984. (Data provided from U.S. EPA Region 3 files.)

14. Delaware Department of Natural Resources and Environmental Control, Water Supply Branch. Public Water Systems in Delaware. 1976.

15. City of Wilmington. City of Wilmington Water Distribution Map. Undated.

16. Artesian Water Company. Water Distribution System. April 24, 1985.

17. United States Geological Survey. Wilmington North, Delaware-Pennsylvania Quadrangle, 7.5 Minute Series. Topographic Map. 1967, photorevised 1973.

18. University of Delaware Water Resources Center. The Availability of Groundwater in New Castle County, Delaware. July 1971.

19. Delaware Geological Survey. Geology of the Wilmington Area, Delaware. Geologic Map Series, No. 4, 1975.

20. United States Department of Agriculture, Soil Conservation Service. Soil Survey of New Castle County, Delaware. October 1970.

21. National Oceanic and Atmospheric Administration. Climatography of the United States. Local Climatological Data. Annual Summary with Comparative Data. Wilmington, Delaware. 1983.

22. United States Department of Commerce. National Climatic Center, Asheville, North Carolina. Climatic Atlas of the United States. Mean Annual Lake Evaporation. 1979.

23. United States Department of Commerce. National Climatic Center, Asheville, North Carolina. Climatic Atlas of the United States. 1-Year, 24-Hour Rainfall. 1979.

24. Rand McNally and Company. Commercial Reference Map and Guide. Delaware, Maryland, and the District of Columbia. Chicago 1983.

25. Kinser, Glenn, United States Department of Interior, Fish and Wildlife Service, to Garth Glenn, NUS FIT 3. Correspondence. September 19, 1988.

26. City of Wilmington, Department of Public Works. Periodic Self Monitoring Report. June 30, 1988. (Information provided by F. Williams of Amtrak.)

APPENDIX A

State Permit Number WPCC 3089/85
NPDES Permit Number DE 0050962
Effective Date September 17, 1985
Expiration Date September 16, 1990

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

AND THE LAWS OF THE

STATE OF DELAWARE

In compliance with the provisions of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 125[illegible] et seq.) (hereinafter referred to as "the Act"), and pursuant to the provisions of 7 Del. C., 6003

The National Railroad Passenger Corporation (Amtrak)
Wilmington Maintenance Facility
400 North Capital Street, N.W.
Washington, D.C. 20001

is authorized to discharge from the facility
(Point Sources 001, 002, 002A) located at

Vandever Ave.
Wilmington, Delaware 19802

001 - Adjacent to Dam B in a tributary of Brandywine Creek
002 - Last manhole of 30" storm sewer in Amtrak's maintenance yard
002A - Outfall of 42" storm sewer in Shellpot Creek (proposed)

to receiving waters named

Brandywine Tributary (001) and Shellpot Creek (002, 002A)

The effluent limitations, monitoring requirements and other permit conditions are set forth in Part I, II and III hereof.

R. Wayne Ashbee

Sept. 17, 1985
Date Signed

R. Wayne Ashbee, Director
Division of Water Resources
Department of Natural Resources
and Environmental Control

B. EFFLUENT LIMITATIONS

During the period beginning effective date and lasting through expiration date the permittee is authorized to discharge from point source(s) 001* the quantity and quality of effluent specified below:

The average quantity of effluent discharged from the wastewater treatment facility shall not exceed N/A million gallons per day (mgd) or N/A cubic meters per day.

Parameter	Daily Average lbs/day	Daily Average kg/day	Daily Average Concentration	Daily Maximum lbs/day	Daily Maximum kg/day	Maximum Instantaneous Concentration
Oil & Grease			10 mg/L 10 PPM			15 mg/L 15 PPM

There shall be no discharge of polychlorinated biphenyls (PCB's) from the Amtrak operations facilities to the Brandywine tributary.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units. The discharge shall be free from floating solids, sludge deposits, debris, oil and scum.

*001 - This is primarily combined industrial wastewater and stormwater runoff. It may include an overflow from the lift station to the Brandywine Creek Tributary during heavy and prolonged rains.

C. MONITORING REQUIREMENTS

During the period beginning effective date and lasting through expiration date the permittee is authorized to discharge from outfall(s) 001

Such discharge shall be monitored by the permittee as specified below:

Effluent Parameter	Monitoring Requirement	
	Measurement Frequency	Sample Type
Oil & Grease	Once per month	Grab
Polychlorinated Biphenyls (PCB's)*	Once per month	Composite
Surfactants*	Once per month	Grab
Trichloroethylene*	Once per month	Composite
pH	Once per month	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 001 at overflow of Dam B on a tributary of Brandywine Creek.

*See special condition A(1) on page 28.

APPENDIX B

PERMIT NO. W-85-04
REVISION NO. 1 DATED : Nov 25, 1987

CITY OF WILMINGTON

DEPARTMENT OF PUBLIC WORKS
800 French Street, Wilmington, DE 19801

W A S T E W A T E R D I S C H A R G E P E R M I T

In accordance with the provisions of the Code of the City of Wilmington, Chapter 24, Section 24-6, regulating Non-domestic Wastewater Discharges into the Public Sewer System, and any applicable Federal or State law or regulation:

NATIONAL RAILROAD PASSENGER CORP.

WILMINGTON MAINTENANCE FACILITY

FOOT OF VANDEVER AVE., WILMINGTON, DE 19801

is granted the discharge of wastewater to the City of Wilmington Sewer System at the location designated as

VANDEVER AVE.

WILMINGTON

subject to the permit conditions established.

Effective Date: January 1, 1988

Expiration Date: December 31, 1993

Signed: W. W. Laws
Commissioner of Public Works
City of Wilmington, DE.

PERMIT CONDITIONS

GENERAL

1. The named permit holder shall be expressly subject to all provisions of Chapter 24, Section 24-6 of the City Code and all other regulations, user charges, and fees established by the City.

2. This Wastewater Discharge Permit is issued in the name of the permit holder and shall not be reassigned or transferred or sold to a new owner, new user, different premises, or a new or changed operation.

3. The permit holder shall report to the Department of Public Works any changes (permanent or temporary) to the premise or operations that significantly change the quantity or quality of the wastewater discharge described in the Wastewater Discharge Permit Application submitted by the permit holder, or deviate from the terms and conditions under which this permit is granted.

4. This permit is subject to revision to reflect any changes to the City code or any applicable categorical standards as and when they are promulgated by the USEPA.

EFFLUENT LIMITATIONS

The discharge from the designated location shall be limited to the effluent quality limitations as defined in Section P-304.2 of Chapter 24, Section 24-6 of the City Code with the following exceptions:

Effluent Constituent	Maximum Permissible Concentration
NONE	

MONITORING REQUIREMENTS

The permitted discharge shall be monitored by the permit holder in compliance with the following schedule:

Effluent Constituent	Monitoring Requirement: Measurement Frequency (Minimum)	Monitoring Requirement: Sample Type
P C B	once / month	daily composite
NICKEL	once / 6 months	daily composite
COPPER	once / 6 months	daily composite
ZINC	once / 6 months	daily composite
CHROMIUM (TOTAL)	once / 6 months	daily composite

Samples taken in compliance with the monitoring requirements above shall be collected at the following location :

Periodic Discharge Reports and Progress Reports on Compliance Schedule

A report containing the results of the monitoring program and progress on compliance schedule (if any) shall be filed with the Department of Public Works every JUNE AND DECEMBER OF EACH YEAR. Reports submitted shall be per the attached format (see page 7 of this permit)

Included in each report shall be:
Nature and concentration of regulated pollutants, average and maximum daily flow rates, methods of sampling and analysis, and a certification that the methods used conform to those approved by the US EPA.

Records Retention :
All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recording from continuous monitoring instrumentation shall be retained for three (3) years. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Department.

Noncompliance Notification :
If the permitted discharge does not comply with any effluent limitations specified in this permit or in the City Code the permittee shall inform the Department in writing within 5 days.

RCRA Notification :
Your facility may be subject to hazardous waste requirements under the Resource Conservation and Recovery Act Subtitles C and D. The State of Delaware Department of Natural Resources and Environmental Control, Division of Air and Waste Management, Dover, DE 19903 regulates hazardous wastes in the State and should be contacted to determine your obligations, if any, under this Act.

Notice of slug loading :
In accordance with 40 CFR Part 403 Section 403.12(f) the discharger shall notify the Department of any slug loading of any pollutant (including oxygen demanding pollutants) released to the treatment system at a flow rate or concentration likely to cause interference with the system.

RATE AND TIME OF DISCHARGE

The average production day flow permitted for discharge at the designated location shall not exceed 200,000 gallons per day.

The maximum _____ discharged flow rate shall not exceed NA.

In accordance with Section P304.7 Chapter 24, Section 24-6 of the City Code, the permit holder is required to install an inspection and sampling manhole at the following location (s):

_____

_____

_____

_____

A meter to measure the wastewater discharge shall be installed at the following locations (s):

_____

_____

Metering devices pertinent to the discharge (s) shall be maintained in good working order and calibrated at least annually.

SEWER USER CHARGES

Per Chapter 41, Section 4106 of the City Code, the permit holder shall be charged for sewer use as follows:

1. User classification C.

2. Quarterly billed in advance based upon actual flow quantities for the previous quarter as determined by:

   Water consumption records

   Sewer Meter Records

3. Charges for BOD and SS shall be based upon:

   (a) BOD: _____ lbs/1000 gal.

   SS: _____ lbs/1000 gal.

or (b) Laboratory sampling/analysis of flow during the previous quarter according to:
   Wilmington WPCF Laboratory And

   Contract Laboratory

PERMIT NO. W-85-04
REVISION NO. 1 DATED : Nov 25, 1987

SPECIAL CONDITIONS:

NONE

PERIODIC SELF MONITORING REPORT

Reporting Period : Jan-June / July-Dec 19___

PERMIT NO. W-85-04 REPORT DATE _____

INDUSTRIAL USER : NATIONAL RAILROAD PASSENGER CORP., WILMINGTON

PARAMETER	CHROMIUM (T)	NICKEL	COPPER	ZINC	P C B
LIMIT mg/l Monthly Average	6.0	1.5	5.0	15.0	-
MONTH -					
MONTH -					
MONTH -					
MONTH -					
MONTH -					
MONTH -					

FLOW DURING REPORTING PERIOD :

AVERAGE _____ GPD MAXIMUM _____ GPD

SAMPLING METHOD : All samples are daily time-proportioned composites over the period of the discharge except as noted below - (indicate sample date, parameter, reason)

_____

_____

METHODS OF ANALYSIS : Conform to those approved by the US EPA except -

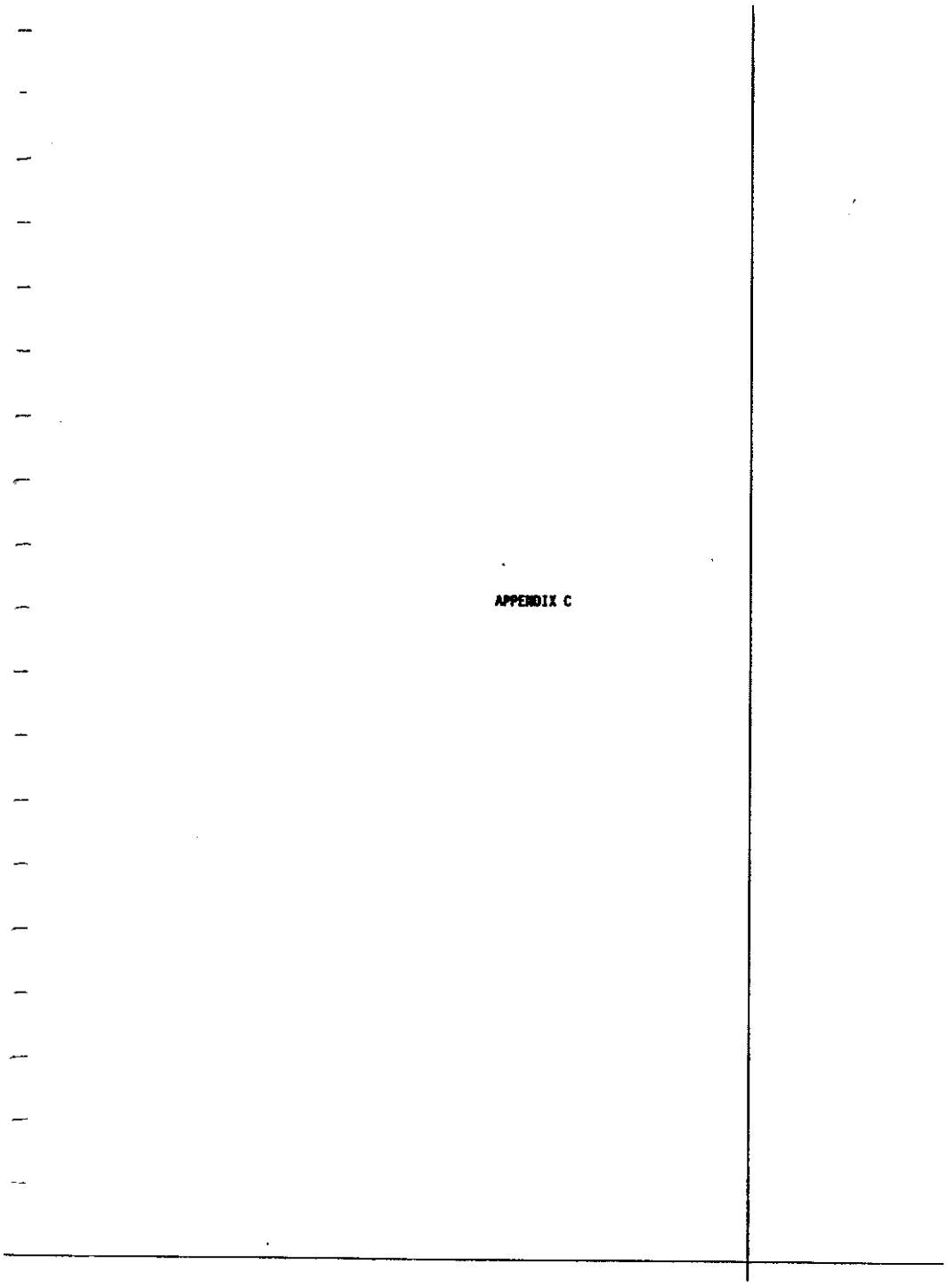
Results indicate that the wastewater discharge standards are being met on a consistent basis _____YES _____NO. If 'NO' explain on a separate sheet what steps are being taken to achieve consistent compliance.

I HEREBY CERTIFY THAT THIS REPORT IS ACCURATE TO THE BEST OF MY KNOWLEDGE

_____ DATE_____

Authorised Representative

NAME : _____ TITLE : _____



APPENDIX C

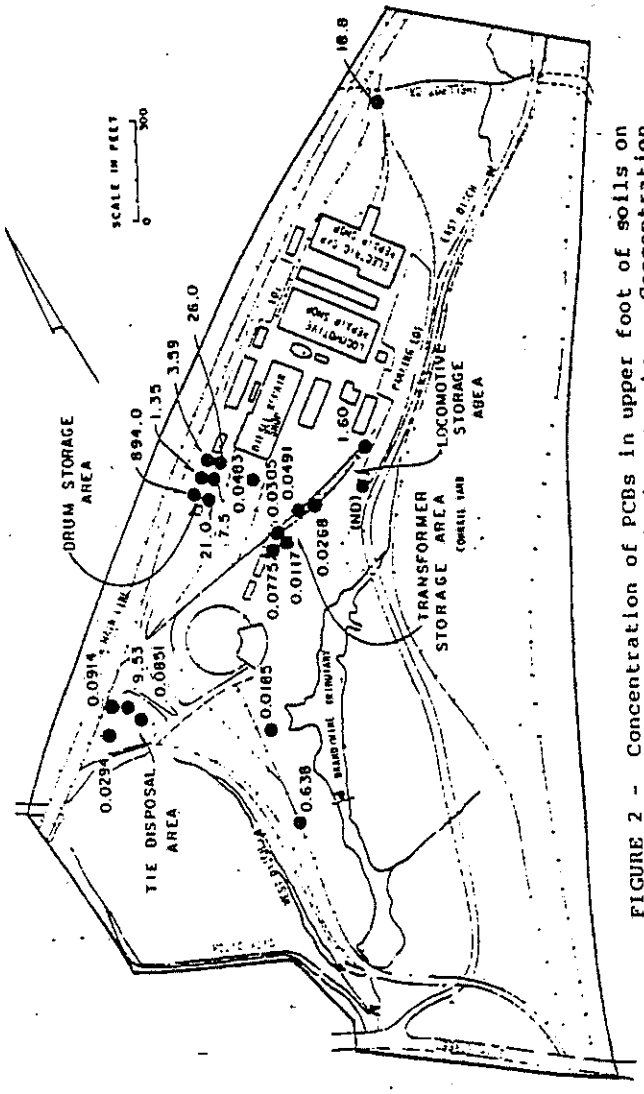


FIGURE 2 - Concentration of PCBs in upper foot of soils on roadways and mainline tracks. Concentration expressed in mg/kg.

TABLE 1 - Concentration of PCBs in soils collected at the Wilmington Maintenance Facility, Wilmington, Delaware. Sample locations are shown in Figures 2, 3 and 4. ND means not detectable.

Sample No.	Date Collected	Concentration PCBs (mg/kg)	Description	Location
2078-28B	6/11/80	0.28	Black fill	East side of main road, 150 feet north of mainline bridge
2078-29	6/11/80	0.386	Black fill	East side of main road, 800 feet north of entrance to facility at right angle bend in road
2078-30	6/11/80	9.53	Black fill	Tie dump area, 150 feet from main road near center of east side of area
2078-31	6/11/80	0.0914	Black fill	Tie dump area on center of north side near edge of marsh vegetation
2078-32	6/11/80	0.294	Black fill	Tie dump area on northwest side about 50 feet from mainline tracks
2078-33	6/11/80	0.0851	Black to tan fill	Southwest corner of tie dump area
2078-34	6/11/80	0.0491	Black fill	Decommissioned locomotive storage area on east side
2078-35	6/11/80	0.0305	Black fill	Center of decommissioned locomotive storage area,
2078-36	6/11/80	0.0268	Black fill	
2078-37	6/11/80	1.6	Black fill	
2078-38	6/11/80	0.0775	Black fill	West side of transformer storage area
2078-39	6/11/80	0.0117	Black fill	East side of transformer storage area
2078-40	6/17/80	23.1	Black fill	East side of main road at high tension Tower 13
2078-41	6/17/80	2.68	Black fill	East side of main road at high tension Tower 17 from beneath puddle
2078-42	6/17/80	0.0467	Black fill	25 feet east of high tension Tower 15 on main road

Sample No.	Date Collected	Concentration PCBs (mg/kg)	Description	Location
2078-43	6/17/80	894	Black fill	Drum storage area near northwest side of Tank 15
2078-44	6/17/80	21.0	Black fill	Drum storage area near northeast side of Tank 15
2078-45	6/17/80	1.35	Black fill	Drum storage area, east side between 10th and 11th rows from Tank 15
2078-46	6/17/80	7.50	Black fill	Drum storage area, west side between 8th and 9th row from Tank 15
2078-47	6/17/80	3.59	Black fill	Drum storage area, east side in 20th row from Tank 15
2078-48	6/17/80	26.0	Black fill	Drum storage area, west side between 18th and 19th rows from Tank 15
2078-49	6/17/80	6.84	Black fill	Main road, northeast side of footbridge between high tension Towers 17 and 18
2078-50	6/17/80	24.8	Black fill	Parking lot, 25 feet east of high tension Tower 19, along mainline, 25 feet east of locker room on main road
2078-51	6/17/80	0.0373	Black fill	25 feet east of locker room on main road
2078-52	6/17/80	9.70	Black fill	Parking lot on east side, 300 feet northeast of water tower
2078-53	6/17/80	ND	Brown fine to coarse sand	Road east side of yard, 3rd telephone pole plus 50 inches, northeast from round house
2078-54	6/17/80	0.0185	Black fill	2nd road west of Brandywine tributary, 200 feet northwest from oil tank in locomotive cleaning area
2078-55	6/17/80	9.76	Brown fine to coarse sand	West side of locker room, 250 feet from high tension Tower 18
2078-56	6/17/80	0.0347	Brown to gray clayey silt with some peat	Marsh, east boundary ditch, east side, 30 feet north of edge of marsh, 30 feet east of creek, 300 feet south of Shellpot Creek, 30 feet west of Conrail Road

TABLE 1 (cont'd-3)

Sample No.	Date Collected	Concentration PCBs (mg/kg)	Description	Location
2078-57	6/17/80	ND	Brown to gray clayey silt with some peat	Marsh, east boundary ditch, 300 feet south of Shellpot Creek, 30 feet west of old ditch
2078-59	6/17/80	4.05	Black fill	Puddle in fill 400 feet south of Shellpot Creek, 450 feet east of Amtrak mainline
2078-60	6/17/80	1.58	Black fill	Puddle in parking lot, 15 feet southeast from southeast leg of water tower
2078-61	6/17/80	ND	Black fine to medium sand with some fill	Marsh, 10 feet west of high tension Tower 8, west of 12th Street access road
2078-62	6/17/80	5.95	Black fine to medium sand	Marsh, 45 feet south of high tension Tower 220, west of 12th Street access road
2078-63	6/18/80	0.329	Black fill	Puddle, 200 feet northwest of round house, 75 feet west of south end of maintenance shed
2078-64	6/18/80	18.8	Black fill	Rail spur to Metroliner maintenance shed, 20 feet southeast of bridge over Shellpot Creek
2078-65	6/18/80	0.0307	Black fill	Amtrak mainline, east side at high tension Tower 20, north end of yard
2078-66	6/18/80	0.0211	Black fill	Amtrak mainline, west side at high tension Tower 14
2078-67	6/18/80	0.0483	Black fill	Diesel repair shop, 4th track from the east, 150 feet south of building
2078-68	6/18/80	0.638	Black fill	Locomotive cleaning area, 50 feet south of sand tower, between Tracks 2 and 3 from east
2078-73	6/18/80	0.0279	Black fill	Amtrak mainline, 100 feet north of overpass for main road, east side

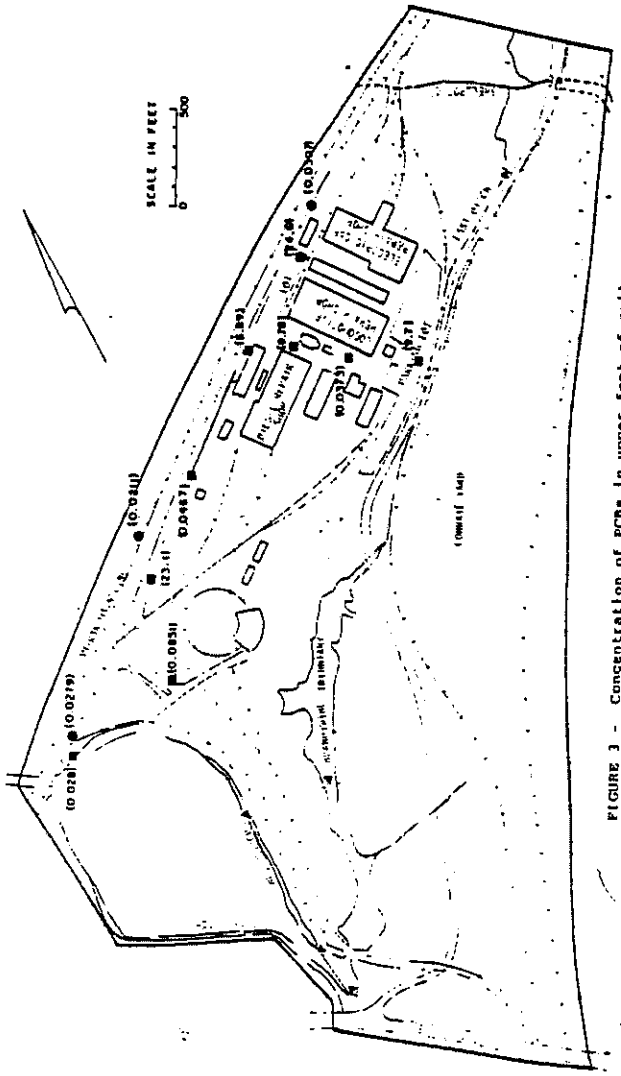


FIGURE 3 - Concentration of PCBs in upper foot of soils on roadways and mainline tracks. Concentration expressed in mg/kg. Circles are locations of samples taken on mainline tracks. Squares are locations of samples on roadways and parking lots.

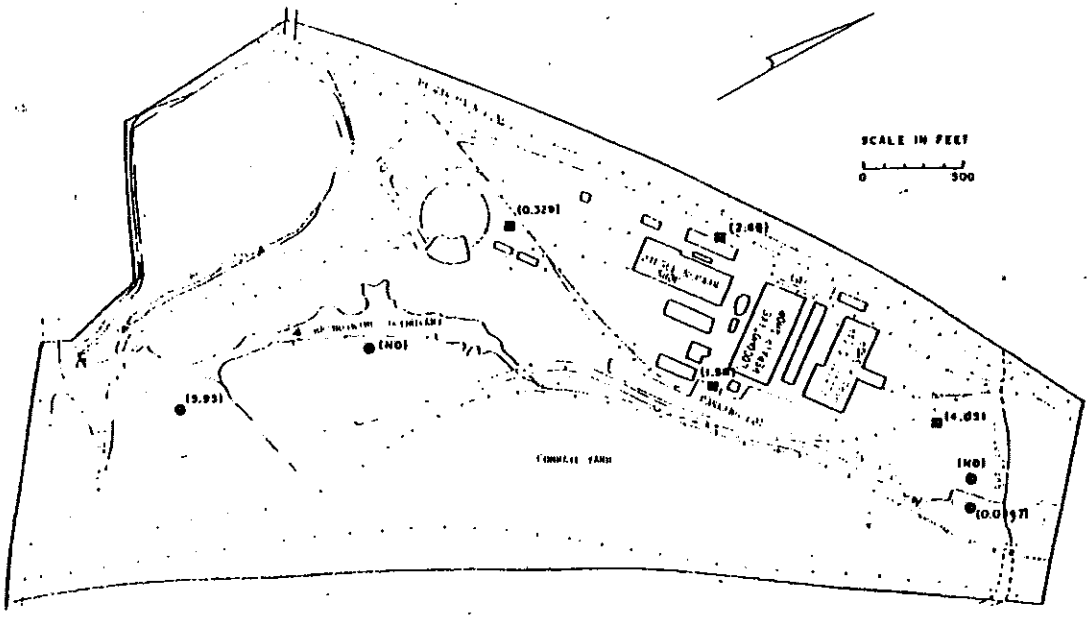


FIGURE 4 - Concentration of PCBs in soil samples collected from soils in marshes and puddles at the Wilmington Maintenance Facility. Values are expressed in mg/kg. ND means not detectable. Locations of marsh samples are shown with circles, and puddle locations are shown with squares.

TABLE 2 - Concentration of PCBs in split spoon samples collected from borings at the Wilmington Maintenance Facility. Locations are shown in Figures 5, 6 and 7. ND means not detectable.

Well No.	Depth (ft)	Sample No.	Date Collected	Concentration (mg/kg)	Description
1	5-6.5	2078-86	7/07/80	1.68	Loose black sand, bricks and wood fill
1	10-11.5	2078-87	7/07/80	1.06	Soft gray peaty silty clay
1	20-21.5	2078-88	7/07/80	ND	Soft gray peaty silty clay
1	25-26	2078-89	7/07/80	ND	Soft gray peaty silty clay
1	35-36.5	2078-90	7/07/80	ND	Loose brown coarse to fine sand, trace gravel
3	5-6.5	2078-91	7/08/80	ND	Very loose to medium dense gray clayey silt, little coarse to fine sand
3	15-16.5	2078-92	7/08/80	ND	Loose brown coarse to fine sand to dense silt, clay; trace medium to fine sand
4	5-6.5	2078-93	7/08/80	0.156	Loose brown coarse to fine sand
4	10-11.5	2078-94	7/08/80	ND	Soft to firm gray silt and medium to fine sand, trace black clayey silt and peat seams
5	2-3.5	2078-055-2	7/09/80	ND	Very soft to stiff red and gray clayey silt, trace coarse to fine sand
5	5-6.5	2078-95	7/09/80	0.0762	Very soft to stiff red and gray clayey silt, trace coarse to fine sand
5	10-11.5	2078-055-10	7/09/80	ND	Loose brown coarse to fine sand, trace gravel, silt and organic material
5	15-16	2078-096	7/09/80	0.0026	Loose brown coarse to fine sand, trace gravel, silt and organic material

TABLE 2 (cont'd-2)

Well No.	Depth (ft)	Sample No.	Date Collected	Concentration (mg/kg)	Description
6	2-3.5	2078-056-2	7/09/80	ND	Black sand and cinder fill
6	5-6.5	2078-97	7/09/80	0.0229	Loose brown coarse to fine sand and silt seams
6	10-11.5	2078-056-10	7/09/80	0.0212	Medium dense gray fine sand and silt, trace medium sand
6	15-16.5	2078-98	7/09/80	0.233	Red clayey silt to black clayey silt and peat, trace fine sand
7	2-3.5	2078-057-2	7/09/80	0.786	Black sand, wood and cinder fill
7	5-6.5	2078-057-5	7/09/80	0.142	Very loose brown coarse to fine sand, silt
7	10-11.5	2078-99	7/09/80	0.0043	Very soft black silty clay to peat, trace fine sand
7	15-16.5	2078-100	7/09/80	0.100	Very soft black silty clay to peat, trace fine sand
8	2-3.5	2078-058-2	7/09/80	ND	Very soft gray to brown silty clay and woody peat
8	10-10.5	2078-101	7/09/80	0.329	Very soft gray to brown silty clay and woody peat
8	15-16.5	2078-102	7/09/80	ND	Very soft gray to brown silty clay and woody peat
13	5-6.5	2078-110	7/11/80	0.402	Medium dense gray silty fine sand, trace coarse to medium sand, oil smell
13	15-16.5	2078-111	7/11/80	ND	Brown coarse to fine sand, trace silt and gravel

TABLE 2 (cont'd-3)

Well No.	Depth (ft)	Sample No.	Date Collected	Concentration (mg/kg)	Description
14	5-6.5	2078-112	7/11/80	0.140	Black sand and rubble fill
14	15-16.5	2078-113	7/11/80	0.286	Very loose red fine sand and silt
15	5-6.5	2078-114	7/11/80	0.0028	Very soft brown silty clay and peat, oily smell
15	15-16.5	2078-115	7/11/80	ND	Very soft brown silty clay and peat, oily smell
16	5-6.5	2078-116	7/11/80	ND	Very soft brown to gray silty clay, trace peat and coarse to fine sand
16	15-16.5	2078-117	7/11/80	ND	Very soft brown to gray silty clay, trace peat and coarse to fine sand
16	25-26.5	2078-118	7/11/80	ND	Dense gray coarse to fine sand and gravel, trace silt
18	5-6.5	2078-119	7/14/80	ND	Black sand, cinder and rubble fill
18	15-16.5	2078-120	7/14/80	ND	Very soft brown silty clay, trace peat

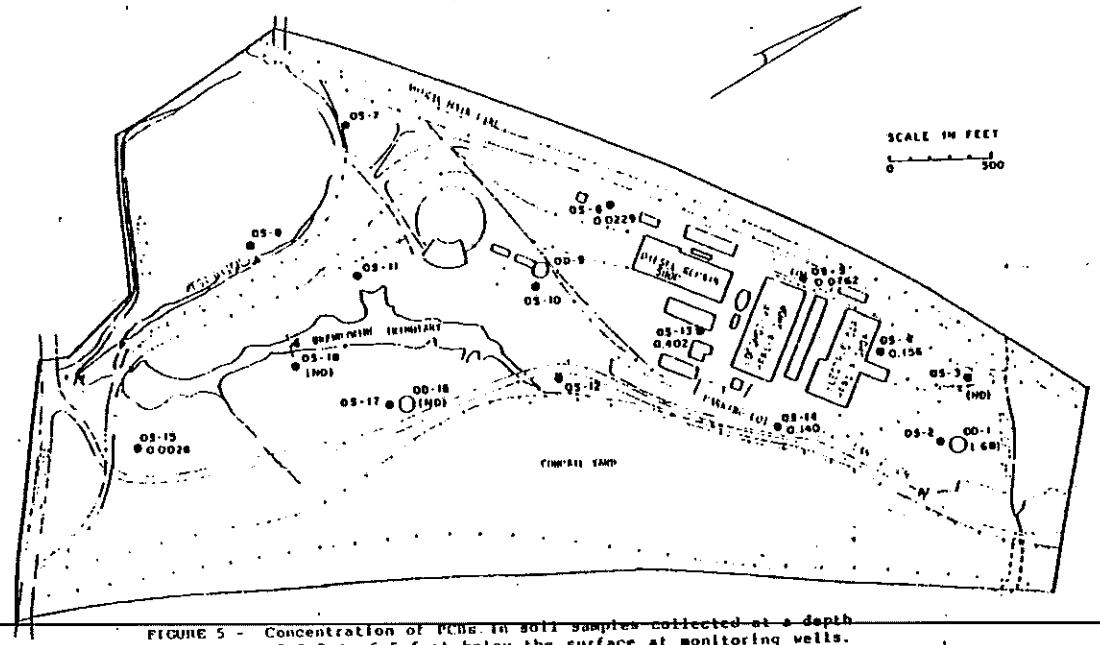


FIGURE 5 - Concentration of PCBs in soil samples collected at a depth of 5.0 to 6.5 feet below the surface at monitoring wells. Values are expressed in mg/kg. ND means not detected. Wells with no values means sample was not analyzed for PCBs.

FIGURE 6 -- Concentration of PCBs in soil samples collected at a depth of 10.0 to 11.5 feet below the surface at observation wells. Values are expressed in mg/kg. NA means not detected. Wells with no values means sample was not analyzed for PCBs.

FIGURE 7 - Concentration of PCBs in soil samples collected at a depth of 15.0 to 16.5 feet below the surface at observation wells. Values are expressed in mg/kg. ND means not detected. Wells with no values means sample was not analyzed for PCBs.

APPENDIX D

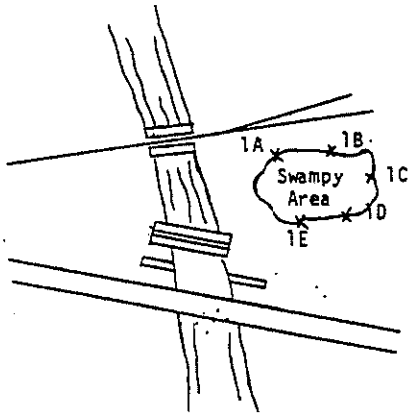
Table 3. Results of oil and grease and PCB determinations on soil samples obtained at the Amtrak Wilmington Maintenance Facility, 23-24 June 1982.

Sample Number	Oil and Grease (mg/kg)	PCB (mg/kg)	Aroclor
1A	10188	473	1260
1B	7755	76.7	1260
1C	140884	257	1260
1D	49540	477	1260
1E	8786	330	1260
2A	1025	7.97	1260
2B	14621	7.15	1260
2C	7512	10.1	1260
2D	7841	4.52	1260
2E	50669	15.3	1260
2F	9558	7.09	1260
2G	21446	4.15	1260
2H	13571	0.39	1260
2I	38936	0.52	1260
2J	12174	0.28	1260
2K	16204	4.35	1260
2L	288	1.14	1260
2M	26817	13.0	1260
3A	5754	0.26	1260
3B	16128	0.40	1260
3C	7245	18.9	1260
3D	8537	4.56	1260
4A	25769	5.79	1260
4B	18364	3.54	1260
4C	70240	0.96	1260
4D	47160	0.58	1260
4E	25099	<0.10	1260
4F	7110	0.82	1260
5A	57578	<0.10	1260
5B	10160	<0.10	1260
5C	46759	0.43	1260
5D	69990	0.69	1260
5E	18314	2.91	1260
5F	24886	1.54	1260
6A	18407	1.62	1260
7A	13692	0.10	1260
7B	80990	0.70	1260
7C	24374	<0.10	1260
7D	13718	<0.10	1260
7E	8723	0.12	1260

Table 3. Continued.

Sample Number	Oil and Grease (mg/kg)	PCB (mg/kg)	Aroclor
8A	4008	0.15	1260
8B	1445	0.45	1260
8C	2580	0.10	1260
8D	90359	0.28	1260
8E	19867	0.17	1260
8F	54044	0.25	1260
8G	12527	0.39	1260
8H	13275	4.14	1260
9A	156	0.10	1260
9B	1578	0.38	1260
9C	15870	1.17	1260
9D	668	1.48	1260
10A	8892	0.62	1260
10B	82388	0.77	1260
11A	14032	22.0	1260
11B	3299	123	1260
11C	3502	19.0	1260
11D	25410	1475	1254
12A	12100	12.3	1260
12B	611	253	1260
12C	8359	50.0	1260
12D	6071	185	1260
12E	9093	66.9	1260
12F	20553	174	1260

