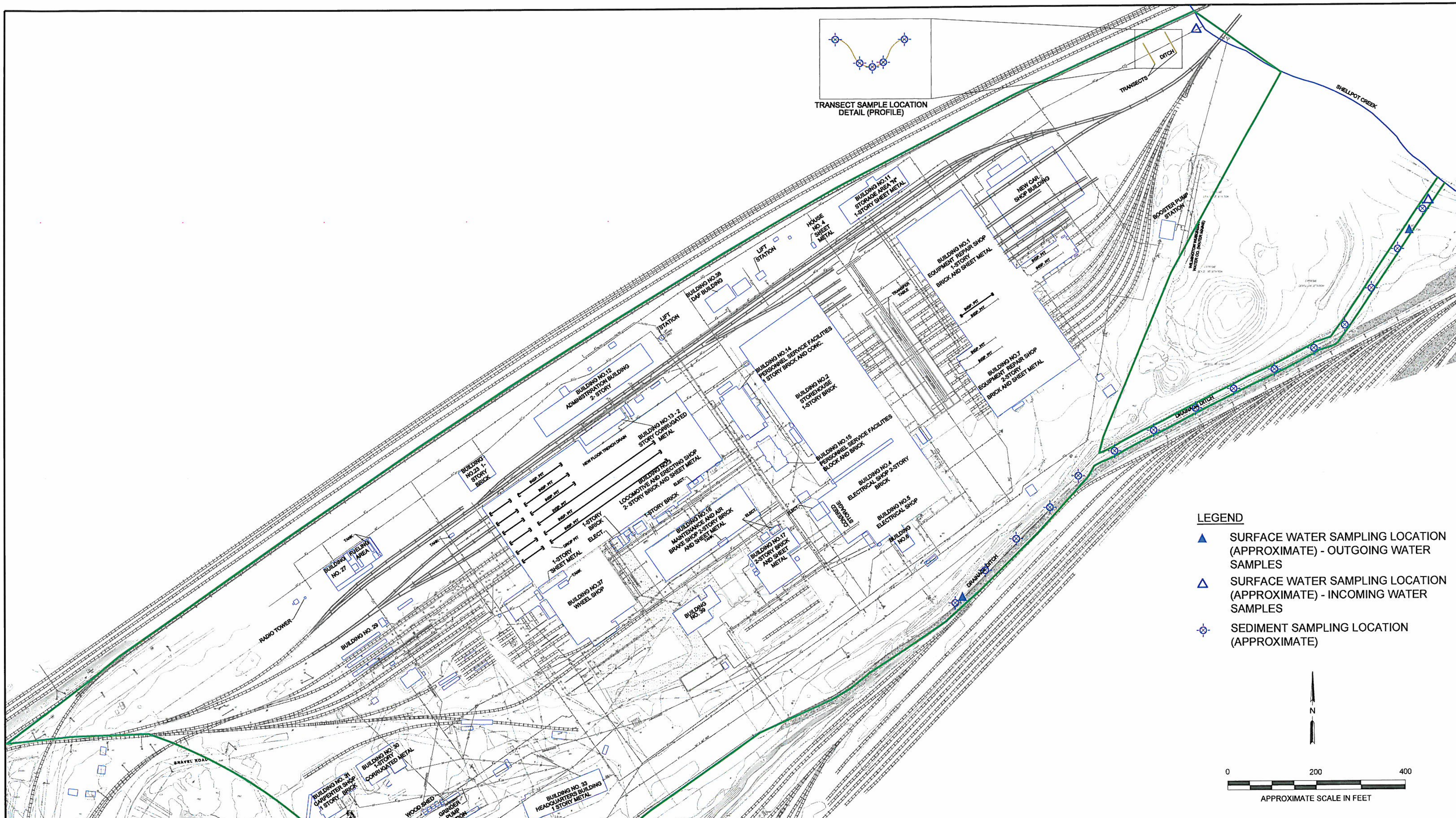

SECOR
102 PICKERING WAY, SUITE 200
EXTON, PENNSYLVANIA
PHONE: (484) 875-3075 FAX: (484) 875-9286

FOR:

AMTRAK FORMER FUELING FACILITY
VANDEVER AVENUE
WILMINGTON, DELAWARE

PROPOSED SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

FIGURE: 5-4

JOB NUMBER:	DRAWN BY: TFB	CHECKED BY: SB	APPROVED BY:	DATE: 05/08/2008

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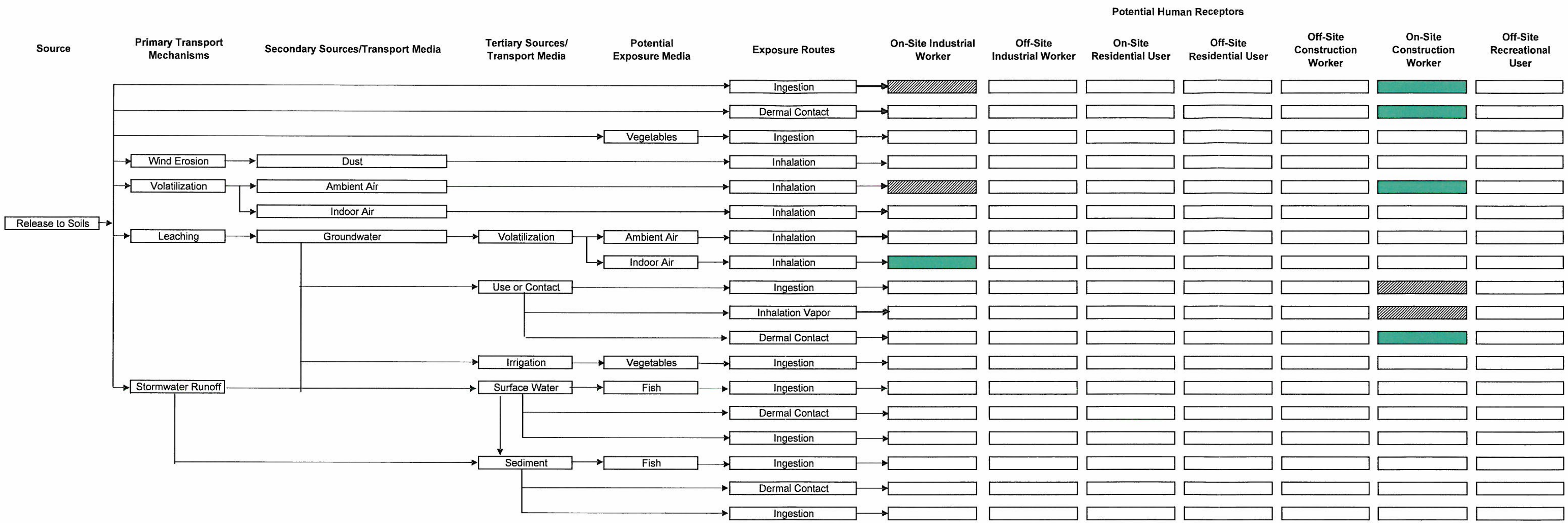
FIGURE 6-1

Conceptual Site Model -
Receptor Pathway Analysis
for Maintenance Facility
Amtrak-APU
Wilmington, DE



LEGEND

Exposure pathway is complete or potentially complete. Pathway will be quantitatively evaluated.

Exposure pathway is potentially complete but risks have been determined to be insignificant. Pathway will not be evaluated quantitatively.

Exposure pathway is incomplete. Pathway will not be evaluated.

TABLES

TABLE 8-1

Sample Laboratory Analyses and QA/QC Requirements
AMTRAK Maintenance Facility

Matrix	Type	No. of Specific Sample	Source	QA/QC Samples			Analytes	Methods	Preservation
				(Blind) Rep.[1]	Field[2]	MS/MSD[3]			
Soil	Discrete Soil Samples (0-6 inches)	117 (approximate) Assumes: - western perimeter - 23 samples - eastern perimeter - 10 samples - interior unpaved areas - 17 samples - northern unpaved area - 40 samples - southern unpaved area - 27 samples	Surface Soils – Unpaved Areas	1	1	1	All samples: -PCB aroclors Approx. 5% of the samples: - PCBs congeners - Petroleum hydrocarbons - VOCs - SVOCs - Metals	SW-846 8082 Method 1668A Mass. EPH/VPH SW-846 8260B SW-846 8270C SW-846 6010B	Cool, 4°C
Soil	Discrete Soil Samples (0-6 inches)	100 (approximate) Assumes: - 1 sample per 200 linear feet of track; 20,000 linear feet of track to be sampled	Surface Soils – Within Tracks	1	1	1	All samples: - PCB aroclors	SW-846 8082	Cool, 4°C
Soil	Discrete Soil Samples (at two foot intervals)	99 (approximate) Assumes: - 33 soil borings, 3 samples per soil boring (assuming the average water table depth is 6 feet)	Soil Borings	1	1	1	All samples: - PCB aroclors Approx. 5% of the samples: - PCBs congeners - Petroleum hydrocarbons - VOCs - SVOCs - TAL Metals	SW-846 8082 Method 1668A Mass. EPH/VPH SW-846 8260B SW-846 8270C SW-846 6010B	Cool, 4°C