TOTAL 64 SAMPLES



X One Foot Deep Core Sampling Site

FIGURE 1: SAMPLING AREA 1

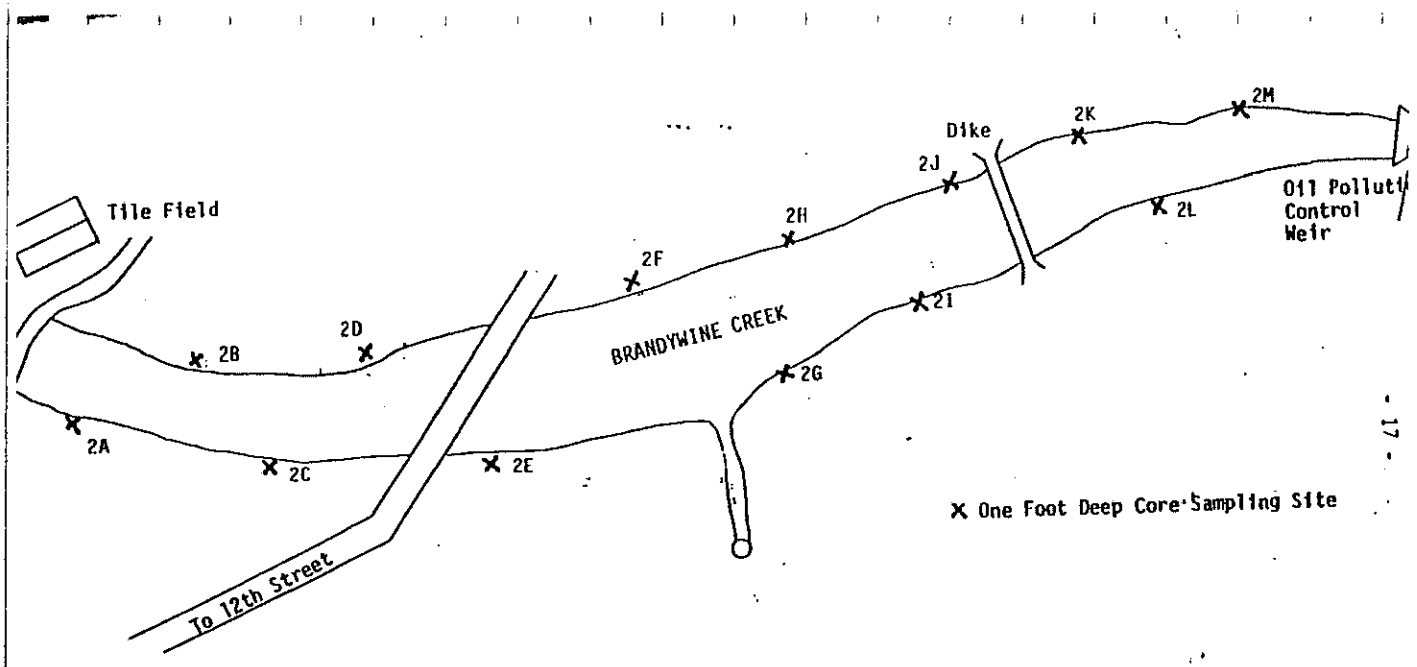


FIGURE 2: SAMPLING AREA 2

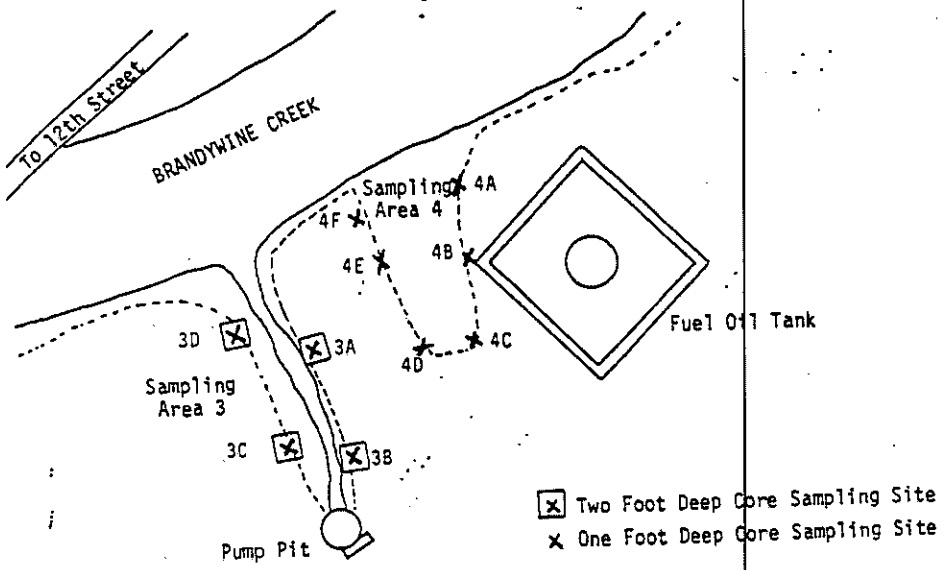


FIGURE 3: SAMPLING AREAS 3 & 4

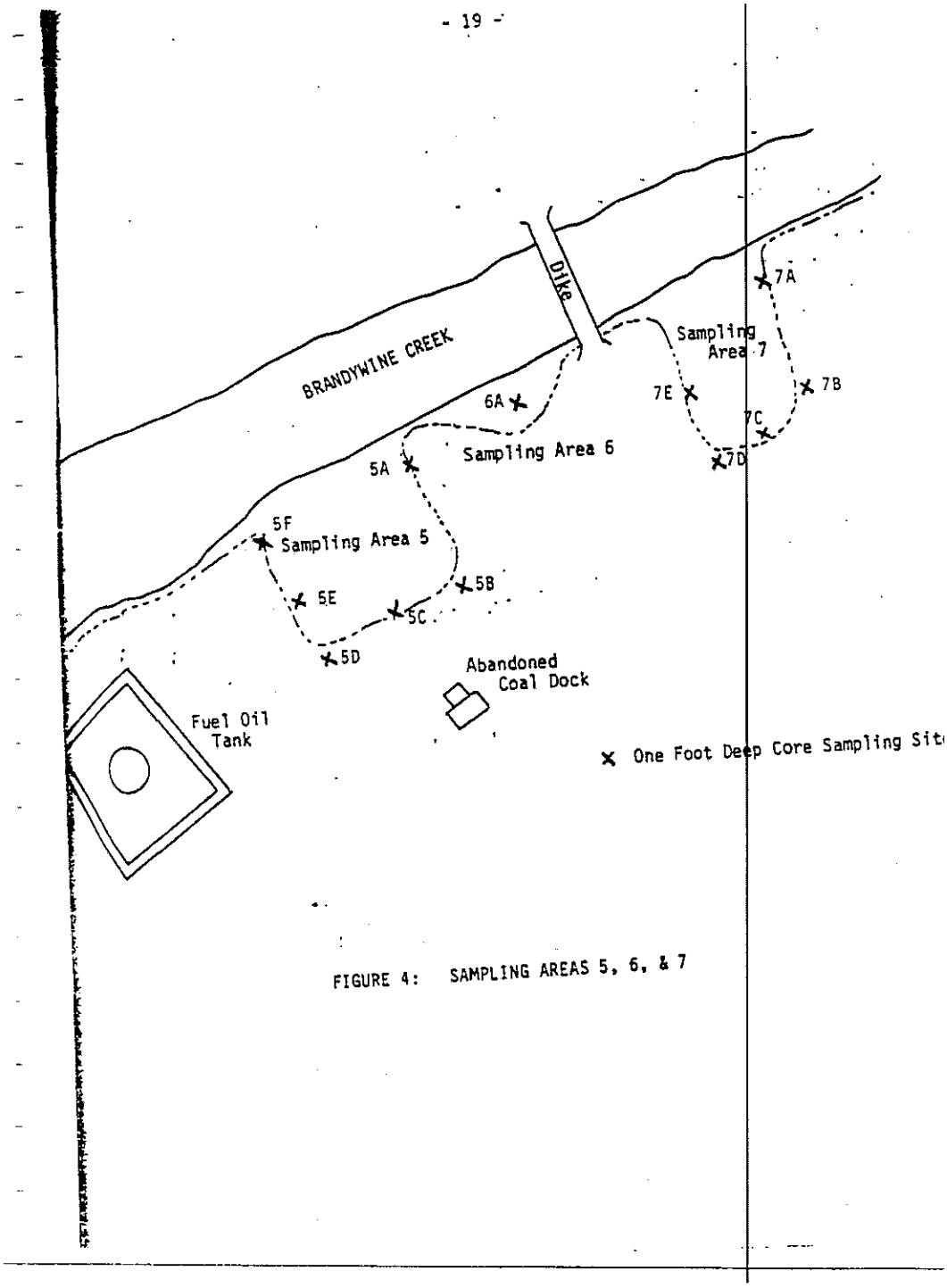


FIGURE 4: SAMPLING AREAS 5, 6, & 7

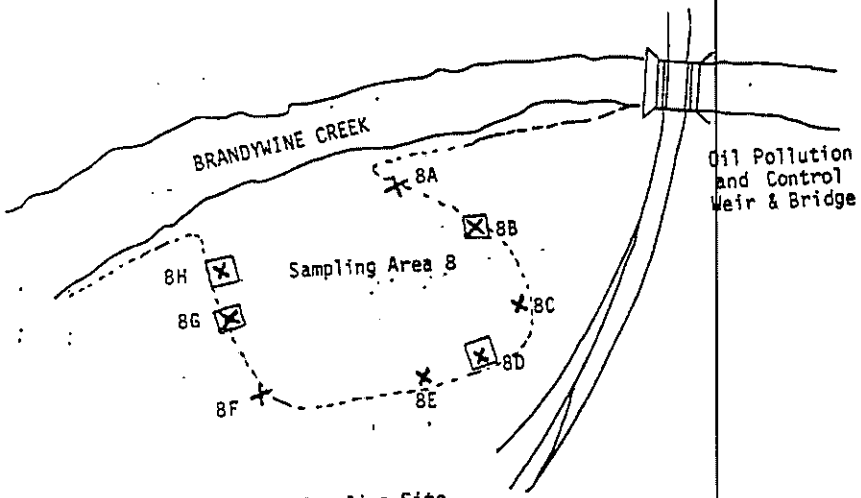


FIGURE 5: SAMPLING AREA 8

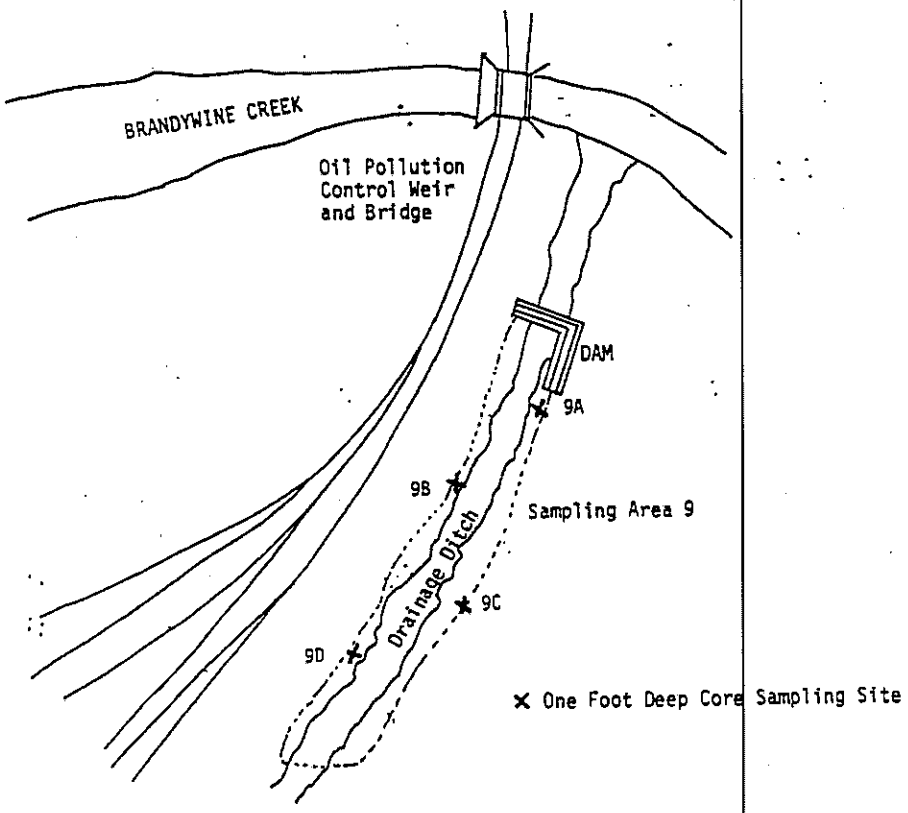


FIGURE 6: SAMPLING AREA 9

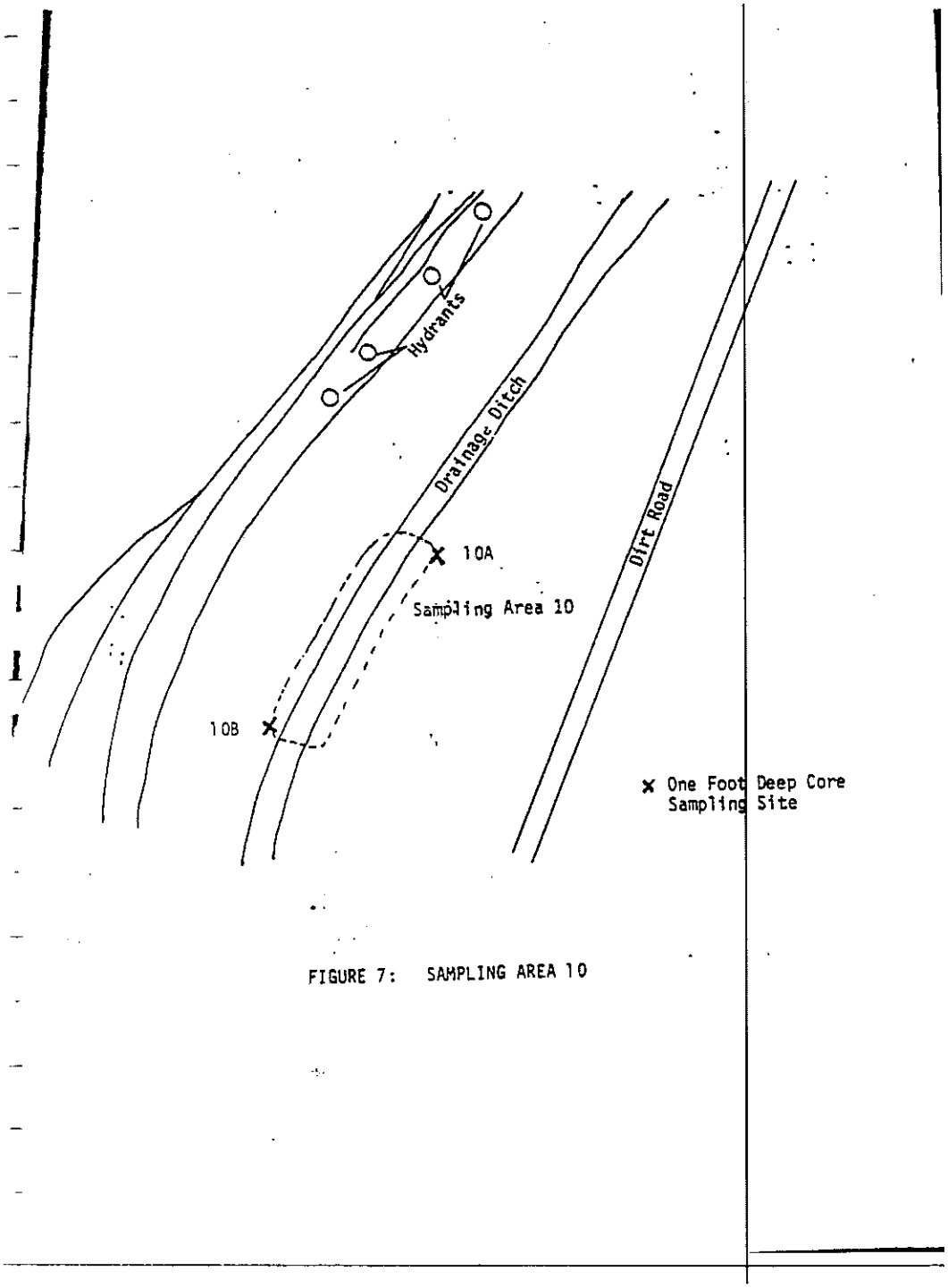


FIGURE 7: SAMPLING AREA 10

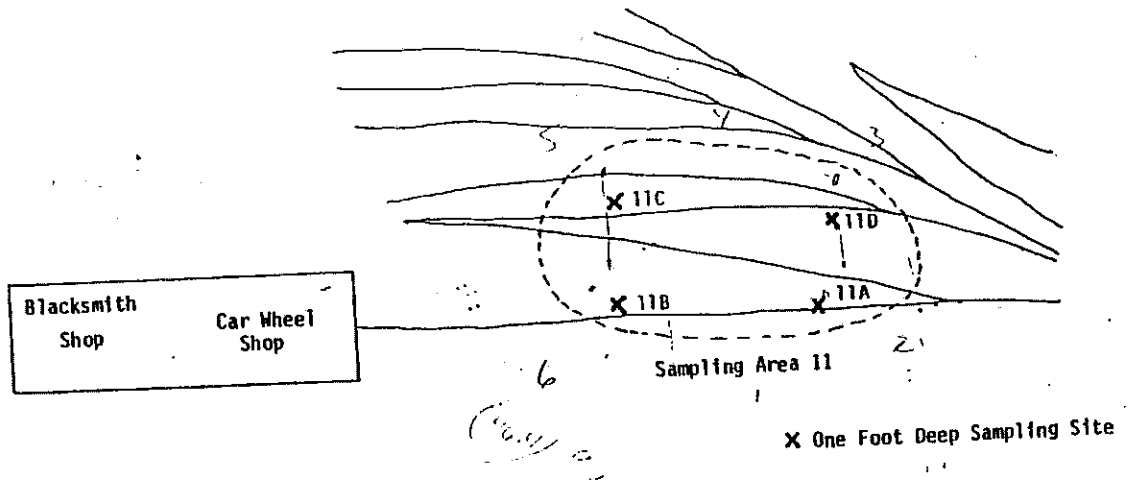


FIGURE 8: SAMPLING AREA 11

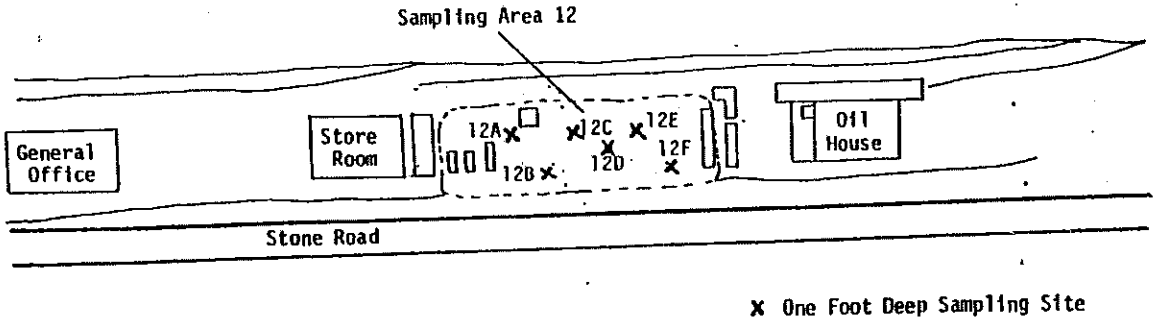


FIGURE 9: SAMPLING AREA 12

APPENDIX E

AMTRAK Wilmington Maintenance Facility
4 November 1983

"Sample A"

Sample Number	Sampling Depth (inches)	PCB Concentration (mg/kg)
1	6	<2.0
2	6	<2.0
3	6	8.0
4	6	23
5	12	<2.0
6	6	<2.0
7	6	<2.0
8	6	14
9	6	460
10	6	890
11	12	140
12	6	99
13	6	55
14	6	65
15	6	680
16	6	2200
17	6	150
18	6	270
19	6	39
20	6	64
21	6	5.0
22	6	920
23	12	21
24	6	23
25	6	20
26		32

Approved By: Richard S. Rodgers

Richard S. Rodgers, Manager
Environmental Chemistry Laboratory
10 November 1983

Seaberra/DMC

PCB in Soil Analysis
AMTRAK Wilmington Maintenance Facility
4 November 1983
Page 2

Number	Sampling Depth (inches)	PCB Concentration (mg/kg)
27	6	760
28	6	272
29	6	458
30	6	833
31	6	577
32	6	133
33	6	150
34	12	14
35	6	28
36	6	112

Approved By: Richard S. Rodgers
Richard S. Rodgers, Manager
Environmental Chemistry Laboratory
10 November 1983

Results of PCB Analysis Performed on Soil Samples Collected from
AMTRAK's Wilmington Maintenance Facility
14 November 1983

"Sample B"

Sample Number	Concentration mg/kg
1	720
2	14.7
3	89
4	290
5	700
6	550
7	13.1
8	9.4
9	230
10	17.9
11	81
12	4480
13	46
14	34
15	12.8
16	150
17	45
18	6.7
19	200
20	76
21	6.6
22	7.2
23	23.8
24	14.7
25	130
26	21.5
27	21.0
28	45
29	<1.0
30	46

Sample Number	Concentration mg/kg
31	1.6
32	22.1
33	5.1
34	1.4
35	68
36	26
37	23.3
38	5.7
39	92
40	340
41	205
42	290
43	6.6
44	18.4
45	170
46	120
47	28
48	270
49	26

Approved By: Richard S. Rodgers

Richard S. Rodgers, Manager
Environmental Chemistry Laboratory
27 December 1983

Canberra/RMC

Results of PCB in Soil Analysis Performed on Samples Collected from
AMTRAK's Wilmington Maintenance Facility
December 1983 Through January 1984
(please consult map for actual sample locations)

"Sample C"

Sample Number	Depth	Concentration (mg/kg)	Sample Number	Depth	Concentration (mg/kg)
1	6"	11.6	27	6"	3.6
2	6"	<1.0	28	6"	2.2
3	6"	65	29	6"	3.0
4	6"	11.8	30	6"	249
5	6"	11.8	31	6"	26
6	6"	280	32	6"	43
7	6"	21.4	33	6"	14.0
8	6"	33	34	6"	22.8
9	6"	1500	35	6"	1.7
10	6"	115	36	6"	2.1
11	6"	24.4	37	6"	<1.0
12	6"	5770	38	6"	7.5
13	6"	66	39	6"	5.1
14	6"	6.1	40	6"	304
15	6"	104	41	6"	87
16	6"	92	42	6"	4.4
17	6"	44	43	6"	4.9
18	6"	42	44	6"	21.4
19	6"	30	45	6"	45
20	6"	52	46	6"	10.1
21	6"	91	47	6"	96
22	6"	27	48	6"	52
23	6"	84	49	6"	15.0
24	6"	23.5	50	6"	28
25	6"	39	51	6"	12.1
26	6"	5.8	52	6"	53

Sample Number	Depth	Concentration (mg/kg)
53	6"	15.4
54	6"	51
55	6"	80
56	6"	160
57	6"	840
58	6"	<1.0
59	6"	28
60	6"	5.1
61	6"	7.0
62	6"	38
63	6"	3.0
64	6"	37
65	6"	36
66	6"	14.1
67	6"	360
68	6"	19.0
69	6"	340
70	6"	280
71	6"	520
72	6"	24.4
73	6"	1020
74	6"	70
75	6"	750
76	6"	560
77	6"	310
78	6"	290
79	6"	770
80	6"	140
81	6"	1700
82	6"	170
83	6"	7.2
84	6"	42
85	6"	1900
86	6"	150
87	6"	110
88	6"	<1.0
89	6"	25
90	6"	14.2
91	6"	82
92	6"	890
93	6"	340
94	6"	48
95	6"	6.5
96	6"	33
97	6"	<1.0
98	6"	45
99	6"	5.9
100	6"	<1.0
101	6"	14.6
102	6"	10.1
103	6"	30
104	6"	20.9

Sample Number	Depth	Concentration (mg/kg)	Sample Number	Depth	Concentration (mg/kg)
105	6"	<1.0	131	24"	--
106	6"	6.3	132	18"	35
107	6"	1.1	133	24"	--
108	6"	9.4	134	18"	28
109	6"	<1.0	135	24"	--
110	6"	2.6	136	18"	81
111	6"	18.2	137	24"	60
112	6"	18.3	138	18"	2300
113	6"	--	139	24"	400
114	6"	9.6	140	16"	3.2
115	6"	11.9	141	18"	85
116	6"	156	142	24"	83
117	6"	180	143	18"	72
118	6"	84	144	24"	66
119	6"	204	145	18"	28
120	6"	52	146	24"	--
121	6"	41	147	18"	46
122	6"	65	148	24"	--
123	6"	90	149	18"	43
124	6"	440	150	24"	--
125	6"	80	151	18"	7.8
126	6"	40	152	18"	24.6
127	6"	54	153	24"	--
128	6"	49	154	18"	1.8
129	16"	162	155	24"	--
130	18"	18.9	156	18"	<1.0

(--) Indicates sample not analyzed.

Sample Number	Depth	Concentration (mg/kg)	Sample Number	Depth	Concentration (mg/kg)
157	24"	--	183	24"	--
158	6"	4.0	184	6"	160
159	6"	<1.0	185	6"	140
160	6"	<1.0	186	6"	2070
161	6"	3.3	187	6"	5.2
162	6"	<1.0	188	18"	<1.0
163	6"	5.5	189	6"	7.8
164	6"	<1.0	190	6"	8.4
165	6"	<1.0	191	6"	76
166	6"	<1.0	192	6"	7.0
167	6"	91	193	6"	37
168	18"	19.6	194	6"	13.0
169	6"	<1.0	195	6"	150
170	18"	<1.0	196	6"	270
171	24"	--	197	6"	29
172	6"	8.2	198	6"	2.5
173	18"	2.2	199	6"	<1.0
174	24"	2.5	200	6"	9.7
175	6"	220	201	6"	5.0
176	18"	80	202	6"	125
177	24"	30	203	6"	21.6
178	6"	6.2	204	6"	3.2
179	18"	1.7	205	6"	5.9
180	24"	--	206	6"	3.3
181	6"	2.2	207	6"	7.6
182	18"	2.1	208	6"	5.7

(--) Indicates sample not analyzed.

Sample Number	Depth	Concentration (mg/kg)
209	6"	10.6
210	6"	9.8
211	6"	9.4
212	6"	2.2
213	6"	<1.0
214	6"	226 -
215	6"	90
216	6"	14.0
217	6"	4.7
218	6"	30
219	6"	1590

Approved By: Richard S. Rodgers

Richard S. Rodgers, Manager
Environmental Chemistry Laboratory
2 February 1983

Canberra/RMC

APPENDIX F

National Railroad Passenger Corporation, 400 North Capitol Street, N.W., Washington, D.C. 20001 Telephone (202) 383-3000

Amtrak

March 17, 1987

Miss Ellen C. Teplitzky
U. S. EPA Region III
841 Chestnut Building
Philadelphia, PA 19107

Dear Miss Teplitzky:

This is in response to your letter dated March 4, 1987, concerning the PCB-contaminated soil dumped on the property of Messrs. Finger and Krieger.

Before cleanup of PCB-contaminated soil, between 1984 and 1985, at Amtrak's Wilmington Facility, there were approximately 400 soil samples taken and analyzed by Woodward-Clyde consultants and Radiation Management Corporation. (See attached sampling results.) Based on these results, Amtrak had approximately 10,000 cubic yards of PCB-contaminated soil removed from the facility and landfilled them in either Niagara Falls, New York, or Williamsburg, Ohio. (See attached site plan for areas of soil removed.)

However, the soil transported by PMC to the property of Messrs. Finger and Krieger was primarily from the recent excavation for Building #37. It is not part of the past PCB cleanup operations.

Mr. R. F. Hill, Director of construction support at Amtrak's office in Philadelphia, is also familiar with the details of the aforementioned matter. He can be reached at (215) 557-1121, and his mailing address is Room 560, 1617 J.F.K. Boulevard, Philadelphia, PA 19107.

Should you have any further questions, please contact me at (202) 383-2531 or Charles Lin at (202) 383-2599.

Very truly yours,

T. W. Brzozowski

T. W. Brzozowski
Director
Environmental Control

APPENDIX G

PERIODIC SELF MONITORING REPORT

Reporting Period : (Jan-June) / July-Dec 19 88

PERMIT NO. W-85-04 REPORT DATE June 30, 1988

INDUSTRIAL USER : NATIONAL RAILROAD PASSENGER CORP., WILMINGTON

PARAMETER	CHROMIUM (T)	NICKEL	COPPER	ZINC	P C B
LIMIT mg/l Monthly Average	6.0	1.5	5.0	15.0	-
MONTH - Jan	< 0.05 mg/l	< 0.05 mg/l	0.05 mg/l	0.09 mg/l	10 ppb
MONTH - Feb	< 0.05 mg/l	< 0.05 mg/l	0.05 mg/l	0.1 mg/l	5 ppb
MONTH - Mar	< 0.05 mg/l	< 0.05 mg/l	< 0.002 mg/l	0.01 mg/l	5 ppb
MONTH - April	< 0.05 mg/l	0.005 mg/l	< 0.002 mg/l	< 0.03 mg/l	5 ppb
MONTH - May	< 0.05 mg/l	< 0.05 mg/l	< 0.02 mg/l	0.02 mg/l	10 ppb
MONTH - June	< 0.05 mg/l	< 0.05 mg/l	< 0.02 mg/l	< 0.02 mg/l	5 ppb

FLOW DURING REPORTING PERIOD :

AVERAGE 25,000 GPD MAXIMUM _____ GPD

SAMPLING METHOD : All samples are daily time-proportioned composites over the period of the discharge except as noted below - (indicate sample date, parameter, reason)

METHODS OF ANALYSIS : Conform to those approved by the US EPA except -

Results indicate that the wastewater discharge standards are being met on a consistent basis ✓ YES _____ NO. If 'NO' explain on a separate sheet what steps are being taken to achieve consistent compliance.

I HEREBY CERTIFY THAT THIS REPORT IS ACCURATE TO THE BEST OF MY KNOWLEDGE

Dutton D. Williams Jr DATE June 30, 1988

Authorised Representative

NAME : Dutton D. Williams Jr TITLE : Dep. Dep. Environment

APPENDIX H

COOPERATIVE VENTURES, INC.
PEDDLER'S VILLAGE, SUITE 3A
NEWARK, DE 19702
(302) 731-1550

FIELD NOTES - AMTRAK

SAMPLE # C46-133-112-113
5/12/87 - 5/13/87 Start: 12:00 P.M.

Outfall 002A - Opening of 42" drainage pipe into Shellpot Creek. Compositor was suspended inside grated area surrounding pipe opening. Cast iron tidal flap on end of pipe wedged open (free flowing tidal water in and out of pipe). Sample tube was placed 10" below water surface at pipe opening at high tide. Heavy thunderstorms beginning in afternoon of 5/12/87 continuing into evening of 5/12/87. 24 consecutive samples taken every hour for 24 hours. Grab samples taken at manhole along drainage pipeline.

SAMPLE # C46-134-104-105
5/13/87 - 5/14/87 Start: 12:00 P.M.

Outfall 001 - Outfall into tributary of Delaware River. Sampling tube placed 36" below water surface at high tide. Compositor was placed 3' from pipe opening on bank of creek. 24 consecutive samples taken every hour for 24 hours. Sunny and clear during duration of sampling time. Grab samples taken at pipe opening. Flow rate was rapid and flowing at a rate greater than 25 gallons per minute.

Jeff Walsh, Field Technician

COOPERATIVE VENTURES, INC.
PEDDLER'S VILLAGE - SUITE 3A
NEWARK, DE 19702
(302) 731-1550

ANALYTICAL REPORT #	C46.14950.7
DATE	5/29/87
DATE SAMPLED	5/12 - 5/13
DATE RECEIVED	5/13
SAMPLED BY	CVI/JW
LOG DATE	133

Mr. Wayne C. La Marche, Manager
Safety/Environmental Control
National Railroad Passenger Corp.
Wilmington Maintenance Facility
Foot of Vandever Avenue
Wilmington, DE 19801

REPORT OF ANALYSIS

COMPOSITE 002A		DIELDRIN	PCB	TRICHLORETHYLENE
ANALYSIS:	DATE	5/22	5/22	5/22
	TIME	0930	0900	1330
	TECH	DR	DR	DR
SAMPLE RESULT		< 1 ppb	< 1 ppb	151 ppb
DUPLICATE		< 1 ppb	< 1 ppb	149 ppb
SPIKE AMOUNT		6.	10.	41.
% RECOVERY		95%	97%	93%
METHOD USED		EPA 608	EPA 608	EPA 601

GRAB 002A		OIL & GREASE	PH	SURFACTANTS (MBAS)
ANALYSIS:	DATE	5/18	5/13	5/29
	TIME	1230	1445	1530
	TECH	MW	MW	JM
SAMPLE RESULT		< 1 ppm	5.75	0.42
DUPLICATE		< 1 ppm	5.70	0.41
SPIKE AMOUNT		N/A	N/A	.65
% RECOVERY		N/A	N/A	91%
METHOD USED		EPA 413.1	EPA 150.1	EPA 425.1

David W. Reber, Tech. Dir.

Facility Name/Location (if different)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

Form Approved
OMB No. 2040-0004
Expires 2-29-84

NAME NATIONAL RAILROAD PASSENGER CORP. (AMTRAK)
ADDRESS WILMINGTON MAINTENANCE FACILITY
400 NORTH CAPITAL ST, N.W.
FACILITY WWTP
LOCATION VANDEVER AVENUE, WILMINGTON, DELAWARE

(2-16) DE 0050962 PERMIT NUMBER

(17-19) 002A DISCHARGE NUMBER

END OF PHASE I

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	87	05	01	TO	87	05	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

DESIGNATOR A

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OIL & GREASE	SAMPLE MEASUREMENT	*	*	*	*	<1	<1	mg/L	0	01/30	GRAB
Mon Loc 1 00556	PERMIT REQUIREMENT	*	*		*	10	15		0	01/30	GRAB
pH	SAMPLE MEASUREMENT	*	*	*	5.75	*	5.75	S.U.	1	01/30	GRAB
Mon Loc 1 00400	PERMIT REQUIREMENT	*	*		6.0	*	9.0		0	01/30	GRAB
POLYCHLORINATED BIPHENYLS (PCB'S)	SAMPLE MEASUREMENT	*	*	*	*	*	<1	ug/L	0	01/30	COMP
Mon Loc 1 39516	PERMIT REQUIREMENT	*	*		*	*	*		0	01/30	COMP.
SURFACTANTS (MBAS)	SAMPLE MEASUREMENT	*	*	*	*	*	.42	mg/L	0	01/30	GRAB
Mon Loc 1 38260	PERMIT REQUIREMENT	*	*		*	*	*		0	01/30	GRAB
TRICHLOROETHYLENE	SAMPLE MEASUREMENT	*	*	*	*	*	151	ug/L	0	01/30	COMP
Mon Loc 1 39180	PERMIT REQUIREMENT	*	*		*	*	*		0	01/30	COMP
DIELDRIN	SAMPLE MEASUREMENT	*	*	*	*	*	<1	ug/L	0	01/30	COMP
Mon Loc 1 39380	PERMIT REQUIREMENT	*	*		*	*	*		0	01/30	COMP.
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Gayle C. Lamarche, Mgr.
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and a maximum imprisonment of between 6 months and 5 years)

David W. Reber
DAVID W. REBER, Tech. Dir.
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 302 | NUMBER 731-1550

DATE: YEAR 87 | MO 05 | DAY 29

ATTACHMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME NATIONAL RAILROAD PASSENGER CORP. (AMTRAK)
ADDRESS WILMINGTON MAINTENANCE FACILITY
400 NORTH CAPITAL ST. N.W.
WASHINGTON, D.C. 20001
FACILITY WMTP
LOCATION VANDEVER AVENUE, WILMINGTON, DELAWARE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

Form Approved - OMB No. 2040-0004 Expires 2-29-84

(2-16) PERMIT NUMBER: DE 0050962
(17-19) DISCHARGE NUMBER: 001

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	87	05	01	TO	87	05	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

DESIGNATOR A

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(I Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
OIL & GREASE	SAMPLE MEASUREMENT	*	*	*	*	<1	<1	mg/L	0	01/30	GRAB
Mon Loc 1 00556	PERMIT REQUIREMENT	*	*		*	10	15		0	01/30	GRAB
pH	SAMPLE MEASUREMENT	*	*	*	6.92	*	6.92	S.U.	0	01/30	GRAB
Mon Loc 1 00400	PERMIT REQUIREMENT	*	*		6.0	*	9.0		0	01/30	GRAB
POLYCHLORINATED BIPHENYLS (PCB'S)	SAMPLE MEASUREMENT	*	*	*	*	*	<1	ug/L	0	01/30	COMP
Mon Loc 1 39516	PERMIT REQUIREMENT	*	*		*	*	*		0	01/30	COMP.
SURFACTANTS (MBAS)	SAMPLE MEASUREMENT	*	*	*	*	*	.42	mg/L	0	01/30	GRAB
Mon Loc 1 38260	PERMIT REQUIREMENT	*	*		*	*	*		0	01/30	GRAB
TRICHLOROETHYLENE	SAMPLE MEASUREMENT	*	*	*	*	*	<1	ug/L	0	01/30	COMP
Mon Loc 1 39180	PERMIT REQUIREMENT	*	*		*	*	*		0	01/30	COMP.
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER: Wayne C. Lamarche, Manager (TYPED OR PRINTED)

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)

David W. Rebec

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT: David W. Rebec, Tech. Dir.

TELEPHONE: AREA CODE 302 NUMBER 731-1550

DATE: YEAR 87 MO 05 DAY 29

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

COOPERATIVE VENTURES, INC.
PEDDLER'S VILLAGE, SUITE 3A
NEWARK, DE 19702
(302) 731-1550

ANALYTICAL REPORT # C46.14950.7
DATE 5/29/87
DATE SAMPLED 5/13 - 5/14
DATE RECEIVED 5/14
SAMPLED BY CVI/JW
LOG DATE 134

Mr. Wayne C. La Marche, Manager
Safety/Environmental Control
National Railroad Passenger Corp.
Wilmington Maintenance Facility
Foot of Vandever Avenue
Wilmington, DE 19801

REPORT OF ANALYSIS

COMPOSITE 001		PCB	TRICHLOROETHYLENE
ANALYSIS:	DATE	5/22	5/22
	TIME	0900	1400
	TECH	DR	DR
SAMPLE RESULT		< 1 ppb	< 1 ppb
DUPLICATE		< 1 ppb	< 1 ppb
SPIKE AMOUNT		10.	41.
% RECOVERY		98%	95%
METHOD USED		EPA 608	EPA 601

GRAB 001		OIL & GREASE	PH	SURFACTANTS (MBAS)
ANALYSIS:	DATE	5/18	5/14	5/29
	TIME	1430	1500	1530
	TECH	MW	MW	JM
SAMPLE RESULT		< 1	6.92	0.40
DUPLICATE		< 1	6.92	0.40
SPIKE AMOUNT		N/A	N/A	.65
% RECOVERY		N/A	N/A	93%
METHOD USED		EPA 413.1	EPA 150.1	EPA 425.1

David W. Reber, Tech. Dir.

COOPERATIVE VENTURES, INC.

PEDDLER'S VILLAGE, SUITE 3A
NEWARK, DE 19702

302 - 731-1550

[illegible] REPORT # [illegible]
DATE [illegible]
DATE SAMPLED [illegible]
DATE RECEIVED [illegible]
SAMPLED BY [illegible]

[illegible]
[illegible]
[illegible]
[illegible], DE [illegible]

REPORT OF ANALYSIS

SAMPLE I.D.: MANHOLE/[illegible]
SAMPLE TYPE: COMPOSITE ([illegible] HOUR)

[illegible] ANALYSIS: PCB IN WATER

[illegible] COMPLETED:

DATE	10/[illegible]
TIME	[illegible]
[illegible]	[illegible]

[illegible] RESULT:	[illegible] ppb
METHOD USED:	EPA [illegible]

Joseph P. Merlo [illegible]

CHAIN OF CUSTODY

SAMPLE TYPE: Composite, Water NO. OF CONTAINERS: 1 glass

LOCATION OF SAMPLING: Amtrak Wilmington manhole

COMPANY NAME: Amtrak

ADDRESS Foot of Vandever Ave.
Wilmington, DE 19801

COLLECTORS NAME: Jimmy Balasingham (C.V.I) TELEPHONE NO: (302) 731-1550

DATE SAMPLED: 12/11/87 12/10/87 ↘ TIME SAMPLED: 1300

HAZARDOUS SAMPLES ONLY

PROCESS PRODUCING WASTES

WASTE CODE: _____DOT
_____EPA
_____STATE ( )

FIELD INFORMATION:

ANALYSIS REQUIRED (LIST)

PCB in Water

RELINQUISHED BY: Amtrak RECEIVED BY: Jimmy Balasingham DATE: 12/11/87 TIME: 1300
Jimmy Balasingham

RELINQUISHED BY: _____ RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY: _____

METHOD OF SHIPMENT:

METHOD OF DISPOSAL:

NATIONAL RAILROAD PASSENGER CORPORATION

INTEROFFICE MEMO

TO: R. Noonan **DATE:** May 30, 1991

FROM: F.P. Claar

SUBJECT: Underground Storage Tank Removal

As per conversation and contract agreement, Hardy Tank Lining Corp. personnel arrived at Amtrak Wilmington Maintenance Facility at 9:15 a.m. on 4/16/91 and began addressing the removal of three obsolete underground storage tanks.

The (2) U.S.T.'s east of the Engine House were the main focus of the work force; however, one crew member was simultaneously uncovering the third U.S.T located south of the Oil House. By 1:00 p.m. on 4/16/91, the first of the two tanks had been pumped out, removed from the ground, cleaned and loaded on a truck for removal from the facility. At 2:10 p.m. DNREC representative arrived and conversed with Jim Noble (Project Superintendent) of Hardy Corp. According to Jim, "everything was ok."

By 8:07 a.m. on 4/17/91 the first of two tanks (Engine House) had been removed from the facility. The second tank was removed from the ground and was being cleaned in preparation for removal from the facility. At 8:15 a.m. the second tank was removed from our facility. At 11:00 a.m., the U.S.T. (kerosene tank) was out of the ground and being cleaned for removal. At 11:00 a.m. two wells for monitoring were installed at the U.S.T. site east of the Enginehouse. At 2:00 p.m. the kerosene tank was removed from our facility, soil samples were taken and the hole was being backfilled. A second visit from DNREC occurred this day. At this time they took pictures of the kerosene tank and checked soil contamination levels.

All liquids from both U.S.T. sites; including water/oil from the excavations, was pumped into a tank truck, transported to our D.A.F. facility and processed. This procedure enabled us to keep our costs down.

At 8:10 a.m. on 4/18/91, backfilling of excavation east of the Enginehouse continued. By 10:10 a.m. both excavations were nearly completely filled and the final grading of the ground surface began. At 11:50 a.m. on 4/18/91 Jim Noble, crew members and equipment (excluding a backhoe, which ran out of gas) left our property.

The Hardy Corporation provided Amtrak a well planned, supervised and executed underground storage tank removal operation. The efficiency of Hardy's operation was reflected by the fact that the project was completed in 2-1/2 days and billed for the dollar amount quoted in their bid.

FPC/mm

cc: J.R. Duncan

TANK CLOSURE RECORD
WILMINGTON MAINTENANCE
FACILITY, VANDEVER AVE.
WILMINGTON, DELAWARE

LOCATION: WILMINGTON MAINTENANCE FACILITY
FOOT OF VANDEVER AVENUE
WILMINGTON, DELAWARE

OWNER: NATIONAL RAILROAD PASSENGER CORP.
4001 VANDEVER AVENUE
WILMINGTON, DE 19802

SUBMITTED BY: JOSEPH T. HARDY & SON, INC.
425 AIRPORT ROAD
NEW CASTLE, DELAWARE 19720

TABLE OF CONTENTS

MAY 20, 1991

NATIONAL RAILROAD PASSENGER CORP.
4001 VANDEVER AVENUE
WILMINGTON, DELAWARE 19802

RE: TANK REMOVAL

CERTIFICATE OF TANK CLOSURE

HARDY TANK LINING CORPORATION DOES HEREBY CERTIFY THAT THE FOLLOWING TANKS WERE REMOVED BY OUR FIRM AT THE ABOVE REFERENCED ADDRESS ON APRIL 16&17, 1991: TWO(2) 8,000 GALLON UNDERGROUND FUEL OIL STORAGE TANKS AND ONE(1) 5,000 GALLON UNDERGROUND KEROSENE STORAGE TANK.

ALL WORK WAS DONE ACCORDING TO STATE OF DELAWARE, DNREC OFFICE,"REGULATIONS GOVERNING UNDERGROUND STORAGE TANKS" API BULLETIN 1604, "RECOMMENDED PRACTICE FOR ABANDONMENT OR REMOVAL OF USED UNDERGROUND TANKS"; AND FEDERAL REGULATIONS DATED DECEMBER 22, 1988.

VERIFIED BY:

JOHN J. HARDY, PRESIDENT
HARDY TANK LINING CORPORATION

TANK REMOVAL/ABANDONMENT REPORT
(circle one)

DATE: 4/12/91
SITE NAME: Amtrak
SITE ADDRESS: Wilmington Maintenance Facility
4001 Vandever Ave., Wilmington, DE
FACILITY #:

DNREC/UST BRANCH
WITNESS: Cheryl Hess

TANK #	PRODUCT	AGE	SIZE	TYPE TANK	TYPE PIPING
Tank I	# 2 Oil	U/K	8,000	Steel	Steel
Tank II	# 2 Oil	U/K	8,000	Steel	Steel

SITE HISTORY:

TRAIN MAINTENANCE YARD

SITE SKETCH (ON BACK OF THIS PAPER)

See Attached Drawing

CIRCLE

HAS PIPING BEEN PROPERLY DRAINED AND ABANDONED.....Y or N

HAS ALL LIQUID BEEN REMOVED FROM THE TANK?.....Y or N

DISPOSAL OF THE LIQUID?

On site at water/oil separator

HAS ALL SLUDGE BEEN REMOVED FROM THE TANK?.....Y or N

DISPOSAL OF THE SLUDGE?

On site at water/oil separator

HAVE TANKS BEEN PURGED OF EXPLOSIVE AND COMBUSTIBLE VAPORS?.....Y or N

CONDITION OF TANK AND PIPING:	TANK I TANK	PIPING	TANK II TANK	PIPING
VISIBLE HOLES (SIZE)	None	None	Yes	None
RUPTURE	No	No	No	No
CORROSION	N/A	N/A	N/A	N/A
OTHER				

CONDITION OF TANK EXCAVATION

GROUNDWATER OBSERVED IN THE PIT?	Yes
SHEEN?	Yes
FREE PRODUCT?	Yes
SOIL CONTAMINATION OBSERVED?	None
STAIN?	None
FREE PRODUCT?	No

IF CONTAMINATED SOIL WAS OBSERVED, HOW WAS IT DISPOSED?

METHOD	CONTACT PERSON	AMOUNT OF SOIL	TIME FRAME FOR STORAGE	SAMPL

COLLECTION OF SOIL SAMPLES

SAMPLE		COLLECTION METHOD	DATE/TIME		TANK	SAMPLE
Tank I	Composite	Grab	4/17/91	11:59am	Oil	James
Tank I	Water Level	Grab	4/17/91	12:20pm	Oil	James
Tank II	Composite	Grab	4/17/91	12:25pm	Oil	James
Tank II	Water Level	Grab	4/17/91.	12:30pm	Oil	James

REPORT OF HEADSPACE ANALYSES OF SOIL SAMPLES OR HNU SCREENING (IF

SAMPLE #	LOCATION	HNU UNITS	DESCRIPTION
N/A			

OTHER OBSERVATIONS AND COMMENTS:

TANK REMOVAL/ABANDONMENT REPORT
(circle one)

DATE: 4/17/91
SITE NAME: Amtrak
SITE ADDRESS: Wilmington Maintenance Facility
4001 Vandever Ave., Wilmington, DE
FACILITY #:

DNREC/UST BRANCH
WITNESS: Cheryl Hes

TANK #	PRODUCT	AGE	SIZE	TYPE TANK	TYP
Tank III	Kerosene	U/K	5,000	Steel	S

SITE HISTORY:

TRAIN MAINTENANCE YARD

SITE SKETCH (ON BACK OF THIS PAPER)

See Attached Drawing

HAS PIPING BEEN PROPERLY DRAINED AND ABANDONED.....Y

HAS ALL LIQUID BEEN REMOVED FROM THE TANK?.....Y

DISPOSAL OF THE LIQUID?

On site at water/oil separator

HAS ALL SLUDGE BEEN REMOVED FROM THE TANK?.....Y

DISPOSAL OF THE SLUDGE?

On site at water/oil separator

HAVE TANKS BEEN PURGED OF EXPLOSIVE AND COMBUSTIBLE VAPORS?.....Y

CONDITION OF TANK AND PIPING:	KERO TANK	PIPING	TANK	PI
VISIBLE HOLES (SIZE)	None	None		
RUPTURE	No	No		
CORROSION	N/A	N/A		
OTHER				

CONDITION OF TANK EXCAVATION

GROUNDWATER OBSERVED IN THE PIT?	Yes
SHEEN?	Yes
FREE PRODUCT?	
SOIL CONTAMINATION OBSERVED?	Yes
STAIN?	Yes
FREE PRODUCT?	No

IF CONTAMINATED SOIL WAS OBSERVED, HOW WAS IT DISPOSED?

METHOD	CONTACT PERSON	AMOUNT OF SOIL	TIME FRAME FOR STORAGE	SAMPL
Stored on site	John Connors	Approx. 4 Tons	Unknown	James

COLLECTION OF SOIL SAMPLES

SAMPLE		COLLECTION METHOD	DATE/TIME		TANK	SAMPLE
Kero	Composite	Grab	4/17/91	11:30am	Kerosene	Jame
Kero	Water Level	Grab	4/17/91	11:45am	Kerosene	Jame

REPORT OF HEADSPACE ANALYSES OF SOIL SAMPLES OR HNU SCREENING (IF

SAMPLE #	LOCATION	HNU UNITS	DESCRIPTION
N/A			

OTHER OBSERVATIONS AND COMMENTS:

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF AIR AND WASTE MANAGEMENT
UNDERGROUND STORAGE TANK BRANCH

715 Grantham Lane
New Castle, Delaware 19720
(302) 323 - 4588

UNDERGROUND STORAGE TANK REGISTRATION FORM
(FOR EXISTING TANKS, RETROFITTING OF EXISTING TANKS, REMOVAL/ABANDONMENT OF EXISTING TANKS, AND INSTALLATION OF NEW TANKS)

FACILITY NUMBER 3-000523

A permit is required to install new or retrofit existing underground storage tanks. Existing, new retrofitted and abandoned tanks all must be in accordance with the provisions of the Delaware Regulations Governing Underground Storage Tanks. For all new tank installations, a **detailed** site plan and the canary copy of this form **must** be submitted to the Office of the State Fire Marshal for approval.

Please fill out all application sections; no more than five tanks may be registered on one form. Assign each tank a number and maintain that number consistently throughout the form.

1. **Facility Information**

Name: Amtrak - Wilm. Maintenance Facility
Street: Foot of Vandever Avenue
City: Wilmington State: DE Zip: 19802
Phone: 429-6454 County: New Castle

2. **Owner Information**

Name: Amtrak - Wilm. Maintenance Facility
Street: Foot of Vandever Avenue
City: Wilmington State: DE Zip: 19802
County: New Castle

3. **Type of Ownership**

(X) Federal (GSA facility ID # _____
( ) State
( ) Municipal
( ) Private or Corporate
( ) County
( ) Public School District
( ) Volunteer Fire or Ambulance Company
( ) Other _____

4. **Facility/Industry Classification**

(mark all that apply)

( ) Automotive
( ) Chemical
( ) Construction
( ) Education
( ) Farm
( ) Government
( ) Manufacturing
( ) Petroleum
( ) Service
(X) Transportation
( ) Other (please specify) _____

5. **Contact Person**

Name: John W. Connors
Title: Manager Facility Maintenance
Phone: 429-6454

6. **Contractor Information**

Name: Hardy Tank Lining Corporation
Title: John J. Hardy, President
Street: 425 Old Airport Road
City: New Castle State: DE Zip: 19720
Operating License #/State: 14688
Phone: 302-328-9457

7. Does the facility have a water well? ( ) Ye
If so, how far is the well from the nearest tar
_____ ft.

8. How close is the tank to a public or off site priva well?
_____ ft.

9. How close is the tank field to an occupied bui
_____ ft.

10. Does the building have a basement?
( ) yes ( ) no

11. Is any routine tank inspection/testing conduct
( ) yes ( ) no (If yes, attach copy of last t

12. Are inventory records kept and reconciled on
( ) yes: ( ) daily ( ) weekly ( ) month
( ) no:

13. **New tank(s)** **Tank Status**

a. Date tank to be installed _____/_____/__
b. Type of pump system:
( ) Positive Pressure
( ) Suction
(proceed to # 19, Tank and Piping Construction

14. **Existing tanks**

a. ( ) Existing, in use
(proceed to # 15)
b. ( ) Existing, not in use
Date tank(s) last used: _____/_____/__
Gallons remaining: Tank No. 1 _____ 2
3 _____, 4 _____ 5 _____
(proceed to # 19, Tank and Piping Constructi
c. ( ) Abandoned, in place
(proceed to # 16, 17 and 18)
d. (X) Remove from ground
Date tank(s) removed: 03 / 12 / 9
e. ( ) Retrofitting
Date tank(s) retrofitted or to be retro
_____/_____/_____

15. Age in years of each tank being reported or year
Tank No. 1 _____ 2 _____ 3 _____ 4 _____

16. If abandoned in place, date tank(s) abandoned:
_____/_____/_____

17. If removed/abandoned, type of substance last sto
Tank 1: _____ Tank 4: #2 Oil
Tank 2: _____ Tank 5: Gasoli
Tank 3: #2 Oil

18. Do abandoned tanks contain inert materials? ( )
Please specify tank number(s) _____
If yes, type of inert material:
( ) concrete ( ) grout ( ) sand ( ) so
If no, amount of substance left in tank(s): Tank No 1
2 _____ gals. 3 _____ gals. 4 _____ gals. 5
(proceed to # 19, Tank and Piping Construction)

Tank and Piping Construction (place an x in all boxes that apply)

TANKS	TANK NO. 1		TANK NO. 2		TANK NO. 3		TANK NO. 4		TANK NO. 5	
19. **Material of Construction**	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping	Tank	Piping
steel	☐		☐		☒		☒		☐	
concrete	☐		☐		☐		☐		☐	
fiberglass / plastic	☐		☐		☐		☐		☐	
double-wall steel	☐		☐		☐		☐		☐	
double-wall fiberglass	☐		☐		☐		☐		☐	
20. **Internal Protection**										
internal lining	☐		☐		☐		☐		☐	
none	☐		☐		☐		☐		☐	
unknown	☐		☐		☐		☐		☐	
21. **External Corrosion Protection**										
cathodic protection	☐		☐		☐		☐		☐	
asphalt / tar coated	☐		☐		☐		☐		☐	
epoxy coated	☐		☐		☐		☐		☐	
fiberglass / plastic	☐		☐		☐		☐		☐	
none	☐		☐		☐		☐		☐	
unknown	☐		☐		☐		☐		☐	
other (specify)										
22. **Piping**										
bare steel		☐		☐		☐		☐		☐
galvanized steel		☐		☐		☐		☐		☐
fiberglass / plastic		☐		☐		☐		☐		☐
cathodic protection		☐		☐		☐		☐		☐
coated / wrapped		☐		☐		☐		☐		☐
unknown		☐		☐		☐		☐		☐
other (specify)										
23. **Monitoring and Detection System**										
line leak detector	☐		☐		☐		☐		☐	
continuous in-tank gauging system	☐		☐		☐		☐		☐	
groundwater monitoring wells	☐		☐		☐		☐		☐	
vapor detection tubes	☐		☐		☐		☐		☐	
on-site spill recovery system	☐		☐		☐		☐		☐	
emergency power shut-off	☐		☐		☐		☐		☐	
Continuous interstitial space monitoring system	☐		☐		☐		☐		☐	
other (specify)										
24. **Substances stored or to be stored (mark one x)**										
heating oil (No. 2)	☐		☐		☐		☐		☐	
heating oil (No. 4)	☐		☐		☐		☐		☐	
heavy heating oil (No. 6)	☐		☐		☐		☐		☐	
light diesel fuel (No. 1-D)	☐		☐		☐		☐		☐	
medium diesel fuel (No. 2-D)	☐		☐		☐		☐		☐	
kerosene	☐		☐		☐		☐		☐	
leaded gasoline	☐		☐		☐		☐		☐	
unleaded gasoline	☐		☐		☐		☐		☐	
alcohol enriched gasoline	☐		☐		☐		☐		☐	
waste oil	☐		☐		☐		☐		☐	
aviation fuel	☐		☐		☐		☐		☐	
mixture (specify)	☐		☐		☐		☐		☐	
hazardous substance	☐		☐		☐		☐		☐	
CAS number										
CERCLA number										
unknown	☐		☐		☐		☐		☐	
other (please specify)										
25. **Tank Capacity in Gallons**	( )		( )		(8,000)		(8,000)		(2,000)	

26. **Owner or Owners Agent Certification**

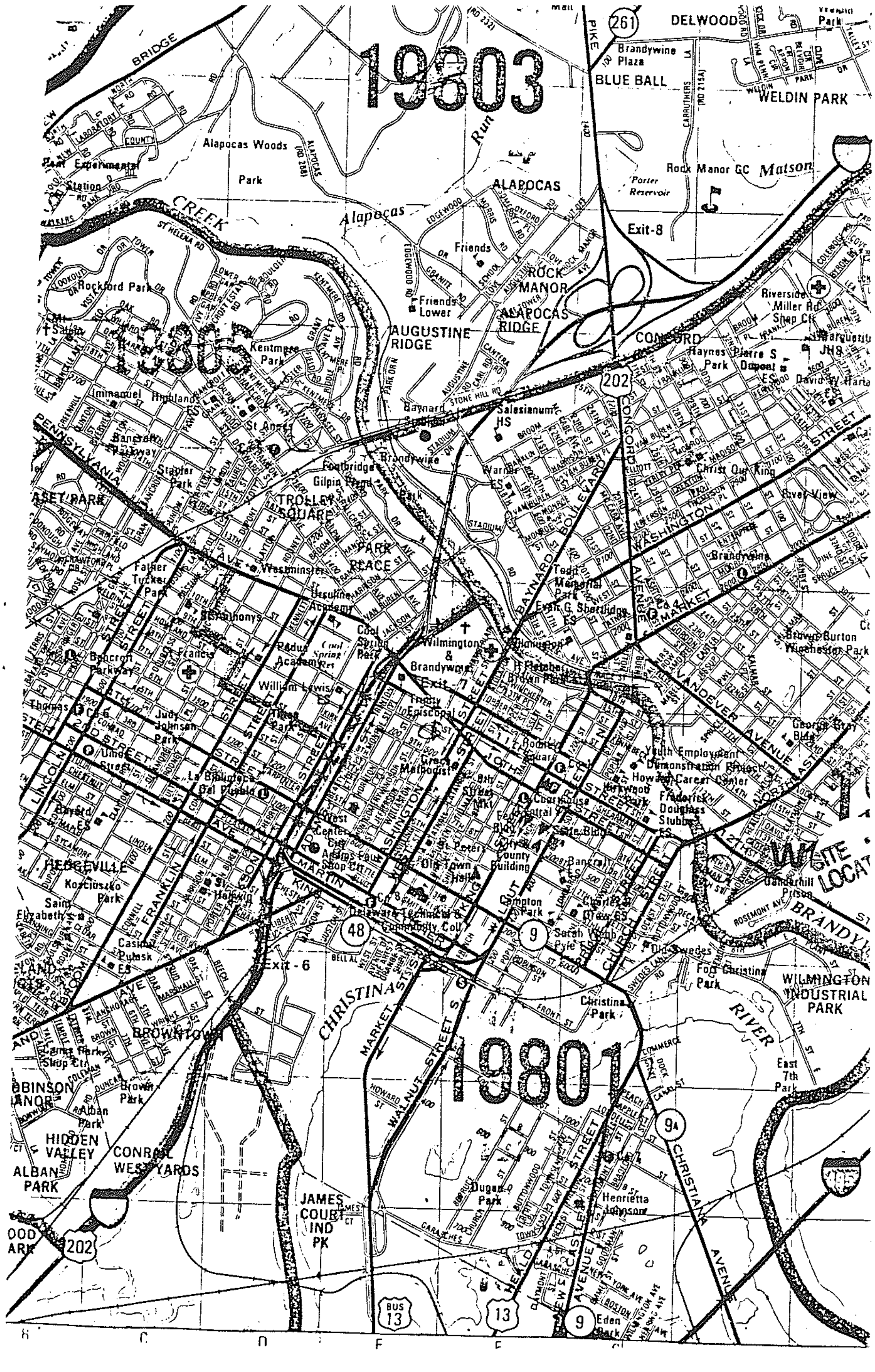
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information submitted is true, accurate, and complete.

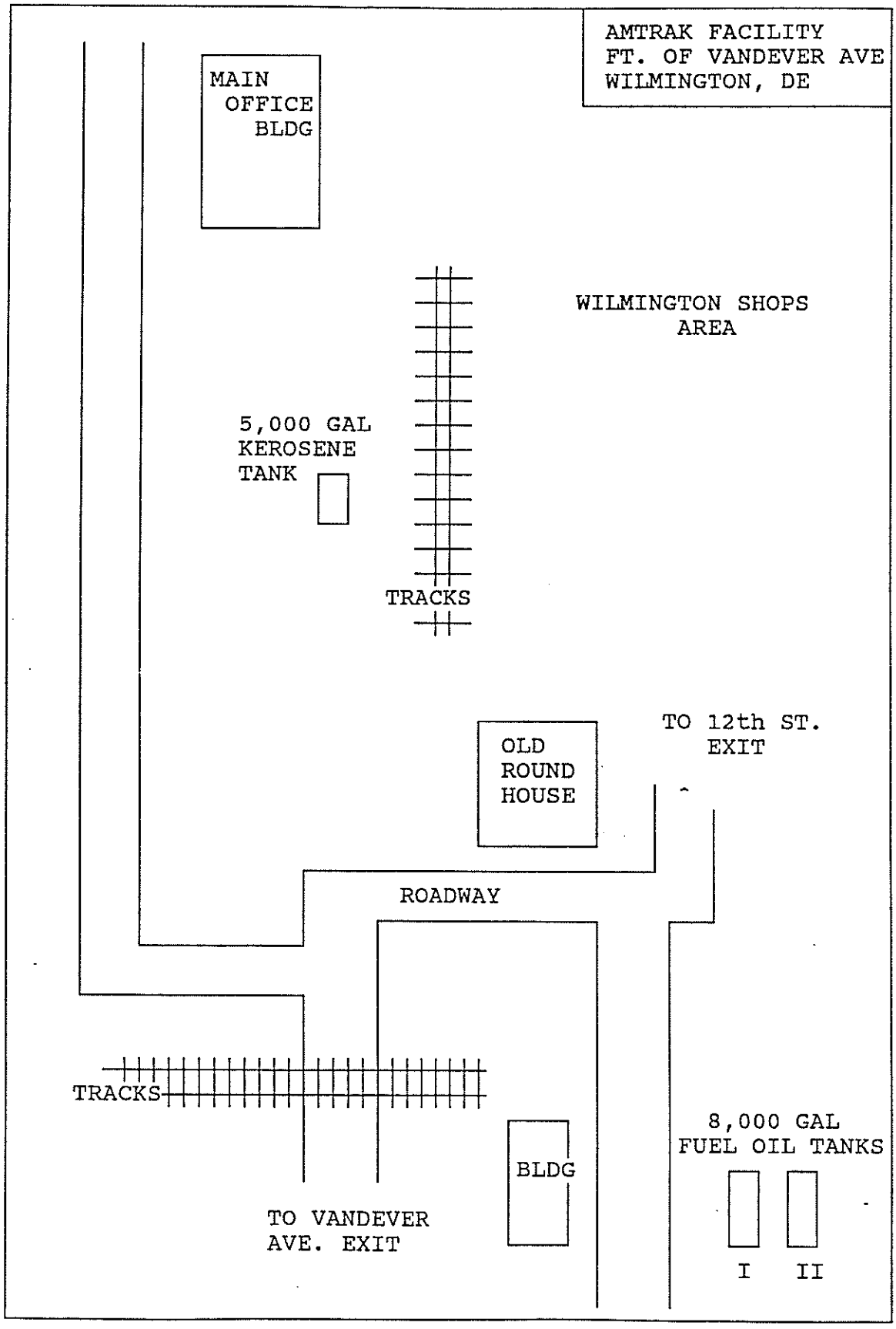
2/25/91

Signature *Date*

John J. Hardy, President

Print or Type name and Title


19803
19806
19801
DELWOOD
Brandywine Plaza
BLUE BALL
WELDIN PARK
Alapocas Woods Park
Alapocas Run
Rock Manor GC
Porter Reservoir
ALAPOCAS
Friends
ROCK MANOR
ALAPOCAS RIDGE
AUGUSTINE RIDGE
Exit-8
CONCORD
Rockford Park
Kentmere Park
Highlands
Riverside Miller Rd Shop Ctr
Salesianum HS
Brandywine Park
TROLLEY SQUARE
PARK PLACE
Westminster
PENNSYLVANIA AVE
WASHINGTON STREET
BOULEVARD
Brandywine
Father Tucker Park
Ursuline Academy
Cool Spring Park
Padua Academy
William Lewis ES
Wilmington & Brandywine
Exit-7
Trinity Episcopal
Judy Johnson Park
Tilton Park
VANDEVER AVENUE
Brown Burton Winchester Park
Youth Employment Demonstration Project
Howard Career Center
Frederick Douglass Stubbs ES
Courthouse
LINCOLN
2ND STREET
Bayard ES
HEDGEVILLE
Kosciusko Park
MARTIN LUTHER KING
Delaware Technical & Community Coll
Old Town Hall
County Building
Compton Park
Old Swedes
Fort Christina Park
WILMINGTON INDUSTRIAL PARK
BRANDYWINE
Exit-6
CHRISTINA RIVER
MARKET ST
WALNUT STREET
Christina Park
BROWNTOWN
Canby Park Shop Ctr
Brown Park
Alban Park
HIDDEN VALLEY
CONRAIL WEST YARDS
ALBAN PARK
JAMES COURT IND PK
Dugan Park
Henrietta Johnson
Eden Park
East 7th Park
CHRISTIANA AVENUE
202
261
48
9
9A
13
BUS 13
495
B
C
D
E
F
G


AMTRAK FACILITY
FT. OF VANDEVER AVE
WILMINGTON, DE
MAIN
OFFICE
BLDG
WILMINGTON SHOPS
AREA
5,000 GAL
KEROSENE
TANK
TRACKS
TO 12th ST.
EXIT
OLD
ROUND
HOUSE
ROADWAY
TRACKS
8,000 GAL
FUEL OIL TANKS
BLDG
TO VANDEVER
AVE. EXIT
I
II

TEST REQUEST / CHAIN OF CUSTODY

medlab
ENVIRONMENTAL TESTING INC.

212 CHERRY LANE
NEW CASTLE, DE 19720

MAILING ADDRESS
P.O. BOX 2045
WILMINGTON, DE 19899
(302) 655-LABS
1-800-MEDLAB-1

SAMPLE COLLECTOR : James Noble
JOB NAME/NO. : Amtrak #92
PURCHASE ORDER: _____
TELEPHONE : ( ) 654-6698

ACCOUNT NO. E127
ACCOUNT NAME HARDY TANK LINING CO
ADDRESS 425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

LABORATORY USE ONLY
Date Received / /
Time Received

ADDITIONAL INFORMATION / SPECIAL INSTRUCTIONS

TOTAL NUMBER OF CONTAINERS
☐ GLASS
☐ PLASTIC
☐ OTHER

SAMPLE I.D.	SAMPLE LOCATION OR DESCRIPTION	PLEASE CHECK ONE ↓	COLLECTION DATE / TIME	VOLATILE ORGANICS BY GC/MS EP9090	SEMI VOA'S (BNA'S) BY GC/MS EP9100	PESTICIDES/PCB'S (608) EP9150	PCB'S EP9151	BTEX EP9081	TPH-PETROLEUM HYDROCARBONS E380	CORROSIVITY E388	IGNITABILITY E390	FLASHPOINT E362	REACTIVITY E389	E.P. TOX METALS E8000	E.P. TOX PEST/HERB E9180	TCLP METALS E8020	TCLP VOLATILE ORGANICS E9095	TCLP SEMI VOA'S (BNA'S) E9105	TCLP PEST/HERB E9190	PRIORITY POLLUTANT METALS (13) E8030	ASBESTOS, FIBER COUNT (PCM) E385	ASBESTOS, BULK I.D. (PLM) E393	ADDITIONAL TESTS OR REMARKS	LAB NUMBER
Tank I	Composite	WATER / ~~SOIL~~ / OTHER	4/17/91 AM 11:54 PM					✓																
Tank I	Water level	WATER / ~~SOIL~~ / OTHER	4/17/91 AM 12:20 PM					✓																
Tank II	Composite	WATER / ~~SOIL~~ / OTHER	4/17/91 AM 12:25 PM					✓																
Tank II	Water level	WATER / ~~SOIL~~ / OTHER	4/17/91 AM 12:30 PM					✓																
		WATER / SOIL / OTHER	/ / AM PM																					

Relinquished By:	Date	Time	Received By	Date	Time
James E. Noble	4/17/91	3:52	Dana O'Brien	4-17-91	3:52

TEST REQUEST / CHAIN OF CUSTODY

medlab
ENVIRONMENTAL TESTING INC.

212 CHERRY LANE
NEW CASTLE, DE 19720

MAILING ADDRESS
P.O. BOX 2045
WILMINGTON, DE 19899
(302) 655-LABS
1-800-MEDLAB-1

SAMPLE COLLECTOR: James Noble
JOB NAME/NO.: Amtrak #92
PURCHASE ORDER:
TELEPHONE: ( ) 654-6698

ACCOUNT NO.: E127
ACCOUNT NAME: HARDY TANK LINING CO
ADDRESS: 425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

LABORATORY USE ONLY
Date Received: / /
Time Received:

ADDITIONAL INFORMATION / SPECIAL INSTRUCTIONS

SAMPLE I.D.	SAMPLE LOCATION OR DESCRIPTION	PLEASE CHECK ONE	COLLECTION DATE / TIME	VOLATILE ORGANICS BY GC/MS EP9090	SEMI VOA'S (BNA'S) BY GC/MS EP9100	PESTICIDES/PCB'S (608) EP9150	PCB'S EP9151	BTEX EP9081	TPH-PETROLEUM HYDROCARBONS E380	CORROSIVITY E388	IGNITABILITY E390	FLASHPOINT E362	REACTIVITY E389	E.P. TOX METALS E8000	E.P. TOX PEST/HERB E9180	TCLP METALS E8020	TCLP VOLATILE ORGANICS E9095	TCLP SEMI VOA'S (BNA'S) E9105	TCLP PEST/HERB E9190	PRIORITY POLLUTANT METALS (13) E8030	ASBESTOS, FIBER COUNT (PCM) E385	ASBESTOS, BULK I.D. (PLM) E393	ADDITIONAL TESTS OR REMARKS	TOTAL NUMBER OF CONTAINERS	LAB NUMBER
KERO	Composite	WATER / SOIL / OTHER	4/11/91 11:30 AM/PM					✓																	GLASS / PLASTIC / OTHER	
KERO	WATER LEVEL	WATER / SOIL / OTHER	4/11/91 11:45 AM/PM					✓																		
		WATER / SOIL / OTHER	/ / AM/PM																							
		WATER / SOIL / OTHER	/ / AM/PM																							
		WATER / SOIL / OTHER	/ / AM/PM																							

Relinquished By: James C Kelly Date: 4/17/91 Time: 3:52

Received By: Dana O'Brien Date: 4/17/91 Time:

medlab
Environmental Testing Inc.
212 Cherry Lane
New Castle, DE 19720
(302) 655-LABS
1-800-MEDLAB-1
(outside DE)

TO: E127
HARDY TANK LINING CORP.
425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

SOURCE COMPOSITE
MATRIX SOIL
SAMPLE TIME: 11:59 AM
SAMPLE DATE: 04/17/91
LAB NO. 04129032
REMARKS TANK I

SAMPLE RECEIVED 04/17/91 REPORT DATE 05/02/91 FINAL REPORT

REPORT

TESTS	RESULTS	RANGE/COMMENTS	UNITS

********EXPLANATIONS OF ABBREVIATIONS AND SYMBOLS USED IN REPORTING*******
RESULT UNITS: PPM=PARTS PER MILLION; i.e., AQUEOUS=MG/L, NON-AQUEOUS=MG/KG
PPB=PARTS PER BILLION; i.e., AQUEOUS=UG/L, NON-AQUEOUS=UG/KG
<"PQL": LESS THAN THE "Practical Quantitation Limit"
NOTE THE FOLLOWING PQL's: BTEX's=5, AQUEOUS TPH=0.5
NON-AQUEOUS TPH=10.0, VOA's=20.0
MDL: MINIMUM DETECTION LIMIT
EE: EXPONENT OF 10; e.g., 125EE3=125000
****

TOTAL PETRO.HYDROCARBONS	2983	EPA METH 418.1	PPM
% MOISTURE	10.8		

UNLESS OTHERWISE SPECIFIED SAMPLE CONCENTRATIONS FOR SEDIMENT/SOIL, SLUDGE AND WASTE SAMPLES ARE EXPRESSED ON A WET-WEIGHT BASIS.

DATE OF ANALYSIS 5/2/91

Mary Ann Hogan
Laboratory Director
MAH

medlab
Environmental Testing Inc.
212 Cherry Lane
New Castle, DE 19720
(302) 655-LABS
1-800-MEDLAB-1
(outside DE)

TO: E127
HARDY TANK LINING CORP.
425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

SOURCE: WATER LEVEL,
MATRIX: SOIL
SAMPLE TIME: 12:20 PM
SAMPLE DATE: 04/17/91
LAB NO. 04129033
REMARKS: TANK I

SAMPLE RECEIVED 04/17/91 REPORT DATE 05/02/91 FINAL REPORT

REPORT

TESTS	RESULTS	RANGE/COMMENTS	UNITS

*********EXPLANATIONS OF ABBREVIATIONS AND SYMBOLS USED IN REPORTING*******
RESULT UNITS: PPM=PARTS PER MILLION; i.e., AQUEOUS=MG/L, NON-AQUEOUS=MG/KG
PPB=PARTS PER BILLION; i.e., AQUEOUS=UG/L, NON-AQUEOUS=UG/KG
<"PQL": LESS THAN THE "Practical Quantitation Limit"
NOTE THE FOLLOWING PQL's: BTEX's=5, AQUEOUS TPH=0.5
NON-AQUEOUS TPH=10.0, VOA's=20.0
MDL: MINIMUM DETECTION LIMIT
EE: EXPONENT OF 10; e.g., 125EE3=125000

TOTAL PETRO.HYDROCARBONS	46.2		PPM
% MOISTURE	11.5	EPA METH 418.1	

UNLESS OTHERWISE SPECIFIED SAMPLE CONCENTRATIONS FOR SEDIMENT/SOIL, SLUDGE AND WASTE SAMPLES ARE EXPRESSED ON A WET-WEIGHT BASIS.

DATE OF ANALYSIS 5/2/91

Mary Ann Hogan
Laboratory Director
MAH

medlab
Environmental Testing Inc.
212 Cherry Lane
New Castle, DE 19720
(302) 655-LABS
1-800-MEDLAB-1
(outside DE)

TO: E127
HARDY TANK LINING CORP.
425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

SOURCE COMPOSITE
MATRIX SOIL
SAMPLE TIME: 12:25 PM
SAMPLE DATE: 04/17/91
LAB NO. 04129034
REMARKS TANK II

SAMPLE RECEIVED 04/17/91 REPORT DATE 05/02/91 FINAL REPORT

REPORT

TESTS	RESULTS	RANGE/COMMENTS	UNITS

********EXPLANATIONS OF ABBREVIATIONS AND SYMBOLS USED IN REPORTING*******
RESULT UNITS: PPM=PARTS PER MILLION; i.e., AQUEOUS=MG/L, NON-AQUEOUS=MG/KG
PPB=PARTS PER BILLION; i.e., AQUEOUS=UG/L, NON-AQUEOUS=UG/KG
<"PQL": LESS THAN THE "Practical Quantitation Limit"
NOTE THE FOLLOWING PQL's: BTEX's=5, AQUEOUS TPH=0.5
NON-AQUEOUS TPH=10.0, VOA's=20.0
MDL: MINIMUM DETECTION LIMIT
EE: EXPONENT OF 10; e.g., 125EE3=125000
****

TOTAL PETRO.HYDROCARBONS	107	EPA METH 418.1	PPM
% MOISTURE	13.2		

UNLESS OTHERWISE SPECIFIED SAMPLE CONCENTRATIONS FOR SEDIMENT/SOIL, SLUDGE AND WASTE SAMPLES ARE EXPRESSED ON A WET-WEIGHT BASIS.

DATE OF ANALYSIS 5/2/91

Mary Ann Hogan
Laboratory Director
MAH

medlab
Environmental Testing Inc.
212 Cherry Lane
New Castle, DE 19720
(302) 655-LABS
1-800-MEDLAB-1
(outside DE)

TO: E127
HARDY TANK LINING CORP.
425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

SOURCE / MATRIX: WATER LEVEL, SOIL
SAMPLE TIME:
SAMPLE DATE:
LAB NO.: 04129035
REMARKS: TANK II

SAMPLE RECEIVED: 04/17/91
REPORT DATE: 05/02/91 FINAL REPOR

REPORT

TESTS	RESULTS	RANGE/COMMENTS

**********EXPLANATIONS OF ABBREVIATIONS AND SYMBOLS USED IN REPORTING**********
RESULT UNITS: PPM=PARTS PER MILLION; i.e., AQUEOUS=MG/L, NON-AQUEOU
PPB=PARTS PER BILLION; i.e., AQUEOUS=UG/L, NON-AQUEOU
<"PQL": LESS THAN THE "Practical Quantitation Limit"
NOTE THE FOLLOWING PQL's: BTEX's=5, AQUEOUS TPH=0.5
NON-AQUEOUS TPH=10.0, VOA's=20.0
MDL: MINIMUM DETECTION LIMIT
EE: EXPONENT OF 10; e.g., 125EE3=125000
****

TOTAL PETRO.HYDROCARBONS	104	
% MOISTURE	12.1	EPA METH 418.1

UNLESS OTHERWISE SPECIFIED SAMPLE CONCENTRATIONS FOR SEDIMENT/SO
SLUDGE AND WASTE SAMPLES ARE EXPRESSED ON A WET-WEIGHT BASIS.

DATE OF ANALYSIS: 5/2/91

Mary Ann Hogan
Laboratory Director
MAH

medlab
Environmental Testing Inc.
212 Cherry Lane
New Castle, DE 19720
(302) 655-LABS
1-800-MEDLAB-1
(outside DE)

TO: E127
HARDY TANK LINING CORP.
425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

SOURCE
MATRIX COMPOSITE
SOIL
SAMPLE TIME:
SAMPLE DATE: 11:
04/
LAB NO. 04129036
REMARKS KERO

SAMPLE RECEIVED 04/17/91 REPORT DATE 04/25/91 FINAL REPORT

REPORT

TESTS	RESULTS	RANGE/COMMENTS

*
*
********EXPLANATIONS OF ABBREVIATIONS AND SYMBOLS USED IN REPORTING*****
RESULT UNITS: PPM=PARTS PER MILLION; i.e., AQUEOUS=MG/L, NON-AQUEOUS=M
PPB=PARTS PER BILLION; i.e., AQUEOUS=UG/L, NON-AQUEOUS=U
<"PQL": LESS THAN THE "Practical Quantitation Limit"
NOTE THE FOLLOWING PQL's: BTEX's=5, AQUEOUS TPH=0.5
NON-AQUEOUS TPH=10.0, VOA's=20.0
MDL: MINIMUM DETECTION LIMIT
EE: EXPONENT OF 10; e.g., 125EE3=125000
****

TOTAL PETRO.HYDROCARBONS 559

% MOISTURE 18.7 EPA METH 418.1

UNLESS OTHERWISE SPECIFIED SAMPLE CONCENTRATIONS FOR SEDIMENT/SOIL, SLUDGE AND WASTE SAMPLES ARE EXPRESSED ON A WET-WEIGHT BASIS.

DATE OF ANALYSIS 4/24/91

medlab
Environmental Testing Inc.
212 Cherry Lane
New Castle, DE 19720
(302) 655-LABS
1-800-MEDLAB-1
(outside DE)

TO: E127
HARDY TANK LINING CORP.
425 OLD AIRPORT ROAD
NEW CASTLE, DE 19720

SOURCE
MATRIX WATER LEVEL
SOIL
SAMPLE TIME: 11:45 AM
SAMPLE DATE: 04/17/91
LAB NO. 04129037
REMARKS KERO

SAMPLE RECEIVED 04/17/91 REPORT DATE 04/25/91 FINAL REPORT

REPORT

TESTS	RESULTS	RANGE/COMMENTS	UNITS

********EXPLANATIONS OF ABBREVIATIONS AND SYMBOLS USED IN REPORTING*******
RESULT UNITS: PPM=PARTS PER MILLION; i.e., AQUEOUS=MG/L, NON-AQUEOUS=MG/KG
PPB=PARTS PER BILLION; i.e., AQUEOUS=UG/L, NON-AQUEOUS=UG/KG
<"PQL": LESS THAN THE "Practical Quantitation Limit"
NOTE THE FOLLOWING PQL's: BTEX's=5, AQUEOUS TPH=0.5
NON-AQUEOUS TPH=10.0, VOA's=20.0
MDL: MINIMUM DETECTION LIMIT
EE: EXPONENT OF 10; e.g., 125EE3=125000
****

TOTAL PETRO.HYDROCARBONS	36.4	EPA METH 418.1	PPM
% MOISTURE	16.4		

UNLESS OTHERWISE SPECIFIED SAMPLE CONCENTRATIONS FOR SEDIMENT/SOIL, SLUDGE AND WASTE SAMPLES ARE EXPRESSED ON A WET-WEIGHT BASIS.

DATE OF ANALYSIS 4/24/91

MAN

TANK WASTE DISPOSAL VOUCHER

A. B. C. TANK CO.

580 E. Clayton Ave., Clayton, NJ 08312

New Jersey
609-881-6586

Out of State
1-800-257-7304

RECEIVED FROM
ADDRESS

DATE

QUANTITY	ITEM NUMBER	DESCRIPTION

PCB CERTIFICATION
I, the undersigned under penalty of law do hereby certify that the material specified on this ticket does not contain polychlorinated biphenyls (PCB's) at a level greater than 49 ppm as defined by 40 CFR 761.

Authorized Signature

Date

TANK WASTE DISPOSAL VOUCHER

A. B. C. TANK CO.

580 E. Clayton Ave., Clayton, NJ 08312

New Jersey
609-881-6586

Out of State
1-800-257-7304

RECEIVED FROM

ADDRESS

DATE

QUANTITY	ITEM NUMBER	DESCRIPTION

PCB CERTIFICATION

I, the undersigned under penalty of law do hereby certify that the material specified on this ticket does not contain polychlorinated biphenyls (PCB's) at a level greater than 49 ppm as defined by 40 CFR 761.

Authorized Signature

Date

TANK DISPOSAL VOUCHER

DIAMOND STATE SALVAGE CO.
14th & CHURCH STS.
WILMINGTON, DELAWARE 19802
(302) 655-1501

118947 Ticket No.

Date APR 17 8

40 220 GROSS

33 400 TARE

Remarks AMTRAK Vandever Avenue

APR 17 9 11

DIAMOND STATE SALVAGE CO.
14th & CHURCH STS.
WILMINGTON, DELAWARE 19802
(302) 655-1501

118936 Ticket No.

Date APR 16

APR 16 3 4

43 000 GROSS

33 520 TARE

Remarks AMTRAK

DIAMOND STATE SALVAGE CO.
14th & CHURCH STS.
WILMINGTON, DELAWARE 19802
(302) 655-1501

118977 Ticket No.

APR 17 1 59

39 100 GROSS

33 600 TARE

5500 NET

Remarks AMTRAK Vandever Avenue 5,000 Gal. Kerosene Tank

APR 17 2 21

Commodity Steel Tank @ 1.00 $ 55.00

Name Hardy

Address

Received ☐

Shipped ☐

Driver

On ☐ Weigher

Off ☒

Report: *Site Inspection -- Amtrak Wilmington Refueling Facility DE-266*

Date: December 1994

Prepared by: DNREC

Area Investigated: Refueling facility

Purpose: To collect data to evaluate potential threat to human health and the environment.
- Identify potential target populations
- Identify potential environmental resources
- Determine potential pathways

Data: Soil, sediment, and surface water 1993/1994 --> toxicological evaluation
TCL/TAL list (PAHs, PCBs, metals (lead, copper, iron, arsenic), waste oils, pesticides)
Original - November 1993: 3 soil, 7 storm water, 7 surface sediment, and 2 field dup (1 soil and 1 storm water)
Resample - January 1994: 2 soil, 5 sediment, 1 field dup (soil)
Total: 27 samples

Notes:
- November 5, 1993 letter from the EPA to DNREC with comments
- December 29, 1994 letter from DNREC to EPA with responses

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL
DIVISION OF AIR AND WASTE MANAGEMENT
715 GRANTHAM LANE
NEW CASTLE, DELAWARE 19720-4801

WASTE MANAGEMENT SECTION
SUPERFUND BRANCH

TELEPHONE: (302) 323 - 4540
FAX: (302) 323 - 4561

December 29, 1994

Maria T. White (3HW73)
U.S. EPA, Region III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Final SI Report for the Amtrak Wilmington Refueling Facility Site, DED 984075432/DE-266

Dear Ms. White:

Enclosed for your review is the "final draft" Site Inspection Report for the Amtrak Wilmington Refueling Facility Site, New Castle County, Delaware, including the rHRS on disk. The report encompasses the comments received from your Toxicologist, Senior Soil Scientist and you. The revised Toxicological Risk Assessment is also included.

In regard to your comments:

1. Information describing the previous investigations has been included. The PCB remediation work took place prior to the PAs and was unrelated. The "hot spots" described were in the vicinity of the locomotive shop and oil drum staging area in the Maintenance Facility area and not in the Refueling Facility, the object of this SI, although low levels of PCB contamination were noted in the Refueling area.

2. Figure numbers have been added.

3. A compass rose has been included.

4. The areas containing Conrail and the Refueling Facility are located mostly off of the map area. The appropriate areas have been delineated. Figure 3 has also been revised.

5. The appendices have been included.

6. A review indicates that seven sediment samples are listed on both page 14, Table 1 and page 15, section 3.1.

7. The wetland description has been expanded.

8. Figures 3 and 8 have been revised to show Shellpot Creek.

9. The sentence has be modified.

10. A review indicates that sample AT-5 is listed as "J" qualified in the previous sentence.

11. I have reviewed the Analytical Result Tables and believe them to be properly labeled. (Note: Only one resample (Soil AT-12R) was analyzed with a positive validated result. Therefore no sediment resamples were included in the tables.)

12. The population data has been reviewed and is believed to be correct.

13. The area of the Refueling Facility (approximately 20 acres) was used as the source area since all site samples contained significant levels of contamination and visible soil staining and areas of seepage were present over much of the site.

14. Upstream samples for surface water and sediment are samples collected from the uppermost reach of the tributaries on both sides of the site. Samples AT-3 and AT-15 were collected from a stream draining a portion of the Maintenance Facility (but not the Refueling Facility) are were used as background samples for both tributaries draining the Refueling Area.

15. The SW environmental pathway calculations have been reviewed and the following clarifications are offered. Please refer to screen 53 in PreScore. All values were derived from Tables 4-23 and 4-24 in Federal Register Vol. 55, No. 240, 40 CFR Part 300, Hazard Ranking System, Final Rule. The Sturgeon/Perigrine Falcon habitat and/or feeding range receives an assigned value of 75 as 'habitat known to used by Federal designated or proposed endangered or threatened species'. Both are designated as such according to the Delaware Natural Heritage Inventory (Reference 38). Endangered species habitat at the confluence of the Brandywine Creek and Christina Rivers receive an assigned value of 50 since the area is 'habitat known to be used by state designated endangered or threatened species'. Sensitive Environment #5, Pea Patch Island receives an assigned value of 25 as a 'particular area(s), relatively small in size, important to maintenance of unique biotic communities'. Distance (in miles) to each particular area is an estimate of distance from the site to the sensitive environment, measured in the in-water distance to the nearest one-tenth mile. Levels of concentration are determined by the computer on the basis of the contaminants found and the distance from the site to the sensitive environments. Surface water definition on the basis of average flow in cubic feet per second is also taken into account (F9 from Screen 53).

    Please note a small change in the wetland definition. According to Section 4.1.4.3.1.1. of the HRS Final Rule, the entire length of the wetland was used as it's frontage (change of 0.38 mile to 0.47 mile) Sampling was performed at the top, middle and lower end of the palustrine wetland. The Rule states that 'for an isolated wetland or for a wetland where the PPE to surface water is the wetland, use the perimeter of that portion of the wetland subject to Level I contamination as the length'. Contaminants were found at all sampling points along the wetland which borders the site and the wetland and tributaries drain directly into the Brandywine Creek after passing under Twelfth Street.

With regard to Mr. Kargbo's comments:

We strongly agree with Mr. Kargbo's comments on the hydrogeological aspects of the report. DNREC's original sampling plans included the installation of four monitor wells and the collection of groundwater samples. The sampling plan was reviewed by EPA and the installation of monitor wells and collection of groundwater samples were not supported by the Site Assessment Manager (See attached memo dated November 5, 1993 from Mike Giuranna to Carl Davis).

With regard to Ms. Hubbard's comments:

1. We have revised the Toxicological Evaluation to consider contaminants screening in at 0.1 of the Risk-Based Concentration, thereby including Antimony and Beryllium in the soil screening.

2. Beryllium has been evaluated under the carcinogenic risk scenario.

3. The cancer risk equation has been incorporated.

4. As discussed with Ms. Hubbard, since there is no recreation on site, and samples were not collected in areas of recreational use (i.e. Brandywine Creek), sediment contaminant concentrations have been evaluated using the soil exposure scenarios.

5. Arsenic, Aroclor, Manganese, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Chromium, Vanadium, Antimony and Pesticides in sediment have been evaluated under the soil exposure scenario. This scenario was utilized due to the sites potential for worker exposure during site work and the potential for trespassing in the vicinity of the tributaries. (See #4, above)

6. The food RfD has been noted in the text.

7. The adult trespasser scenario has been changed to 24 years.

8. The screening level for Lead has been changed to 400 mg/kg.

9. The suggested wording change has been made.

10. The suggested wording change has been made.

11. The statement has been corrected.

12. According to the Region III Environmental Services Assistance Team (ESAT) Data Validator, the "Chemical Health Advisory Level" corresponds to the 10-day Health Advisory Level for Lead. This has been incorporated in the report.

13. The suggested wording changes have been made.

14. The suggested wording change has been made.

Thank you for your comments and suggestions. If you have any questions, please call me at (302) 323-4540.

Sincerely,

Lawrence J. Jones
Environmental Scientist
Superfund Branch

LJJ:dw
LJJ94070.wp
DE-266 II-A3

Enclosure

pc: N.V. Raman
Karl Kalbacher

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Review of Sampling Plan for Amtrak Wilmington Refueling Facility

DATE: 11-5-93

FROM: Mike Giuranna
EPA, Region III

TO: Carl Davis
Delaware DNREC

I have reviewed the draft sampling plan for the Amtrak site and have the following comments.

1. EPA will not support the drilling of monitoring wells or the sampling of ground water at this site. Surface water is the media of concern here. The Preliminary Assessment for this site demonstrated that the ground water pathway was not a concern. The ground water to surface water pathway is not a strong enough concern to justify the drilling of monitoring wells. Therefore these samples should be dropped from the sampling plan.

2. Regarding the soil samples. Deep soil samples do not count in the HRS model for scoring a site. Therefore it is not necessary to take any of these. Since soil exposure is not a problem here two on-site soil samples and a background sample should be adequate to characterize the soil at this site.

3. The surface water and sediment samples are approved as proposed. However, keep in mind that when evaluating wetlands under the HRS model the important thing is the documented area of wetlands frontage which is contaminated. This contamination can be shown only through sampling. So it would benefit you to take the wetlands samples over as long a frontage as possible. Also samples SW-1 is not pictured on figure 9, please correct this in the revised sampling plan.

4. Since there are no ground water samples being taken an equipment blank is not necessary. However, if you would still like to take one you may substitute it for the field blank. This would leave a total 4 QA/QC blanks.

The total number of samples for this site would now be 3 soil samples, 14 surface water/sediment samples and 4 QA/QC samples for a total of 21 samples which is more in line with our recommended total of 20 for a Screening Site Inspection. Keep in mind that our objective here is to take only as many samples as necessary to characterize the site for HRS scoring purposes. More thorough sampling would be done at a later stage if the site warranted it. If there any questions on the above, please call me at (215) 597-3165.

SITE INSPECTION
AMTRAK WILMINGTON REFUELING FACILITY
DE-266

DECEMBER, 1994

Prepared By:

Lawrence J. Jones
Environmental Scientist
PA/SI Group

Catharina R. Groot
Hydrogeologist
DNREC

Ann L. Bruce
Environmental Scientist
PA/SI Group

Reviewed By:

Karl F. Kalbacher
Program Manager I
PA/SI Group

SUMMARY REPORT
AMTRAK WILMINGTON REFUELING FACILITY
DED 984075432/DE-266

A Site Inspection at the Amtrak Wilmington Refueling Facility was conducted to collect necessary data to evaluate the potential threat to human health and the environment. Information was compiled to identify potential target populations and environmental resources and to determine potential pathways.

The Amtrak Wilmington Refueling Facility is a portion of a 85 acre active railyard. The approximately 20 acre site is utilized for the servicing and fueling of diesel locomotives and for temporary storage of wrecked and damaged railcars. Past operations included the supplying of coal for steam engines.

Amtrak holds a NPDES permit for surface water run-off in Shellpot Creek and a tributary of the Brandywine Creek. In addition, Amtrak holds a small quantity EPA Hazardous Waste Permit, and a large quantity RCRA permit. It is not considered a treatment, storage, and disposal facility.

Amtrak has been the subject of several previous investigations including two preliminary assessments, one for the Maintenance Facility in 1989 and one for the Refueling Facility in 1993. In addition and unrelated to the PAs, numerous property soil samples were collected and analyzed between June, 1980, and January, 1984, by two private firms under the TSCA program. As a result, approximately 10,000 cubic yards of PCB contaminated soils were removed from "hot spots" in the yard. Most of the "hot spots" were located around the locomotive shop and former oil drum staging area in the Maintenance Facility, to the north and east of this investigation.

An on-site reconnaissance in March, 1993, showed visible soil contamination over a large area mostly devoid of vegetation. Many areas show signs of stained soil around the fueling center and along the rail spurs, possibly from spills and leakage from damaged railcars and past operations.

Sampling of soil, sediment and surface water was conducted on November 30, 1993. Due to equipment problems at the laboratory, several soil and sediment locations were resampled on January 13, 1994.

Sampling and analysis indicate contamination by organic and inorganic compounds is present as a result of past site activities. Polycyclic Aromatic Hydrocarbons, Polychlorinated Biphenyls, metals and waste oils are present in significant amounts both in the ground and in the surface water drainage canals located on the northeast and southwest borders of the site. Contaminants including lead, copper, iron, arsenic, pesticides PAHs and PCBs were detected well above background levels in sediments and/or surface water samples and may be attributed to on-site soil contamination.

Analytical problems due to sample matrix interference resulting in very high detection limits make it likely that additional compounds may be present in significant quantities.