TABLE 8-1

Sample Laboratory Analyses and QA/QC Requirements
AMTRAK Maintenance Facility

Matrix	Type	No. of Specific Sample	Source	QA/QC Samples			Analytes	Methods	Preservation
				(Blind) Rep.[1]	Field[2]	MS/MSD[3]			
Sediment	Discrete Sediment (0-3 inches) "A" Interval	25 (approximate) Assumes: - Outfall 002 drainage ditch - 10 samples - Drainage north of the Eastern Drainage Ditch – 15 samples	Drainage Ditches	1	1	1	All samples: - PCB aroclors - TPH-DRO - TOC Approx. 5% of the samples: - PCBs congeners - Petroleum hydrocarbons	SW-846 8082 SW846 8015B TBD Method 1668A Mass. EPH/VPH	Cool, 4°C
Sediment	Composite Sediment (3 inches to top of substrate; one sample per 3 foot vertical interval) "B" Interval	50 (approximate) Assumes: - Outfall 002 drainage ditch - 20 samples; two "B" interval samples per location - Drainage north of the Eastern Drainage Ditch – 30 samples; two "B" interval samples per location	Drainage Ditches	1	1	1	All samples: - PCB arocdors - TPH-DRO - TOC Approx. 5% of the samples: - PCBs congeners - Petroleum hydrocarbons	SW-846 8082 SW846 8015B TBD Method 1668A Mass. EPH/VPH	Cool, 4°C
Sediment	Discrete Sediment (0 to 1' into substrate) "C" Interval	25 (approximate) Assumes: - Outfall 002 drainage ditch - 10 samples - Drainage north of the Eastern Drainage Ditch – 15 samples	Drainage Ditches	1	1	1	All samples: - PCB aroclors - TPH-DRO - TOC Approx. 5% of the samples: - PCBs congeners - Petroleum hydrocarbons	SW-846 8082 SW846 8015B TBD Method 1668A Mass. EPH/VPH	Cool, 4°C

TABLE 8-1

Sample Laboratory Analyses and QA/QC Requirements
AMTRAK Maintenance Facility

Matrix	Type	No. of Specific Sample	Source	QA/QC Samples			Analytes	Methods	Preservation
				(Blind) Rep.[1]	Field[2]	MS/MSD[3]			
Ground water	Grab (after well purging)	24 Assumes: - 12 of 14 proposed wells will be free of LNAPL and will be sampled - Two sampling events	Monitoring wells	1	1	1	All Samples: -PCB aroclors (filtered and unfiltered samples) -VOCs -SVOCs -TAL Metals (dissolved)	SW-846 8082 SW-846 8260B SW-846 8270C SW-846 6010B	Cool, 4°C HCl to pH <2 $Na_2S_2O_3$ HNO_3 pH <2
LNAPL	Grab	2 Assumes: - 2 of the 14 proposed wells will contain LNAPL	Monitoring wells	NA	NA	NA	-PCB aroclors -specific gravity -viscosity -gas chromatography fingerprint	SW-846 8082 TBD TBD TBD	Cool, 4°C
Surface Water (to be collected under the PMP Program)	24-hour time weighted composite	2 (Outfall 002 and Outfall 007; wet weather samples per the PMP)	Storm Water Outfalls 002 and 007	1	NA	NA	PCB congeners	Method 1668A	Cool, 4°C

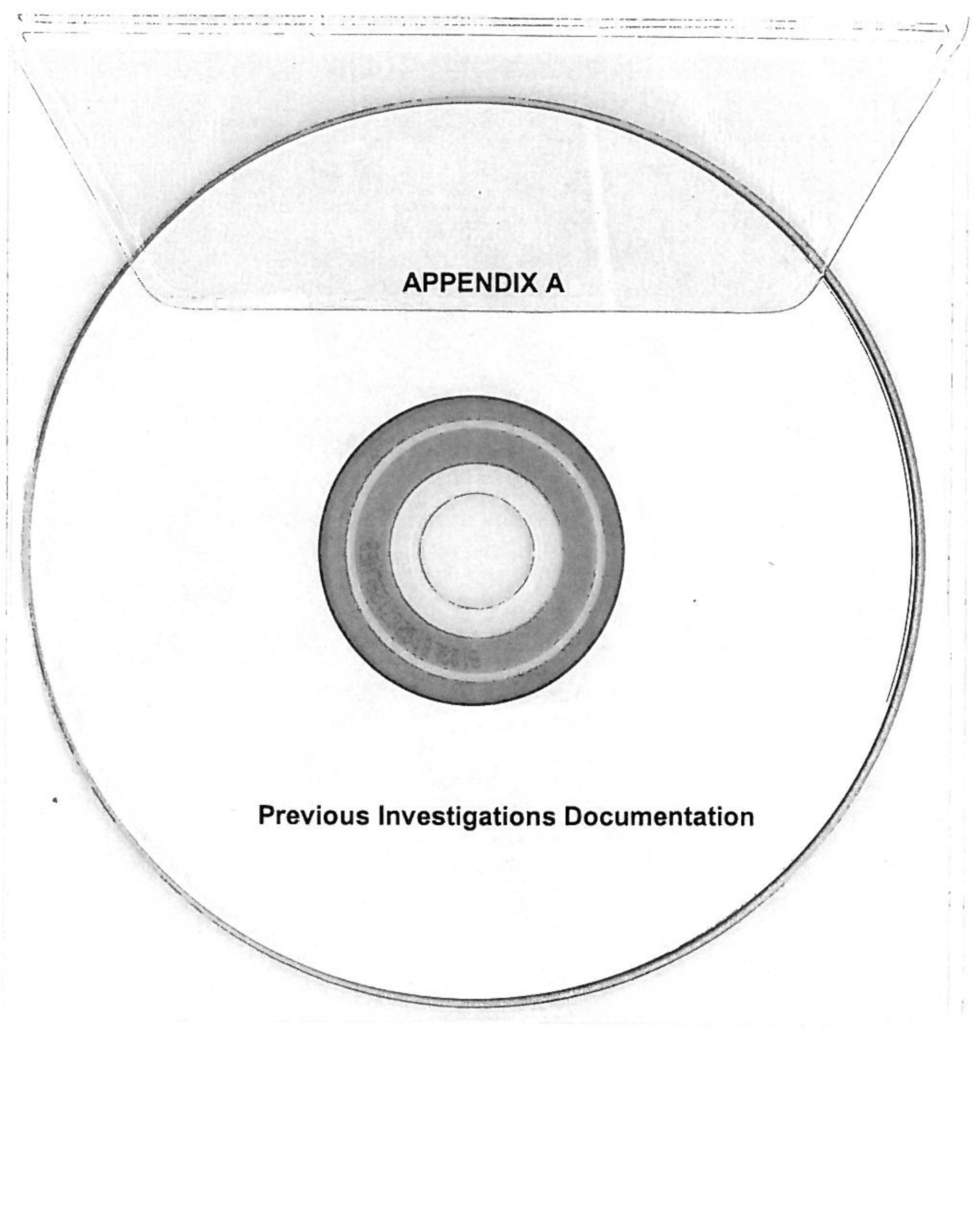
TABLE 8-1

Sample Laboratory Analyses and QA/QC Requirements
AMTRAK Maintenance Facility

Matrix	Type	No. of Specific Sample	Source	QA/QC Samples			Analytes	Methods	Preservation
				(Blind) Rep.[1]	Field[2]	MS/MSD[3]			
Surface Water	Grab	6 Assumes: - Outfall 002 drainage ditch - 1 sample location; incoming water - Drainage north of the Eastern Drainage Ditch – two sample locations; outgoing water (dry and wet weather) - Drainage north of the Eastern Drainage Ditch – one sample on an incoming tide	Drainage Ditches	1	NA	NA	- PCB aroclors (filtered and unfiltered samples) - TSS (unfiltered samples only) - PCBs congeners (filtered and unfiltered samples)	SW-846 8082 TBD Method 1668A	Cool, 4°C
Sewer Liquids and/or Sediment		40 Assumes: - Allowance for 40 samples; locations to be determined based on site reconnaissance - Sediment or liquids samples may be collected as determined by site conditions and field observations	Sewer drains inside building	1	1	1	- PCB aroclors	SW-846 8082	Cool, 4°C

[1] 1 per 20 samples/matrix, [2] 1 per day/sampling equipment area, [3] 1 per 20 samples matrix

APPENDIX A



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

Amtrak

January 30, 1981

RECEIVED

FEB 4 1981

Office of the Group
Vice President
Operations and Maintenance

Mr. Jack J. Schramm
Regional Administrator
U. S. Environmental Protection Agency
Region III
6th & Walnut Streets
Philadelphia, PA 19106

Attention: Diane Ajl

Dear Ms. Ajl:

As indicated to you and Mr. Ben Kalkstein in our meeting of April 18, 1980, and in our correspondence of the same date, Amtrak had planned to make a full assessment of the PCB contamination of the soil and water at Amtrak's Wilmington maintenance facility resulting from past PCB handling procedures which predated the EPA regulations on PCBs. On April 23, 1980, a contract was awarded to Woodward-Clyde Consultants to perform the assessment. Enclosed for your information is a copy of Woodward-Clyde's final report on this assessment.