The potential for migration of these site contaminants to the Brandywine Creek and Christina River is high due to their presence in bordering surface water and sediments and the short pathway distance to the receiving streams. Additional sampling of the surface water pathway will be necessary to fully evaluate this impact.

Soil contamination at the site is significant and provides a potential current and future risk to on-site workers and trespassers, as well as a continuing source of contamination to the surface water pathway via sub-surface seepage and surface runoff and discharge.

Based upon these findings, the Superfund Branch of DNREC strongly recommends that further action/investigation occur at the Amtrak facility. This investigation should include sampling and evaluation of surface water and sediments in the Brandywine Creek and an evaluation of groundwater beneath the site.

LJJ:dw
LJJ94072.wp
DE-266 II-A3

Site Inspection Report
Amtrak Wilmington Refueling Facility
December, 1994

TABLE OF CONTENTS

Appendix E. Site Inspection Report

Date: December, 1994

Prepared By: Lawrence J. Jones, Environmental Scientist, PA/SI Group
Catharina R. Groot, Hydrogeologist, DNREC
Ann L. Bruce, Environmental Scientist, PA/SI Group

Site: Amtrak Wilmington Refueling Facility

EPA ID No.: DED 984075432

DE ID No.: DE-266

1. INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Delaware Department of Natural Resources and Environmental Control (DE DNREC) conducted a Site Inspection (SI) at the Amtrak Wilmington Refueling facility. This Site Inspection is the third investigation conducted at the Amtrak Site.

In 1989, the first Preliminary Assessment (DE-170) was performed under EPA Contract No. 68-01-7346. This Preliminary Assessment covered the area around the locomotive maintenance shop and administrative buildings, known as the Wilmington (Figure 3 and 4) Amtrak Railyard - Maintenance Facility, to the north and east of the current investigation. An area defined as the Amtrak Wilmington Refueling Facility was the subject of a second Preliminary Assessment (DE-266) conducted in February 1993. This area is the subject of the current Site Inspection (See Figures 3 and 4).

The purpose of this Site Inspection was to collect information concerning conditions in this additional area sufficient to assess the threat posed to human health and environment and to determine the need for additional investigation under CERCLA/SARA or other authority. The scope of the inspection included a review of the available file information including the first two Pas, a comprehensive target survey, site reconnaissance, and sampling of environmental media to test Preliminary Assessment hypotheses and to document HRS factor values and scores.

2. SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERISTICS

2.1 Location

The Amtrak Wilmington Refueling facility is located at the foot of Vandever Avenue in Wilmington, Delaware, between the Amtrak and Conrail railroad tracks. The center of the site property can be located at latitude 39°44'49" north and longitude 75°31'20 west. (Figures 1, 2, 3, 4) (Reference 1)

New Castle County is characterized by a humid, temperate type climate that is typical of most coastal areas of the Middle Atlantic States.

According to climatological data obtained for Wilmington, Delaware for the period from 1951 to 1980, the average annual temperature is 54.0°F; the coldest month is January with a mean temperature of 31.2°F, and the hottest month is July with a mean temperature of 76°F. The average annual precipitation is 41.38 inches. The net annual precipitation (mean annual precipitation minus mean annual lake evaporation) was found to be approximately 6.38 inches. (Reference 2,3)

2.2 Site Description

The Amtrak facility is a 85-acre railyard used for the repair of locomotives and passenger railcars. The facility site boundaries are as follows: The main rail line for Amtrak serves as the western border. Beyond these tracks to the west is a large commercial zone and Center City Wilmington. Immediately adjacent to the railroad tracks is a community center and park with a baseball field. The nearby residences along Vandever and Marsh Roads consist mostly of low income housing. The main line proceeds north over Shellpot Creek, which marks the northern boundary. A stream designated as unnamed tributary #1 serves as the eastern boundary of the site. East of this tributary is a marshy area and access road that is the property of the adjoining Conrail Edgemoor Railyard. Several businesses lease property from Conrail along the east side of the access road including a cement plant, an asphalt plant and a tank car cleaning company. The properties of Conrail, the Brandywine Industrial Complex and Atlas Sanitation Co. Subdivision serve as the southern border of the facility. (see Figures 3 & 4). (Reference 1,4,5,6)

The first Preliminary Assessment covered the more northern part of the Amtrak property. This area consisted of the maintenance shops, locomotive shop, the former PCB transformer retrofit unit, asbestos abatement rooms, the powerhouse and various offices and other site buildings (see Figure 5). At the southeast side of this area are the remnants of an abandoned roundhouse, a early maintenance and storage building equipped with a turntable to distribute trains to various tracks. (Reference 7)

Approximately 700 feet south of the round house is the center of the Refueling Facility and the subject of this Site Inspection. (see Figure 4). The area comprises about 20 acres. A 250,000 gallon above-ground storage tank (AST) for fuel oil, used for refueling of the locomotives, is the most prominent landmark. Along the railroad tracks are a 6,000 gallon waste oil AST, a diesel lube oil AST, an abandoned coal dock, a 500 gallon kerosene AST, the engine house, a sand tower and fueling station and numerous railroad passenger cars in various states of repair. Little or no vegetation is present over most of this area. Away from the tracks the vegetation is non-existent where the soil is stained with petroleum. Much of the soil surface consists of fill material including metal slag and coal ash with considerable railroad debris, scrap metal, railroad spikes etc. Rubbish from illegal dumping is prevalent throughout the site including shingles, plastic pipe, scrap cable and wire, a television set, tires and paint cans. (Reference 8)

An unnamed tributary (#1) (Figure 4) to the Brandywine Creek originates on Conrail property and continues on the Amtrak Site running approximately south along the eastern boundary of the site. It is joined by a small ditch coming from a cement factory which is located on land leased from Conrail (Figure 4).

On the west side of the property is a second unnamed tributary (#2) (Figure 4) that is used for stormwater discharge. It joins the eastern tributary #1 at the south end of the Amtrak facility. From there the tributary flows under 12th Street and joins the Brandywine Creek.

Leachate control systems, consisting of booms placed at areas of seepage and discharge from the property to collect debris and oil, are present along the banks and in both tributaries and the ditch. The booms are replaced weekly and are sometimes dislodged by heavy rains. (Reference 8)

The site is not fenced and there is a problem with trespassing and illegal dumping of trash at the site. Although, Amtrak officials attempt to stop this dumping, more rubbish was found near the ditch during recent site visits. Children are known to trespass on the facility and occasionally vandalize Amtrak property. Also according to Amtrak personnel, indigents are sometimes found camping on the site. (Reference 8)

During the site reconnaissance for the Preliminary Assessment, the following observations were made:

Walking from the coal station to the 250,000 gallon fuel tank along unnamed tributary #1, patches of petroleum sheen were observed and a reddish brown film was flowing out of a pipe and into the tributary. The film was floating on top of the water and appeared to float past the booms. There was a full dumpster seen by the edge of the tributary, south of the coal station. While observing the site from the top of the fuel tank, a dead bird was seen to the northeast and a tire was seen to the southeast, both in the tributary.

Walking northwest from the fuel tank toward the main set of railroad tracks, indiscriminate trash, metal slag and spent coal ash was present throughout the site and creosote treated wood was observed. There was petroleum stained soil in this area, except where there were buried railroad tank cars. These tank cars were found in the area between the coal station and the large fuel tank. Amtrak hired Joseph H. Hardy to remove these railroad tank cars in the summer of 1990. The soil is a reddish color above where these tanks were located. No vegetation was found in this area. Along the ditch on the western side, wetland areas persist. The most abundant vegetation present is sedges. The wetland areas have been impacted by waste fluids and oils being released into the ditch. The wastes have resulted in barren stretches being present (i.e., stained with waste fluids) in the wetland areas. Beyond the barren stretches, the wetland vegetation is stressed to the confluence with the unnamed tributary.

The water of the ditch is reddish in color. Booms were placed along discharge areas of the ditch, although this did not appear to help keep the contaminants from spreading throughout the water. As we crossed a bridge going over the ditch, there were wooden barrels and plastic trash seen in the water to the north. To the south, rusty drums were visible in the water. A trash pile was seen on the other side; it consisted mainly of wood. From the railroad tracks to the east of the ditch, the vegetation appeared to be stressed.

The railroad track area is at a higher topographic elevation than both of the tributaries and the ditch. It appears that there has been a considerable release of waste fluids and solids (metal, coal ash, slag) in the railroad track area over an extended period of time. The wastes from the railroad area appear to be discharging to the surface water from both overland run-off and shallow groundwater seepage. (Reference 8)

To the east and south of the Amtrak facility is the location of the Conrail property (see Figure 4). According to the Amtrak personnel, Conrail is involved in the same type of operation as Amtrak.

2.3 Operational History and Waste Characteristics

The Refueling Facility property is owned by the National Railroad Passenger Corporation, commonly known as Amtrak. Amtrak Corporate offices are located in Washington, D.C. Amtrak took over the ownership and operation of the facility in 1976 from the Penn Central Railroad Company (currently Conrail). Prior to Amtrak or its predecessor, the Penn Central Railroad Company, the Philadelphia-Wilmington-Baltimore Railroad Company occupied two locations in the area. (Reference 8)

Since the original construction of the railyard on the subject property the railyard has been utilized essentially for the same purpose: the maintenance, fueling, service, and overhaul of locomotives and railcars.

The primary activity at the refueling facility area is the servicing of diesel locomotives with lubricating and fuel oil at the Enginehouse (Figure 4). Kerosene is also provided for the cabin heaters in the cabooses. Past operations included supplying locomotives and cabin cars with fuel oil, sand and water and coal for steam engines. Currently only diesel work engines are fueled at this location.

According to the Spill Prevention, Control and Countermeasure Plan for the Amtrak Wilmington Maintenance Facility, locomotives to be fueled are taken to the fuel rack located at the Enginehouse. The engine is parked over a metal spill catch pan. Any spill from overfilling or broken hoses is supposed to be captured in the catch pan and pumped to a 6,000 gallon waste oil tank. When full, the oil is removed by a waste oil dealer for recycling. (Reference 6)

The area is also used for storage of locomotives and railcars. During a site reconnaissance on September 1, 1994 approximately 24 cars were parked throughout the site. Some were old cars scheduled to be sold for scrap while others were wrecked or damaged and awaiting repair.

Amtrak holds a large quantity RCRA permit No. DED 060058062, but it is not considered a treatment, storage, and disposal (TSD) facility. The regulated hazardous wastes consist of lubricating and waste oil. (Reference 8)

Amtrak holds a State Permit WPCC3089A/85 and a NPDES permit DE0050962 for six discharges (Figure 6). The designated uses of the Brandywine and Shellpot Creeks in the area of discharge are: Industrial Supply, Primary and Secondary Contact Recreation and Protection of Fish, Aquatic Life and Wildlife. (Reference 8,9)

The monitoring point for outfall 001 is in the Brandywine tributary which represents the downstream water quality after dilution. Stormwater run-off from the north side of the Amtrak property discharges through outfall 002A to the Shellpot Creek. It disposes of storm water from about one third of the site (Figure 6). (Reference 8,9)

For true representation of storm water run-off water quality to the Brandywine Creek four new monitoring locations (003, 004, 005, and 006) (Figure 6) were installed. Outfall 003 is located near the 250,000 gallon AST and Dam B and should represent the most likely contaminated run-off of the site. Outfall 004 is the discharge from the catch basin south of the round house. This basin has

a lower elevation as compared to its surroundings and storm water run-off stays there and eventually flows to the drainage ditch. Outfall 005 is the downstream flow of the drainage ditch which represents the extreme south side of the maintenance yard. Outfall 006 is the stormwater discharge through a 38 inch by 60 inch pipe from the southern half of the maintenance facility. (Reference 8,9)

The monitoring requirements and effluent limitations are based on the State of Delaware Surface Water Quality Standards (DSWQS). For the Amtrak site, the effluent limitations are: (1) The daily average oil and grease concentration shall not exceed 10 mg/L and the maximum instantaneous concentration shall be less than 15 mg/L. (2) There shall be no discharge of polychlorinated biphenyls (PCBs) from the Amtrak facility. (3) The Ph shall not be less than 6.0 standard units nor greater than 9.0 standard units. (4) The discharge shall be free from floating solids, sludge deposits, debris, oil and scum. (Reference 8,9)

The monitoring requirements are the following:

Oil and Grease	Quarterly Measurement	Grab Sample
PCB's	Quarterly Measurement	Composite Sample
Surfactants	Quarterly Measurement	Composite Sample
TCE	Quarterly Measurement	Grab Sample
Ph	Quarterly Measurement	Grab Sample
TPH	Quarterly Measurement	Grab Sample

Recent data for the outfalls is presented in Reference 43.

In addition to the above permits, Amtrak was granted permit number W-85-04 for the discharge of facility waste waters to the City of Wilmington's sewer system. Sampling reports are submitted to the Department of Public Works every six months. Sampling of the release to the city sewer system after pretreatment on site is conducted for PCB's, nickel, copper, zinc, and total chromium. The analyses of the last four years show that the PCB concentrations have been below 10 ppb, and the concentrations of nickel, copper, zinc, and total chromium have been below the limits of 1.5, 5.0, 15.0, and 6.0 ppb respectively. (Reference 8)

2.4 Previous Inspections

Over a four-year period, Amtrak completed an extensive study of PCB concentrations in on-site soils. Samples were collected throughout the railyard and along its perimeter by two different consultants during three different sampling periods. Throughout June and July 1980, samples were collected and analyzed by Woodward-Clyde Consultants. Forty-one samples, ranging in concentration from 0 up to 894 mg/kg PCBs, were collected in back-filled soils along the roadways and mainline tracks and in marshes and puddles throughout the yard. An additional 35 samples, ranging in concentration from 0 to 1.68 mg/kg PCBs, were collected in split spoon samples at depths from 2 to 34 feet in 18 wells located along the perimeter and throughout the yard (see Appendix F for sample results). Except for one sample in a drum storage area of 894 mg/kg, PCB concentrations in all of the samples collected in 1980 were below the accepted action level of 50 ppm PCBs. (Reference 8,10)

On June 23 and 24, 1982, 64 soil samples were collected by Radiation Management Corporation and analyzed for oil and grease and PCB concentrations. Samples were obtained from one- and two-foot cores, predominantly from areas bordering Brandywine Creek, its tributary, and on-site drainage areas. Concentrations of PCBs (Aroclor 1260) ranged from less than 0.10 mg/kg to 473 mg/kg. One sample

measuring 1,475 mg/kg of the PCB Aroclor 1254 was detected along railroad tracks near the blacksmith shop. (Figure 5) (Reference 8,11)

A third sampling was completed in late 1983. Radiation Management Corporation obtained samples on November 4, 1983, November 14, 1983, and December 1, 1983 through January 9, 1984. Soil samples were collected at depths of 6 to 12 inches. A total of 304 samples were gathered from locations along the perimeter of the site, in the yard, and the area around the locomotive shop. PCB concentrations ranged from less than 1 mg/kg to 5770 mg/kg. Concentrations were highest along railroad tracks and in areas along the perimeter or off-site. (Reference 8,12)

Working with EPA Toxic Substances Control Act (TSCA) representatives, as well as other federal and state agencies, Amtrak decided to complete a removal of soils deemed PCB "hot spots" in and around the Maintenance Facility. Samples collected in the Refueling Area contained relatively low levels of PCBs and were not subject to the remediation. During 1984 and 1985, approximately 10,000 cubic yards of PCB-contaminated soils were removed from the facility. The clean-up area included soils in and around the locomotive shop and oil drum staging area, as well as along the mainline tracks and track area south of the locomotive shop. The total cost was approximately three million dollars. Most of the affected area is currently paved or refilled. (Reference 8)

No other remedial action has occurred at the site.

A preliminary assessment of a 1/4-acre drum storage area associated with the WMF and located off-site, under interstate 95, was completed by the Delaware Department of Natural Resources and Environmental Control (DE DNREC) Preliminary Assessment/Site Inspection group in August 1987. Also in 1987, the TSCA's clean-up site was revisited, and at that time, further action under the Federal Superfund program was recommended. (Reference 8,13)

Liquid wastes on site are treated via a dissolved air flotation wastewater treatment system located west of car shop no. 2. (Figure ??) The treated effluent from this system is released to the City of Wilmington sewerage system. Solid and asbestos wastes are removed to the Twelfth Street Solid Waste Authority, a sanitary landfill in Wilmington. (Reference 8)

Waste oils are stored in a 4,000-gallon above-ground storage tank on site. The unhydrated oil is sold to recyclers where possible.

3. WASTE/SOURCE SAMPLING

For this Site Inspection, on-site sampling was performed to document and characterize the waste and contaminant sources as a result of past practices at the refueling facility, and to evaluate the surface water and soil exposure pathways. Initial sampling for the SI was conducted on November 30, 1993. Due to equipment problems at the analytical laboratory, holding times were exceeded for several samples. As a result, additional samples were collected at a number of the soil and sediment locations on January 13, 1994. The additional samples were numbered according to their original locations with the suffix (R) added to identify the resample (Tables 1 and 2). (Reference 14,15)

All samples were analyzed for EPA Target Compound List (TCL) and Target Analyte List (TAL) according to appropriate protocols and procedures. Validation reports for the sampling at the Amtrak site are included in Appendices C and D. Review

and comments by the DNREC Superfund Branch Chemist are included. (Reference 16)

3.1 Sample Locations

Figures 7 and 8 and Tables 1 and 2 summarize the locations and rationale for all samples collected for this Site Inspection on November 30, 1993 and the subsequent resampling performed on January 13, 1994. The original samples consisted of:

- **Three (3) soil samples collected from 0-12" below ground surface.** One sample was taken from the east side of the refueling facility, one from the west side and one from a community park located immediately north and west of the facility (off-site background).

- **Seven (7) surface water samples collected from on-site surface waters.** Three samples were collected from unnamed tributary #1 east of the site; two samples were collected from unnamed tributary #2 on the west side, one sample was collected from a ditch draining an area occupied by a cement and an asphalt plant on the adjoining property to the east, and one sample from a pond below the confluence of tributaries #1 and #2 and the ditch.

- **Seven (7) surface sediment samples collected in conjunction with the previously described surface water samples.**

- **Two field duplicates (one soil and one surface water)** were collected in addition to trip blanks, equipment blanks and laboratory duplicates.

The resampling event consisted of:

- **Two (2) soil samples** both from on-site.

- **Five (5) sediment samples;** three from tributary #1, one from the pond at the confluence of tributary #1 and #2 and one from the cement plant ditch.

- **One field duplicate of the east soil sample.**

3.2 Analytical Results

All samples were analyzed and the results were compared to several parameters depending on the media tested.

Surface water analytical results, both organic and inorganic, were compared against three parameters; three times the background sample concentration, the available ambient water quality criteria (AWQC) for freshwater chronic exposure and the Delaware Surface Water Quality Standards (DSWQS). (Tables 3 and 5) (Reference 17,18)

Organic and inorganic sediment sample analytical results were compared to three parameters; three times the background sample concentration and the available Risk Based Concentrations (RBC) for both residential and industrial soils. (Tables 4 and 6) (Reference 19)

All analytical results for soil samples were also compared against the same parameters as the sediment samples. (Tables 7 and 8) (Reference 19)

In addition, lead exceeded the Chemical Health Advisory Levels in several samples, as noted in the data validation package. (Reference 20)

4. GROUNDWATER PATHWAY

4.1 Hydrogeologic Setting

Amtrak lies within the Coastal Plain Physiographic Province, which consists of unconsolidated sediments that form very gently rolling or flat plains. The site is underlain by the Quaternary age Columbia Formation, consisting of gravelly, fine to coarse sands with interbedded silts and clays. They are generally up to 10 feet thick in this area (see Figure 9). (Reference 21)

The Cretaceous age Potomac Formation underlies the Columbia Formation and consists of variegated red, gray, purple, yellow, and white silts and clays. These silts and clays contain beds of white, gray, and rust brown quartz sands and gravels. The Potomac Formation pinches out along the northwestern edge of the site, so the thickness of the Potomac Formation is expected to be thin beneath the site. (Figure 10) (Reference 21,22)

The Precambrian age Wilmington Complex subcrops beneath the Columbia Formation along the northwestern border of the site and crops out approximately 0.1 mile north of the site. In the site area, the Wilmington Complex consists of norite, hypersthene-quartz-andesine gneiss, and noritic anorthosite. These crystalline basement rocks are often weathered to a depth of several tens of feet. The resulting regolith is as much as 70 feet thick in some areas, but only 20-50 feet just north of the site area (Figure 11). (Reference 22)

The Columbia Formation forms the water-table aquifer and is expected to be hydraulically connected with the Potomac Formation and the regolith of the Wilmington Complex. Because the Columbia Formation is only 10 feet thick in the study area, its use as an aquifer is limited. In addition, the potential for groundwater recharge at the site is limited. (Figure 12) (Reference 23)

The Potomac Formation is also thin and of little use as a source of groundwater in the vicinity of the site. (Reference 8)

The Wilmington Complex stores and transmits groundwater almost entirely within fractures; they only yield small quantities of groundwater, usually less than 10 gallons per minute. (Reference 24)

The groundwater beneath the site is expected to flow south toward an unnamed tributary of Brandywine Creek and to the northeast to Shellpot Creek.

4.2 Groundwater Targets

The potable water supply for the study area is supplied by the City of Wilmington. It utilizes two surface water intakes from the Brandywine River located approximately two miles northwest of the WMF. The intakes are both located above a dam two miles upstream of the confluence of the site tributaries and the Brandywine Creek. Other areas within the four-mile target distance are served by the Wilmington Suburban Water Corporation (WSWC) and the Artesian Water Company (AWC). WSWC utilizes surface water from three streams located outside

of the target distance, and AWC utilizes approximately 40 wells and purchased water from Wilmington, WSWC and New Castle City. Only one of AWC's wells is within the four-mile radius of the site. (Reference 25)

The location of the Amtrak site, along the Fall line (Figures 10, 11), where the Piedmont Province and the Coastal Plain meet, predetermines a scarcity of groundwater. Not only are the sedimentary strata thin, such as those of the Potomac and Columbia Formation, but the regolith of the Piedmont Province, which occurs just north of the facility, is not thick enough to produce much groundwater. (Reference 23)

The Delaware Water Use Data System (DWUDS) conducted a search for public and private wells within four miles of the Amtrak site. Only a handful of wells were found with four miles of the site. Approximately 24 private wells were found within that range and the closest private domestic well was two miles from the site. The closest public water supply wells are those of ICI Americas' Atlas Point Plant (public/industrial) and the Artesian Water Company's Collins Park well, both approximately four miles to the south. (Reference 26,27)

The Collins Park well was closed for some time due to Volatile Organic Compound contamination, which was not related to the Amtrak site. This well is now being aerated and is on line again. It provides water to approximately 3300 people in the water company service district. The wells serving the ICI plant are reported to be used only for industrial process water and do not provide drinking water to the facility. All these wells obtain their groundwater from the Potomac aquifer which has its recharge and subcrop area south of Wilmington, but not in the vicinity of the Amtrak site. The impact of the site on these wells seems very unlikely. Not only is this area not updip from these wells, but the Potomac aquifer is likely confined in that area. (Reference 8, 26)

The domestic wells are located in the Wilmington Complex rock north and west of the city. An estimated population of 69 are served by these wells. The nearest Wellhead Protection area, as defined by New Castle County ordinance is approximately 3.4 miles away to the south. (Reference 28)

4.3 Groundwater Sample Locations

Due to the lack of groundwater targets and the minimal potential for development of the area as a source of groundwater in the future, installation of monitoring wells and sampling of groundwater were not approved as part of the sampling workplan. It should be noted however, that groundwater at the site may be contaminated and serve as an ongoing source of contamination to surface water via discharge.

4.4 Groundwater Analytical Results

No groundwater samples were collected during this Site Inspection.

4.5 Groundwater Conclusions

The groundwater beneath the site is not used for a public water supply.

The Amtrak site is not a source for groundwater development for the following reasons: (1) The sediments below the site are very thin; the Columbia Formation sediments are less than ten feet thick, while the underlying Potomac Formation increases in thickness from the Fall line, which coincides with the Amtrak railroad tracks and northwest border of the property, from 0 to approximately 10-15 feet. (2) The regolith on the northwest boundary of the property has a maximum thickness of 20 feet and does not form a source of groundwater. (Reference 8)

The nearest public water supply wells are four miles to the south, and the Amtrak site is not believed to be a threat as a contamination source for these wells, because the wells are not downdip and the aquifer used is probably confined. (Reference 8)

Although there is likely groundwater discharge to surface water at the Amtrak site, it was not included in the sampling program for this Site Inspection.

5. SURFACE WATER PATHWAY

5.1 Hydrologic Setting

The relatively flat surface across the site precludes any significant site runoff. Puddling is common throughout the yard area indicating that overland runoff may be significant during periods of heavy precipitation. Most of the site lies in the area of 100-year floods as defined by the National Flood Insurance Program, 1991. (Figure 13) (Reference 29)

Excessive runoff apparently enters either Shellpot Creek, located on the northern border of the site, or a tributary of Brandywine Creek, which flows from east of the round house to its confluence with the Brandywine Creek. (Figure 4) The eastern tributary may also receive drainage from the Conrail property. In addition to the eastern ditch, there is a small unnamed tributary (#2) running between the WRF and the Atlas Sanitation Co. Subdivision Site on the western boundary of the property. Both sites are likely contributors of surface water to this tributary. The west and east tributaries converge in a pond at the southern end of the property, prior to entering the Brandywine Creek. A small ditch also drains the southern end of the marshy area between the Conrail access road and the Amtrak property. Drainage to this ditch may also be contributed by the cement and asphalt plants (Figure 4).

The National Wetlands Inventory indicates that most of the site is an unclassified man-modified area with a palustrine semi-permanent, impounded, open-water area along the eastern tributary (Figure 14). This tributary and the bordering marsh and wetland areas stretch approximately 2500 feet from the entrance to the Amtrak Maintenance Yard (where the access road crosses the tributary) to the southern end of the site (outlet pond). (Reference 30) Numerous areas of seepage and staining, indicating Probable Points of Entry (PPE) exist along the entire length of the tributary.

The western tributary is classified as a riverine excavated, lower perennial, open-water area and is about 2500 feet in length (Figure 14). Seeps and staining are also prevalent long this tributary. Both the Brandywine Creek and Christina River downstream from the site are lined with tidal mud flats, marshes and low marshes as shown in Figure 14. (Reference 30)

A small wetland approximtely one acre in size is located at the southern portion of the site between the railroad tracks and Twelfth Street. This wetland receives drainage from the site including both bordering tributaries and in turn drains into the Brandywine Creek. The obligate wetland plant, Typha sp., or Cattail, is present over a major portion of the border of the site. An obligate wetland plant is defined as one which 'occur almost always' (estimated probability >99%) in wetlands under natural conditions.

The 1994 Preliminary Assessment of Atlas Sanitation Co-Subdivision, Wilmington gives the following description of the probable groundwater to surfacewater discharge route of the adjacent Atlas site:

> "Surface runoff from the tributaries located on-site appears to be adversely impacted from leachate from polluted groundwater. The stained soils noted in the 1990, Environmental Audit and the strong petroleum odor at the 1993 trench sites show contamination of the soils to a depth of at least 13 feet. Groundwater flowing through the buried wastes and petroleum laden soils may leach out to the surface and contaminate the overland flow. Surface water coming from the Atlas Sanitation Site may be contributing to the non-point source pollution of the Brandywine Creek and Christina River". (Reference 31)

Both the eastern and western drainage ditches of the Amtrak site have a strong petroleum odor, which may be contributing to contamination further down stream. The distance from the pond, where the two drainage ditches converge to the Brandywine Creek is approximately 250 ft. The confluence of the Brandywine Creek and Christina River is approximately 3,500 ft from the site; the mouth of the Delaware River is 1.6 miles from the site (Figures 3 and 4).

A review of the 1992 Delaware Water Quality Inventory Report - Basin Assessments for the Christina River indicated several pollutants to be present in sediment and fish tissue. Lead, cadmium and zinc were noted above typical concentrations for sediments under the 1988 toxics screening program. Toxics found in tissue from channel catfish included aluminum, mercury, zinc, chromium, lead, dieldrin, DDD and DDE. Mercury, selenium, zinc and DDE were found in yellow perch. (Reference 32)

5.2 Surface Water Targets

The closest surface water pathway from the facility is the Brandywine Creek, which flows into the Christina River, a tributary to the Delaware River. (Figures 3 and 4) The annual mean flow in the Brandywine Creek, about 3.5 miles upstream from the site, is 491 cfs (cubic feet per second) for the water years 1974-1993 (Regulated, Unadjusted). The annual mean flow on the Delaware River, over a 60 year period, is 11,744 cfs gauged at Trenton, NJ. (Reference 33,34)

In the Division of Fish and Wildlife's 1986-1991 Final Report, "Streams and Inland Bays Fish Survey," the Brandywine Creek's non-tidal portions were found to support reproducing populations of bass and redbreast sunfish. The tidal portions of the Brandywine Creek and Christina River are utilized by several non-resident species for spawning and nursery habitat. Many species that use the Delaware River for spawning were found to reside in the tidal portions of the Christina River. The Delaware River north of the Chesapeake and Delaware Canal is becoming an important spawning and recreational fishing area for striped bass. (Reference 35,36)

DNREC published a report in 1994, titled: "Summary and Assessment of Striped Bass from the Delaware Estuary". It discusses previous reports on fish contamination (EPA, 1991a) and the U.S. Fish and Wild the Service study of 1991. The latter provided evidence of PCB contamination in striped bass, which is one of the key biological resources in the Estuary. As a result, DNREC conducted a pilot study of PCB contamination in the edible tissue of striped bass during 1991 and 1992. In 1992 and 1993, DNREC proceeded with a full scale investigation of the nature and extent of the contamination. The conclusion of the study was that the PCB's in recreational size striped bass from the spawning ground in the Delaware River near Wilmington exhibits a higher level of chlorination than the other size/location categories studies. Eating these fish poses a moderate to high cancer risk. (Reference 37)

Drinking water intakes are not present on the Brandywine Creek, Christina River or Delaware River downstream from the site, however, all three bodies of water are utilized extensively for recreational purposes. Canoeing, other types of recreational boating and fishing are some of the recreational uses of all three rivers.

5.3 Sensitive Environments and Endangered Species

The Delaware Division of Parks and Recreation has reviewed the Delaware Natural Heritage Inventory for species of concern along the Brandywine Creek, Christina River and Delaware River for the 15-mile target distance limit downstream of the site. According to the available information the federally endangered Peregrine Falcon (Falco peregrinus) nests on the Delaware Memorial Bridge, 4.1 miles from the site, and migrates through the area in search of food. The listed endangered Short-nosed Sturgeon (Acipenser brevirostrum) also spawns in the Delaware River and its tributaries. The Bur-marigold (Bidens bidentoides), a candidate plant species for the federally endangered species list, occurs in several areas near the town of New Castle and Pea Patch Island. (Reference 38)

The Delaware Natural Heritage Inventory also advised of the following species listed as endangered within the State. The closest species of concern are the Horned Pondweed (Zannichellia palustris), ranked S1 - extremely rare within the state, and the Arrowhead (Sagittaria calycina), ranked S2 - very rare within the state. Both species occur approximately 1400 feet downstream of the confluence of the Brandywine Creek and the Christina River, about one mile from the site. Other species of concern occurring within the 15-mile surface water pathway include the Southern Cattail (Typha domingensis) and River Bank Quillwort (Isoetes riparia), both ranked S1. (Reference 38)

Pea Patch Island and the Killcohook Wildlife Management Area are located with the 15-mile surface water pathway. Pea Patch Island is the largest multi-species heronry north of Florida and is considered one of Delaware's most important natural resources. The heronry is home to the Yellow Crowned Night Heron (Nyctanassa voilacea), Tricolored Heron (Egretta tricolor), and Snowy Egret (Egretta thula), all ranked S1B - extremely rare within the state, rare breeding. Also residing on the island are the S2B - very rare within the state, rare breeding Glossy Ibis (Plegadis falcinellis), Cattle Egret (Bubulcus ibis), Black Crowned Night Heron (Nycticorax nycticorax), Little Blue Heron (Egretta caerulea), Great Egret (Casmerodius albus) and Great Blue Heron (Ardea herodias). The southern portion of the island is also home to the S1 ranked Hooded Skullcap (Scutellaria galericulata). (Reference 38,39)

5.4 Surface Water Sample Locations

A total of fifteen surface water pathway media samples were collected, including eight surface water (AT-3 through AT-10) and seven sediment samples (AT-15 through AT-21). The sample locations are shown in Figures 7 and 8 and described in Tables 1 and 2. The surface water sampling locations were a tributary to Shellpot Creek; the upstream, midstream and downstream points on tributary #1 on the east side of the site; upstream and middle of tributary #2 on the west side; the ditch draining the cement plant and asphalt plant area; and the outlet pond at the south end of the site. A field duplicate was also taken at the pond. A sediment sample was collected at each of the surface water sampling locations.

5.5 Surface Water Analytical Results

Analytical results of the surface water sampling are shown in Tables 3 and 5.

Several inorganic analytes were detected in concentrations exceeding three times their background levels in one or more samples, including aluminum, iron, mercury, zinc and cyanide. Aluminum was detected in samples AT-5, AT-6, AT-7 and AT-8 in concentrations ranging from 747 ug/L to 1520 ug/l, no qualifiers, compared to the background sample AT-3 with a concentration of 136 ug/l, "[]" qualified. These samples all exceeded the Delaware Surface Water Quality Standard (DSWQS) of 87 ug/l for freshwater chronic exposure and three exceeded the DSWQS for Freshwater acute exposure (Reference 18). Sample AT-10 contained iron at 24,900 ug/l, "J" qualified, and mercury at 0.39 ug/l, no qualifiers, compared to 3680 ug/l, "J" qualified and "Not Detected" respectively in the background sample. Samples AT-4 and At-5 contained zinc at 35.1 ug/l and 31.4 ug/l respectively, no qualifiers and cyanide at 10.3 ug/l and 11.5 ug/l respectively, no qualifiers. Neither analyte was detected in the background sample.

Iron concentrations exceeded the Ambient Water Quality Criteria (AWQC) and the DSWQS for freshwater chronic exposure in all surface water samples. Concentrations ranged from 2070 ug/l to 24,900 ug/l (all "J" qualified) compared to the AWQC and DSWQS of 1000 ug/l. Lead was detected in samples AT-3, AT-4 and AT-5 at concentrations of 9.1 ug/l, 13.2 ug/l and 22.3 ug/l respectively, all "J" qualified, compared to the AWQC of 3.2 ug/l (hardness dependent). In addition, sample AT-5 ("J") also exceeded the Chemical Health Advisory Level for lead of 20.0 ug/l. Cyanide exceeded the AWQC of 5.2 ug/l in samples AT-4 and AT-5. Mercury also exceeded the AWQC and DSWQS of 0.012 ug/l in sample AT-10. (Reference 17,18,20)

Organic analysis of surface water samples at the Amtrak WRF site detected few TCL organic compounds. Background sample AT-3 contained 1 ug/l of chloroform and 1 ug/l of chlorobenzene, both "J" qualified. Sample AT-10 contained 10 ug/l of 2-methylnaphthalene, no qualifiers, and 2 ug/l chlorobenzene, 3 ug/l acenaphthene, 2 ug/l dibenzofuran and 4 ug/l fluorene, all "J" qualified. None of the compounds detected exceeded the applicable benchmarks. (Table 5)

A review of Tentatively Identified Compounds (TICs) indicated that sample AT-5 contained four unknown alkanes and AT-4 contained one unknown semivolatile. Sample AT-10 contained 22 TICs including six unknown alkanes, five unknown C2 naphthalenes, eight unknown C3 naphthalenes, one unknown C1 biphenyl, one unknown semivolatile and 1-methylnaphthalene. Detailed TIC data is included in the data validation package in Appendix ??.

The results of analysis of the sediment samples is presented in Tables 4 and 6. Inorganic analytes exceeding three times the background sample included arsenic in samples AT-16 (32.6 mg/kg, "L" qualified) and sample AT-20 (53.5 mg/kg, "L" qualified); copper in sample AT-16 (301 mg/kg, "J" qualified); iron in sample AT-20 (236,000 mg/kg, "J" qualified); lead in sample AT-16 (1040 mg/kg, no qualifiers); manganese in sample AT-20 (4710 mg/kg, "L" qualified) and cyanide in samples AT-16 and AT-17 (1.7 mg/kg and 1.2 mg/kg, no qualifiers).

Compounds exceeding the Risk Based Concentration (RBC) for Residential Soil were arsenic and manganese. Arsenic exceeded the RBC (residential-non carcinogen) of 23 mg/kg in samples AT-16, AT-19, AT-20 and AT-21 (32.6 mg/kg, 26.2 mg/kg, 53.5 mg/kg and 23.9 mg/kg, all "L" qualified, respectively). All sediment samples exceeded the RBC for both residential (0.37 mg/kg) and industrial (1.6 mg/kg) soil when considered as a carcinogen. Samples AT-15 (697 mg/kg, "L"), AT-16 (581 mg/kg, "L"), AT-18 (470 mg/kg, "L") and AT-20 (4710 mg/kg , "L") had manganese concentrations greater than the RBC (residential) of 390 mg/kg (Table 4). (Reference 19)

In addition, the lead concentration in sample AT-16 was 1040 mg/kg, in excess of the Chemical Health Advisory Level of 500 mg/kg. (Reference 20) Organic analysis of the sediment at the Amtrak WRF site indicated a number of organic compounds have been released to the surface water pathway. Review by the branch's Laboratory Specialist noted difficulties in the lab analysis. Due to excessive levels of total petroleum hydrocarbons in most of the sediment samples, the samples were extracted at a medium level resulting in very high detection levels for semivolatile TCL compounds. As a result, several of the detection levels may exceed the 10-6 risk based concentrations. (Reference 16,20)

The highest concentration of polynuclear aromatic hydrocarbons (PAH) detected in sediment samples at levels greater than three times the background level include 2-methylnaphthalene (AT-17, 45,000 ug/kg); acenaphthalene (AT-21, 24,000 ug/kg, "J" qualified); dibenzofuran (AT-21, 8100 ug/kg, "J" qualified); fluorene (AT-21, 33,000 ug/kg); phenanthrene (AT-21, 78,000 ug/kg); fluoranthene (AT-16, 4200 ug/kg, "J" qualified); pyrene (AT-16, 4800 ug/kg, "J" qualified); benzo(a)anthracene (AT-21, 3800 ug/kg, "J" qualified); chrysene (AT-21, 4000 ug/kg, "J" qualified) and benzo(b)fluoranthene (AT-21, 2500 ug/kg, "J" qualified). (Table 6)

Benzo(a)pyrene was found in background sample AT-15 at 500 ug/kg, "J" qualified and in sample AT-19 at 200 ug/kg, "J" qualified, both exceeding the Risk Based Concentration (RBC) for residential soil of 88 ug/kg. AT-15 also exceeded the RBC for industrial soil of 390 ug/kg. Dibenzo(a,h)anthracene was found in sample AT-15 (130 ug/kg, "J" qualified) above the RBC-residential of 88 ug/kg. Sample AT-21 contained benzo(a)anthracene and benzo(b)fluoranthene in excess of the RBC-residential (both 880 ug/kg). (Table 6) (Reference 19)

Pesticides detected included 4,4'-DDE (AT-21, 10 ug/kg, "J" qualified); endrin (AT-21, 490 ug/kg, "DJ" qualified); 4,4'-DDD (AT-21, 28 ug/kg, "J" qualified); endosulfan sulfate (AT-17, 260 ug/kg, "DJ" qualified); endrin ketone (AT-19, 12 ug/kg, "J" qualified) and endrin aldehyde (AT-21, 600 ug/kg, "DJ" qualified). (Table 6)

Although dieldrin was detected at the site less than three times the background level, it exceeded the RBC-residential of 40 ug/kg in two samples; AT-16 (68 ug/kg, "J" qualified) and AT-18 (62 ug/kg, "J" qualified). (Table 6) (Reference 19)

Polychlorinated biphenyls (PCBs) were detected in all sediment samples collected at the Amtrak site (Table 6). Samples AT-16 (30,000 ug/kg, "D" qualified), AT-18 (8500 ug/kg), AT-20 (8000 ug/kg, "DJ" qualified) and AT-21 (19,000 ug/kg, "DJ" qualified) had concentrations of Aroclor-1260 exceeding three times the background level of 1500 ug/kg. All seven samples exceeded the Risk Based Concentrations for both residential and industrial soils of 83 ug/kg and 370 ug/kg, respectively. Sample AT-16 also contained 6600 ug/kg, "DJ" qualified of Aroclor-1254 which also exceeded the RBC for residential and industrial soil. (Reference 19)

5.6 Surface Water Conclusions

Elevated concentrations of several inorganic and organic contaminants were indicated in the surface water pathway at the Amtrak WRF site. Surface water in the tributaries bordering and draining the site contained aluminum, zinc and cyanide above background levels.
Iron was detected in all surface water samples at levels well above the Ambient Water Quality Criteria (AWQC) for freshwater chronic exposure. Lead and cyanide

were also detected above the AWQC level in several samples from tributary #1, and lead exceeded the Chemical Health Advisory Level in one sample, also from tributary #1. (Reference 18,20)

Low levels of several organic compounds were detected in the surface water samples consisting of one volatile organic and four semivolatiles.

All sediment samples contained concentrations above the risk based benchmarks for arsenic as a carcinogen (both residential and industrial) while four of the samples exceeded the RBC values for residential soil as a non-carcinogen. Detected concentrations of lead exceeded the Chemical Health Advisory Level in one sample from tributary #1 and the manganese concentration was above the RBC-residential soil in four locations around the property. Cyanide concentrations from tributary #1 also exceeded the background concentration benchmark in two samples. (Reference 19,20)

Organic analysis of sediment samples indicated PCB contamination in all sample locations at levels above the RBC values for industrial soil. Previous soil sampling discussed earlier found significant PCB contamination at locations around the site. Site related PCB contamination is a likely source of the PCBs in the sediment. Numerous semivolatiles were detected at levels above the background benchmark, several of which exceeded the RBC values for residential soil. Sample matrix interference resulting in extremely high detection levels make it possible that sediment samples may contain significant levels of additional organic compounds. (Reference 16,19)

Detection of elevated concentrations of various inorganic and organic compounds, including lead, iron, copper, arsenic, pesticides and PCBs, indicate a release of contaminants to the surface water pathway from the site.

6. SOIL EXPOSURE AND AIR PATHWAYS

6.1 Physical Conditions

According to the U.S. Department of Agriculture, Soil Conservation Service, the site is located in the Othello-Fallsington-Urban land complex. It consists of poorly drained, nearly level Othello and Fallsington soils that have been used for residential, commercial, and industrial development. Much of it has been covered with as much as 18 inches of fill material. Although this unit has often been artificially drained, seasonal wetness and a high water table limit its suitability for building sites. (Figure 15) (Reference 40)

6.2 Soil and Air Targets

The soil exposure pathway could be limited to workers for Amtrak and trespassing adults and children. A total of 571 workers are located at the Amtrak Maintenance Facility, including the Refueling Facility. (Reference 6)

Approximate populations within one-half mile and one mile, respectively, of the site are 2800 and 12,660. Total population within four miles is 127,168 and the population of the City of Wilmington in 1990 was 71,529. (Reference 41)

The nearest school, Martin Luther King, Jr. Elementary, is located 2700 feet northeast of the site. It has a school population of 435 students and approximately 47 staff. Five schools fall within a one-mile radius of the site, totaling 3511 students and about 380 staff. Approximately 32,000 students attend

school within the four-mile target distance limit, along with 3500 staff members. (Reference 42)

The Delaware Natural Heritage Inventory has reviewed its database of species of special concern for the above site. Rare plant species occurring within about one-mile of the Amtrak Refueling Facility include the S1 ranked - extremely rare within the state - Horned Pondweed (Zannichellia palustris) and Bur Marigold (Bidens bidentoides) and the S2 ranked - very rare within the state - Parkers Pipewort (Eriocaulon parkeri), Walter Paspalum (Paspalum dissectum) and An Arrowhead (Sagittaria calycina). Also occurring historically within one-mile of the site are Sensitive Joint-Vetch (Aeshenomene virginica) and Tall Bur Marigold (Bidens vulgata), both ranked SH - historically known, expected to be rediscovered. (Reference 38)

6.3 Soil Sampling Locations

A total of four shallow soil samples (AT-11 through AT-14) were collected at the Amtrak site, including one background sample and one field duplicate (Figure 7, Tables 1 and 2). One soil sample was collected from the vicinity of the 250,000 gallon oil storage tank and abandoned coal dock, and the other was taken from the area between the engine house and the western tributary #2. The background sample came from near the baseball field at Anderson Park to the north and west of the site. Soil samples were collected from 3" to 12" below ground surface.