The results represent the effects of extensive use of PCBs at this facility for several decades. Detectable levels of PCBs were measured in essentially all surface soil samples. Only the former PCB drum storage area, however, was found to have PCB contamination in excess of 50 ppm. Subsurface soil PCB contamination was found to be very low with all samples being less than 10 ppm. No detectable levels of PCBs were measured in the surface runoff for the shop area on the two occasions that surface water from the site was sampled. However, PCBs were detected in sediments in both the sewers and creeks in the area. The levels were up to 39.9 ppm in the sewer outfall sediments and up to 6.46 ppm in the creek sediments. Sewer sediments ranged to a high of 311 ppm. Sediment transport appears to be the primary source of PCB migration from the site; ground water was not found to be an important pathway of PCB migration from the site.

As mentioned in our meeting and our correspondence of April 15, 1980, during the next two to four years an extensive rehabilitation program is scheduled for the Wilmington Shop area. This is being funded by the Federal Railroad Administration as part of the Northeast Corridor Improvement Project (NECIP).

Based on the results of the PCB assessment, and based on the planned NECIP Wilmington Maintenance Facility modifications, we are considering the following corrective actions at Wilmington.

A. Excavate the portion of the drum storage area which exceeds 50 ppm. Pave the balance of the drum storage area.

B. Pave all roadways and parking lots.

C. Separate storm industrial and sanitary lines directing all clean stormwater runoff to Shellpot Creek and the Brandywine tributary.

D. Abandon existing sewer trunk lines by sealing and installing new sewers.

The actual work to be accomplished and the timing of the work will be contingent upon the monies made available by congress through the FRA. After you have had the opportunity to review the assessment, we would be glad to meet with you to answer any questions which you may have on this study. By copy of this letter, we are also inviting Mr. Phil Retallick, Region III, EPA; Mr. Bob Touhey, State of Delaware, EPA; and Mr. Glenn Kuntz, Federal EPA, Washington, D. C. to participate in this meeting. We would suggest that the meeting be held at Amtrak headquarters.

If you are interested in such a meeting or if you have any questions, please contact us.

Yours very truly,

R. F. Lawson

Robert F. Lawson
Vice President/Chief Engineer

ASSESSMENT OF PCBs AT THE WILMINGTON MAINTENANCE FACILITY WILMINGTON, DELAWARE

P.O. WHS-0073-014

Submitted to:

NATIONAL RAILROAD PASSENGER CORPORATION
Washington, D.C.

Prepared by:

WOODWARD-CLYDE CONSULTANTS
Plymouth Meeting, Pennsylvania

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1.0 INTRODUCTION

The Wilmington Maintenance Facility of the Amtrak railroad system is located adjacent to the mainline tracks of Amtrak in Wilmington, Delaware. It has served as a major maintenance and repair facility for electric cars and locomotives, and previously served a similar function when it was operated by the Penn Central and Pennsylvania Railroad Companies. From about 1940 to late in the 1970's, transformer oil (Askeril) utilized at the facility contained polychlorinated biphenyls (PCBs) as a dielectric. During servicing of the electric cars, transformer oils were routinely changed, and the used oil was discarded on site. Also, there are storage facilities on site for the new oil. Thus, there appears to have been an opportunity for PCBs to have contaminated the site area prior to knowledge or concern about the environmental effects of PCB exposure.

1.1 PURPOSES OF INVESTIGATION

The goals of this investigation were to assess the extent of PCB contamination in surface soils, surface water, groundwater, and subsurface materials at the site; to determine pathways of PCB migration at the site, and to develop conceptual alternatives to reduce or eliminate PCB contamination in signficantly contaminated parts of the site.

This report details our findings at the site. Section 2.0 summarizes the field investigations, including methods of analysis, laboratory analyses, and results of these investigations. An assessment and analyses of these data are given in Section 3.0, and recommendations are provided in Section 4.0.

1.2 LOCATION OF SITE

The Wilmington Maintenance Facility site comprises an area of about 110 acres in Wilmington, Delaware, and it occupies part of the flood plain of the Delaware River which was backfilled to provide usable land (Figure 1). The mainline tracks of Amtrak (labeled Penn-Central in Figure 1) and the switching yard of Conrail (shown as Penn-Central in Figure 1) bound the area to the northwest and southwest, respectively.

The site is situated in the Coastal Plains Province of Delaware near its inner (northwest) margin. It is underlain by Cretaceous age unconsolidated sediments that belong to the Raritan-Magothy Formation, a series of strata comprising alternating beds of sands and clayey silts. The Formation is a major aquifer for potable water supplies in the Coastal Plain area. Pleistocene age sediments, including recent flood plain and marsh sediments of the Delaware River locally form a surficial veneer on these older sediments. The site is located at the inner margin of the Delaware River flood plain sediments.

2.0 FIELD AND LABORATORY INVESTIGATIONS

Field investigations and laboratory analyses of collected samples were conducted to assess the distribution of PCBs in the soil, surface water and groundwater at the site. This section describes the methods of data acquisition, summarizes the data acquired during the investigation, and provides preliminary conclusions on the distribution of PCBs.

For each sample collected, as described in subsequent sections, steps were taken to reduce the probability of cross-contamination and to assume a high probability that valid samples were collected. All samples were collected in sample containers

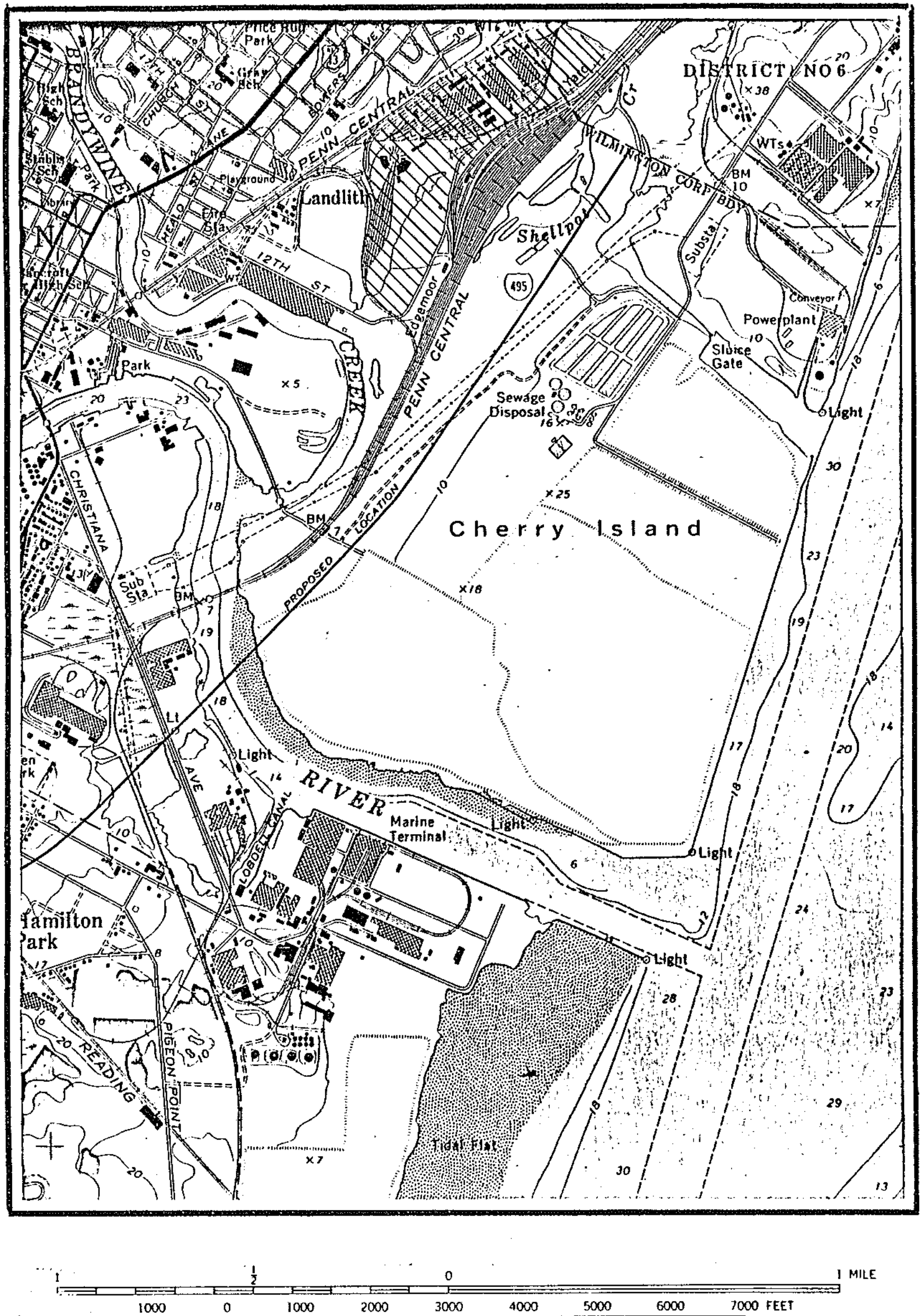

FIGURE 1 - Location of Wilmington Maintenance Facility, Wilmington, Delaware

prepared by the analysis laboratory for PCB analysis. They were pre-cleaned and had Teflon lined caps. Sample containers were placed on ice immediately after filling, and returned to the laboratory within 24 hours. A chain of custody record is available for each sample collected.

2.1 SURFACE SOILS

Samples of approximately the upper one foot of the surface soils were collected in numerous parts of the site area, including soils beneath puddles, and soils from marsh areas. The discussion of field techniques is followed by the results of analyses for the specific types of samples. One table is used to list all soil samples.

2.1.1 FIELD TECHNIQUES: All surface soil sampling was accomplished by digging a trench about one foot deep and scraping the sides of the trench with a clean tool or by hand, after which the sample was collected. All soil samples were collected with a clean disposable glove, and the samples were stored and returned to the laboratory as described above. A new glove was used to collect each sample.

2.1.2 RESULTS OF ANALYSES:

STORAGE AREAS: Soil samples were collected from 20 locations on the site (Figure 2; Table 1), including the tie disposal, drum storage, transformer storage, and locomotive storage areas. The shaded areas shown in Figure 2 are areas where transformer oil could have been spilled in the past or where contaminated soils may be concentrated. The highest levels of PCBs occurred in the drum storage area, where concentrations ranged from 1.35 to 894 mg/kg (milligrams per kilogram). As an area that once served for storage of transformer oil, the contamination of soils was likely due to spills from these drums.

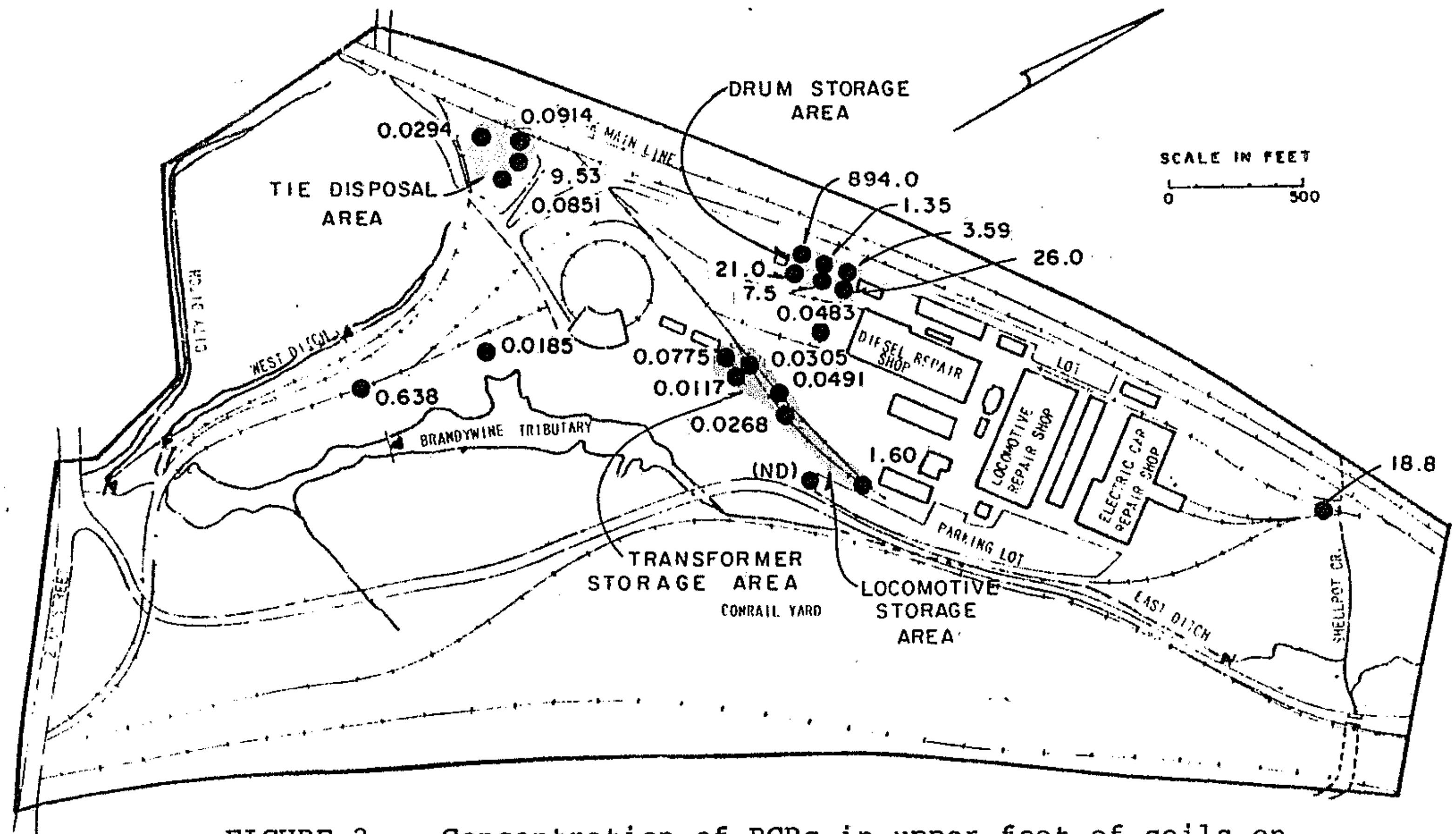

FIGURE 2 - Concentration of PCBs in upper foot of soils on roadways and mainline tracks. Concentration expressed in mg/kg.

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

TABLE 1 (cont'd-2)

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

Six samples collected from the locomotive and transformer storage areas contained 0.026 to 1.6 mg/kg and 0.0117 to 0.0775 mg/kg PCBs, respectively. Given the potential for higher concentrations due to leakage from transformers at both locations, the relatively low concentration can be attributed either to the integrity of the transformers stored in these areas, or to low sampling density such that samples with higher concentrations were not collected.

The concentration of PCBs in the rail tie disposal area ranged from 0.0294 to 9.53 mg/kg. The area now serves as a storage area for used ballast and old ties. No data exist which suggest that transformer oil was spilled or dumped in this area; thus, the source of PCBs in this area is probably from the stored materials. Spillage of PCBs, onto either the ties or ballast during their previous usage, is the probable source of PCBs collected during this investigation.

<u>ROADWAYS AND MAINLINE TRACK SAMPLES</u>: The concentration of PCBs along roadways and the mainline tracks is shown in Figure 3. It was reported that spent transformer oil was used as a dust suppressant on roadways and parking lots within the facility. Thus, the concentration of PCBs along the roadways can be expected to be elevated in places. The concentration of PCBs in these areas ranged from 0.0373 to 24.8 mg/kg. The differences in the concentration of PCBs in these samples may reflect, in part, the maintenance program followed after the use of the oils as a dust suppressant was suspended. Roadways currently are maintained by grading and adding gravel as needed; thus, there is reworking of contaminated roadways and uncontaminated new material that probably accounts for the variable concentration of PCBs.