6.4 Soil Analytical Results

Soil sampling analytical results are shown in Tables 7 and 8. Inorganic analytes exceeding three times the background concentrations (listed with the highest concentration detected) included arsenic (AT-14, 31.4 mg/kg, "L"qualified); chromium (AT-13, 56.7 mg/kg), copper (AT-14, 172 mg/kg, "J" qualified), iron (AT-14, 71,000 mg/kg, "J" qualified), lead (AT-14, 650 mg/kg), mercury (AT-14, 0.56 mg/kg, "J" qualified), selenium (AT-12, 4.7 mg/kg, "L" qualified) and zinc (AT-14, 478 mg/kg, "J" qualified).

Lead was detected in sample AT-14 at a concentration of 650 mg/kg, in excess of the Chemical Health Advisory Level of 500 mg/kg. Arsenic was found in samples AT-12, AT-13 and AT-14 at concentrations of 28.2 mg/kg, 27.8 mg/kg and 31.4 mg/kg, respectively. All were "L" qualified and exceeded the Risk Based Concentration (RBC) for residential soil of 23 mg/kg when considered as a non-carcinogen. All samples including the background contained arsenic in excess of the RBC for both residential and industrial soil of 0.37 mg/kg and 1.6 mg/kg, when considered as a carcinogen. Beryllium was detected in AT-14 at 0.23 mg/kg "[]" and "L" qualified, above the RBC-residential level as a carcinogen.Sample AT-14 also contained manganese at 380 mg/kg, "L" qualified, just under the RBC-residential of 390 mg/kg. (Table 7) (Reference 19,20)

Organic analysis of the soil samples at the Amtrak site detected several organic compounds (Table 8). As with the sediment samples, as a result of the medium level extractions performed by the laboratory due to high concentrations of total petroleum hydrocarbons, semivolatile detection limits in the onsite samples were very high and exceeded the 10-6 RBC for some compounds. (Reference 16)

Compounds detected at levels greater than three times the background levels included ethylbenzene (AT-12R, 1700 ug/kg, "L" qualified), total xylenes (AT-12R, 900 ug/kg, "L" qualified), naphthalene (AT-12, 7000 ug/kg, "J" qualified), 2-methylnaphthalene (AT-12, 22,000 ug/kg), fluorene (AT-13, 4100 ug/kg, "J"

qualified), phenanthrene (AT-12, 9000 ug/kg, "J" qualified), pyrene (AT-13, 3400 ug/kg, "J" qualified), endosulfan I (AT-12, 16 ug/kg, "J" qualified), 4,4'-DDE (AT-12, 15 ug/kg, "J" qualified), endrin (AT-14, 220 ug/kg, "J" qualified), endosulfan sulfate (AT-12, 230 ug/kg, "J" qualified), endrin aldehyde (AT-14, 210 ug/kg, "J" qualified) and aroclor-1260 (AT-14, 7900 ug/kg, "J" qualified).

Aroclor-1260, a PCB found in sample AT-14, exceeded the Risk Based Concentration (RBC) for both residential and industrial soils, 83 ug/kg and 370 ug/kg respectively. Aroclor-1260 (230 ug/kg) and benzo(a)pyrene (240 ug/kg) were detected in background sample AT-11 at levels above the RBC-residential of 83 ug/kg and 88 ug/kg, respectively. (Reference 19)

6.5 Air Monitoring Results

No formal air sampling program was conducted at the Amtrak WRF. Air monitoring during sampling activities as part of the Health and Safety program utilized photoionization detectors (HNu) and combustible gas indicators (CGI). No measurements above background levels were detected.

6.6 Soil Exposure and Air Pathway Conclusion

Soil sampling analysis for inorganic analytes detected four that were present in all three site samples (including the field duplicate) above the benchmark of three times the background concentration; arsenic, copper, lead and selenium. Sample AT-14 from the west side of the site contained lead at a concentration above the Chemical Health Advisory Level. Arsenic exceeded the risk based benchmark for industrial soil as a carcinogen in all samples, and as a non-carcinogen when compared to the risk based concentration for residential soil in the on-site samples. Beryllium was also detected in one soil sample above the risk based concentration value for residential soil. (Reference 19,20)

As discussed previously, matrix interference in the organic samples due to total petroleum hydrocarbons resulted in very high detection limits, some of which were greater than the 10-6 risk based concentrations. Several polynucleated aromatic hydrocarbons (PAH) and volatile organics were found in on-site soil samples well above background levels, as well as five pesticides and pesticide breakdown products. The PCB aroclor-1260 was found in sample AT-14 greater than the risk based concentration for industrial soil. One PAH and one PCB were also detected in the background sample above the RBC for residential soil. (Reference 16)

Even considering the high detection levels, sample analysis indicates considerable contamination of on-site soils as a result of historical site activities. Several of these contaminants including lead, iron, copper, arsenic, pesticides and PCBs were detected in on-site soil samples as well as in the sediment or surface in the bordering tributaries. Additional sampling would be required at this site to definitively assess the soil pathway at the Amtrak WRF, but based on this limited sampling, the soil pathway may pose a significant threat to on-site persons due to the contamination in the shallow soil. In addition, the site may continue to be a source of contamination to the surface water pathway as evidenced by the visible oily seeps and discharges along the tributaries.

7. SUMMARY AND CONCLUSIONS

This Site Inspection at the Amtrak Wilmington Refueling Facility was conducted to collect necessary data to evaluate the potential threat to human health and

the environment. Information was compiled to identify potential target populations and environmental resources and to determine potential pathways.

The Amtrak Wilmington Refueling Facility is a portion of a 85 acre active railyard. The approximately 20 acre site is utilized for the servicing and fueling of diesel locomotives and for temporary storage of wrecked and damaged railcars. Past operations included the supplying of coal for steam engines.

Amtrak holds a NPDES permit for surface water run-off in Shellpot Creek and a tributary of the Brandywine Creek. In addition, Amtrak holds a small quantity

EPA Hazardous Waste Permit, and a large quantity RCRA permit. It is not considered a treatment, storage, and disposal facility.

Amtrak has been the subject of a several previous investigations including two preliminary assessments. In addition, numerous property soil samples were collected and analyzed between June, 1980, and January, 1984, by two private firms. As a result, approximately 10,000 cubic yards of PCB contaminated soils were removed from "hot spots" in the yard.

An on-site reconnaissance in March, 1993, showed visible soil contamination over a large area mostly devoid of vegetation. Many areas show signs of stained soil around the fueling center and along the rail spurs, possibly from spills and leakage from damaged railcars and past operations.

It is evident from sampling and analysis that contamination by organic and inorganic compounds is present as a result of past site activities. Polycyclic Aromatic Hydrocarbons, Polychlorinated Biphenyls, metals and waste oils are present in significant amounts both in the ground and in the surface water drainage canals located on the northeast and southwest borders of the site. Contaminants including lead, copper, iron, arsenic, pesticides PAHs and PCBs were detected well above background levels in sediments and/or surface water samples and may be attributed to on-site soil contamination. Analytical problems due to sample matrix interference resulting in very high detection limits make it likely that additional compounds may be present in significant quantities.

The potential for migration of these site contaminants to the Brandywine Creek and Christina River is high due to their presence in bordering surface water and sediments and the short pathway distance to the receiving streams. Additional sampling of the surface water pathway will be necessary to fully evaluate this impact.

Soil contamination at the site is significant and provides a potential current and future risk to on-site workers and trespassers, as well as a continuing source of contamination to the surface water pathway via sub-surface seepage and surface runoff and discharge.

Based upon these findings, the Superfund Branch of DNREC strongly recommends that further action/investigation occur at the Amtrak facility.

REFERENCES

1. United States Department of the Interior Geological Survey, 7.5 Minute Topographic Quadrangle Maps: Wilmington South, DEL.-N.J., Wilmington North, DEL.-PA.

2. United States Department of Commerce, National Oceanic and Atmospheric Administration, Climatological Data, Annual Summary of Maryland and Delaware, 1992, Volume 96, Number 13.

3. United States Department of Commerce, Climatic Atlas of the United States, 1983, (pp. 48, 63)

4. Amtrak Wilmington Maintenance Facility Informational Booklet, July, 1993.

5. Amtrak Wilmington Maintenance Facility Emergency Action Plan, January 1, 1993.

6. Amtrak Wilmington Maintenance Facility Spill Prevention Control and Countermeasure Plan.

7. NUS Corporation - Superfund Division, Preliminary Assessment of Wilmington Amtrak Railyard - Maintenance Facility, EPA No. DE-170, Contract No. 68-01- 7346, February 23, 1989.

8. Delaware Department of Natural Resources and Environmental Control, Superfund Branch, Preliminary Assessment of Amtrak Wilmington Refueling Facility, DE-266, February, 1993.

9. Delaware Department of Natural Resources and Environmental Control, Division of Water Resources, National Pollutant Discharge Elimination System Permit DE 0050962, Wilmington Amtrak Maintenance Facility.

10. Woodward-Clyde Consultants, Concentration of PCBs in Soils Collected at the Wilmington Maintenance Facility, Wilmington, Delaware, Sample Data June/July, 1980.

11. Canberra/Radiation Management Corporation, Results of Oil and Grease and PCB determinations on Soil Samples obtained at the Amtrak Wilmington Maintenance Facility, Sample Data June 23 and 24, 1982.

12. Canberra/Radiation Management Corporation, Results of PCB Analysis Performed on Soil Samples Collected from Amtrak's Wilmington Maintenance Facility, Sample Data November 4, 14, 1983, December, 1983 through January, 1984.

13. Delaware Department of Natural Resources and Environmental Control, Preliminary Assessment of the Wilmington Train Yard, DE-159, August, 1987.

14. Amtrak WRF (DE-266) Site Inspection Sampling Activity Field Notebook, Books 1 & 2, DE DNREC, November 30, 1993.

15. Amtrak WRF (DE-266) Site Inspection Re-sampling Event Field Notebook, Book 1 of 1, DE DNREC, January 13, 1994.

16. Memorandum from R. Schulte to L. Jones, Review of Amtrak Data, August 1, 1994.

17. Water Quality Criteria Summary, U.S. EPA, Ecological Risk Assessment Branch, Washington, D.C, May 1, 1991.

18. State of Delaware Surface Water Quality Standards, Delaware Department of Natural Resources and Environmental Control, February 26, 1993.

19. Risk-Based Concentration Table, Third Quarter 1994, U.S. EPA, Technical Support Section, Philadelphia, PA. July 11, 1994.

20. Table 4, Inorganic Data Validation Report, U.S. EPA, Quality Assurance Branch, Annapolis , MD., March 10, 1994.

21. Woodruff, K.D., and A.M. Thompson, Geology of the Wilmington, Delaware Area, Geologic Map Series No. 4, Delaware Geological Survey, 1975.

22. Christopher, M.J., and K.D. Woodruff, Thickness of Regolith in the Delaware Piedmont, Open File Report No. 19, Delaware Geological Survey, 1982.

23. Petty, S., W.D. Miller and B.A. Lanan, Potential for Groundwater Recharge in the Coastal Plain of Northern New Castle County, Delaware, Open File Report No. 28, Delaware Geological Survey, December 1983.

24. Sundstrom, R.W., and T.E. Pickett, The Availability of Groundwater in New Castle County, Delaware, University of Delaware, Water Resources Center, July, 1971.

25. WATER 2020, Public Water Supply Systems of New Castle County, Water Resources Agency for New Castle County, March, 1989, Volume 1.

26. Delaware Water Use Data System (DWUDS), Data on groundwater wells located within a four-mile radius of the Amtrak WRF., January, 1994.

27. Community/Non-transient Non-community Water Supply Lists, Delaware Division of Public Health, DHSS, May 17, 1993.

28. Water Resource Protection Areas for City of Newark, City of Wilmington, New Castle County, Delaware, 1993, Map 1 of 3.

29. Flood Insurance Rate Map, City of Wilmington, Delaware, New Castle County, Community Panel Number 100028 0005 C, Federal Emergency Management Agency (FEMA), August 19, 1991.

30. National Wetlands Inventory Map, United States Department of the Interior, Fish and Wildlife Service, Wilmington South, DE. Quadrangle.

31. Delaware Department of Natural Resources and Environmental Control, Superfund Branch, Preliminary Assessment of Atlas Sanitation Company Subdivision, (DE-280), March 1994.

32. Delaware Department of Natural Resources and Environmental Control, 1992 Water Quality Inventory 305(b) Report, Volume II, Basin Assessment Report for the Christina River.

33. Water Resources Data: Maryland and Delaware, Water Year 1993, Volume 1, Surface Water Data, U.S. Geological Survey, MD-DE-93-1.

34. Telecomm. R. Fromuth, Delaware River Basin Commission to L. Jones, Mean Annual Streamflow on the Delaware River at Trenton, March 2, 1994.

35. Delaware Department of Natural Resources and Environmental Control, Division of Fish and Wildlife, Stream and Inland Bays Fish Survey, February 1986 - April 1991, Summary.

36. Telecomm. C. Shirey, DE DNREC Div. of Fish and Wildlife to L. Jones, Fisheries on the Delaware River, February 3, 1994.

37. Delaware Department of Natural Resources and Environmental Control, Summary and Assessment of Polychlorinated Biphenyls and Selected Pesticides in Striped Bass from the Delaware Estuary, March 1994.

38. Memorandum, A. Dalton, Delaware Natural Heritage Inventory, to L. Jones, Water Migration Routes, April 4, 1994.

39. Fleming, L., Delaware's Outstanding Natural Area and Their Preservation, Delaware Nature Education Society, Hockessin, Delaware 1978, pp. 150-54.

40. Soil Survey, New Castle County, Delaware, U.S. Department of Agriculture, Soil Conservation Service, October, 1970.

41. Population Estimations: from 1990 Census Data, D. Wolf (DNREC), J. Cherry (DDO), and M. Raley (DELDOT) using the ATLAS program and database of the Delaware Development Office.

42. Racial and Ethnic Report - Pupil Enrollment, State Board of Education and Department of Public Instruction, September 1993.

43. Discharge Monitoring Report Data for Amtrak Wilmington Refueling Facility NPDES discharges 001, 002A, 003, 004, 005, 006, from Delaware Department of Natural Resources and Environmental Control, Division of Water Resources, August 28, 1994.

LJJ:dw
LJJ94056.wp
DE-266 II-A3

LIST OF FIGURES

Figure 1. Location of the
Amtrak Wilmington Refueling Facility
New Castle County, Delaware

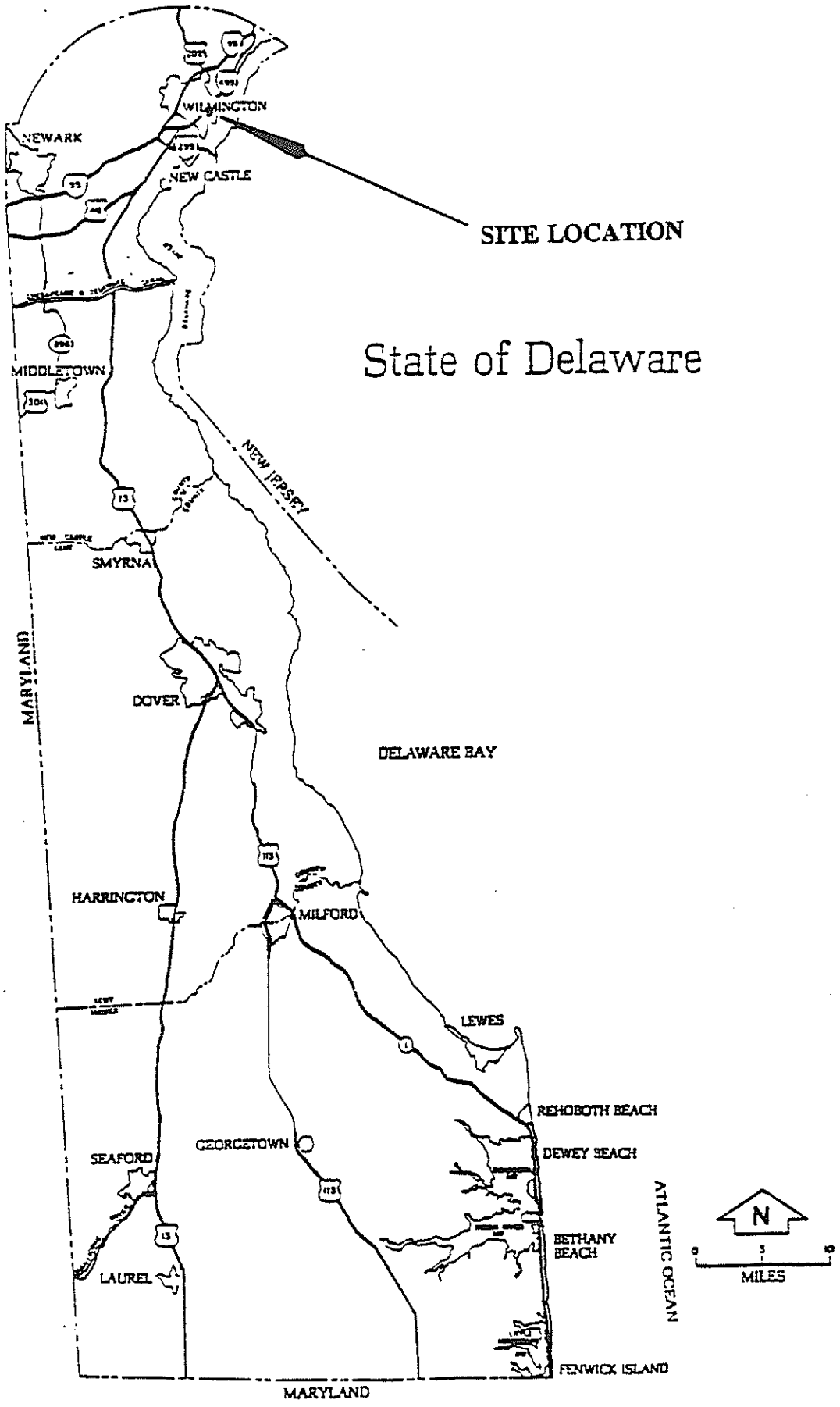


Figure 2. Location of the
Amtrak Wilmington Refueling Facility
New Castle County, Delaware

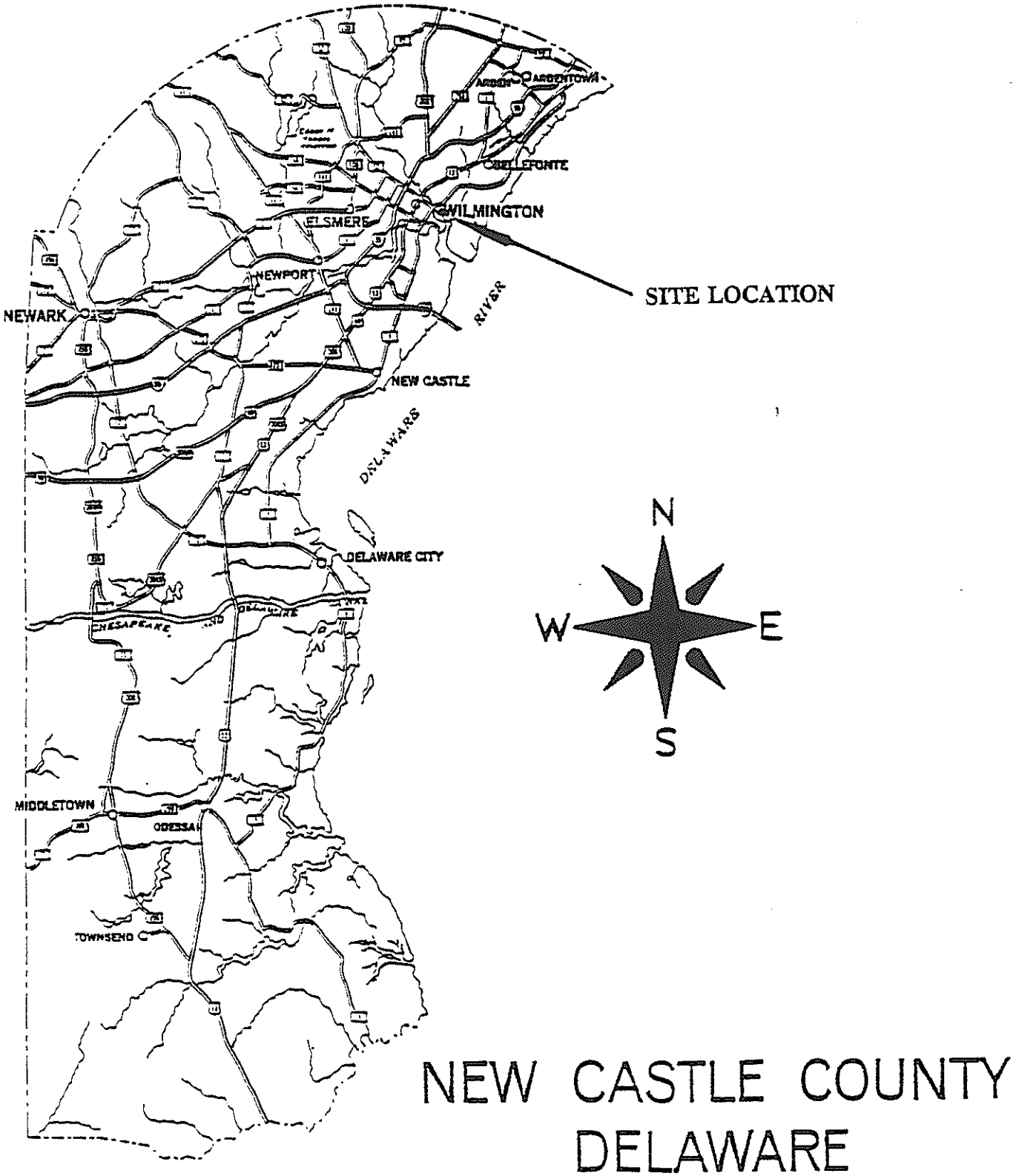


Figure 3. Location of the Amtrak Wilmington Refueling Facility New Castle County, Delaware

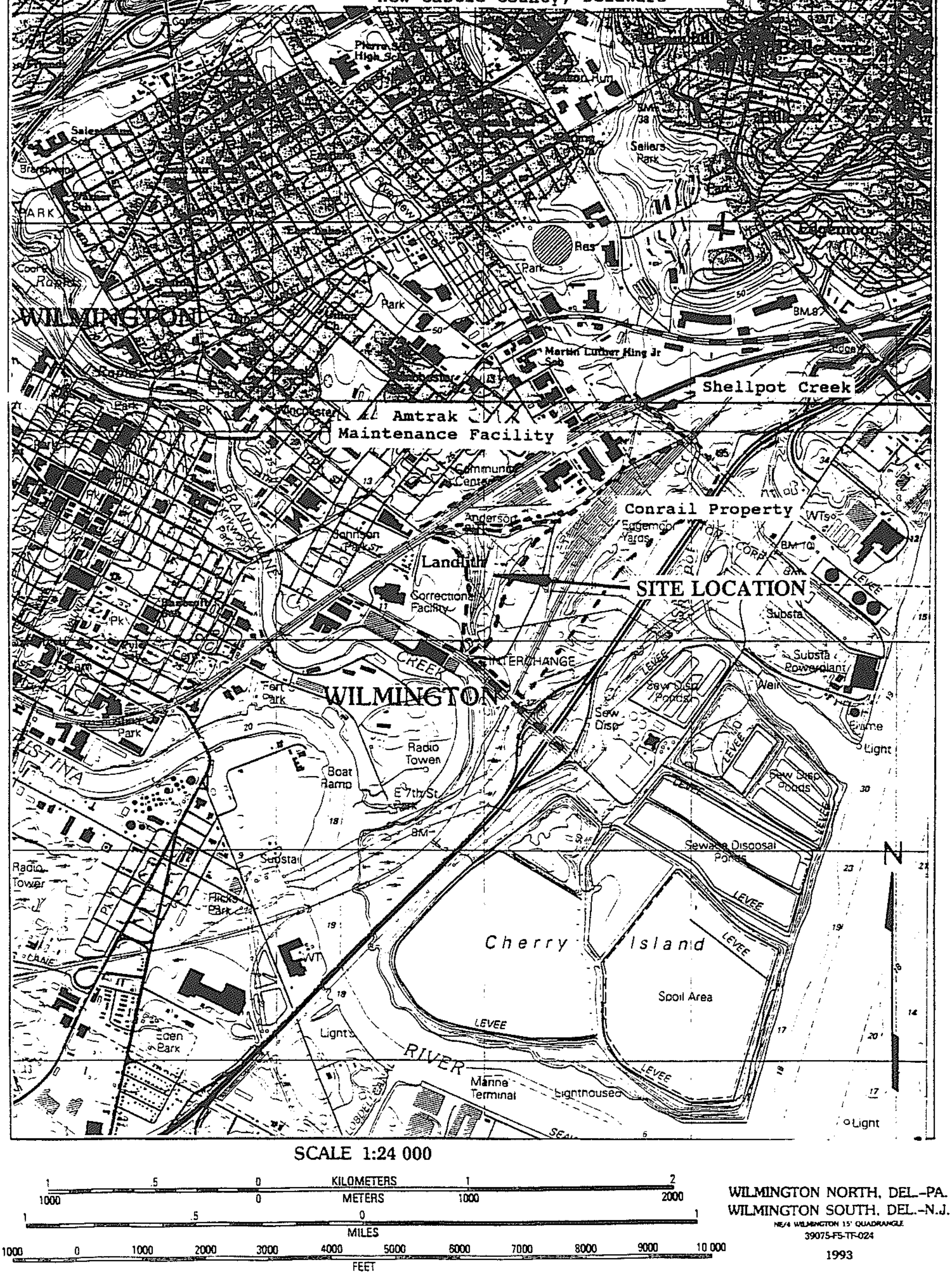
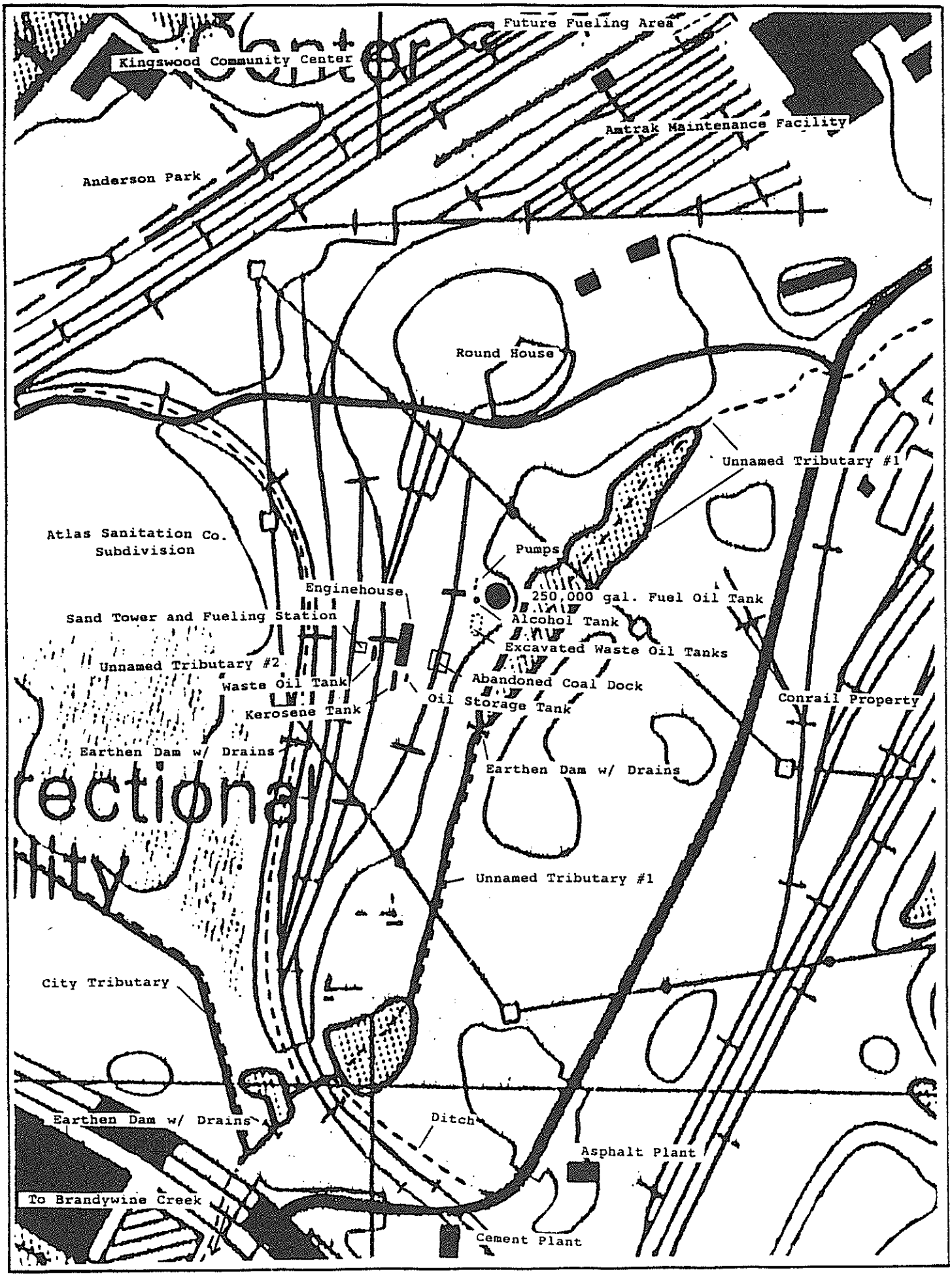


Figure 4. Detailed Site Map of the Amtrak Wilmington Refueling Facility



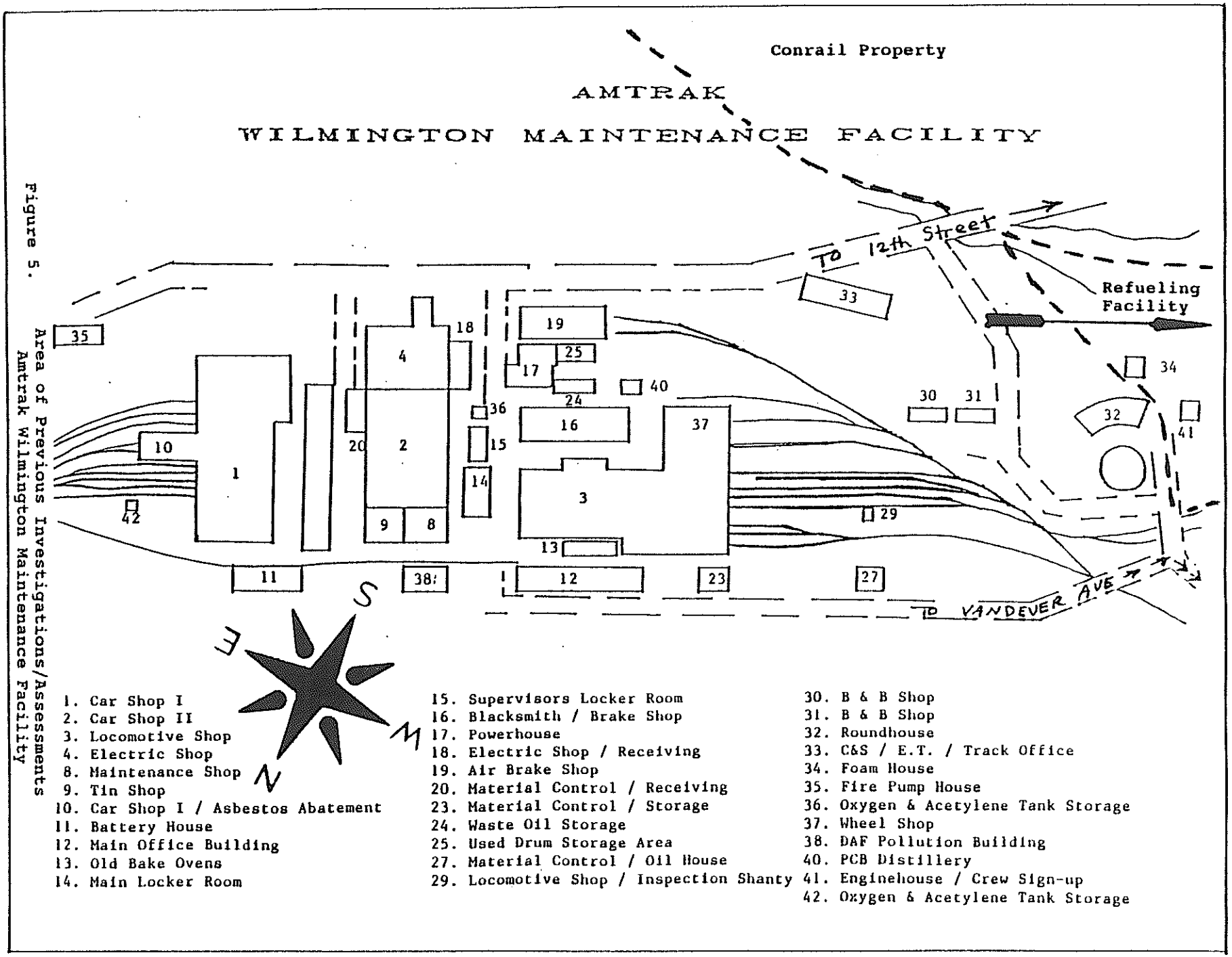


Figure 5. Area of Previous Investigations/Assessments
Amtrak Wilmington Maintenance Facility

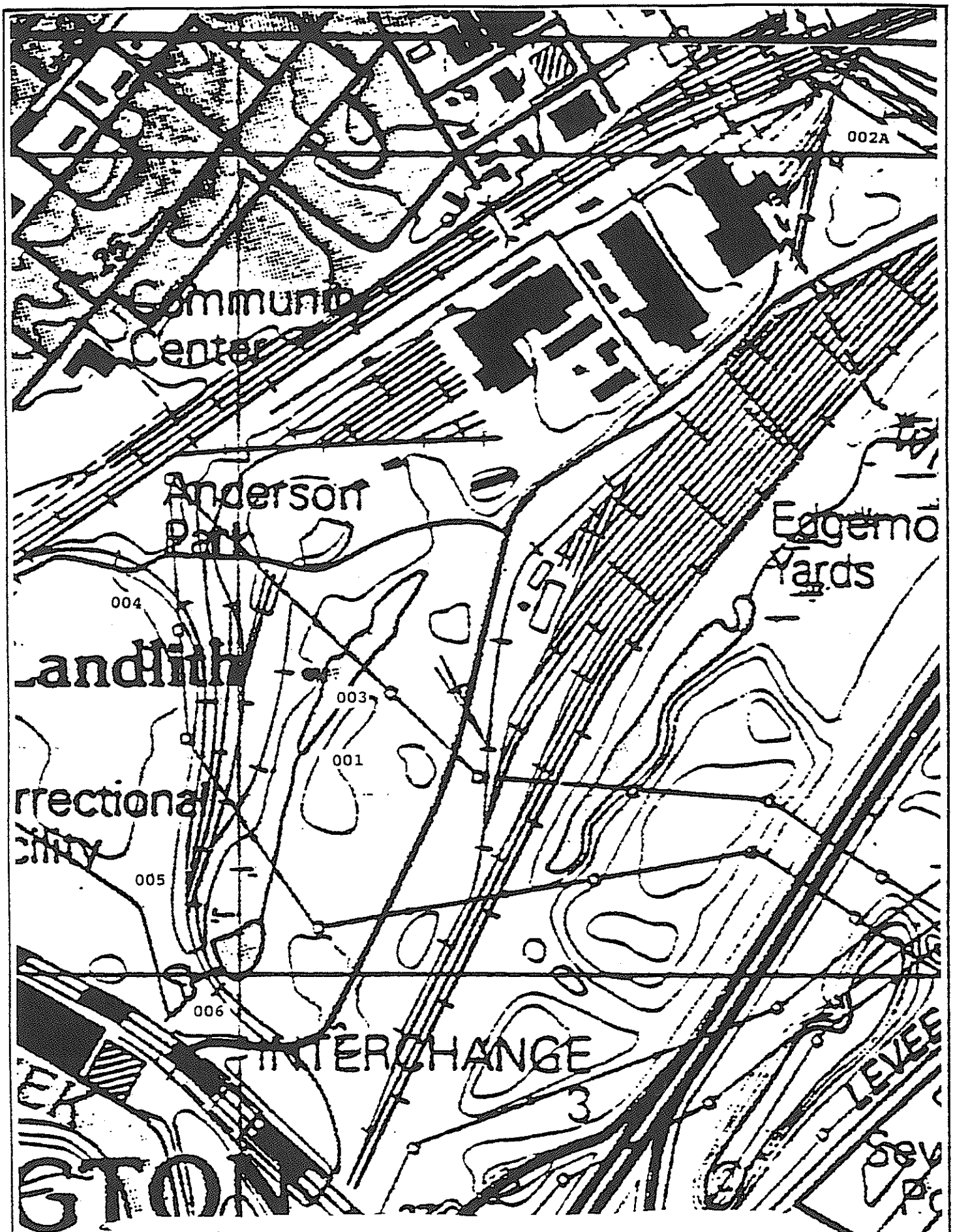


Figure 6. National Pollution Discharge Elimination (NPDES) Monitoring Points

Figure 7. Sample Location Map of the Amtrak Refueling Facility

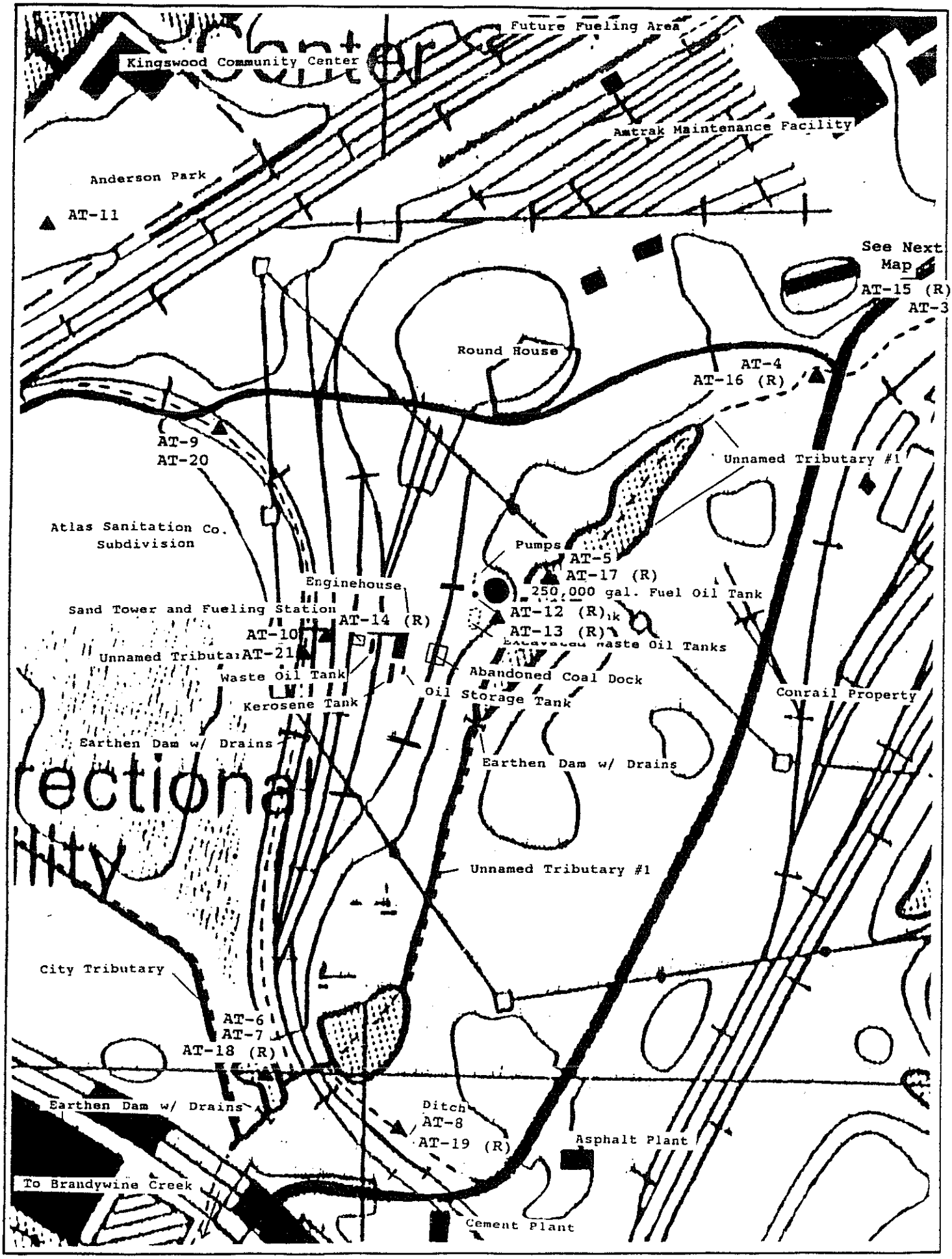


Figure 8. Sample Location Map of the Amtrak Refueling Facility

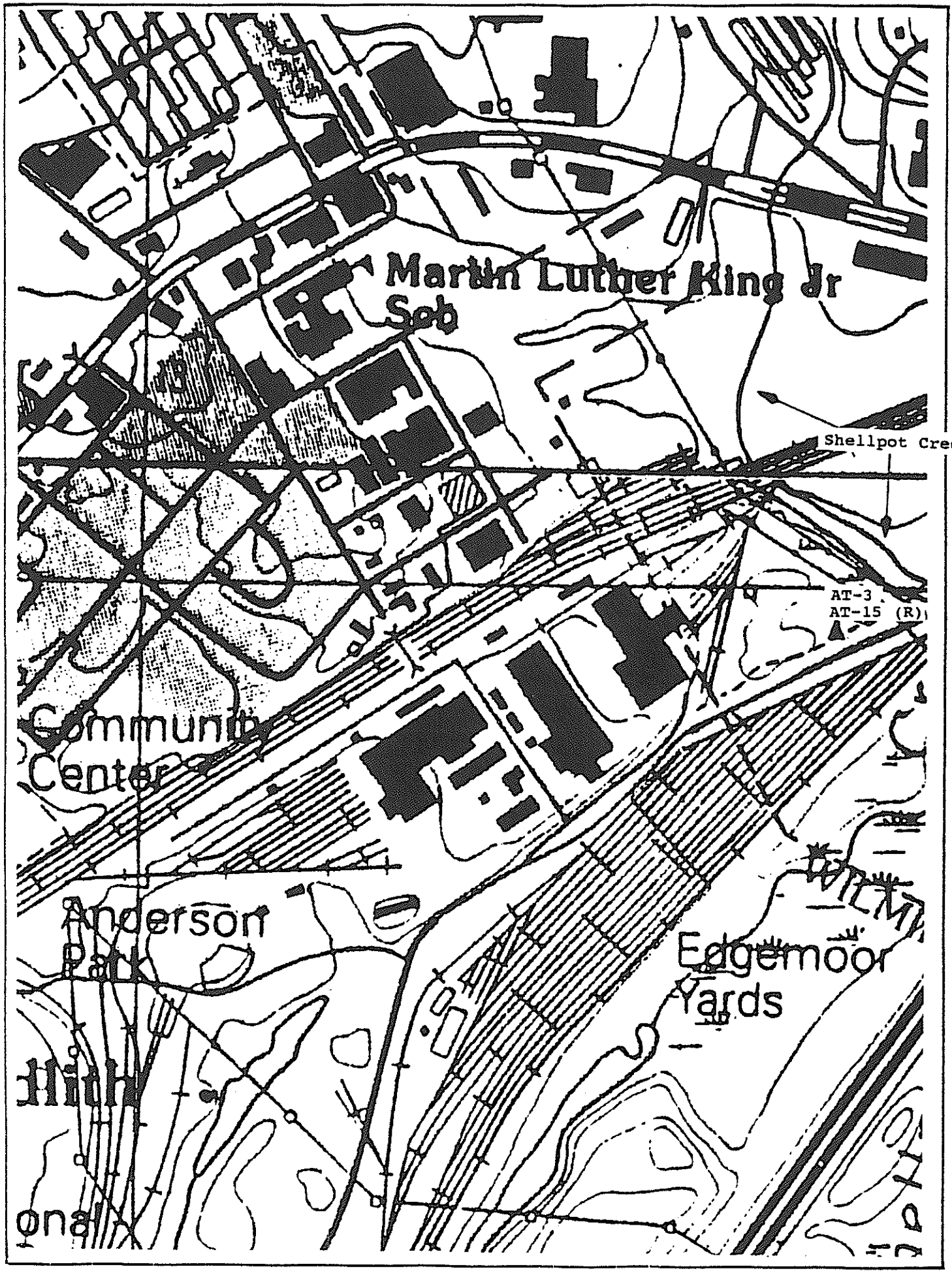
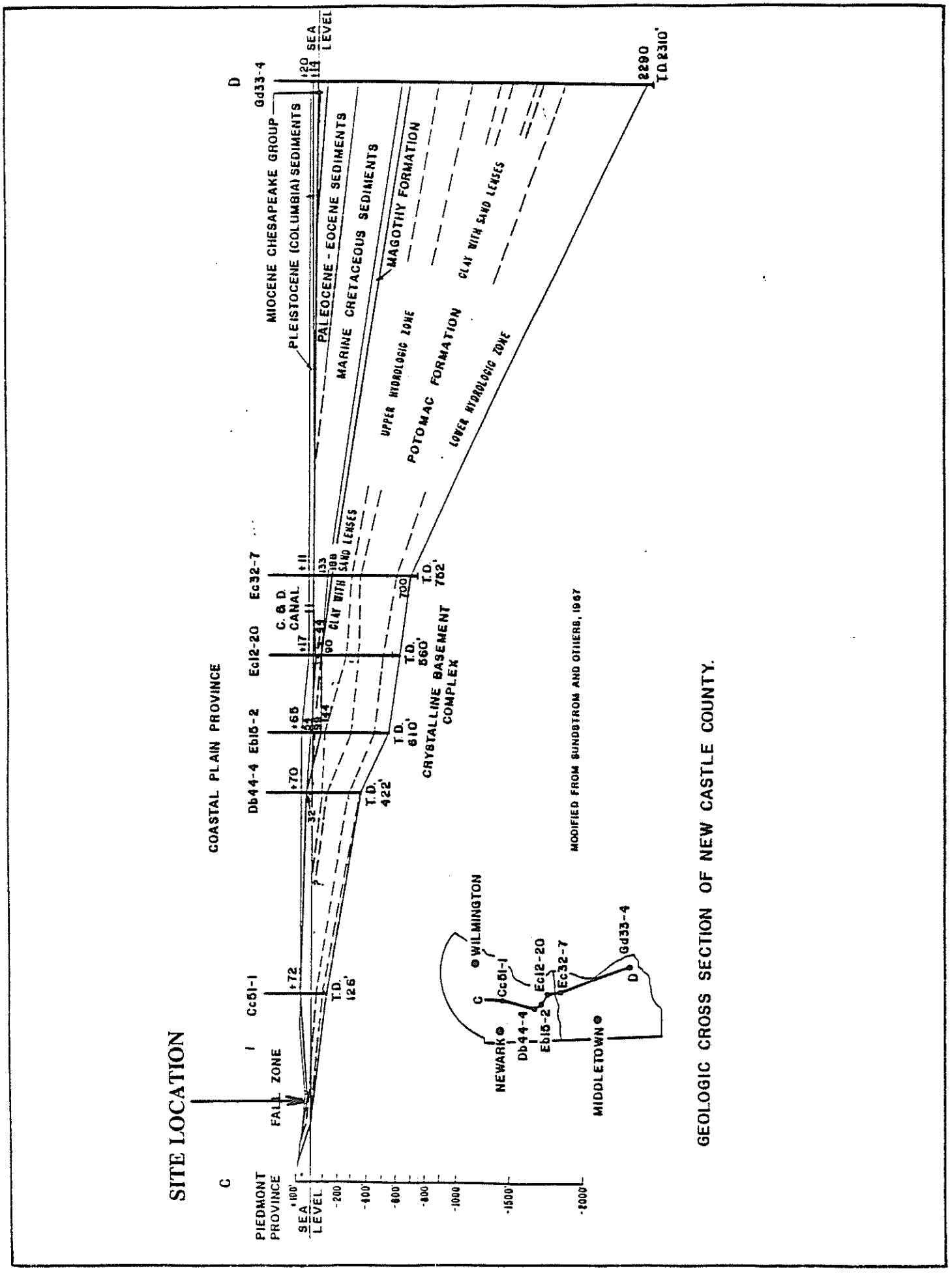