The concentration of PCBs from the bed of the mainline tracks ranged from 0.0211 to 0.0307 mg/kg (Figure 3; Table 1). Because operations at the Maintenance Facility with respect to

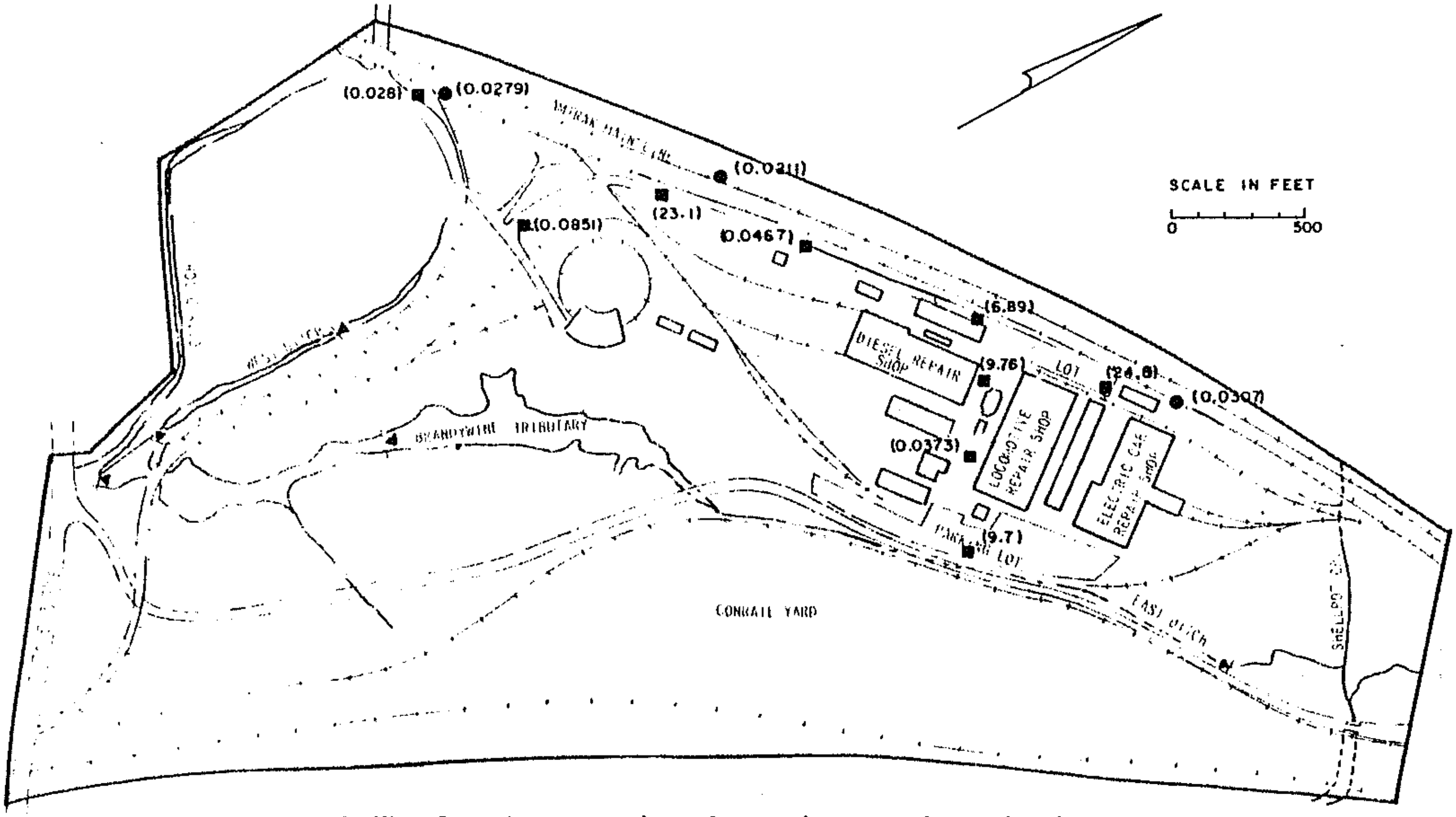

FIGURE 3 - Concentration of PCBs in upper foot of soils on roadways and mainline tracks. Concentration expressed in mg/kg. Circles are locations of samples taken on mainline tracks. Squares are locations of samples on roadways and parking lots.

transformer oil do not affect the mainline tracks, these measured concentrations probably represent background concentrations of PCBs on electrified rails of the area. The relative uniformity of concentration probably reflects the long-term slow loss of PCBs from electrified cars and locomotives.

PUDDLES AND MARSH SAMPLES: Soil samples were collected from beneath puddles and marsh vegetation at the site (Figure 4; Table 1). The puddle samples were collected along roadway areas, which therefore are areas where runoff from adjacent areas accumulate. The concentration of PCBs in these samples ranged from 0.329 to 4.05 mg/kg.

The concentration of PCBs in marsh soil samples ranged from less than detectable to 5.95 mg/kg, with all but one of the samples in the range of non-detectable to 0.0347 mg/kg. A concentration of 5.95 mg/kg is surprisingly high and is not consistent with the other data. A local area where oils may have been disposed in the past may have been sampled or this may be an area where contaminated runoff has accumulated over time. It is also possible that the sample may have been compromised in some manner.

2.2 SUBSURFACE SOILS

An exploratory boring program was completed to determine the depth to the water table and the stratigraphy of the site, to sample the subsurface materials, and to install piezometers.

2.2.1 FIELD METHODS: Subsurface soil samples were collected during the exploratory boring program. The bore holes were advanced using a hollow stem auger. This type of auger allowed for sampling of undisturbed soils at the base of the bore hole. Possible sources of contamination from the bore hole sidewalls were reduced because cuttings from the borings were continuously carried

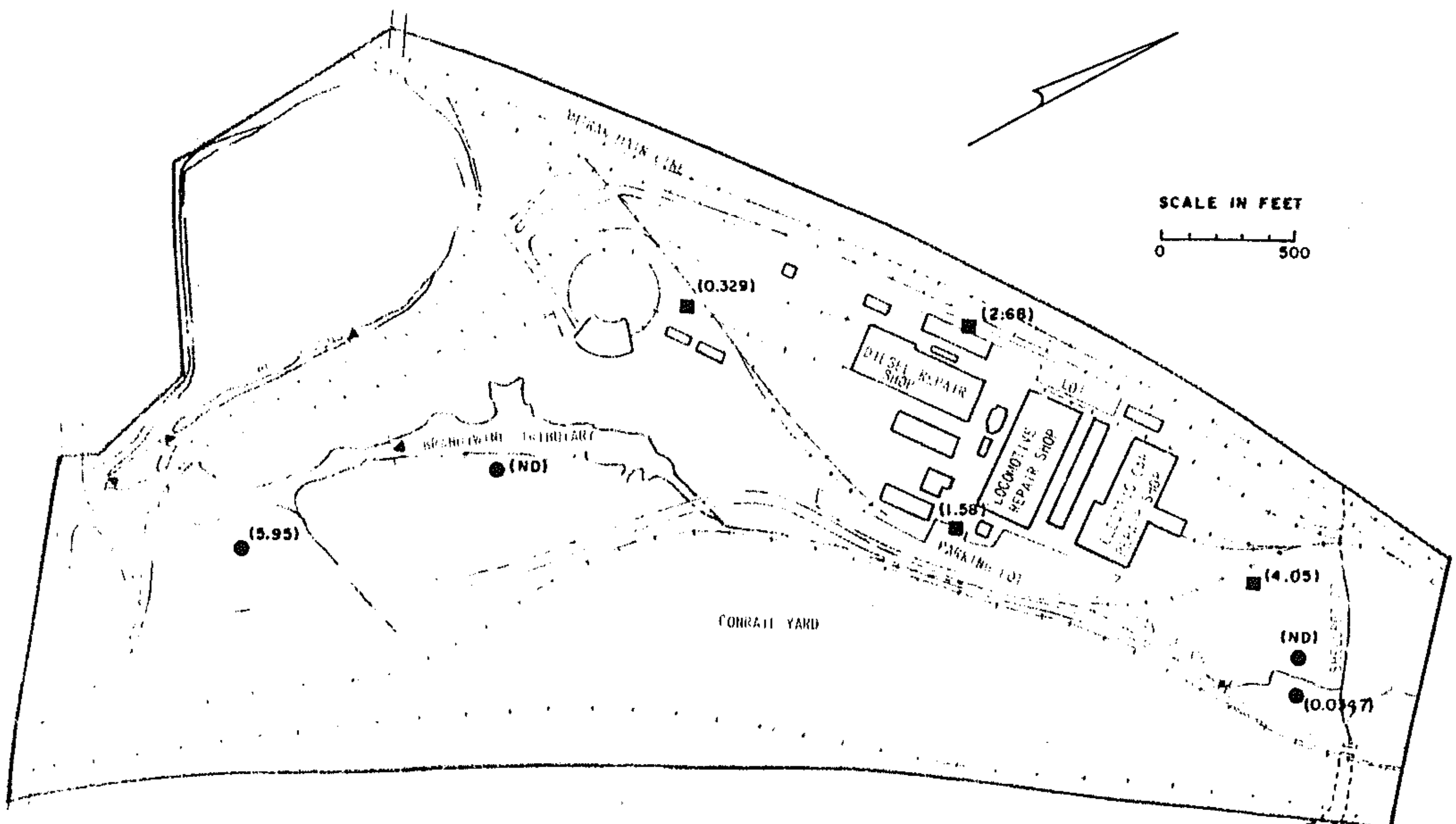

FIGURE 4 - Concentration of PCBs in soil samples collected from soils in marshes and puddles at the Wilmington Maintenance Facility. Values are expressed in mg/kg. ND means not detectable. Locations of marsh samples are shown with circles, and puddle locations are shown with squares.

to the surface by the auger. Soil samples were collected by connecting a two inch split spoon sampler to the end of a drilling rod. The drilling rod was lowered inside the hollow stem of the auger to the base of the bore hole. The sampler was advanced by dropping a 140 pound hammer 30 inches for a maximum penetration of 18 inches. The sample was removed, the outside of the sample was scraped clean, and the lithology logged. (Boring logs are provided in Appendix A.) The bottom six inches of the samples that were selected for chemical analysis were put in a Teflon lid jar, placed on ice, and returned to the laboratory within 24 hours of collection. Only that part of the sample that represented in place soils was collected for analysis. The split spoon sampler was washed thoroughly with fresh water and rinsed with lead-free gasoline after each use to reduce the possibility of cross-contamination.

A 1¼ inch (inside diameter) PVC piezometer was installed at each bore hole location. The piezometer was slotted in the lower five feet and installed with a gravel pack over the length of the slots. A bentonite seal was placed on top of the gravel pack to prevent contamination from the surface.

2.2.2 STRATIGRAPHY: Three deeper wells were drilled to a depth of about 30 feet to determine the stratigraphy of the site. The strata in Wells OD1, OD9 and OD16 (Plate 1, Appendix A) were fundamentally similar. At a depth of 25 to 30 feet below the ground surface, each of the wells intercepted a fine to medium grained sand with a trace of gravel. This sand is overlain by a 15 to 20 foot thick bed of clayey silt or silty clay with traces of sand and some peat. At the top of this bed, a thin (less than one foot thick) layer of peat was identified in some of the shallow wells. The peat, when present, is overlain by fill composed of bricks, wood, sand, cinders and other materials. The fill ranges in thickness from two to ten feet. Oil and grease were present in many of the fill samples.

The strata identified at the site are interpreted to be developed uniformly over the area. The lower silty sand with some gravel probably is an alluvial sediment that may be channel sands of the Delaware River. The sands are overlain by clayey silts that probably are over-bank (flood plain) deposits on which wetland vegetation grew, at least over part of the area. Fill subsequently was placed on these marsh areas to provide usable land for the Maintenance Facility.

2.2.3 RESULTS OF LABORATORY ANALYSES: Split spoon samples were collected at drilling depths of 2, 5, 10 and 15 feet, and at five foot intervals thereafter in the deeper borings. Undisturbed samples were placed in sample containers and returned to the laboratory for analyses. About half of the samples collected were analyzed for PCBs (Table 2).

The concentrations of PCBs at depths of 5, 10 and 15 feet are shown in Figure 5, 6 and 7, respectively. Except for Wells 6 and 7, the concentration of PCBs is less than 0.01 mg/l (or not detectable) at depths of 15 feet. In general, it appears that there is a notable reduction of PCB concentration with increasing depth in the soil profile. The concentration of PCBs at 15 feet in Well 6 was measured to be 0.233 mg/l. This well is located in the drum storage area, where surface soil samples (Section 2.1) contained the highest concentration of PCBs in the soils.

The concentration of PCBs at a depth of 15 feet at Well 7, located in the tie disposal area, was measured to be 0.1 mg/l, while at a depth of 10 feet, the concentration was 0.0043 mg/l. Because a lower concentration of PCBs was detected at a lesser depth, the measured value of 0.1 mg/l may represent some inadvertent cross-contamination. Alternatively, the black silty clay, at a depth of 15 feet in Well 7, may be concentrating PCBs as they move downward through the overlying silts.

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

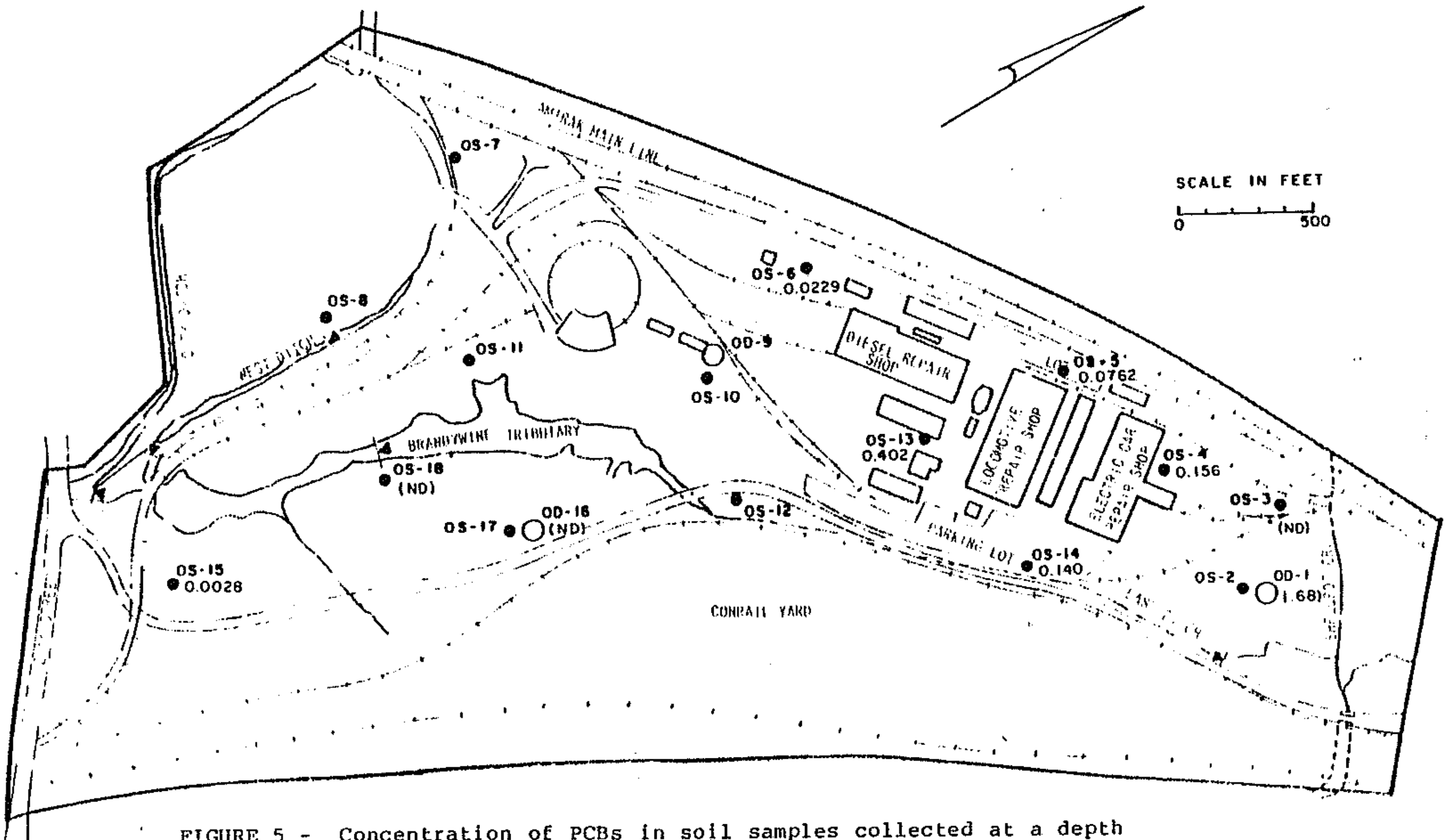

FIGURE 5 - Concentration of PCBs in soil samples collected at a depth of 5.0 to 6.5 feet below the surface at monitoring wells. Values are expressed in mg/kg. ND means not detected. Wells with no values means sample was not analyzed for PCBs.