Figure 9.
Thickness of the Quaternary Sediments (Feet) (from Geology of the Wilmington Area, Delaware, Woodruff, K.D. and A.M. Thompson, Delaware Geological Survey, 1975)

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

Figure 10. Geologic Cross Section of New Castle County, Delaware



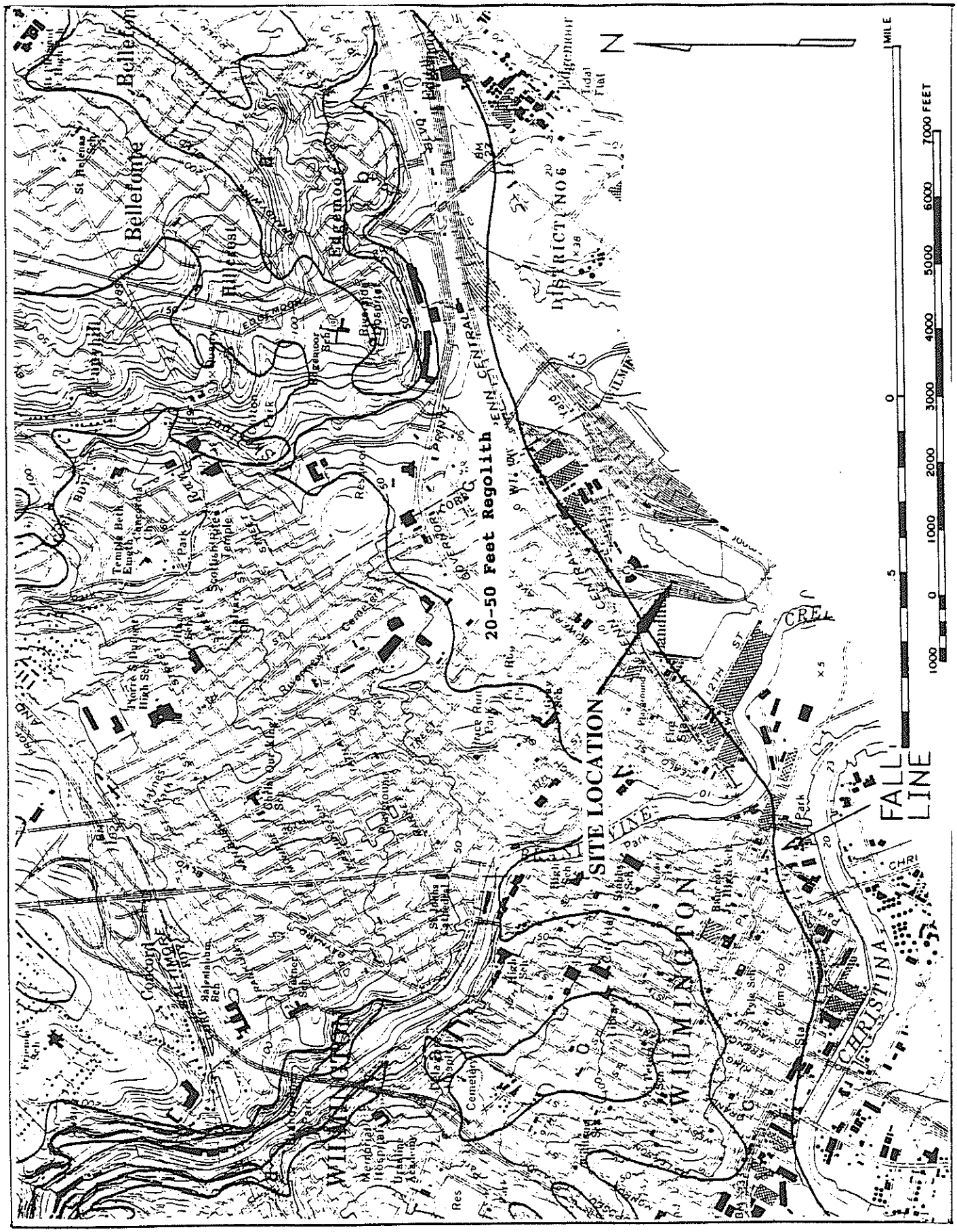


Figure 11.
Thickness of the Regolith in the Delaware Piedmont (from Christopher, M.J. and K.D. Woodruff, Delaware Geological Survey, 1982)

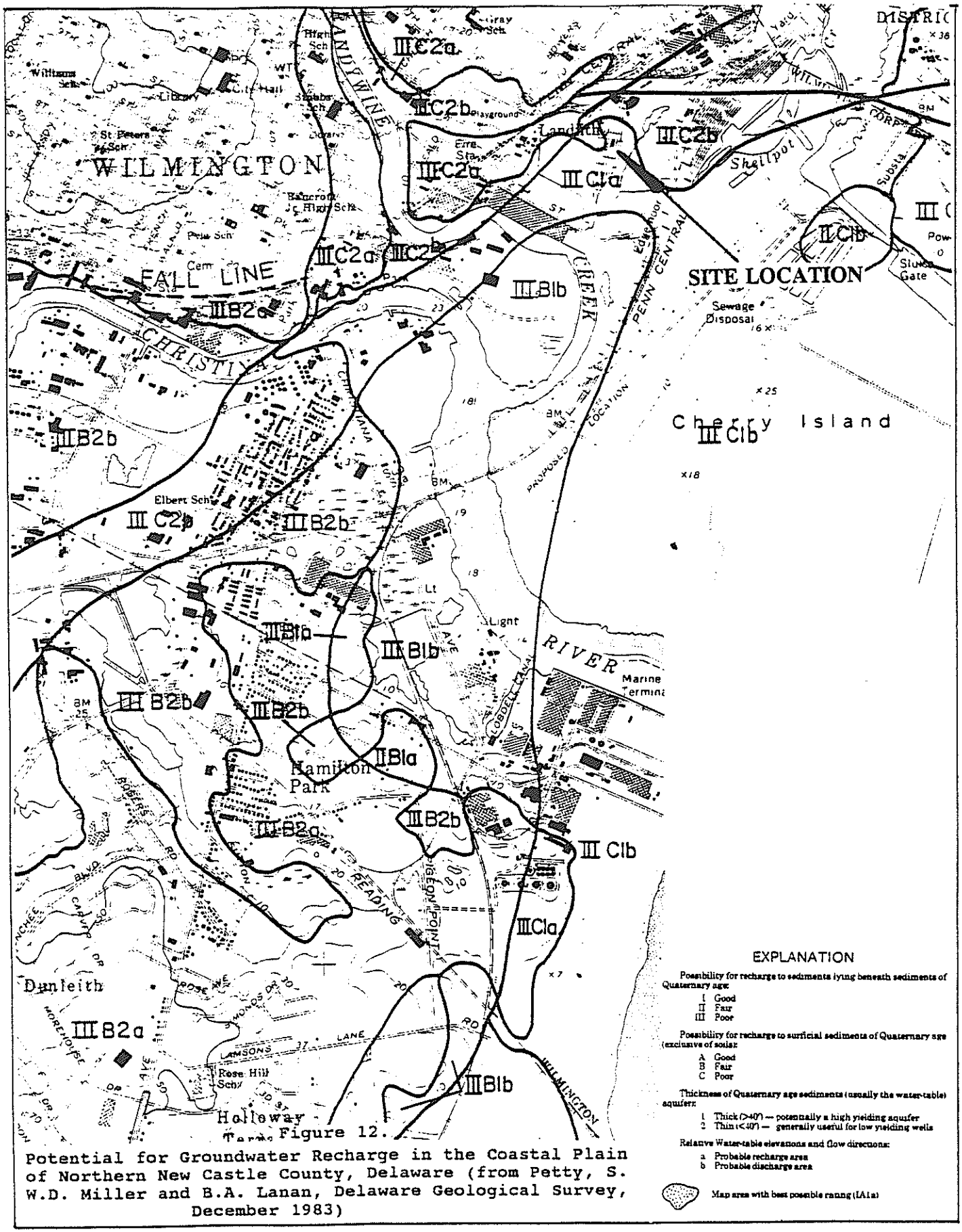
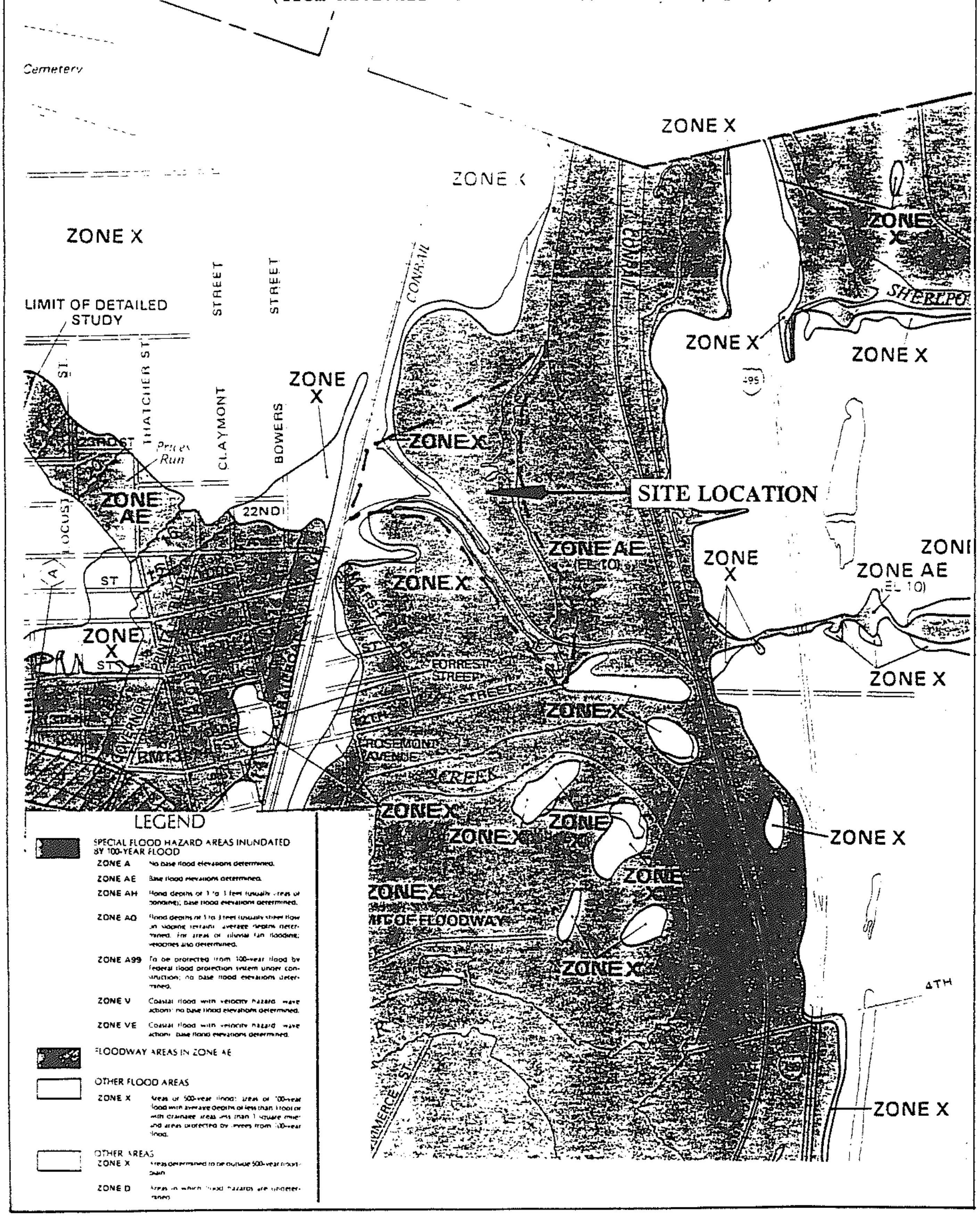


Figure 12. Potential for Groundwater Recharge in the Coastal Plain of Northern New Castle County, Delaware (from Petty, S. W.D. Miller and B.A. Lanan, Delaware Geological Survey, December 1983)

Figure 13. Flood ...
(from National ... Program, 1991)



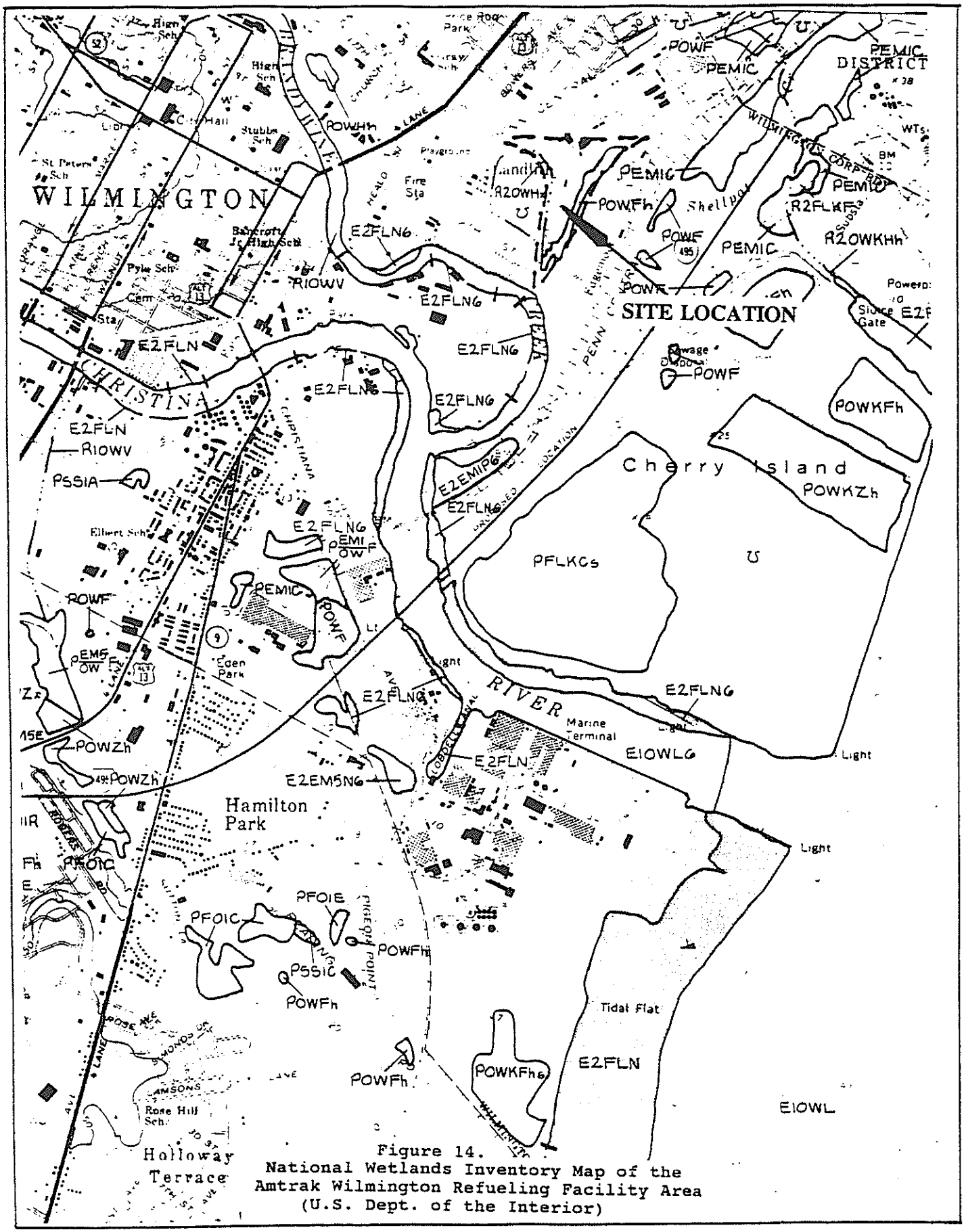
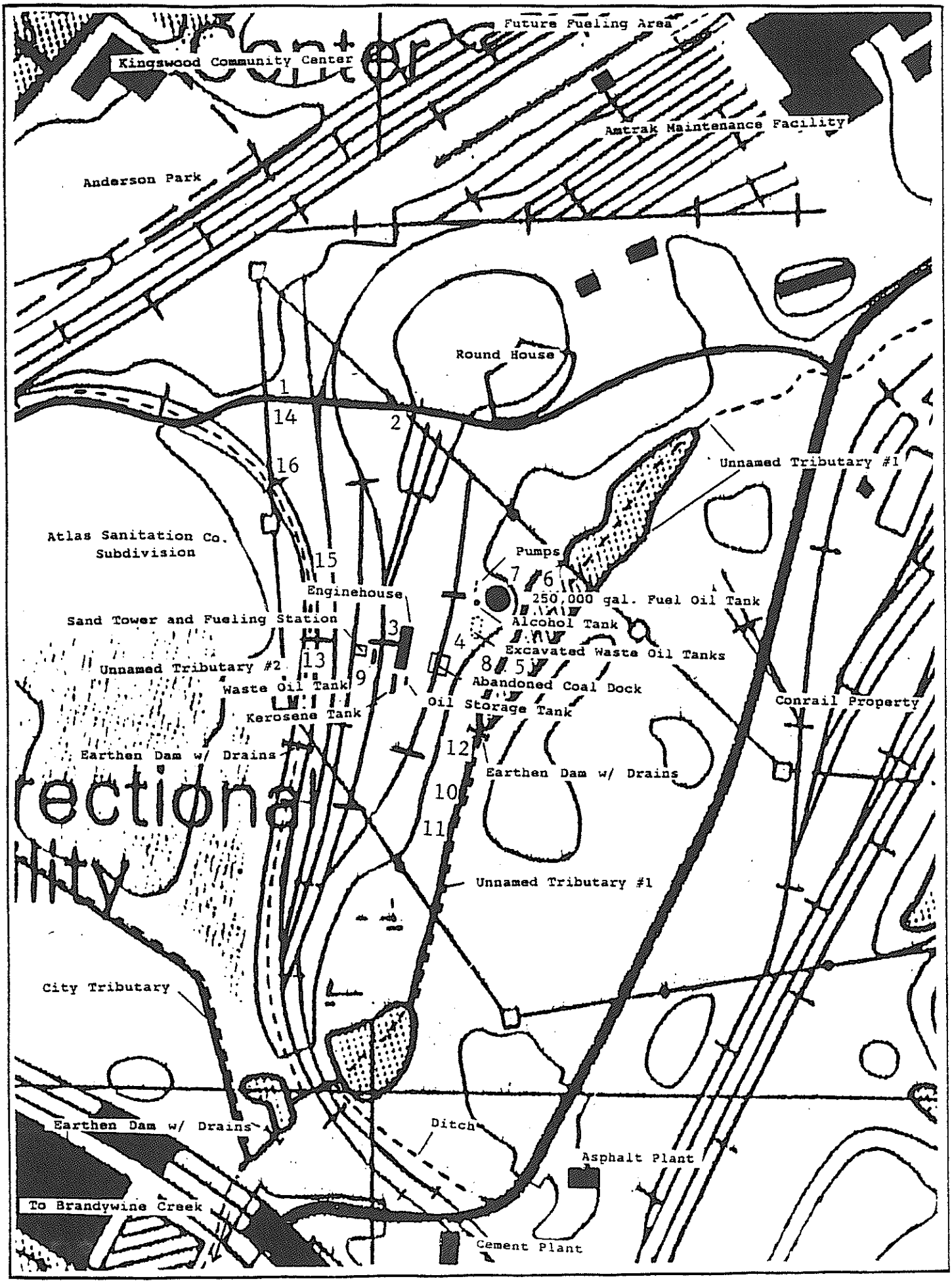


Figure 14.
National Wetlands Inventory Map of the
Amtrak Wilmington Refueling Facility Area
(U.S. Dept. of the Interior)

Figure 15.
Soils Map of the Amtrak Wilmington Refue...
(SCS, U.S. Dept. of Agriculture)

Figure 16. Photo Location Map of the Amtrak Refueling Facility



Site Inspection Report
Amtrak Wilmington Refueling Facility
December, 1994

LIST OF TABLES

TABLE 1. AMTRAK WILMINGTON REFUELING FACILITY SAMPLE IDENTIFICATION SAMPLE IDENTIFICATION# AND RATIONALE – INORGANIC 11–30–93

S.I. Sample #	Lab Sample #	Sample Location #	Time	Sample Type	Description/Objective
AT–2	DT–3977	– – –	1420	Aqueous – Rinsate Blank	Equipment Rinsate Blank
AT–3	DT–3978	SW #1	1327	Aqueous – Surface Water	Trib. #1 Background
AT–4	DT–3979	SW #2	1235	Aqueous – Surface Water	Trib. #1 Upstream
AT–5	DT–3980	SW #3	1212	Aqueous – Surface Water	Trib. #1 Middle
AT–6	DT–3981	SW #4	1003	Aqueous – Surface Water	Trib. #1 & 2 Pond Downstream
AT–7	DT–3982	SW #4	1005	Aqueous – Surface Water	Trib. #1 & 2 Pond – Field Duplicate of DT–3981
AT–8	DT–3983	SW #5	1120	Aqueous – Surface Water	Trib. #1 Ditch
AT–9	DT–3984	SW #6	1320	Aqueous – Surface Water	Trib. #2 Upstream
AT–10	DT–3985	SW #7	1415	Aqueous – Surface Water	Trib. #2 Middle
AT–11	DT–3965	SS #1	1130	Soil – Shallow	Off–Site Background
AT–12	DT–3966	SS #2	0952	Soil – Shallow	East Side Refueling Area
AT–13	DT–3967	SS #2	0952	Soil – Shallow	East Side Refueling Area – Field Duplicate of DT–3966
AT–14	DT–3968	SS #3	1030	Soil – Shallow	West Site Refueling Area
AT–15	DT–3969	SD #1	1346	Sediment	Trib. #1 Background
AT–16	DT–3970	SD #2	1246	Sediment	Trib. #1 Upstream
AT–17	DT–3971	SD #3	1240	Sediment	Trib. #1 Middle
AT–18	DT–3972	SD #4	1025	Sediment	Trib. #1 & 2 Pond Downstream
AT–19	DT–3973	SD #5	1131	Sediment	Trib. #1 Ditch
AT–20	DT–3974	SD #6	1340	Sediment	Trib. #2 Upstream
AT–21	DT–3975	SD #7	1431	Sediment	Trib. #2 Middle

LJL00594.wk3

TABLE 2. AMTRAK WILMINGTON REFUELING FACILITY
IDENTIFICATION # AND RATIONALE – ORGANIC
11–30–93 (Unless Noted)

S.I. Sample #	Lab Sample #	Sample Location #	Time	Sample Type	Description/Objective
AT–2	930–3977	– – –	1420	Aqueous – Rinsate Blank	Equipment Rinsate Blank
AT–3	930–3978	SW #1	1327	Aqueous – Surface Water	Trib. #1 Background
AT–4	930–3979	SW #2	1235	Aqueous – Surface Water	Trib. #1 Upstream
AT–5	930–3980	SW #3	1212	Aqueous – Surface Water	Trib. #1 Middle
AT–6	930–3981	SW #4	1003	Aqueous – Surface Water	Trib. #1 & 2 Pond Downstream
AT–7	930–3982	SW #4	1005	Aqueous – Surface Water	Trib. #1 & 2 Pond – Field Duplicate of DT–3981
AT–8	930–3983	SW #5	1120	Aqueous – Surface Water	Trib. #1 Ditch
AT–9	930–3984	SW #6	1320	Aqueous – Surface Water	Trib. #2 Upstream
AT–10	930–3985	SW #7	1415	Aqueous – Surface Water	Trib. #2 Middle
AT–11	930–3965	SS #1	1130	Soil – Shallow	Off–Site Background
AT–12	930–3966	SS #2	0952	Soil – Shallow	East Side Refueling Area
AT–13	930–3967	SS #2	0952	Soil – Shallow	East Side Refueling Area – Field Duplicate of DT–3966
AT–14	930–3968	SS #3	1030	Soil – Shallow	West Site Refueling Area
AT–15	930–3969	SD #1	1346	Sediment	Trib. #1 Background
AT–16	930–3970	SD #2	1246	Sediment	Trib. #1 Upstream
AT–17	930–3971	SD #3	1240	Sediment	Trib. #1 Middle
AT–18	930–3972	SD #4	1025	Sediment	Trib. #1 & 2 Pond Downstream
AT–19	930–3973	SD #5	1131	Sediment	Trib. #1 Ditch
AT–20	930–3974	SD #6	1340	Sediment	Trib. #2 Upstream
AT–21	930–3975	SD #7	1431	Sediment	Trib. #2 Middle
AT–12R	9400190	SS #2	1010	Soil – Shallow	East Side Refueling Area – VOA Resample 1–13–94
AT–13R	9400191	SS #2	1010	Soil – Shallow	East Side Refueling Area – Field Duplicate of 9400190
AT–14R	9400192	SS #3	1215	Soil – Shallow	West Site Refueling Area – VOA Resample 1–13–94
AT–15R	9400193	SD #1	0910	Sediment	Trib. #1 Background – VOA Resample 1–13–94
AT–16R	9400194	SD #2	0940	Sediment	Trib. #1 Upstream – VOA Resample 1–13–94
AT–17R	9400195	SD #3	1342	Sediment	Trib. #1 Middle – VOA Resample 1–13–94
AT–18R	9400196	SD #4	1115	Sediment	Trib. #1 & 2 Pond Downstream – VOA Resample 1–13–94
AT–19R	9400197	SD #5	1145	Sediment	Trib. #1 Ditch – VOA Resample 1–13–94

I.JI.01205.wk3

TABLE 3. SURFACE WATER SAMPLING ANALYTICAL RESULTS FOR INORGANIC ANALYTES, AMTRAK WRF

Sample Number:	DT3977	DT3978	DT3979	DT3980	DT3981	DT3982	DT3983	DT3984	DT3985	Ambient
Location:	Equipment Blank AT-2	Trib. #1 SW-1 Background AT-3	Trib. #1 SW-2 Upstream AT-4	Trib. #1 SW-3 Midstream AT-5	Trib. #1 & 2 Exit SW-4 AT-6	Trib. #1 & 2 Exit SW-4 AT-7	Trib. #1 Ditch SW-5 AT-8	Trib. #2 SW-6 Upstream AT-9	Trib. #2 SW-7 Midstream AT-10	Water Quality Criteria Freshwater Chronic
Type:										
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum		[136]	[96.6]	747	1430	1520	1150	[67.2]	[48.3]	87 *
Antimony								[3.7] UL		p/30/
Arsenic		[3.7] K	[1.6] K			[2.1]		[2.1] L	[2.6] L	III 190
Barium		295	9.9	[78.0]	[50.7]	[46.5]	[51.1]	344	352	
Beryllium										5.3 LOEL
Cadmium										1.1
Calcium	[17.7]	46000	43500	21600	14900	14800	22100	72700	87900	
Chromium										III-210+ VI 11.0
Cobalt										
Copper										12
Iron		3680 J	2080 J	2290 J	2390 J	2470 J	2070 J	6580 J	24900 J	1000
Lead	[1.8] J	9.1 J	13.2 J	22.3 J						3.2+
Magnesium		14100 J	12200 J	[4960] J	5560 J	5550 J	5000 J	31000 J	24200 J	
Manganese		328	227	235	119	122	125	553	924	
Mercury									0.39	0.012
Nickel										160+
Potassium										
Selenium	[1.1]									5.0
Silver	[7.0]									0.12
Sodium		62100	27600	11500	7440	7720	12000	46000	51900	
Thallium										40
Vanadium										
Zinc	[5.3]		35.1	31.4						10
Cyanide			10.3	11.5						5.2

J = Analyte present. Reported value may not be accurate or precise.
[ ] = Analyte present. As values approach the IDL, the quantitation may not be accurate.
K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.
* = Delaware Surface Water Quality Standards, as amended, February 26, 1993
p/?/ = Proposed criterion
+ = Hardness dependent
LOEL = Lowest Observed Effect Level

TABLE 4. SEDIMENT SAMPLING ANALYTICAL RESULTS FOR INORGANIC ANALYTES, AMTRAK WRF

Sample Number:	DT3969	DT3970	DT3971	DT3972	DT3973	DT3974	DT3975	Risk-Based	Risk-Based
Location:	SD-1 AT-15 Background	SD-2 AT-16 Upstream	SD-3 AT-17 Midstream	SD-4 AT-18 Exit	SD-5 AT-19 Ditch	SD-6 AT-20 Upstream	SD-7 AT-21 Midstream	Concentration Residential Soil	Concentration Industrial Soil
Type:								7-11-94	7-11-94
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	21800	16400	3940	17300	7070	4890	3890	230,000 *	1,000,000 *
Antimony		[17.6]	[9.5]	[7.7]	[2.6]	[24.5]	[12.3]	31	410
Arsenic	10.0 L	32.6 L	11.6 L	14.6 L	26.2 L	53.5 L	23.9 L	23 n 0.370	310 n 1.6 c
Barium	209	366	152	207	94.3	602	292	5500	72000
Beryllium								0.15	0.67
Cadmium								39	510
Calcium	4640	14000	1740	3230	41600	43400	2490		
Chromium	56.7	89.0	25.4	92.7	36.9	23.6	27.2	III 78000, VI 390	IV 1,000,000, VI 5100
Cobalt	[13.9]	[17.7]	[4.6]	[15.0]	[4.6]	[8.1]	[5.5]	4700	61000
Copper	97.7 J	301 J	53.0 J	132 J	51.7 J	109 J	217 J	2900	38000
Iron	35000 J	74900 J	16100 J	39400 J	16300 J	236000 J	40300 J		
Lead	162	1040	366	452	108	135	470		
Magnesium	3810 J	5420 J	[466] J	3360 J	4580 J	[2870] J	[564] J		
Manganese	697 L	581 L	97.7 L	470 L	269 L	4710 L	291 L	390	5100
Mercury	0.59 J							23	310
Nickel	33.2	43.4	[9.5]	39.5	16	[24.7]	[16.0]	1600	20000
Potassium									
Selenium					3.3 L			390	5100
Silver								390	5100
Sodium		[1750] J				[3590] J			
Thallium						[1.8]		6.3 - 7.0	82 - 92
Vanadium	70.5	81.4	20.1	65.3	20.9	[12.3]	38.7	550	7200
Zinc	312 J	758 J	93.8 J	539 J	122 J	919 J	303 J	23000	310000
Cyanide		1.7	1.2					1600 (FREE)	20,000 (FREE)

J = Analyte present. Reported value may not be accurate or precise.
[ ] = Analyte present. As values approach the IDL, the quantitation may not be accurate.
K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.
* = Risk Based Concentration Tables, 4-20-94.

TABLE 5. SURFACE WATER SAMPLING ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS
AMTRAK WRF

Sample Number:	9303977	9303978	9303979	9303980	9303981	9303982	9303983	9303984	9303985	Ambient
Location:	EQUIPMENT BLANK AT-2	TRIB #1 SW-1 BACKGROUND AT-3	TRIB #1 SW-2 UPSTREAM AT-4	TRIB #1 SW-3 MIDSTREAM AT-5	TRIB #1-2 SW-4 EXIT AT-6	TRIB #1-2 SW-4 EXIT-FIELD DUPL AT-7	TRIB #1 SW-5 DITCH AT-8	TRIB #2 SW-6 UPSTREAM AT-9	TRIB #2 SW-7 MIDSTREAM AT-10	Water Quality Criteria - Freshwater Chronic
Type:										
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	7 J									
Chloroform		1 J								1240
Chlorobenzene		1 J							2 J	
2-Methylnaphthalene									10	
Acenaphthene									3 J	520
Dibenzofuron									2 J	
Diethylphthalate	1 J									
Fluorene									4 J	
Bis(2-Ethylhexy)phthalate	62									

J = Analyte present. Reported value may not be accurate or precise.

TABLE 6. SEDIMENT SAMPLING ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS, AMTRAK WRF

Sample Number Location Type Units	9303969 SD-1 BACKGROUND TRIB. #1 AT-15 ug/kg	9303970 SD-2 UPSTREAM TRIB. #1 AT-16 ug/kg	9303971 SD-3 MIDSTREAM TRIB. #1 AT-17 ug/kg	9303972 SD-4 EXIT TRIB. #1-2 AT-18 ug/kg	9303973 SD-5 DITCH TRIB. #1 AT-19 ug/kg	9303974 SD-6 UPSTREAM TRIB. #2 AT-20 ug/kg	9303975 SD-7 MIDSTREAM TRIB. #2 AT-21 ug/kg	Risk-Based Concentration Residential Soil 7-11-94 ug/kg	Risk-Based Concentration Industrial Soil 7-11-94 ug/kg
2-Butanone	28 J					100			
Naphthalene					77 J			3,100,000	41,000,000
2-Methylnaphthalene			45000				24000 J	4,700,000	61,000,000
Acenaphthylene					85 J		8100 J		
Dibenzofuran						360 J		63,000,000	820,000,000
Diethylphthalate							33000	3,100,000	41,000,000
Fluorene		4100 J	2200 J		250 J	290 J	78000		
Phenanthrene	460 J	18000 J	490 J		95 J			23,000,000	310,000,000
Anthracene					590 J	440 J		3,100,000	41,000,000
Fluoranthene	1200 J	4200 J			500 J	350 J		2,300,000	31,000,000
Pyrene	890 J	4800 J						16,000,000	200,000,000
Butylbenzylphthalate	110 J				290 J		3800 J	880	3900
Benzo(a)anthracene	440 J				380 J	240 J	4000 J	88000	390,000
Chrysene	660 J				430 J	250 J	2500 J	880	3900
Benzo(b)fluoranthene	770 J				240 J	160 J	970 J	8800	39000
Benzo(k)fluoranthene	560 J				200 J			88	390
Benzo(a)pyrene	500 J				170 J			880	3900
Indeno(1,2,3-cd)pyrene	490 J							88	390
Dibenz(a,h)anthracene	130 J								
Benzo(g,h)perylene	120 J							40	180
Dieldrin	27 J	68 J		62 J			10 J	1900	8400
4,4'-DDE						110 J	490 DJ	23000	310000
Endrin						22 J	28 J	2700	12000
4,4'-DDD			260 DJ						
Endosulfan Sulfate					12 J				
Endrin Ketone			180 DJ				600 DJ		
Endrin Aldehyde						11 J	7.6 J	490	2200
alpha-Chlordane	60 J	54 L	47 J					490	2200
gamma-Chlordane	51 J			33 J				83	370
Aroclor-1254		6600 DJ		1900 J				83	370
Aroclor-1260	1500	30000 D	3500 DJ	8500	920	6000 DJ	19000 DJ		

J = Analyte present. Reported value may not be accurate or precise.
L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.
D = Extracted sample was diluted.

TABLE 7. SOIL SAMPLES ANALYTICAL RESULTS FOR INORGANIC ANALYTES, AMTRAK WRK

Sample Number:	DT3965	DT3966	DT3967	DT3968	Risk-Based	Risk-Based
Location:	SS-1 Background AT-11	SS-2 East AT-12	SS-2 East AT-13	SS-3 West AT-14	Concentration Residential Soil	Concentration Industrial Soil
Type:					7-11-94	7-11-94
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	11400	3300	3120	6140	230,000 *	1,000,000 *
Antimony				[8.9]	31	410
Arsenic	7.5 L	28.2 L	27.8 L	31.4 L	23 n 0.37 c	310 n 1.6 c
Barium	62.5	118	132	146	5500	72000
Beryllium	[0.11] L			[0.23] L	0.15	0.67
Cadmium					39	510
Calcium	1380	1610	1680	[1280]		
Chromium	18.8	44.4	56.7	27.8	III 78000, VI 390	III 1,000,000, VI 5100
Cobalt	[5.5]	[8.5]	[6.1]	[8.8]	4700	61000
Copper	13.8 J	85.4 J	90.4 J	172 J	2900	38000
Iron	16000 J	19300 J	17200 J	71000 J		
Lead	72.5	298	319	650		
Magnesium	1630 J	[371] J	[337] J	[244] J		
Manganese	208 L	71.4 L	64.3 L	380 L	390	5100
Mercury				0.56 J	23	310
Nickel	[9.1]	[12.3]	15.6	18.7	1600	20000
Potassium						
Selenium		4.7 L	4.0 J	2.2 L	390	5100
Silver					390	5100
Sodium				[1040] J		
Thallium			[0.62]		6.3 - 7.0	82 - 92
Vanadium	32.0	29.0	29.7	45.7	550	7200
Zinc	47.3 J	109 J	116 J	478 J	23000	310000
Cyanide					1600 (FREE)	20000 (FREE)

J = Analyte present. Reported value may not be accurate or precise.

[ ] = Analyte present. As values approach the IDL, the quantitation may not be accurate.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

* = Risk Based Concentration Tables, 4-20-94.

1JL00394.wk3

TABLE 8. SOIL SAMPLING ANALYTICAL RESULTS FOR ORGANIC COMPOUNDS
AMTRAK WRF

Sample Number	9303965	9303966	9303967	9303968	9400190	9400191	9400192	Risk-Based	Risk-Based
Location	SS-1 BACKGROUND AT-11	SS-2 EAST AT-12	SS-2 EAST FIELD DUPL. AT-13	SS-3 WEST AT-14	SS-2 (VOAS) EAST AT-12 R	SS-2 (VOAS) EAST AT-13 R	SS-3 (VOAS) WEST AT-14R	Concentration Residential Soil	Concentration Industrial Soil
Type								7-11-94	7-11-94
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
Ethylbenzene					1700 L			7,800,000	100,000,000
Total Xylenes					900 L			160,000,000	1,000,000,000
Naphthalene		7000 J	4400 J					3,100,000	41,000,000
2-Methylnaphthalene		22000							
Fluorene			4100 J					3,100,000	41,000,000
Phenanthrene	130 J	9000 J	6000 J						
Fluoranthene	440							3,100,000	41,000,000
Pyrene	380 J		3400 J					2,300,000	31,000,000
Benzo(a)anthracene	250 J							880	3900
Chrysene	300 J							88000	390,000
Benzo(b)fluoranthene	310 J							880	3900
Benzo(k)fluoranthene	220 J							8800	39000
Benzo(a)pyrene	240 J							88	390
Indeno(1,2,3-cd)pyrene	170 J							880	3900
Dibenzo(a,h)anthracene	40 J							88	390
Endosulfan I		16 J	15 J					470,000	6,100,000
4,4'-DDE		15 J	13 J					1900	8400
Endrin				220 J				23000	310,000
Endosulfan Sulfate		230 J	79 J						
4,4'-DDT	5 J							1900	8400
Endrin Aldehyde				210 J					
Aroclor-1260	230			7900 J				83	370

J = Analyte present. Reported value may not be accurate or precise.
L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

TABLE 9
PHOTO DOCUMENTATION LOG

PHOTO #	
1	Amtrak, Wilmington Maintenance Facility (Wilmington Refueling Facility).
2	View from north end of the Refueling Facility from top of 250K oil tank.
3	Engine house and sand tower from top of the 250K oil tank. Tributary #2 is located towards the tree line.
4	View of abandoned coal dock from top of 250K oil tank. Note oil seep area at lower left.
5	Tributary #1 from top of 250K oil tank. Note oil sheen, seep areas, and containment booms.
6	View of tributary #1. Note extensive oil sheen on surface of water.
7	Oil seep and stained soils toward tributary #1 immediately north of 250K tank.
8	Oil seep and stained sediment from south of 250K tank in the area of excavated waste oil tanks.
9	Amtrak WRF fueling station and sand tower. Note waste oil tank and heavily stained soils.
10	Railroad ties and miscellaneous rubbish along east side of Amtrak Site along the marsh area towards tributary #1.
11	Stained soils in marsh area on the east side of Amtrak Site.
12	Amtrak WRF looking south from dam on tributary #1.
13	Red stained water in tributary #2. Note stained sediment and bank soils.
14	Site run-off along western portion of the site. Note oil sheen, scrap metal and railroad ties.
15	Discarded railroad ties along western border of the site.
16	Illegal dumping along western side of Amtrak Refueling Facility.

PHOTO 1. Amtrak, Wilmington Maintenance Facility (Wilmington Refueling Facility).