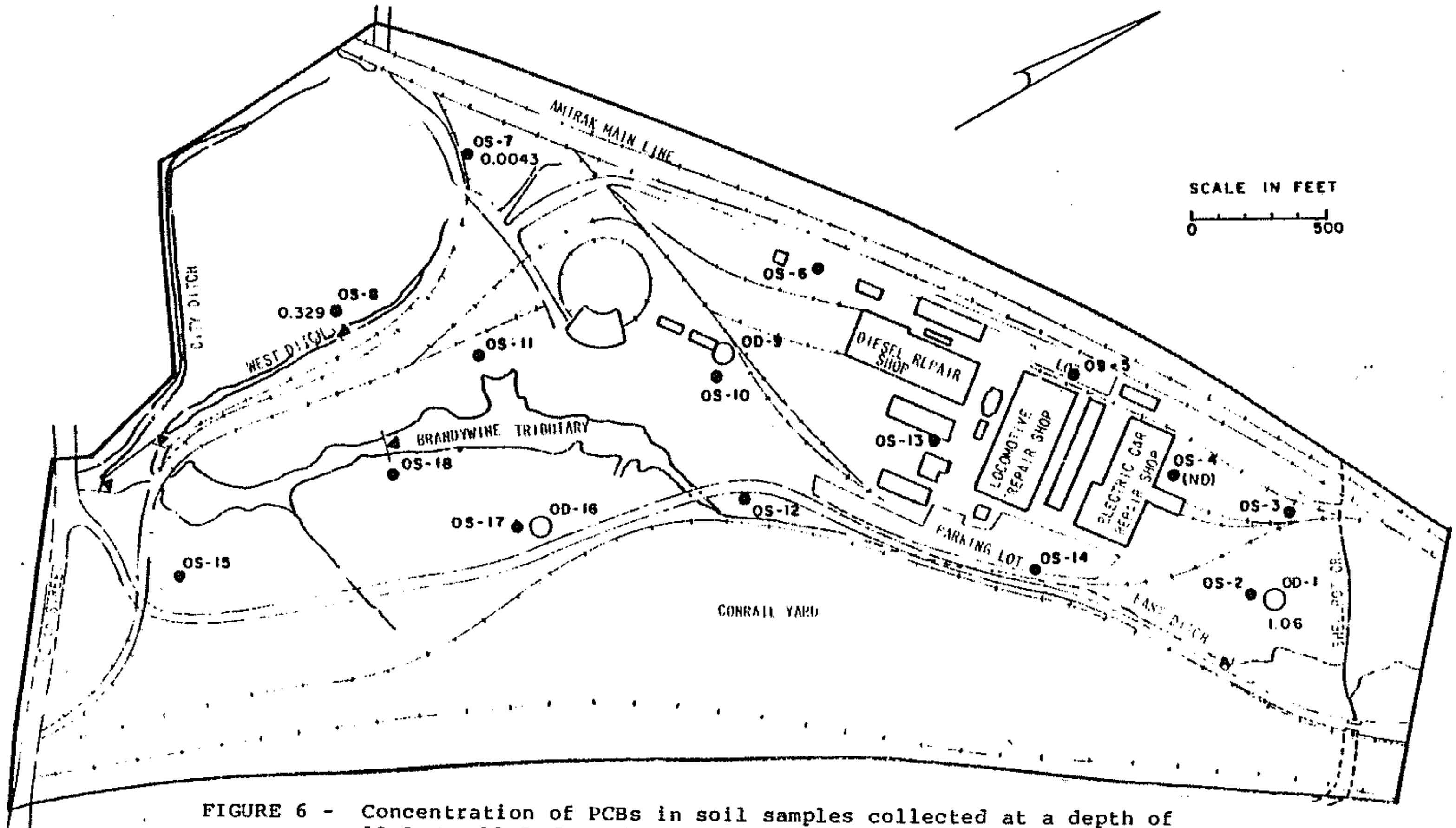

FIGURE 6 - Concentration of PCBs in soil samples collected at a depth of 10.0 to 11.5 feet below the surface at observation wells. Values are expressed in mg/kg. ND means not detected. Wells with no values means sample was not analyzed for PCBs.

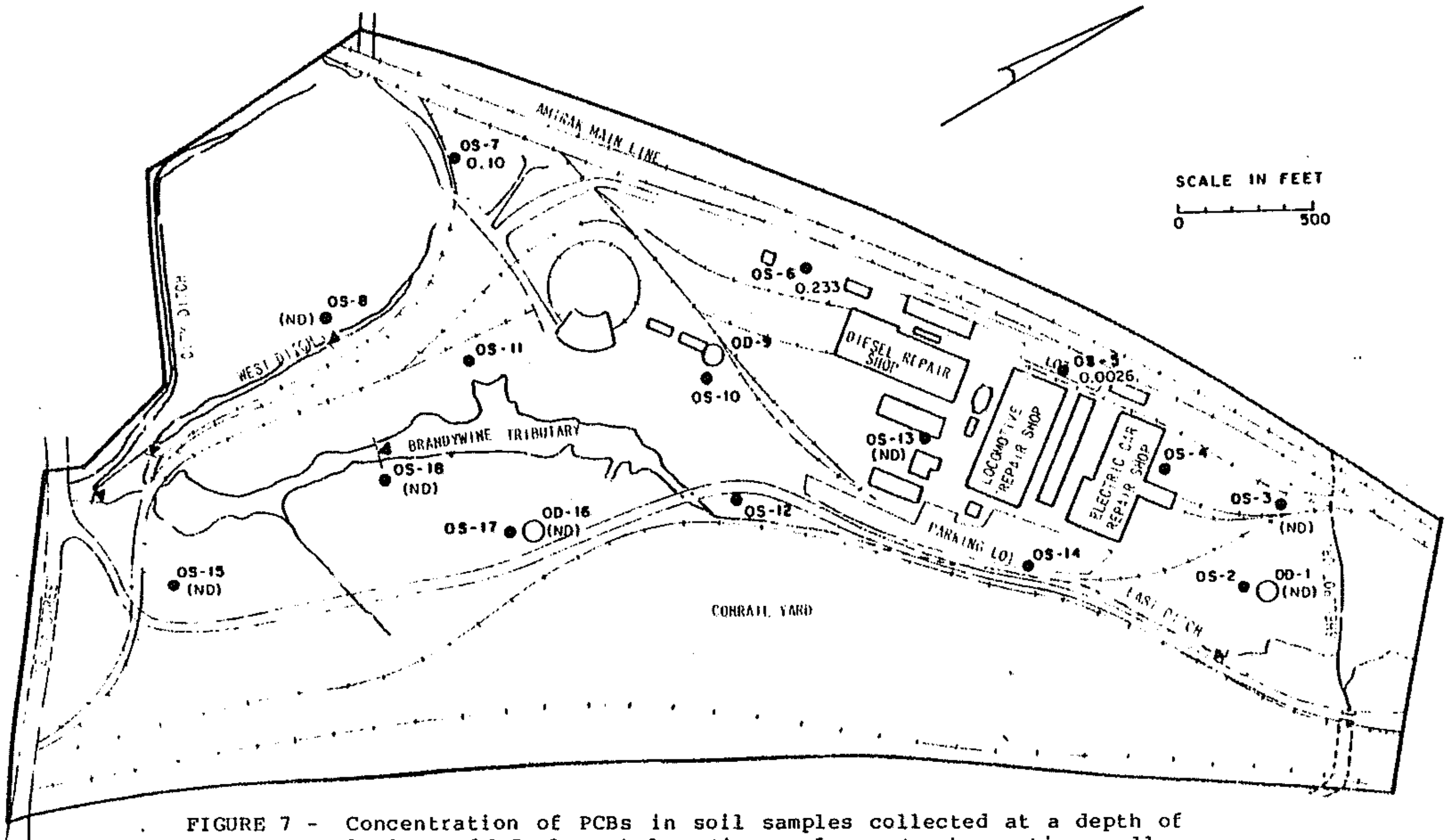

FIGURE 7 - Concentration of PCBs in soil samples collected at a depth of 15.0 to 16.5 feet below the surface at observation wells. Values are expressed in mg/kg. ND means not detected. Wells with no values means sample was not analyzed for PCBs.

2.3 SURFACE WATER

Runoff from the site flows either to Shellpot Creek to the north, to the East Ditch to the southeast, to the Brandywine Tributary, or to the West Ditch. Based on visual observation during periods of precipitation, most of the area drains to the East Ditch or to the Brandywine Tributary. Groundwater (Section 2.5) discharges mostly to the Brandywine Tributary and to the East Ditch. As described in Section 2.6 (Sewers), one sewer line, which extends from the drum storage area to Shellpot Creek, intercepts runoff and groundwater before it discharges to Shellpot Creek near the mainline tracks.

Flow from the Brandywine Tributary and the West Ditch to the City Ditch was controlled by two culverts along each drainage path, such that the upstream area of each culvert formed a sediment detention pond. Flow in Shellpot Creek is unimpeded. Tide gates in Shellpot Creek located downstream of the site did not function properly during the period of this site investigation. Flow measurements were made and surface water samples were collected at each culvert, at the sewer outfall at Shellpot Creek, and at two locations in Shellpot Creek.

2.3.1 FIELD METHODS: Field methods included the collection of samples and flow measurements. Several methods of flow measurements are discussed. Flow measurements and collection of samples were made after a five day period of no rainfall, and after rainfall of 0.5 inches within five days prior to measurement.