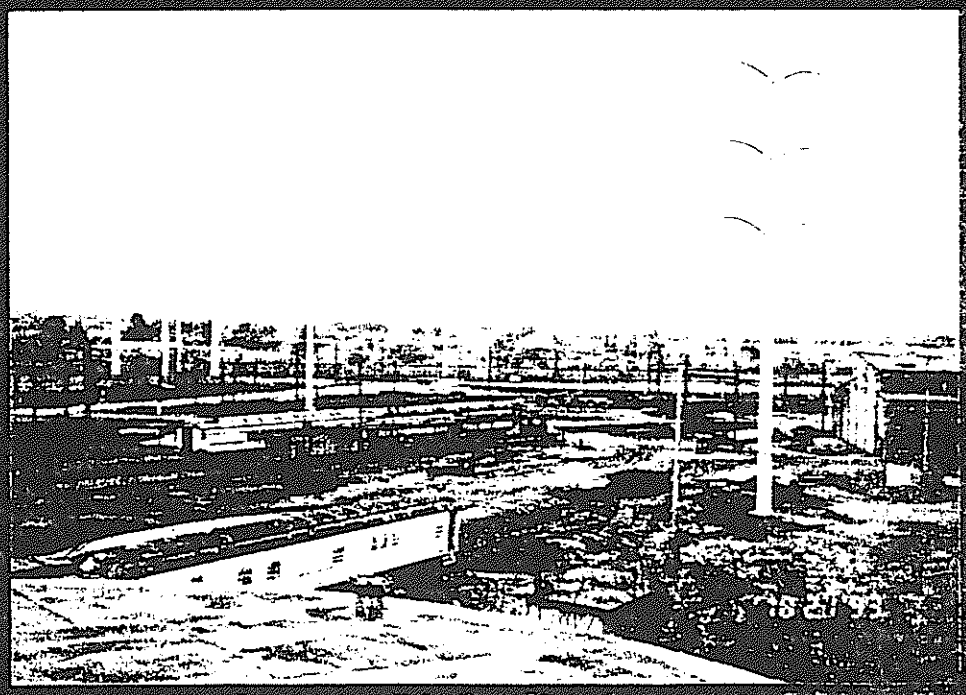


PHOTO 2. View of north end of the Refueling Facility from top of 250K oil tank.

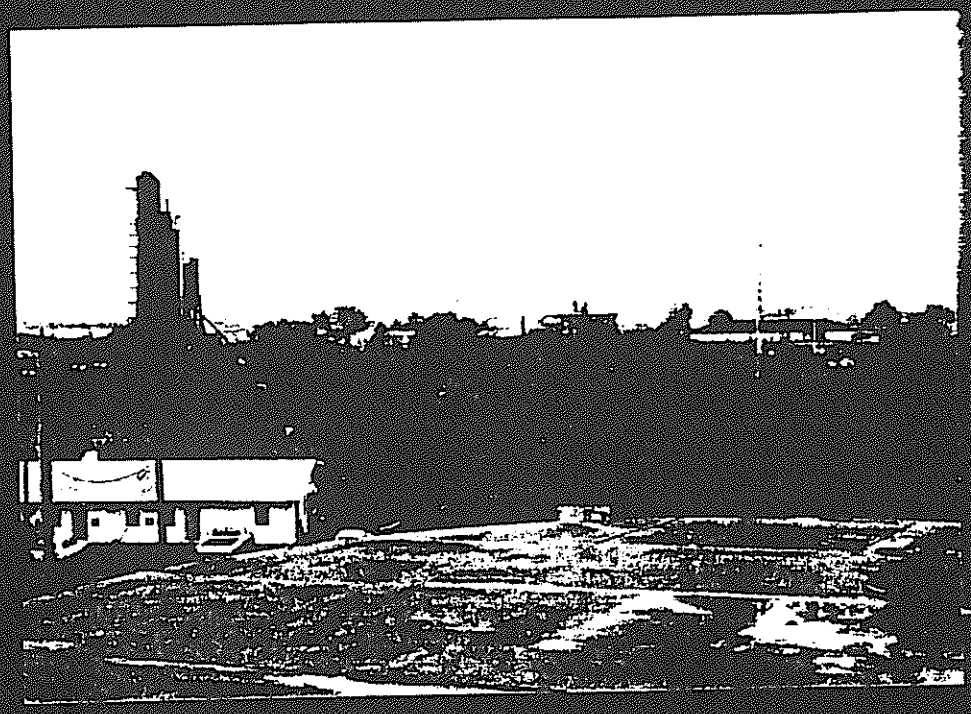


PHOTO 3. Engine house and sand tower from top of the 250K oil tank. Tributary #2 is located towards the tree line.

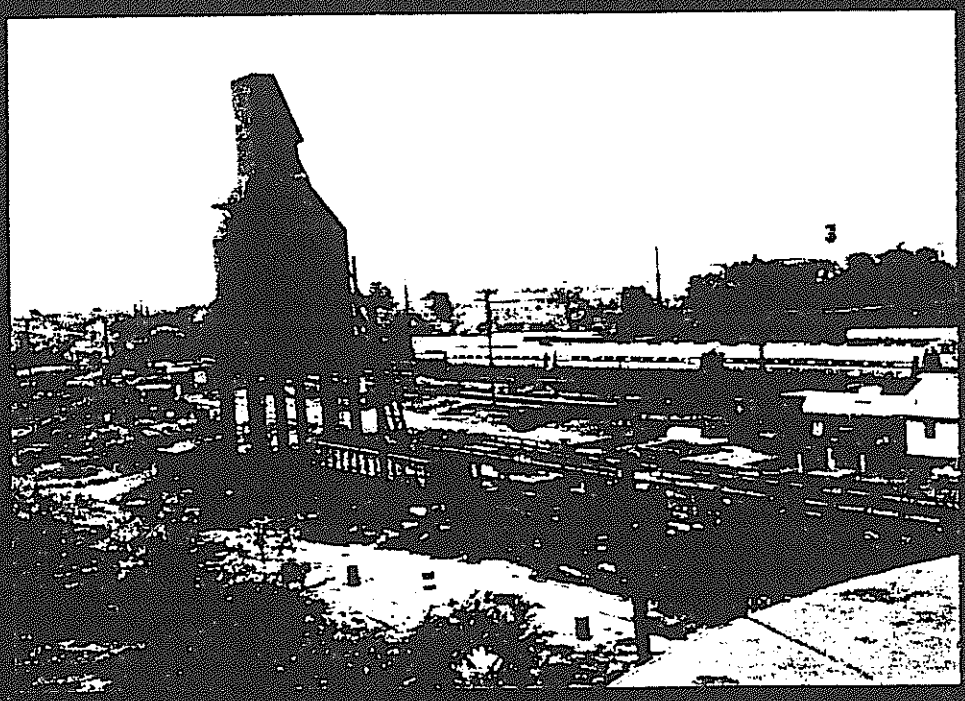


PHOTO 4. View of abandoned coal dock from top of 250K oil tank. Note oil seep area at lower left.

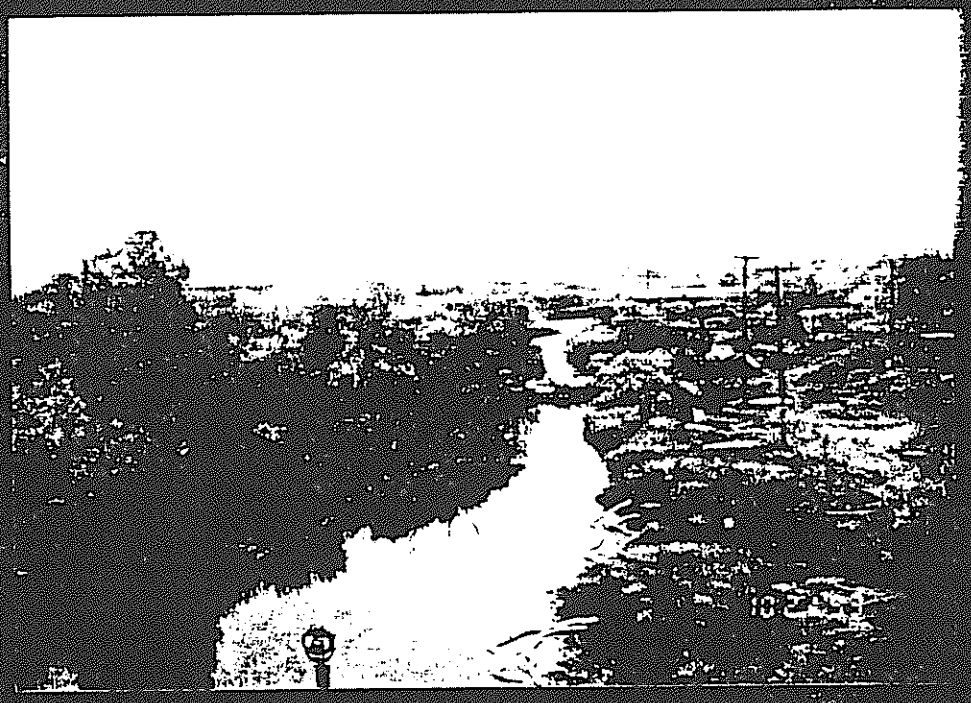


PHOTO 5. Tributary #1 from top of 250K oil tank. Note oil sheen, seep areas, and containment booms.

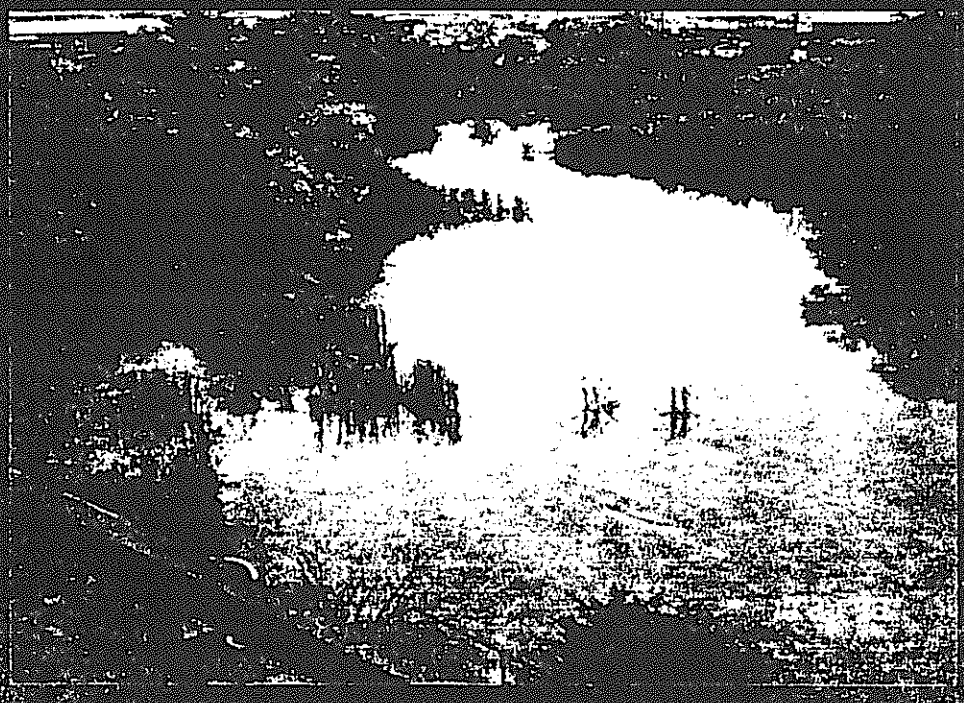


PHOTO 6. View of tributary #1. Note extensive oil sheen on surface of water.

PHOTO 7. Oil seep and stained soils toward tributary #1 immediately north of 250K tank.

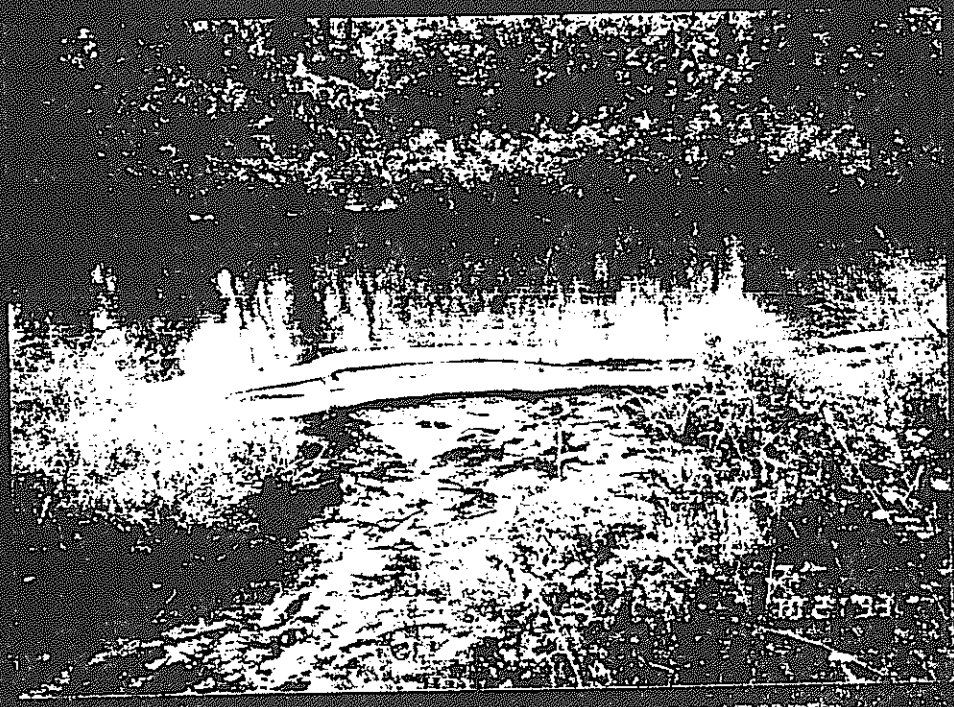


PHOTO 8. Oil seep and stained sediment from south of 250K tank in the area of excavated waste oil tanks.

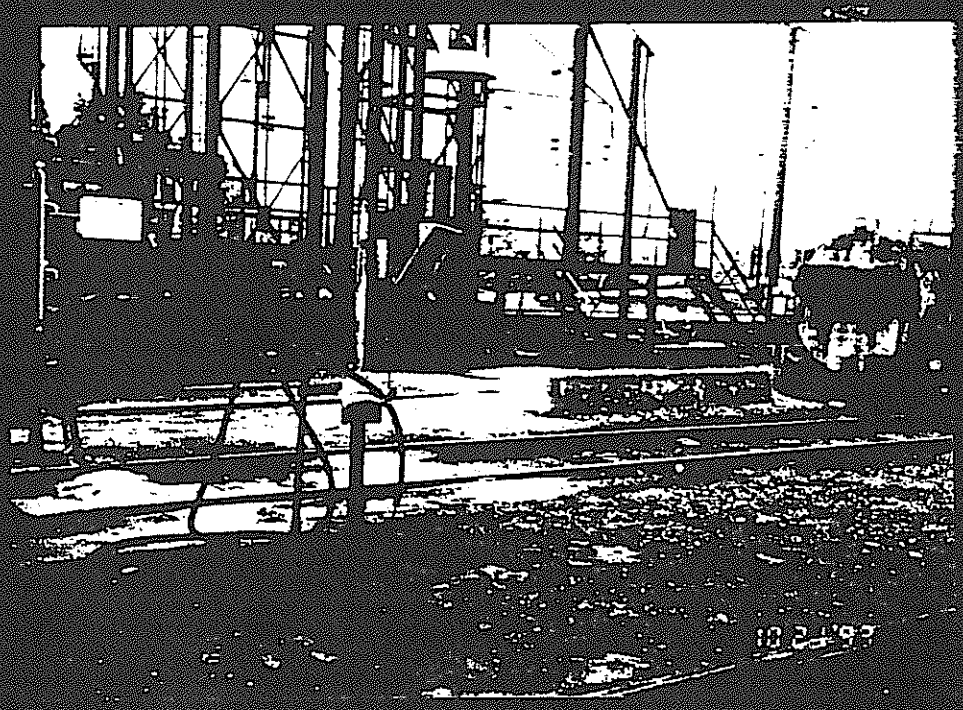


PHOTO 9. Amtrak WRF fueling station and sand tower. Note waste oil tank and heavily stained soils.

PHOTO 10. Railroad ties and miscellaneous rubbish along east side of Amtrak Site along the marsh area towards tributary #1.

PHOTO 11. Stained soils in marsh area on the east site of Amtrak Site.

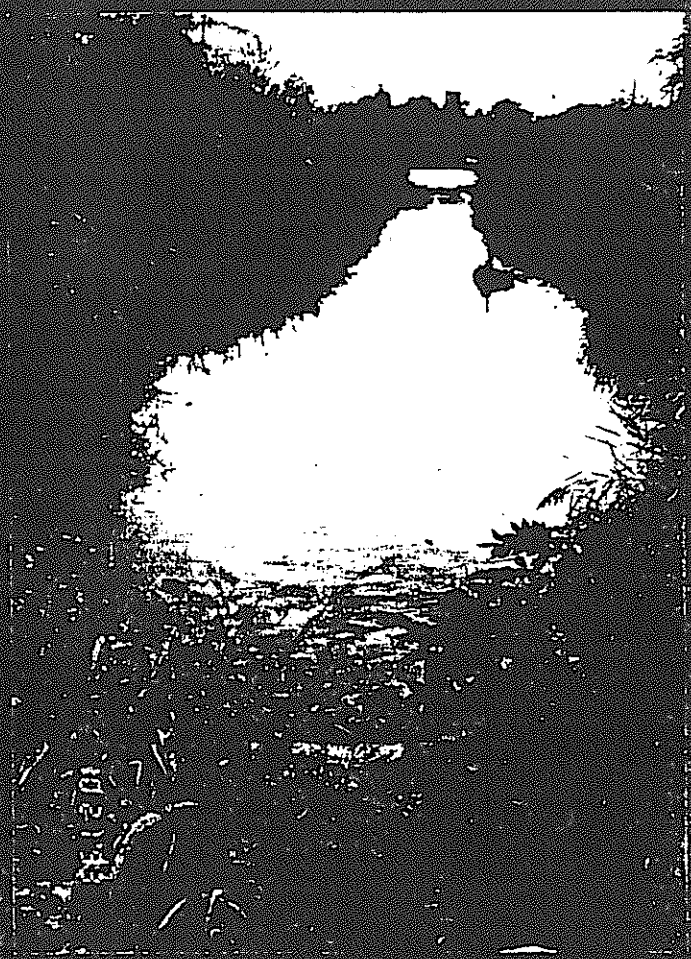


PHOTO 12. Amtrak WRF looking south from dam on tributary #1.

PHOTO 13. Red stained water in tributary #2. Note stained sediment and bank soils.

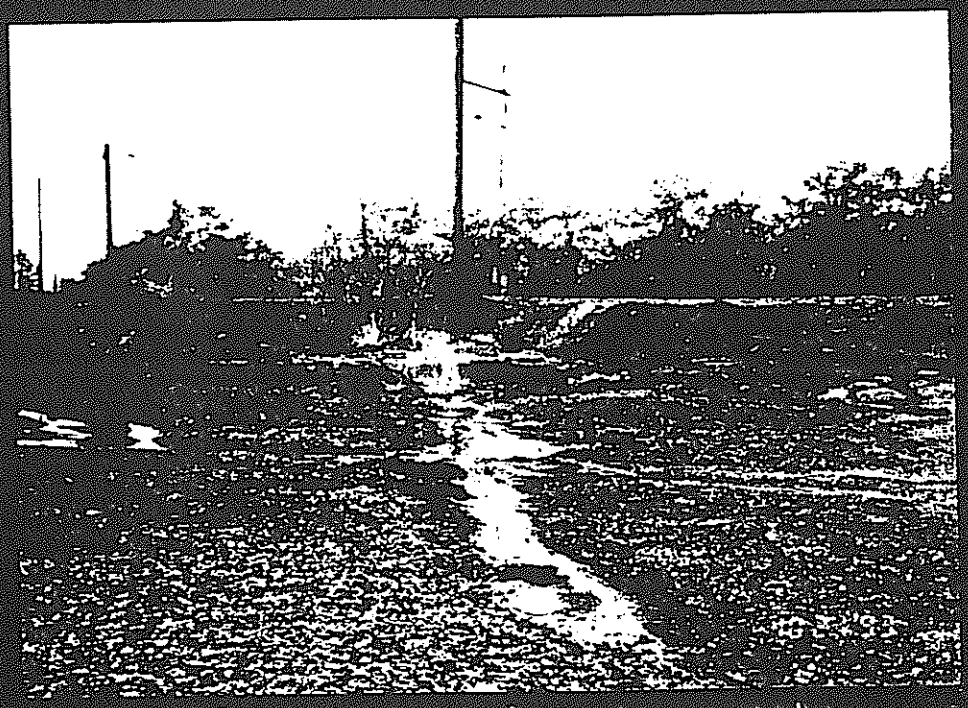


PHOTO 14. Site run-off along western portion of the site. Note oil sheen, scrap metal and railroad ties.

PHOTO 15. Discarded railroad ties along western border of the site.

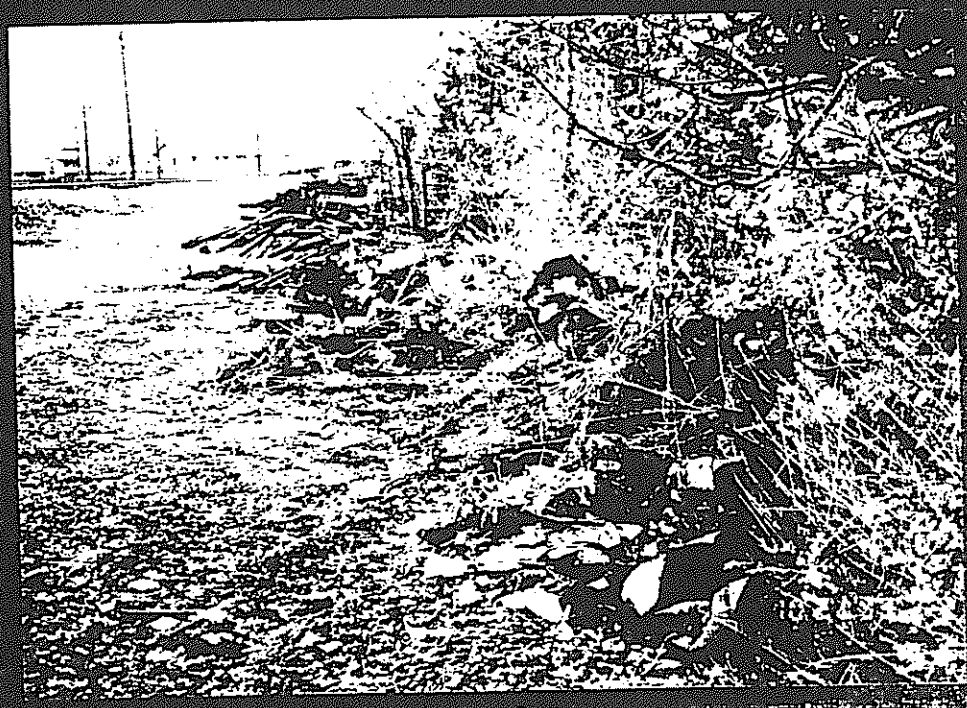


PHOTO 16. Illegal dumping along western side of Amtrak Refueling Facility.

APPENDIX A

TOXICOLOGICAL EVALUATION

TOXICOLOGICAL EVALUATION

FOR THE

AMTRAK WILMINGTON REFUELING FACILITY
VANDEVER AVENUE
WILMINGTON, DELAWARE 19802

December 29, 1994

(Site Investigation)

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

DIVISION OF AIR AND WASTE MANAGEMENT

SUPERFUND BRANCH
715 GRANTHAM LANE
NEW CASTLE, DELAWARE 19720

Prepared By:

Lawrence J. Jones
Environmental Scientist
Superfund Branch, PA/SI Group
Division of Air & Waste Mgmt.
Department of Natural Resources
& Environmental Control
715 Grantham Lane
New Castle, DE 19720

Reviewed & Approved By:

Karl F. Kalbacher, P.G.
Environmental Program Manager I
Superfund Branch, PA/SI Group
Division of Air & Waste Mgmt.
Department of Natural Resources
& Environmental Control
715 Grantham Lane
New Castle, DE 19720

0266-TT-RI

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0. Summary

The Amtrak Wilmington Refueling Facility was investigated to collect necessary data to evaluate the potential threat to human health and the environment resulting from historical site-related activities. Sampling was undertaken to characterize the on-site soil and the surface water and sediment from the tributaries bordering the Amtrak property. Increased cancer risks were found for on-site workers and for theoretical future adult and child residents via the inadvertent ingestion of contaminated surface soils. Cancer risks for on-site workers and future residents were greater when contaminant concentrations found in sediment samples were evaluated using the soil exposure scenarios. For future child residents, potential non-cancer effects could not be ruled out.

Increased incremental lifetime cancer risk was evaluated for eight compounds in soil; Arsenic (as a carcinogen), PCBs, Benzo(a)pyrene, Beryllium, Benzo(a)anthracene (BaA), Benzo(b)fluoranthene (BbF), Indeno(1,2,3-cd)pyrene (IP) and Dibenzo(a,h)anthracene (DahA).

Arsenic detected at a concentration of 31.4 mg/kg in soil sample SS-3 and PCB, also found in SS-3 at a concentration of 7.9 mg/kg provided for a 8.6E-05 and 9.5E-05 cancer risk, respectively, when modeled for a future adult resident of the site. As modeled for the on-site worker the increased cancer risk for Arsenic and PCB was 1.9E-05 and 2.1E-05, respectively. Benzo(a)pyrene, detected in background soil sample SS-1 at 0.24 mg/kg, provided a increased cancer risk of 2.7E-06 and 6.1E-07 for future adult resident and the on-site worker, respectively. Evaluated individually, the risks for the on-site soil sample exceeded the target cancer risk of 1.0E-06 but fell within the 1.0E-04 to 1.0E-06 acceptable cancer risk range normally used by U.S.EPA, Region III. Evaluated as a total for the future adult resident, the on-site sample exceeded the 1.0E-04 risk with a calculated risk of 1.84E-04. The total risk for the on-site worker was 4.11E-05, within the 1.0E-04 to 1.0E-06 range usually considered acceptable.

The addition of Beryllium (SS-3), BaA, BbF, IP and DahA (all in SS-1), which were screened in greater than 0.1 of the (Risk-Based Concentration (RBC) to account for additive effects, raised the total increased incremental lifetime cancer risk for the future adult resident to 1.87E-04. The risk for the on-site worker increased to 4.17E-05.

The potential for future adverse health effects for future adult, child, worker and trespassing adult and child as modeled indicate that the non-cancer effects of Arsenic and Manganese in on-site soil sample SS-3, and Chromium in on-site soil sample SS-2 were the primary contributors to a hazard quotient (HQ). The theoretical future child resident was the only receptor to have a hazard index (HI) of 2.45 in excess of the target of 1.0. All other modeled receptors had hazard indexes well below unity; 0.263 for the adult resident, 0.187 for the worker, 0.547 for the trespassing child and 0.0058 for the trespassing adult. The index for the future child resident was mainly driven by the inadvertent ingestion of Arsenic (HQ= 1.338) and Manganese (HQ= 0.971).

The inclusion of Antimony (SS-3) and Beryllium (SS-3), as a result of their presence at greater than 0.1 of the RBC, in the evaluation of potential future adverse health effects increased the cumulative Hazard Index to 2.74 for the future child resident, 0.293 for the future adult resident, 0.209 for the worker, 0.610 for the trespassing child and 0.0016 for the trespassing adult.

Matrix interference due to excessive levels of total petroleum hydrocarbons in most of the soil and sediment samples resulted in very high detection limits for TCL compounds and may exceed the 1.0E-06 risk based concentrations in many cases.

Lead levels in surface soil sample SS-3 (650 mg/kg) exceeded the action level for residential cleanup usually applied by the U.S.EPA of 400 mg/kg (500 mg/kg prior to July, 1994). Children residing or trespassing on the site may provide a future concern because of the lack of an identifiable threshold for Lead, a neurotoxicant. The maximum Lead concentration found in sediment samples was even greater, at 1040 mg/kg in SD-2.

Although Amtrak patrols the site, continued illegal dumping of trash continues to take place on the property. Access to the site is limited only by uncontrolled gates at several locations. The site is not fenced and it's remote location relative to the Maintenance Facility makes it attractive to trespassing.

The site is a likely contributor to exceedances of Ambient Water Quality Criteria in the tributaries bordering the facility. Chronic exposures to aquatic organisms were noted for Aluminum, Iron, Lead, Mercury and Cyanide. In addition, concentrations of PCBs were detected in all sediment samples up to a high of 36.6 mg/kg (total PCB) in sample SD-1. Significant concentrations of Lead, Arsenic, Iron, Manganese were also detected in sediment samples.

Most of the analytes screened for use in this evaluation were detected in sediment samples in concentrations exceeding those found in soil samples. Due to the potential for exposure to site contaminants via contact with sediment, cancer and non-cancer risks were evaluated under the soil exposure scenarios.

Arsenic (as a carcinogen), PCBs and Benzo(a)pyrene (BaP) were found in sediment samples at concentrations greater than the RBC for residential soil. Dieldrin, Benzo(a)anthracene (BaA), Benzo(b)fluoranthene (BbF), Dibenzo(a,h)anthracene (DahA) and Chlordane were detected at concentrations greater than 0.1 of the RBC.

Arsenic was detected in sediment sample SD-6 at a concentration of 53.5 mg/kg and PCB were found in SD-2 at a concentration of 36.6 mg/kg. These provided for a 1.46E-04 and 4.41E-04 cancer risk, respectively, when modeled for a future adult resident of the site. As modeled for the on-site worker the increased cancer risk for Arsenic and PCB was 3.27E-05 and 9.85E-05, respectively. Benzo(a)pyrene, detected in background sedimet sample SD-1 at 0.5 mg/kg, provided a increased cancer risk of 5.71E-06 and 1.27E-06 for future adult residents and the on-site worker, respectively. These three compounds provide a total combined risk of 5.93E-04 for the future resident and 1.32E-04 for the on-site worker when modeled in a soil exposure scenario. The addition of Dieldrin, BaA, BbF, DahA and Chlordane increases the total incremental lifetime cancer risk slightly to 6.04E-04 and 1.35E-04 for the resident and worker, respectively.

The potential for future adverse health effects for future adult, child, worker and trespassing adult and child as modeled indicate that the non-cancer effects of Arsenic, Manganese and Aroclor-1254 (a PCB) in sediment samples were the primary contributors to a hazard quotient (HQ). Additional contaminants screened at greater than 0.1 of the RBC, including Chromium (as VI), Vanadium, Copper, Antimony, Dieldrin and Chlordane, increased the HI seven (7) percent across all scenarios. The adult trespasser was the only receptor to have a hazard index (HI) less than the target of 1.0. All other modeled receptors had hazard indexes above unity; 2.1275 for the adult resident, 19.8566 for the future child resident, 1.5196 for the worker and 4.4252 for the trespassing child.

Security at the site should be increased, including perimeter fencing to limit trespassing and illegal dumping on the property. Additional sampling and characterization of site contaminants should be performed to more thoroughly address human health and environmental concerns. Future investigation should include surface water and sediment sampling of the Brandywine Creek to evaluate the potential impact of site related contaminants on the recreational use of the creek.

2.0. Support Documentation for Toxicological Evaluation

Standard and default toxicological values and assumptions were applied herein and most can be found in the Appendices. The corrected (July 11, 1994) Risk Based Concentration Table from U.S. EPA, Region III, was used as a screening tool to identify chemicals of concern. Modeled parameters and procedures were based on RAGs and can be found in the References and/or Appendices as noted above. Lifetime cancer risks were developed for adult resident life exposure and are slightly less conservative than a combined child and adult exposure time of 30 years with adjusted body weight. The reported findings result in an insignificant modeled difference yet the recognition of this application to the model should be sufficient to address any concerns.

Reference dose and cancer slope factors were obtained from the Risk-Based Concentration (July 11, 1994) tables from U.S. EPA, Region III. IRIS was used as a source of toxicological information and the U.S. EPA listing of AWQC for chronic exposure to aquatic organisms was surveyed for exceedances.

2.1. Exposure Pathways

The Amtrak Wilmington Refueling Facility is a portion of the larger Maintenance Facility. There are no workers permanently assigned to the refueling area, but engine crews and other workers are on-site periodically. A total of 571 employees work at the Maintenance Facility. There is a potential that the refueling area will be the site of future expansion of the Amtrak facility to service new trains.

The site is essentially unrestricted; there are two unguarded gates and the perimeter is not fenced. Amtrak has had problems with trespassers, vandalism and illegal dumping of trash on site. Occasionally, indigents are found camping on the property. A community center, park and baseball field are located within 600 feet of the site, just across the main rail line on the northwest border. The nearest homes are located approximately 1000 feet from the edge of the site.

The Amtrak site has little vegetative cover over the surface; only the bordering tributaries have any significant plant growth.

The tributaries draining the site flow south approximately 250 feet to the Brandywine Creek. From there, the Brandywine Creek flows about 3200 feet to the Christina River and then to the Delaware River. All three rivers are used for recreation and recreational fishing, and the Delaware River is also commercially fished.

The shallowest aquifer at the site, the Quaternary age Columbia Formation, is approximately 10 feet thick and consists of gravelly, fine to coarse sands with interbedded silts and clays. The Cretaceous age Potomac Formation underlies the Columbia Formation and consists of variegated red, gray, purple, yellow and white silts and clays containing beds of white, gray and rust brown quartz sands and gravels. The Potomac Formation pinches out along the northwestern edge of the property and is expected to be thin beneath the site. There is no known potable groundwater use from the Columbia or the Potomac within about two miles of the site. Due to the lack of near-by present-time receptors, groundwater was not sampled during this inspection.

A more detailed description of the Amtrak Facility is presented in the main Site Inspection Report.

2.2. Receptors

2.2.1. Present Time Receptors

There are no on-site residents. Approximately 2800 people live within one-half mile of the site. Present-time exposure includes on-site workers and a trespassing child and adult exposure scenario applied here as being two episodes a week for 39 weeks over 6 years and 24 years respectively. Details for this and other exposure estimates and default values can be found in Appendix 1. The pathway and route would be via inadvertent soil/sediment ingestion. The maximum values for analytes present in the soil pathway were screened based upon Risk-Based Concentration Values (RBC) from U.S. EPA, Region III, July 11, 1994 and were also screened against one-tenth of the RBC to account for additive effects. Table 9 shows the exposure scenarios evaluated in this report.

Fish in the Delaware River have been found to contain significant levels of PCBs based upon sampling conducted by others. PCBs can bioaccumulate in the food chain. As a result, a Fish Consumption Advisory was issued for portions of the Delaware Estuary north of the Chesapeake and Delaware Canal for striped bass, white perch and channel/white catfish. Other studies have detected aluminum, mercury, zinc, chromium, lead, dieldrin, DDD and DDE in fish tissue from the Christina River. Consumers of fish taken from waters in the area of the Amtrak site may also be potential receptors.

2.2.2. Future Receptors

Future land use could include both worker and residential (adult and child). While it is highly unlikely that the site will every be developed for residential use, this potential future land use was evaluated as a worst case scenario. Recreational use of the site and its tributaries is also highly unlikely. Future investigation of the site should include sampling of surface water and sediment in the Brandywine Creek near the site for inclusion in a recreational scenario.

Modeling for present time and future land use evaluated the inadvertent ingestion of soil or sediment as a theoretical basis for determining the potential for adverse human health effects and increase cancer risks (adult only). Potential site related exposure scenarios are described in Table 9.

3.1. Organic Contamination

3.1.1. Soil

Four soil samples were collected during the site inspection; one background sample, two samples including a field duplicate from the east side (SS-2), and one sample from the west side of the site (SS-3). A map and description of all sample locations is included in the Site Inspection report. Descriptions of all samples and the analytical results are presented in Tables 1 through 8.

The results of the organic analysis of the soil samples were compared to three parameters; three times the background concentration of each constituent for the off-site soil, and screen via the Risk-Based Concentration (RBC) for residential and industrial soil (U.S. EPA, July 11, 1994). (Table 8)

Organic compounds detected in samples from the east side of the site at levels three times background or greater (including non detect in the background) were Ethylbenzene, Xylene, Naphthalene, 2-Methylnaphthalene, Fluorene, Phenanthrene, Pyrene, Endosulfan I, 4,4'-DDE and Endosulfan Sulfate. TCL compounds from location SS-3 on the west side of the site included Endrin, Endrin Aldehyde and PCBs (aroclor-1260). See Table 8 for analytical results.

Organic compounds detected which exceeded the benchmark Risk-Based Concentration for residential and/or industrial soil included PCB in sample SS-3 (7900 ug/kg, "J" qualified) and in the background sample SS-1 (230 ug/kg, NQ). Also detected in the background sample was Benzo(a)pyrene (BaP) at 240 ug/kg, "J" qualified). Organic compounds exceeding one-tenth of the RBC for residential soil included Benzo(a)anthracene (BaA) (250 ug/kg, "J" qualified), Benzo(b)fluoranthene (BbF) (310 ug/kg, "J"), Indeno(1,2,3-cd)pyrene (IP) (170 ug/kg, "J") and Dibenzo(a,h)anthracene (DahA) (40 ug/kg, "J"). These four compounds were all detected in the background sample, SS-1.

Most of the analytes detected in on-site soil samples and used for this evaluation were found in greater concentrations in sediment samples from the bordering tributaries and will be evaluated separately. (Tables 4 and 6)

It should be noted that matrix interference due to excessive levels of total petroleum hydrocarbons in most of the soil and sediment samples resulted in very high detection limits for TCL compounds and may exceed the 1.0E-06 risk based concentrations in many cases.

3.1.1.1. Polychlorinated Biphenyls

Polychlorinated Biphenyls (PCB) are a group of man-made chemicals with no known natural sources. They may be in the form of oily liquids or solids. PCBs have been used as coolants and lubricants in electrical transformers, capacitors and other equipment because they are good insulators and do not burn easily. They have not been manufactured in the United States since 1977. PCBs may still be found in some fluorescent lighting fixtures and electrical appliances using parts made before the manufacture of PCBs stopped.

PCBs may cause skin irritations such as acne and rashes in exposed individuals. In test animals, ingested PCBs caused health effects including liver damage, stomach and thyroid injury, anemia and reproductive problems. PCBs are a suspected carcinogen in humans. PCBs can also bioaccumulate in the food chain.

3.1.1.2. Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Indeno(1,2,3-cd)pyrene, DiBenzo(a,h)anthracene

Benzo(a)pyrene (BaP) and the others are polycyclic aromatic hydrocarbon (PAH) compounds. They are formed during the burning of petroleum products and plant or animal materials. It is also found in coal tar, road and roofing tars and in creosote. Cigarette smoke also contains PAHs. PAHs can enter the body by breathing smoke containing the material or by ingesting it. It is not normally absorbed through the skin, but small amounts may be if the skin has contact with heavy oils containing PAHs.

PAHs have been shown to cause tumors in laboratory animals and are suspected human carcinogens.

3.2. Risks for Present-Time Exposures Based on Soil Data

For the present-time worker at the site, the soil sample with PCB at a concentration of 7900 µg/Kg, ("J" qualified) and the sample containing Benzo(a)pyrene (BaP) at 240 ug/kg (NQ) were modeled for a lifetime worker exposure cancer risk. The RBC screening value for PCBs in soil is 83 ug/kg (residential) and 370 ug/kg (industrial) and for BaP is 88 ug/kg (residential) and 390 ug/kg (industrial).

Table 10 shows an increased incremental lifetime cancer risk to the worker at this site of 2.1E-05 due to PCB and 6.1E-07 for BaP. The risk due to PCB is above the target risk of 1.0E-06 considered as a *de minimis* risk but within the 1.0E-04 to 1.0E-06 acceptable cancer risk normally applied by U.S.EPA, Region III. The potential risk as a result of BaP in the soil is below the target risk of 1.0E-06, but consideration should be given to it's classification as a B2 carcinogen (possible human carcinogen).

When the same contaminants are modeled under a future exposure risk based on soil data for a theoretical adult resident, PCB generates an increased incremental cancer risk of 9.5E-05, just within the lower limit of the 1.0E-04 to 1.0E-06 acceptable range. BaP evaluated under the same scenario provides an increased risk of 2.74E-06. (Table 10)

The additional cancer risk to the on-site worker resulting from the presence of BaA, BbF, IP and DahA is minimal. The increased incremental lifetime cancer risk as evaluated was 6.4E-08 for BaA, 7.9E-08 for BbF, 4.3E-08 for IP and 1.0E-07 for DahA, all well below the 1.0E-06 target level. For the theoretical future adult resident the risk is 2.8E-07 for BaA, 3.5E-07 for BbF, 1.9E-07 for IP and 4.6E-07 for DahA, again well below the target risk when considered individually, and slightly above the target of 1.0E-06 when combined.

3.3. Sediment

Seven sediment samples were collected during the site inspection; one background sample (SD-1) from a tributary to Shellpot Creek, two samples (SD-2 and 3) from tributary #1 on the east side of the property, two samples (SD-6 and 7) from tributary #2 on the west side of the site, one sample (SD-4) from the outlet pond to the south of the site and one sample (SD-5) from the ditch draining the asphalt and cement plant area. A map and description of all sample locations is included in the Site Inspection report. Descriptions of all samples and the analytical results are presented in Tables 1 through 8.

The results of the organic analysis of the sediment samples were compared to three parameters; three times the background concentration of each constituent for the off-site soil, and screen via the Risk-Based Concentration (RBC) for residential and industrial soil (U.S. EPA, July 11, 1994). (Table 8)

Organic compounds detected in sediment which exceeded the benchmark Risk-Based Concentration for residential and/or industrial soil included PCBs in sample SD-2 (36,600 ug/kg, "DJ" qualified), Benzo(a)pyrene (BaP) at 500 ug/kg, "J" qualified). Organic compounds exceeding one-tenth of the RBC for residential soil included Benzo(a)anthracene (BaA) (3800 ug/kg, "J" qualified, SD-7), Benzo(b)fluoranthene (BbF) (2500 ug/kg, "J", SD-7), Dibenzo(a,h)anthracene (DahA) (130 ug/kg, "J", SD-1), Dieldrin (68 ug/kg, "J", SD-2) and Chlordane (111 ug/kg, "J", SD-1).

Dieldrin and Chlordane are both pesticides. The use of both Dieldrin and Chlordane compounds have banned by the U.S.E.P.A.

As with the soil samples, it should be noted that matrix interference due to excessive levels of total petroleum hydrocarbons in most of the soil and sediment samples resulted in very high detection limits for TCL compounds and may exceed the 1.0E-06 risk based concentrations in many cases.

3.3.1 Risks for Present-Time Exposures Based on Sediment Data

For the present-time worker at the site, the sediment sample with PCB at a concentration of 36,600 µg/Kg, ("DJ" qualified) and the sample containing Benzo(a)pyrene (BaP) at 500 ug/kg ("J") were modeled for a lifetime worker exposure cancer risk using the soil exposure scenario. Table 15 shows an increased incremental lifetime cancer risk to the worker at this site of 9.8E-05 due to PCB and 1.2E-06 for BaP. The risk due to PCB is greater than the target risk of 1.0E-06 considered as a *de minimis* risk but within the 1.0E-04 to 1.0E-06 acceptable cancer risk normally applied by U.S.EPA, Region III. The potential risk as a result of BaP in the soil is just above the target risk of 1.0E-06, but consideration should be given to it's classification as a B2 carcinogen (possible human carcinogen).

When PCBs and BaP are modeled under a future exposure risk based on sediment data for a theoretical adult resident, PCB generates an increased incremental cancer risk of 4.4E-04, exceeding the lower limit of the 1.0E-04 to 1.0E-06 acceptable range. BaP evaluated under the same scenario provides an increased risk of 5.7E-06. (Table 15)

The additional modeled cancer risk to the on-site worker resulting from the presence of BaA, BbF, DahA, Dieldrin and Chlordane in the sediment is shown in Figure 15. The increased incremental lifetime cancer risk as evaluated was 9.7E-07 for BaA, 6.4E-07 for BbF, 3.3E-07 for DahA, 3.8E-07 for Dieldrin and 5.0E-08 for Chlordane. These five compounds provide a combined risk falling within the 1.0E-04 to 1.0E-06 target range. For the theoretical future adult resident the risk is 4.3E-06 for BaA, 2.8E-06 for BbF, 1.5E-06 for DahA, 1.7E-06 for Dieldrin and 2.2E-07, cumulatively above the target of 1.0E-06.

4.1. Inorganic Contamination

4.1.1. Soil

The results of the inorganic analysis of the soil samples were compared to three parameters; three times the background concentration of each constituent for the off-site soil and screened via the Risk-Based Concentration (corrected RBC) for both residential and industrial soil (U.S. EPA, July 11, 1994). Only qualified data as per Appendix 2 were utilized. Table 7 reports these analytical findings.

Inorganic analytes exceeding three times the background concentration in samples from location SS-2 were Arsenic, Chromium, Copper, Lead and Selenium. Sample location SS-3 yielded Arsenic, Copper, Iron, Lead, Mercury, Selenium and Zinc at concentrations greater than three times background.

The only inorganic analyte to exceed the Risk Based Concentration benchmark was Arsenic. Antimony and Beryllium exceeded one-tenth of the RBC for residential soil and were included to account for additive effects. All samples including the background exceeded the RBC for both residential and industrial soil for Arsenic as a carcinogen, and both on-site sample locations exceeded the RBC for residential soil for Arsenic as a non-carcinogen.

Soil sample SS-3 contained Lead at a concentration greater than the Chemical Health Advisory Limit for soil according to the Inorganic Data Validation package. This sample also exceeded the U.S.E.P.A. screening level for Lead in soil of 400 mg/kg. No reference dose exists for Lead and it is discussed below.

Manganese in sample SS-3 was slightly under the RBC for residential soil and was included in the evaluation and discussion.

4.1.1.1. Arsenic

Arsenic was detected in sample SS-3 at a concentration of 31.4 mg/kg, "L" qualified, and in sample SS-2 and it's field duplicate at 28.2 mg/kg and 27.8 mg/kg ("L"), respectively. The Risk-Based Concentration for non-carcinogenic effects is 23 mg/kg for residential soil. When considered as a carcinogen the RBC is 0.37 mg/kg for residential soil and 1.6 mg/kg for industrial soil.

When future adverse health effects of Arsenic as non-carcinogen were modeled under a future residential scenario the hazard quotient was 1.338 for the child and 0.143 for the adult. The hazard quotient for the present-time trespassing child was 0.298. (Tables 11 and 12)

Arsenic is found naturally in the earth's crust. It is also a by-product of smelting of metals and burning of fossil fuels. The primary use of Arsenic is in weed and insect pesticides and as a wood preservative. It is also used in lead-base alloys for hardening lead used in batteries, bearings and cable and as a rust inhibitor in antifreeze.

Systemic effects of Arsenic ingestion include irritation of the digestive tract, decreased production of red and white blood cells, abnormal heart function, blood vessel damage, liver and kidney injury and impaired nerve function. One of the most common characteristics of ingestion of inorganic Arsenic is the appearance of dark and light spots on the skin, or small corns or warts on the palms, soles and trunk. Arsenic ingestion has also been connected to increased incidence of some forms of cancer. In contrast, there is also some evidence that small amounts (normal dietary intake) of Arsenic may be beneficial to good health.

4.1.1.2. Lead

Lead was found at soil sample location SS-3 at the maximum of 650 mg/Kg having no qualifier. The concentration of Lead in the two samples from location SS-2 were 298 mg/Kg (NQ) and 319 mg/kg (NQ), greater than three times the background level of 72.5 mg/kg (NQ). All samples including background surface soil exceeded the U.S.G.S. average of 19 mg/Kg. (Table 7)

Lead has been classified by EPA as a Group B2 - Probable Human Carcinogen. While there is no reference dose or slope factor value for lead, it is desirable to minimize Lead exposure to the extent possible, especially for children who preferentially absorb it. Children are also more sensitive to lead anemia than adults, and young children may experience subtle neurological damage without ever exhibiting classical signs of juvenile lead brain damage, such as loss of motor skills and speech. Learning ability may be impaired due to motor incoordination, lack of sensory perception or inability to concentrate.

Usual Lead cleanup values that are commonly considered are the 400 mg/Kg residential level generally applied by EPA as a trigger cleanup guideline. Lead in soils in residential neighborhoods above 400 mg/kg merits further evaluation in future efforts; i.e., evaluation of blood-lead levels.

Using these guidelines, Lead may be considered an analyte of concern for a theoretical future resident.

4.1.1.3. Manganese

Manganese was detected at a concentration of 380 mg/kg ("L" qualified) in sample SS-3, just under the RBC screening value of 390 mg/Kg for residential soil. The value for this non-carcinogen was sufficiently high so they were included as an analyte of concern and were modeled for future residents, adults and children using the oral RfD for inadvertent soil ingestion.

When modeled for future adults Manganese had a hazard quotient of 0.104, which is inconsequential given a target hazard quotient usually applied by the U.S. EPA of unity. For future child residents living on the site the hazard quotient for this receptor was 0.971, being slightly below the target of 1.000. The oral RfD for Manganese of 5.0-E-03 may be very conservatve. When the food RfD of 1.40E-01 is used the hazard quotient for the future child resident drops from 0.971 to 0.0347. Some additional information on Manganese is provided below. (Table 7)

> Although Manganese lacks a cancer potency factor and is considered in most cases as having a D weight-of-evidence as a carcinogen - not classified, there is a new oral RfD available (5.0E-03, IRIS-2) which was applied in this situation. RfD values are peer developed and agreed upon toxicological designations that are commonly accepted by risk assessors.
>
> Eating a small amount of Mn each day is important in maintaining health. The amount of Mn in a normal diet (about 2-9 mg/day) seems to be enough to meet our daily need, and no cases of illness from eating too little Mn have been reported in humans. In animals, eating too little Mn can interfere with normal growth, bone formation, and reproduction. However, too much Mn, however, can cause serious illness. Although there are some differences between different kinds of Mn, most Mn compounds seem to cause the same effects.
>
> Manganese miners or steel workers exposed to high levels of Mn dust in the air have mental and emotional disturbances and their body movement could become slow and clumsy. This is Manganism and it injures a part of the brain that helps control body movements.
>
> It is not certain whether eating or drinking too much Mn can cause Manganism or not. Studies in some animals have shown that very high levels of Mn in food or water can cause changes in the brain.
>
> Two human chronic ingestion data studies via water and food indicate that CNS is the point of critical effects. The new oral RfD is 5.0E-03 mg/Kg/day. Several studies were used to derive the RfD. No information is available to indicate toxic levels of Mn in the diet of humans. Because of this homeostatic control humans have over Mn, it is not considered to be very toxic when ingested with the diet.

4.1.1.4. Risks for Present-Time Exposures Based on Soil Data

Increased incremental cancer risk was modeled for Arsenic as a carcinogen for the current on-site worker. Utilizing the 31.4 mg/kg, "L" qualified sample for location SS-3, Table 10 shows an increased cancer risk for the on-site worker of 1.9E-05. The value is greater than the target risk of 1.0E-06 but falls within the 1.0E-04 to 1.0E-06 acceptable range normally used by U.S. EPA, Region III. The total risk via soil exposure to organic and inorganic compounds as modeled for the on-site worker was 4.1E-05, within the 1.0E-04 to 1.0E-06 acceptable range. (Table 10)

When evaluated for future adult residents the increased incremental cancer risk for Arsenic as a carcinogen was 8.6E-05, falling with the normally accepted range. The combined increased incremental cancer risk due to PCB, Arsenic and Benzo(a)pyrene in the soil was 1.84E-04, exceeding the 1.0E-04 upper end of the acceptable range. (Table 10)

As noted previously, matrix interference due to high levels of total petroleum hydrocarbons in the samples resulted in very high analytical detection limits exceeding the 1.0E-06 Risk-Based Concentrations for some organic compounds. Therefore it is possible that contaminants exist on site that were not detected during the field investigation, and thus were not evaluated in this report.

4.1.1.5. Present-Time Potential Adverse Effects

The present-time adverse health effects were modeled for inadvertent ingestion of soil. Arsenic was the only analyte to exceed a Risk-Based Concentration (for residential soil). Manganese was detected at a concentration slightly under the RBC for residential soil. The most significant exposure when modeled under a present-time exposure scenario was the trespassing child with a combined hazard index of 0.6106, well below unity value of 1.0. (Table 11) This includes the addition of Chromium, Antimony and Beryllium to this scenario.

When modeled under a theoretical future adult/child non-cancer effects scenario, the hazard quotient for a child resident was found to be 1.3382 due to Arsenic and 0.9716 for Manganese. The combined hazard index was 2.7399, greater than the target value of 1.0. (Table 12)

The addition of Antimony and Beryllium to the future adverse health effects scenario generated a slight increase in non-carcinogenic effects. The most significant of these is in the theoretical future child resident scenario and results in a hazard quotient of 0.2844 for Antimony and 0.0006 for Beryllium. (Table 12)

The next most significant analyte from a non-cancer risk perspective was Chromium, which only increased the risk for a future child resident by 0.1449. (Table 12)

4.1.2. Surface Water

Table 3 shows several analytes of interest. Aluminum, which is pH dependent has an Ambient Water Quality Criteria (AWQC) of 87 µg/L for chronic effects on fresh water organisms, was exceeded by 8.5 to 17.4 times at the sampling locations SW-3, SW-4 and SW-5.

Lead which is also pH dependent, has an AWQC of 3.2 µg/L. This value was exceeded at SW-1 (9.1 µg/L, "J"), at SW-2 (13.2 µg/L, "J"), and and the greatest exceedance at SW-3 (22.3 µg/L, "J"). Lead concentration in sample SW-3 also exceeded the Chemical Health Advisory Level of 20.0 ug/l. (Table 3) According to the Region III Environmental Services Assistance Team (ESAT) Data Validation Chemist, the Chemical Health Advisory Level is defined as the 10 day health advisory concentration.

Cyanide from sampling locations SW-2 at 10.3 µg/L and SW-3 at 11.5 µg/L exceeded the 5.2 µg/L AWQC. (Table 3)

Iron was detected at all sampling locations in excess of the AWQC of 1000 ug/l. Concentrations ranged from 2070 ug/l, "J" at SW-5 to 24,900 ug/l, "J" at SW-7. The background sample SW-1 measured 3680 ug/l, "J". (Table 3)

Mercury in sample SW-7 measured 0.39 ug/l, in excess of the AWQC of 0.012 ug/l.

There are potential chronic adverse environmental health effects on freshwater aquatic organisms from these analytes.

4.1.3. Sediment

Tables 4 and 6 list the analytical results of sediment sampling. Arsenic in all sediment samples (10.0 mg/kg, "L" to 53.5 mg/kg, "L") exceeded the Risk-Based Concentration (RBC) for both residential and industrial soil when considered as a carcinogen. When compared as a non-carcinogen, sample locations SD-2, SD-5, SD-6 and SD-7 exceeded the RBC for residential soil (23 mg/kg).

Manganese exceeded the RBC for residential soil (390 mg/kg) in sediment samples SD-1 (697 mg/kg, "L"), SD-2 (581 mg/kg, "L"), SD-4 (470 mg/kg, "L") and SD-6 4710 mg/kg, "L"). (Table 4)

Lead concentration in sample SD-2 (1040 mg/kg) was greater than twice the Chemical Health Advisory Level for soil of 500 mg/kg and the EPA screening level of 400 mg/kg. (Table 4)

Aroclor-1254 was detected in sediment sample SD-2 at a concentration of 6.6 mg/kg, "DJ". (Table 6) Several Polynucleated Aromatic Hydrocarbons were also detected and have been discussed earlier.

Chromium, (SD-4, 92.7 mg/kg, "NQ"), Copper(SD-2, 301 mg/kg, "J"), Antimony (SD-6, 24.5 mg/kg, "[]"), Dieldrin (SD-2, 62 ug/kg, "J") and Chlordane-total (SD-1, 111 ug/kg, "J") were detected at concentrations greater than one-tenth of the RBC.

The non-carcinogenic exposure scenarios are presented in Tables 16 and 17. The potential for future adverse health effects for future adult, child, worker and trespassing adult and child as modeled indicate that the non-cancer effects of Arsenic, Manganese (Oral RfD) and Aroclor-1254 (a PCB) in sediment samples were the primary contributors to a hazard quotient (HQ). Additional contaminants screened at greater than 0.1 of the RBC, including Chromium (as VI), Vanadium, Copper, Antimony, Dieldrin and Chlordane, increased the HI seven (7) percent across all scenarios. The adult trespasser was the only receptor to have a hazard index (HI) less than the target of 1.0. All other modeled receptors had hazard indexes above unity; 2.1275 for the adult resident, 19.8566 for the future child resident, 1.5196 for the worker and 4.4252 for the trespassing child.

5.1. Across Media Summaries of Cancer Risks and Adverse Health Effects

No Across Media Summary was evaluated as part of this baseline Risk Assessment. Groundwater is not used in the vicinity of the site. Surface water is used for drinking water supply, but the intakes are located upstream above a dam and therefore are not influenced by the site. (Table 13)

Sediment at the site shows significant contamination by several analytes including PCBs, PAHs, Arsenic, Lead and Manganese. Due to limited exposure opportunities to humans at the site, sediment was not evaluated as part of this assessment. Regardless, both sediment and surface water may be a concern in future investigations due to the use of the Brandywine Creek and Christina River for recreation, fishing and other environmental impacts.

6.1. Recommendations and Summary

The site is readily accessible, lacking any fencing or controlled gate. Security at the site should be increase, especially the perimeter, helping to prevent trespassing and illegal dumping. The additional site security would eliminate the potential for adverse health effects to trespassers.

The trespassing child scenario was not found to exceed a hazard quotient of unity being about 0.6106, but it would be prudent not to have children on the site or having ready access to the site if for no other reason than the danger of trains and other railyard equipment. (Table 14)

Drilling and sampling of monitoring wells near the site is recommended to characterize and subsequently evaluated the local groundwater and the groundwater to surface water pathway.

The site presents a significant present time exposure risk and some exceedances of the target for increased incremental lifetime cancer risk for workers from PCBs and Arsenic in the surface soil. These are both singly and in total within the 1.0E-04 to 1.0E-06 acceptable cancer risk normally used by U.S. EPA, Region III. (Table 14)

An increased incremental cancer risk of 1.87E-04, greater than the 1.0E-04 lower end of the acceptable rang was also modeled for a theoretical future adult resident of the site, which is a highly unlikely scenario. (Table 14)

The potential for future adverse health effects for future residents, adult and child, as modeled, indicate that non-cancerous effects from Arsenic and Manganese in the surface soil at the Amtrak Wilmington Refueling Facility are the primary contributors to the hazard index. The hazard index for a theoretical child resident was 2.7399 and was the only value to exceed unity. (Table 14)

In general, contaminant concentrations for most analytes were higher in sediments samples than in soil samples and pose greater risks as modeled.

Considerable limitations in this assessment were a result of analytical data that was affected by the large amount of total petroleum hydrocarbons present in the soils and sediments at the site. Matrix interference resulted in very high detection limits for some compounds above their 1.0E-06 Risk-Based Concentrations.

The other important finding resulting from this study was the exceedance of Ambient Water Quality Criteria for aquatic organisms. This was based on a chronic exposure to surface water and the analytes found in surface waters bordering the site (Aluminum, Lead, Iron, Mercury and Cyanide). In addition, several analytes were found in sediments surrounding the Amtrak site (PCBs, PAHs, Lead, Iron, Arsenic, Dieldrin and Manganese). Fish tissue from the Christina River near the site have been found to contain levels of some of the same compounds.

7.1. Uncertainties Associated With Toxicity Assessment

In concluding this report, it should be noted that there are many uncertainties associated with the use of toxicological information in health risk assessments which are related to uncertainties intrinsic to toxicology, the models applied, and the interpretations of such derived results. Chief among these uncertainties are the use of dose-response information from high-dose studies to predict adverse health effects at low dose and also the applicability of experimental animal studies to predict effects in humans. However, these and other uncertainties are intrinsic limitations to the risk assessment process which cannot be resolved quantitatively given the current understanding of toxicology and humar health. These uncertainties are addressed in part by consistent application of conservative assumptions regarding the toxic effects of chemicals, such as uncertainty factors for reference doses and upper bound estimates for cancer slope factors. Such procedures are intended to protect public health and are expected, in many cases, to overstate potential impacts on human health.

The summation of risks for analytes within and across media may also contribute to such worst case evaluation. Additional uncertainty, also not the case for this site, is usually incorporated by accepting the non-threshold theory for carcinogenicity, wherein any exposure to a carcinogen may result in a theoretical increased lifetime risk of cancer.

REFERENCES & SOURCES

1. Risk Assessment Guidance for Superfund, Vol. 1, Human Health Evaluation (Part A). U.S. EPA, Office of Emergency and Remedial Response, Washington, DC 20460, EPA/540/1-89/002, December, 1989.

2. United States Environmental Protection Agency, 1992. Integrated Risk Information System (IRIS-2 Database). Office of Research and Development.

3. United States Environmental Protection Agency. Risk-Based Concentration Table, Region III, Philadelphia, PA. July 11, 1994.

4. Health Effects Assessment Summary Tables. United States Environmental Protection Agency, Office of Solid Waste and Emergency and Remedial Response, December, 1989, Updated Quarterly, 1991 last quarter update.

5. United States Environmental Protection Agency, December 1992. Drinking Water Regulations and Health Advisories. Office of Water, Washington, D.C.

6. United States Environmental Protection Agency, May 1986. Quality Criteria for Water 1986. Office of Water Regulations and Standards, Washington, DC.

7. United States Environmental Protection Agency. 1988. Drinking Water and Health. Vol. 5. Safe Drinking Water Committee, Washington, DC.

8. Sax, N.I. and Lewis, R.J., Sr., 1987. Hawley's Condensed Chemical Dictionary. Van Nostrand Reinhold Company, NY.

9. Griffith, H. W., A Complete Guide to Vitamins, Minerals, and Supplements. (U.S. Food and Drug Administration Recommended Dietary Allowances for Specific Age Groups), Fisher Books, Tucson, AZ, 1988.

10. Sax, N.I., Dangerous Properties Of Industrial Materials. 6th Ed., Van Nostrand Reinhold Co., NY, 1984.

11. Clement Associates, Inc. for the United States Environmental Protection Agency. 1985. Chemical, Physical, and Biological Properties of Compounds at Hazardous Waste Sites. Final Report.

12. Lenga, R.E., (editor), The Sigma-Aldrich Library of Chemical Safety Data. Edition II, Sigma-Aldrich Corp., Milwaukee, WI, 1988.

13. Shacklette, H.T., and Boerngen, J.G., 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. United States Geological Survey Professional Paper 1270.

14. Montgomery, J. H., (1991), Groundwater Chemicals Field Guide, Lewis Publishers, Chelsea, MI.

15. Sittig, M., Handbook of Toxic and Hazardous Chemicals and Carcinogens, (1985), Second Edition, Noyes Publications, Park Ridge, NJ.Site

16. State of Delaware-Surface Water Quality Standards - As Amended, February 26, 1993, Delaware Department of Natural Resources and Environmental Control, Division of Water Resources, Dover, DE.

17. ARARs Q's & A's: Compliance With Federal Water Quality Criteria, Office of Solid Waste and Emergency Response, United States Environmental Protection Agency, Publication 92;34-09/FS, June, 1990.

18. Water Quality Criteria Summary: Concentrations in µg/L. U.S. EPA, Office of Science and Technology, Health and Ecological Criteria Division, Human Risk Assessment Branch, 401 M. St., S.W., Washington, D.C., May 1, 1991.

19. Budavari, S. (editor), (1989), The Merck Index, 11th ed., Merck & Co., Inc., Rahway, NJ.

20. Farm Chemicals Handbook, (1992), Meister Publishing Co., Willoughby, OH.

21. Seminar on Characterizing and Remediating Dense Non-Aqueous Phase Liquids at Hazardous Sites, U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, OH 45682, EPA/600/K-93/003, May, 1993.

22. Amtrak Wilmington Refueling Facility, SI Sampling Activities Field Notebooks, DE DNREC, November 1993.

23. Toxicological Profile for Selected PCBs (Aroclor-1260, 1254, 1248, 1242, 1232, 1221, and 1016), Update, Agency for Toxic Substances and Disease Registry, U. S. Department of Health and Human Services, Public Health Service, TP-92/16, Atlanta, GA 1993.

24. Toxicology Profile for Arsenic. Agency For Toxic Substances and Disease Registry, U. S. Department of Health and Human Services, Public Health Service, TP-88/02, Atlanta, GA 1989.

25. Lead in Soil - Interim Soil Cleanup Level for Total Lead. OSWER Directive #9355.4-02, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, DC, September 7, 1989.

26. Toxicology Profile for Lead. Agency For Toxic Substances and Disease Registry, U. S. Department of Health and Human Services, Public Health Service, Atlanta, GA, 1990.

27. Toxicology Profile for Manganese. Agency For Toxic Substances and Disease Registry, U. S. Department of Health and Human Services, Public Health Service, TP-91-19, Atlanta, GA 1992.

28. Toxicology Profile for Benzo(a)pyrene. Agency For Toxic Substances and Disease Registry, U. S. Department of Health and Human Services, Public Health Service, TP-88/05, Atlanta, GA, 1990.

29. Toxicology Profile for Polycyclic Aromatic Hydrocarbons. Agency For Toxic Substances and Disease Registry, U. S. Department of Health and Human Services, Public Health Service, Atlanta, GA, 1989.

30. Clement Associates, Inc. for the United States Environmental Protection Agency. 1985. Chemical, Physical, and Biological Properties of Compounds at Hazardous Waste Sites. Final Report.

31. United States Environmental Protection Agency. 1989. Drinking Water Standards and Health Advisories; Quick Look List. Office of Drinking Water, Ground Water Protection Branch, Washington, DC, April 5, 1989.

32. United States Environmental Protection Agency. Air Quality Criteria for Lead. Research Triangle Park (NC), Office of Health and Environmental Assessment, 1986, EPA/600/8-83/028aF.

33. United States Department of Health and Human Services, Public Health Service, Centers For Disease Control. Preventing Lead Poisoning in Young Children, October, 1991.

34. Proposed Sediment Quality Criteria for the Protection of Benthic Organisms: Dieldrin, U.S. EPA, Office of Water & Office of Research Development, Office of Science and Technology, Health and Ecological Criteria Division, November, 1991, Washington, DC 20460.

35. Toxicology Profile for Chromium. Agency For Toxic Substances and Disease Registry, U. S. Department of Health and Human Services, Public Health Service, TP-88/10, Atlanta, GA, 1989.

36. Proposed Sediment Quality Criteria for the Protection of Benthic Organisms: Endrin, U.S. EPA, Office of Water & Office of Research Development, Office of Science and Technology, Health and Ecological Criteria Division, November, 1991, Washington, DC 20460.

37. Proposed Sediment Quality Criteria for the Protection of Benthic Organisms: Phenanthrene, U.S. EPA, Office of Water & Office of Research Development, Office of Science and Technology, Health and Ecological Criteria Division, November, 1991, Washington, DC 20460.

38. Hazard Evaluation Handbook, A Guide to Removal Actions. Prepared by the Roy F. Weston Technical Assistance Team for the U.S. Environmental Protection Agency, Region III, Phila., PA. Superfund Removal Branch under Contract #68-WO-0036, October, 1991.

LIST OF APPENDICES

LIST OF TABLES

APPENDIX 1. TOXICOLOGICAL EXPOSURE ASSUMPTIONS, DEFINITIONS, AND EXPOSURE PARAMETERS APPLIED IN THIS RISK EVALUATION

Reasonable Maximum Exposure	Applied herein as the maximum analyte concentrations reported for a designated medium and exposure scenario
Target Cancer Risk	1.00×10^{-6} (specific contaminant)
Target Hazard Index/Quotient Value	1 (Unity) (specific contaminant)
Acceptable Risk Range (U.S. EPA, Region III)	1.00×10^{-4} to 1.00×10^{-6}
Body Weight	Adult: 70 Kg Child: 15 Kg
Averaging Time (Years of Life)	70 years
Drinking Water Ingestion Rate	Adult: 2 L/day Child: 1 L/day Age Adjusted: 1.09 (L-y/Kg-d)
Soil Ingestion	Adult: 100 mg/day (conservative) Child: 200 mg/day Worker: 100 mg/day (very conservative) Age Adjusted: 114.29 (mg-y/Kg-d)
Exposure Frequency	Residential: 350 days/year Occupational: 250 days/year
Exposure Duration	Residential: 30 years Occupational: 25 years
Child Trespasser	Two episodes per week for 39 weeks over six years
Adult Trespasser	May vary but is generally two episodes per week for 39 weeks over 24 years

RELEVANT COMMENTS/NOTES/BENCHMARKS & SCREENING

The upper-bound estimate of carcinogenic risk is expressed in terms of the number of excess cancers over a lifetime in an exposed population under a specific exposure scenario. For instance, a carcinogenic risk of 1.0×10^{-6} (1.0 x 10E-06 or 1.0E-06) is defined as 1 additional cancer per 1 million exposed individuals. In general, the U. S. EPA (Region III, Technical Section and others) defines incremental carcinogenic risk within the 1.0E-06 to 1.0E-04 range as being acceptable, with 1.0E-06 being the point-of-departure. This supports a cleanup initiation point of 1.0E-04. The target risk or de minimis risk level is considered also to be 1.0E-06.

Appendix 1. (Continued)

A non-carcinogenic threat is expressed in terms of a Hazard Quotient (HQ). An HQ is the ratio between the dose of a single substance over a specified period of time compared to the RfD for that substance. The Hazard Index (HI) is the sum of more than one HQ for multiple substances or multiple exposure routes and pathways. When the HQ or the HI exceeds unity, there may be concern for potential non-cancer health effects. The target non-cancer risk here is unity.

Systemic effects, usually non-carcinogenic, requires absorption and distribution of the toxicant to a site distant from the point of entry, and at which point effects are produced. Most chemicals that produce systemic toxicity usually do not cause a similar degree of toxicity in all organs. Normally the major toxicity is demonstrated in one or more organs. These are referred to as the target organs for that chemical.

The combined carcinogenic risks and non-carcinogenic threats over a 30 year residential exposure duration (6 years as a child resident plus 24 years as an adult resident) are presented. It is recognized that a recently applied philosophical change is now being applied by Region III to estimate exposures to carcinogens and is used to derive the benchmark values. Previous versions of the benchmark table noted estimated exposures to carcinogens on the basis of 30 years of adult exposure. Now the calculations for three media have been changed to reflect 30 years of combined childhood and adult exposure, using **age adjusted factors** via integrated weight and ingestion/inhalation estimates for combined child/adult exposures. This has lowered the appropriate risk based concentrations for carcinogens in tap water, in ambient air, and in occupational and residential soil slightly. Other exposure rates such as for fish consumption remained the same.

The study herein does not apply the ingestion adjusted estimated exposure for carcinogens, and thus the modeled values for adults exposed to carcinogens in drinking water and soil ingestion or air will show slightly less risk. In time, as it is evident that the use of this age-adjustment factor has been followed without revision/change for a reasonable period of time, then our models will begin applying it routinely, but until a consistent pattern emigres, the past model parameters will continue to be used. The previous revision based upon body weight changes lasted for three months and wasted considerable time and effort related to revising the models. The most recently released and "corrected" benchmark values are used for screen purposes, thus analytes of concern are included based on the new philosophy and corrected tables.

Benchmark values are concentrations in various media providing cancer risks reported at 1.0E-06 or a HQ, non-cancer risk reported at unity or 1. These values have been generally applied as a screening level to identify analyte exceedances in this report so that such compounds may be considered for inclusion in risk assessment models. Risk-Based Concentration Tables are provided via U.S. EPA Region III by Senior Toxicologist, Roy L. Smith, Ph.D., in the Technical Support Section (3HW13) on a quarterly basis and as noted in the references in this document. It is important to note that the accompanying comments relevant to the table provides the following information, comments and disclaimers.

Appendix 1. (Continued)

"The table contains reference does and carcinogenic potency slopes (obtained from IRIS through ....., HEAST through...., OHEA-Cincinnati, and other EPA sources) for nearly 600 chemicals. These toxicity constants have been combined with 'standard' exposure scenarios to calculate chemical concentrations corresponding to a fixed level of risk (i.e., a hazard quotient of 1, or lifetime cancer risk of 10E-06, whichever occurs at a lower concentration) in water, air, fish tissue, and soil.

The Region III toxicologists use this table as a risk-based screen for Superfund sites, and as a desk reference for emergencies and other requests for immediate information. The table also provides a useful benchmark for evaluating preliminary site investigation data and contractor-prepared preliminary remediation goals. The table has no official status as either regulation or guidance, and should but used only as a predictor of generic single-contaminant health risk estimates. The table is specifically not intended as (1) a stand-alone decision-making tool, (2) a substitute for EPA guidance for preparing baseline risk assessments, (3) a source of site-specific cleanup levels, or (4) a rule to determine if a waste is hazardous under RCRA. In general, chemical concentrations above the levels in the table suggest a need for a closer look by a toxicologist, but should not be used as the sole basis for taking any action."

APPENDIX 2. GLOSSARY OF DATA QUALIFIERS APPLIED TO RESULTS OF LABORATORY ANALYSES*

Identification Codes (Confidence concerning presence or absence of analytes.)

U	Not detected. The associated number indicates approximate sample concentration necessary to be detected.
NQ	No Qualifier - Identification confirmed.
B	Not detected substantially above the level reported in laboratory or field blanks.
R	Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.
N	Tentative identification. Consider present. Special methods may be needed to confirm its presence or absence in future sampling efforts

Quantitation Codes (Can be used for both positive results and sample quantitation limits.)

J	Analyte present. Reported value may not be accurate or precise.
K	Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L	Analyte present. Reported value may be biased low. Actual value is expected to be higher.
[ ]	Analyte present. As values approach the Instrument Detection Limit (IDL) the quantitation may not be accurate. (Above R but lower than J.)
UJ	Not detected, quantitation limit may be inaccurate or imprecise.
UL	Not detected, quantitation limit is probably higher.

Other Codes

Q	No analytical result.

* Codes normally utilized in risk assessment include: NQ, J, K, and L. Values in brackets are normally not used, but could be applied if judged appropriate. Brackets are considered higher in confidence than R but lower than J.

APPENDIX 3. DATA SELECTION PROCEDURES APPLIED FOR DEVELOPMENT OF CHEMICALS OF CONCERN

For inclusion, data:

A. Had no delimiting qualifiers, or were J, K, L or [] qualified.

B. Was the highest concentration encountered for specific medium.

C. Were analytes of concern with completed exposure pathways and exceedances of toxicological benchmarks, but not generally within an order of magnitude of such benchmarks unless specified. The latter is often discussed but not included in the calculations.

D. Had surface soil exposures for present and future risks which were given preference over subsurface sample data. Deep soil exposures discussed but not developed into scenarios.

E. Had filtered groundwater samples that were applied over non-filtered but unfiltered data usually is discussed.

F. Had results showing inconsistencies, differences between duplicates, high or low background levels, et cetera. Such results were noted and discussed but normally excluded from consideration in the exposure scenarios.

APPENDIX 4. MAXIMUM CONTAMINANT LEVELS, MAXIMUM CONTAMINANT LEVEL GOALS, AND SECONDARY MAXIMUM CONTAMINANT LEVELS

Maximum Contaminant Level Goal (MCLG)

An MCLG is a non-enforceable analyte concentration of a drinking water contaminant set at a level that will result in no known or anticipated adverse health effects and allows an adequate margin of safety.

Maximum Contaminant Level (MCL)

An MCL is an enforceable standard as a drinking water regulation set by the U.S. EPA under the Safe Drinking Water Act and adopted by the State. The standard relates to drinking water delivered to any user of a public system. It is a value as close to the MCLG as feasible with treatment technologies and costs considered. The MCL is protective of adverse human health effects. It may or may not pose a risk greater than 1.0E-06. For certain analytes, especially those having long-time-established MCLs, it has been found at times to be the case whereby, for a specific chemical, the MCL may show an increased incremental lifetime cancer risk greater than the target value.

Secondary Maximum Contaminant Level (SMCL)

An SMCL is non-regulatory health guidance value which relates to the aesthetic quality of drinking water. Contributing factors include taste, odor, color, hardness ....

Reference Dose (RfD)

An estimate of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects over a lifetime.

Drinking Water Equivalent Level (DWEL)

A lifetime exposure concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a contaminant is from a drinking water source.

APPENDIX 5. EPA WEIGHT-OF-EVIDENCE CLASSIFICATION SYSTEM FOR POTENTIAL CARCINOGENS

Category	Group Description	Evidence of Support
Group A*	Human Carcinogen	Sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer in humans.
Group B1*	Probable Human Carcinogen	Limited evidence in humans from epidemiologic studies.
Group B2*	Possible Human Carcinogen	Sufficient evidence in animals, inadequate evidence in humans.
Group C	Possible Human Carcinogen	Limited evidence in animals and/or carcinogenic properties in short-term studies.
Group D	Not Classified	Inadequate evidence in animals.
Group E	No Evidence	No evidence in at lease two adequate animal tests or in both epidemiologic and animal studies.

*Cancer Slope Values usually available via EPA, Integrated Risk Information System.

Source: U.S. EPA, 1986.

APPENDIX 6. DOSE EQUATIONS USED IN THIS RISK EVALUATION - INGESTION

Hazard Quotient (HQ)

$$CDI = \frac{(CW)\ (IR)\ (EF)\ (ED)}{(BW)\ (AT)}$$

$$\frac{CDI}{RfD} = HQ$$

Cancer Risk (CR)

$$CDI = \frac{(CW)\ (IR)\ (EF)\ (ED)}{(BW)\ (AT)}$$

$$CDI \times SF = CR \qquad \text{or} \qquad CR = 1 - e(-Dose \times SF)$$

CW = Concentration, mg/L or mg/Kg
IR = Ingestion Rate, L/day or mg/day
EF = Exposure Frequency, days/year
ED = Exposure Duration, year
BW = Body Weight, Kg
AT = Averaging Time, 25,500 days, carcinogen, adult; 9,125 days, non-carcinogen, worker; 2,190 days, non-carcinogen, child (period over which exposure is averaged, days)
CDI = Chronic Daily Intake
RfD = Reference Dose (NOAEL/Safety Factor)
NOAEL = No Observed Adverse Effect Level
RfD to Water = DWEL,

$$\frac{RfD \times 70Kg}{2L/day} = DWEL$$

95% Confidence Level = The mean +/- 2 standard deviations
Lifetime Durations = 70 years
CF = Conversions Factor, for soil ingestion, 1 x 10^{-6}Kg/mg
FI = Fraction Ingested, from contaminated source, usually 100% = 1

LJJ:dw
LJJ94071.wp
DE-266 II-A3

TABLE 1. AMTRAK WILMINGTON REFUELING FACILITY SAMPLE IDENTIFICATION
SAMPLE IDENTIFICATION# AND RATIONALE – INORGANIC
11-30-93

S.I. Sample #	Lab Sample #	Sample Location #	Time	Sample Type	Description/Objective
AT-2	DT-3977	---	1420	Aqueous – Rinsate Blank	Equipment Rinsate Blank
AT-3	DT-3978	SW #1	1327	Aqueous – Surface Water	Trib. #1 Background
AT-4	DT-3979	SW #2	1235	Aqueous – Surface Water	Trib. #1 Upstream
AT-5	DT-3980	SW #3	1212	Aqueous – Surface Water	Trib. #1 Middle
AT-6	DT-3981	SW #4	1003	Aqueous – Surface Water	Trib. #1 & 2 Pond Downstream
AT-7	DT-3982	SW #4	1005	Aqueous – Surface Water	Trib. #1 & 2 Pond – Field Duplicate of DT-3981
AT 8	DT-3983	SW #5	1120	Aqueous – Surface Water	Trib. #1 Ditch
AT-9	DT-3984	SW #6	1320	Aqueous – Surface Water	Trib. #2 Upstream
AT-10	DT-3985	SW #7	1415	Aqueous – Surface Water	Trib. #2 Middle
AT-11	DT-3965	SS #1	1130	Soil – Shallow	Off-Site Background
AT-12	DT-3966	SS #2	0952	Soil – Shallow	East Side Refueling Area
AT-13	DT-3967	SS #2	0952	Soil – Shallow	East Side Refueling Area – Field Duplicate of DT-3966
AT-14	DT-3968	SS #3	1030	Soil – Shallow	West Site Refueling Area
AT-15	DT-3969	SD #1	1346	Sediment	Trib. #1 Background
AT-16	DT-3970	SD #2	1246	Sediment	Trib. #1 Upstream
AT-17	DT-3971	SD #3	1240	Sediment	Trib. #1 Middle
AT-18	DT-3972	SD #4	1025	Sediment	Trib. #1 & 2 Pond Downstream
AT-19	DT-3973	SD #5	1131	Sediment	Trib. #1 Ditch
AT-20	DT-3974	SD #6	1340	Sediment	Trib. #2 Upstream
AT-21	DT-3975	SD #7	1431	Sediment	Trib. #2 Middle

LJL00594.wk3

TABLE 2. AMTRAK WILMINGTON REFUELING FACILITY
IDENTIFICATION # AND RATIONALE – ORGANIC
11–30–93 (Unless Noted)

S.I. Sample #	Lab Sample #	Sample Location #	Time	Sample Type	Description/Objective
AT–2	930–3977	– – –	1420	Aqueous – Rinsate Blank	Equipment Rinsate Blank
AT–3	930–3978	SW #1	1327	Aqueous – Surface Water	Trib. #1 Background
AT–4	930–3979	SW #2	1235	Aqueous – Surface Water	Trib. #1 Upstream
AT–5	930–3980	SW #3	1212	Aqueous – Surface Water	Trib. #1 Middle
AT–6	930–3981	SW #4	1003	Aqueous – Surface Water	Trib. #1 & 2 Pond Downstream
AT–7	930–3982	SW #4	1005	Aqueous – Surface Water	Trib. #1 & 2 Pond – Field Duplicate of DT–3981
AT–8	930–3983	SW #5	1120	Aqueous – Surface Water	Trib. #1 Ditch
AT–9	930–3984	SW #6	1320	Aqueous – Surface Water	Trib. #2 Upstream
AT–10	930–3985	SW #7	1415	Aqueous – Surface Water	Trib. #2 Middle
AT–11	930–3965	SS #1	1130	Soil – Shallow	Off–Site Background
AT–12	930–3966	SS #2	0952	Soil – Shallow	East Side Refueling Area
AT–13	930–3967	SS #2	0952	Soil – Shallow	East Side Refueling Area – Field Duplicate of DT–3966
AT–14	930–3968	SS #3	1030	Soil – Shallow	West Site Refueling Area
AT–15	930–3969	SD #1	1346	Sediment	Trib. #1 Background
AT–16	930–3970	SD #2	1246	Sediment	Trib. #1 Upstream
AT–17	930–3971	SD #3	1240	Sediment	Trib. #1 Middle
AT–18	930–3972	SD #4	1025	Sediment	Trib. #1 & 2 Pond Downstream
AT–19	930–3973	SD #5	1131	Sediment	Trib. #1 Ditch
AT–20	930–3974	SD #6	1340	Sediment	Trib. #2 Upstream
AT–21	930–3975	SD #7	1431	Sediment	Trib. #2 Middle
AT–12R	9400190	SS #2	1010	Soil – Shallow	East Side Refueling Area – VOA Resample 1–13–94
AT–13R	9400191	SS #2	1010	Soil – Shallow	East Side Refueling Area – Field Duplicate of 9400190
AT–14R	9400192	SS #3	1215	Soil – Shallow	West Site Refueling Area – VOA Resample 1–13–94
AT–15R	9400193	SD #1	0910	Sediment	Trib. #1 Background – VOA Resample 1–13–94
AT–16R	9400194	SD #2	0940	Sediment	Trib. #1 Upstream – VOA Resample 1–13–94
AT–17R	9400195	SD #3	1342	Sediment	Trib. #1 Middle – VOA Resample 1–13–94
AT–18R	9400196	SD #4	1115	Sediment	Trib. #1 & 2 Pond Downstream – VOA Resample 1–13–94
AT–19R	9400197	SD #5	1145	Sediment	Trib. #1 Ditch – VOA Resample 1–13–94

LJL01205.wk3

TABLE 3. SURFACE WATER SAMPLING ANALYTICAL RESULTS FOR INORGANIC ANALYTES, AMTRAK WRF

Sample Number:	DT3977	DT3978	DT3979	DT3980	DT3981	DT3982	DT3983	DT3984	DT3985	Ambient
Location:	Equipment Blank AT-2	Trib. #1 SW-1 Background AT-3	Trib. #1 SW-2 Upstream AT-4	Trib. #1 SW-3 Midstream AT-5	Trib. #1 & 2 Exit SW-4 AT-6	Trib. #1 & 2 Exit SW-4 AT-7	Trib. #1 Ditch SW-5 AT-8	Trib. #2 SW-6 Upstream AT-9	Trib. #2 SW-7 Midstream AT-10	Water Quality Criteria Freshwater Chronic
Type:										
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum		[136]	[96.6]	747	1430	1520	1150	[67.2]	[48.3]	87 *
Antimony								[3.7] UL		p/30/
Arsenic		[3.7] K	[1.6] K			[2.1]		[2.1] L	[2.6] L	III 190
Barium		295	9.9	[78.0]	[50.7]	[46.5]	[51.1]	344	352	
Beryllium										5.3 LOEL
Cadmium										1.1
Calcium	[17.7]	46000	43500	21600	14900	14800	22100	72700	87900	
Chromium										III-210+ VI 11.0
Cobalt										
Copper										12
Iron		3680 J	2080 J	2290 J	2390 J	2470 J	2070 J	6580 J	24900 J	1000
Lead	[1.8] J	9.1 J	13.2 J	22.3 J						3.2+
Magnesium		14100 J	12200 J	[4960] J	5560 J	5550 J	5000 J	31000 J	24200 J	
Manganese		328	227	235	119	122	125	553	924	
Mercury									0.39	0.012
Nickel										160+
Potassium										
Selenium	[1.1]									5.0
Silver	[7.0]									0.12
Sodium		62100	27600	11500	7440	7720	12000	45000	51900	
Thallium										40
Vanadium										
Zinc	[5.3]		35.1	31.4						10
Cyanide			10.3	11.5						5.2

J = Analyte present. Reported value may not be accurate or precise.
[ ] = Analyte present. As values approach the IDL, the quantitation may not be accurate.
K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.
* = Delaware Surface Water Quality Standards, as amended, February 26, 1993
p/?/ = Proposed criterion
+ = Hardness dependent
LOEL = Lowest Observed Effect Level

TABLE 4. SEDIMENT SAMPLING ANALYTICAL RESULTS FOR INORGANIC ANALYTES, AMTRAK WRF

Sample Number:	DT3969	DT3970	DT3971	DT3972	DT3973	DT3974	DT3975	Risk-Based Concentration	Risk-Based Concentration
Location:	SD-1 AT-15 Background	SD-2 AT-16 Upstream	SD-3 AT-17 Midstream	SD-4 AT-18 Exit	SD-5 AT-19 Ditch	SD-6 AT-20 Upstream	SD-7 AT-21 Midstream	Residential Soil	Industrial Soil
Type:								7-11-94	7-11-94
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	21800	16400	3940	17300	7070	4890	3890	230,000 *	1,000,000 *
Antimony		[17.6]	[3.8]	[7.7]	[2.6]	[24.5]	[12.3]	31	410
Arsenic	10.0 L	32.6 L	11.6 L	14.6 L	26.2 L	53.5 L	23.9 L	23 n 0.370	310 n 1.6 c
Barium	209	366	152	207	94.3	602	292	5500	72000
Beryllium								0.15	0.67
Cadmium								39	510
Calcium	4640	14000	1740	3230	41600	43400	2490		
Chromium	56.7	89.0	25.4	92.7	36.9	23.6	27.2	III 78000, VI 390	IV 1,000,000, VI 5100
Cobalt	[13.9]	[17.7]	[4.6]	[15.0]	[4.6]	[8.1]	[5.5]	4700	61000
Copper	67.7 J	301 J	53.0 J	132 J	61.7 J	109 J	217 J	2900	38000
Iron	35000 J	74900 J	16100 J	39400 J	16300 J	236000 J	40300 J		
Lead	162	1040	366	452	108	135	470		
Magnesium	3810 J	5420 J	[466] J	3360 J	4580 J	[2870] J	[564] J		
Manganese	697 L	581 L	97.7 L	470 L	269 L	4710 L	291 L	390	5100
Mercury	0.59 J							23	310
Nickel	33.2	43.4	[8.8]	39.5	16	[24.7]	[16.0]	1600	20000
Potassium									
Selenium					3.3 L			390	5100
Silver								390	5100
Sodium		[1760] J				[3580] J			
Thallium						[1.8]		6.3 - 7.0	82 - 92
Vanadium	70.5	81.4	20.1	66.3	20.9	[12.3]	36.7	550	7200
Zinc	312 J	758 J	93.8 J	539 J	122 J	919 J	303 J	23000	310000
Cyanide		1.7	1.2					1600 (FREE)	20,000 (FREE)

J = Analyte present. Reported value may not be accurate or precise.
[ ] = Analyte present. As values approach the IDL, the quantitation may not be accurate.
K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.
* = Risk Based Concentration Tables, 4-20-94.