COLLECTION OF SAMPLES: Surface water samples were collected by filling a pre-cleaned pint amber glass bottle with unfiltered surface water. Samples were placed on ice and returned to the laboratory within 24 hours of collection.

FLOW MEASUREMENTS: Some stream and ditch water flows were measured. The methods of measurement varied and are discussed in this subsection. The first method involved measuring the time required for the drainage flow to fill a bucket of known volume. This method was used at several locations listed below. The bucket was placed under the outfall of the inverts measured, and time versus volume measurements were taken at three consecutive intervals, then averaged to determine the flow. Where necessary, the ground surface was leveled under the outfall to ensure accurate measurements and that all outflow entered the bucket. These areas were returned to their original character after each measurement. At areas other than inverts where this method was used, similar procedures were followed. The locations where this method was used included the following:

(1) Northern West Ditch invert;

(2) Southern West Ditch invert;

(3) Northern Brandywine Tributary invert, north pipe, southern Brandywine Tributary invert;

(4) Sewer outfall to Shellpot Creek east of the mainline tracks.

CROSS-SECTIONAL AREA VERSUS VELOCITY METHOD: The cross-sectional area method involves determining the cross-sectional area of stream flow and the velocity of the water across that area. The area of the stream was measured perpendicular to flow across the stream channel at one foot intervals. The water velocity was measured by floating an object on the surface along flow lines spaced at five foot intervals for a total length of 20 feet. Several velocity measurements were taken, and each measured velocity was related to the partial cross-sectional area of the stream where it was measured. The volume for each part of the cross-sectional area was then added to determine the total discharge.

Where stream conditions permitted, a General Oceanics flow meter was used to determine velocity. The data from the flow meter measurements were used as a control on surface measurements because of the inherent error in measuring velocity under shallow water conditions.

Flow measurements using the above described techniques were taken at the two locations listed below:

(1) Shellpot Creek west of the Amtrak mainline;

(2) Shellpot Creek west of the Conrail yard bridge.

OPEN PIPE FLOW METHOD: This method was used at two locations where the first two methods could not be applied. The height of the pipe, height and width of the water at the outfall and, where possible, velocity through the pipe were measured. From these measurements, the volume of flow was calculated, utilizing equations for a sharp crested weir of circular section.

This method was used at the two locations listed below:

(1) South pipe at the southern Brandywine Tributary invert;

(2) Northern invert, eastern boundary ditch north of the ditch divide.

A tabular listing of all measured flows is provided in Table 3.

2.3.2 RESULTS OF SURFACE WATER ANALYSES: Flow measurements made during "non-rainfall" and "rainfall" periods show that (1) runoff from the site increases substantially with moderate precipitation, and (2) flow during non-rainfall periods is maintained by groundwater discharge from the site, as well as from

TABLE 3 - Discharge of surface water at various locations of the Wilmington Maintenance Facility, Wilmington, Delaware. Precipitation at the Wilmington airport was 0.7 inches during the two day period preceding June 10, 1980. No precipitation was recorded in the five day period preceding June 25, 1980.

Location	Date	Flow (gpm)	Sample
Shellpot Creek, 100 feet west of Amtrak Mainline, center of creek	6/10/80	5,740	2078-1
	6/25/80	1,360	2078-82
Shellpot Creek, 100 feet west of Conrail tracks, center of creek	6/10/80	1,410	2078-3
	6/25/80	6,120	2078-81
Sewer outfall to Shellpot Creek near Amtrak mainline	6/10/80	38	2078-25
	6/25/80	41	2078-83
East boundary ditch, 600 feet south of Shellpot Creek, at six inch steel pipe	6/10/80	26	2078-7
	6/25/80	26	2078-80
West ditch, northern invert	6/10/80	8	2078-16
	6/25/80	5	2078-84
West ditch, southern invert	6/10/80	14	2078-18
	6/25/80	6	2078-75
Brandywine Tributary, northern invert	6/10/80	69	2078-14
	6/25/80	32	2078-77
Brandywine Tributary, southern invert	6/10/80	202	2078-21
	6/25/80	135	2078-74

adjacent areas. The total runoff from the site can be estimated by the addition of the flow recorded at the Brandywine Tributary southern invert and the difference between the flow in Shellpot Creek 100 feet west of the Conrail tracks and the flow in Shellpot Creek 100 feet west of the Amtrak mainline (Table 3). During the measured rainfall period, the total flow was calculated to be approximately 580 gpm (380 gpm in Shellpot Creek; 202 gpm in Brandywine Tributary). Measurements taken after a period of five days with no precipitation yielded a total flow of approximately 180 gpm (50 gpm in Shellpot Creek; 135 gpm in Brandywine Creek). Not all of this flow is derived from the site, but all of the runoff from the site does flow past one of these two points of measurement.

Because no precipitation occurred during the five day period preceding the low flow measurements of June 25, 1980, that flow is judged to reflect groundwater discharge to the surface water. The recorded flow then is a single measurement of base flow for the streams. The percentage of this flow that is due to areas outside of the site area was not determined.

Surface runoff from the northern part of the site includes the flow from the sewer line which discharges to Shellpot Creek near the mainline tracks. This flow was relatively constant during the dry and rainfall periods of measurements (38 and 41 gpm, respectively). Thus, because most of the flow is groundwater drainage, the flow is considered to be runoff when it enters Shellpot Creek. (A more detailed analysis of this flow is given in Section 2.6.) Flow from the East Ditch to Shellpot Creek was measured at 26 gpm during both periods of measurement. Thus, the total flow from the East Ditch and the sewer outfall was approximately 60 gpm. The increase in flow actually measured in Shellpot Creek during both measurement periods was 50 gpm. The difference between these estimates reflects the accuracy of the measurement methods.

During periods of rainfall, the increase in flow in Shellpot Creek from the Amtrak mainline to the Conrail bridge is substantially greater than the flow from the East Ditch and the sewer outfall. Thus, surface runoff from the site, and from areas outside of the site proper, contributes substantially to the flow in Shellpot Creek. Some additional flow may be due to groundwater recharge.

Except for upstream samples of the Brandywine Tributary, the East Ditch and the sewer outfall, no samples of surface water contained detectable levels of PCBs (Table 4; Figures 8 and 9). The only surface water that contained detectable levels of PCBs when leaving the site were water samples collected at the sewer outfall in the northern part of the site. The concentrations measured were 0.00255 and 0.0065 mg/l.

2.4 SEDIMENTS

Samples of sediment in the ditches, the Brandywine Tributary, Shellpot Creek, and the sewer outfall to Shellpot Creek were collected and analyzed for PCBs. Samples were collected by directly inserting the pre-cleaned sample jar into the sediment. The sample was placed on ice and returned to the analysis laboratory within 24 hours.

PCBs were detected in all samples collected in Shellpot Creek (Table 5; Figure 10). The concentrations ranged from 0.0112 mg/kg upstream of the site to 6.46 mg/kg at the downstream end of the site near the Conrail property. The increase in PCBs probably occurs in the area where the sewer outfall and the East Ditch enter Shellpot Creek. Sediment samples collected in the sewer outfall and the East Ditch contained 39.9 and 23.9 mg/kg of PCBs, respectively. Therefore, it is probable that the PCBs identified in sediments of Shellpot Creek are derived from one or both of these sources.

TABLE 4 - Concentration of PCBs in surface water at the Wilmington Maintenance Facility. Locations of sampling stations shown in Figure 8. ND means not detectable.

Sample No.	Date Collected	Type	Concentration (mg/l)	Location of Sample
2078-1	6/10/80	Runoff	ND	Shellpot Creek, 100 feet west of Amtrak mainline, center of creek
2078-3	6/10/80	Runoff	ND	Shellpot Creek, 100 feet west of Conrail tracks, center of creek
2078-7	6/10/80	Runoff	ND	East boundary ditch flow pipe, 600 feet south of Shellpot Creek, north end of pipe
2078-9	6/10/80	Puddle	ND	West side of Conrail tracks, 800 feet north of 12th Street ramp to Route I-95, 200 feet east of 12th Street access road to Amtrak and Conrail
2078-11	6/10/80	Runoff	ND	City drainage ditch, 250 feet northwest of the southern Brandywine tributary invert, east bank of ditch
2078-12	6/10/80	Runoff	0.0393	Brandywine tributary, 200 feet south of ditch divide, center of ditch
2078-14	6/10/80	Runoff	ND	Brandywine tributary, northern invert
2078-16	6/10/80	Runoff	ND	West ditch, northern invert
2078-18	6/10/80	Runoff	ND	West ditch, southern invert
2078-19	6/10/80	Runoff	ND	Brandywine tributary, 200 feet north of Brandywine tributary invert, northwest side of intersection of Amtrak access tracks and Brandywine tributary
2078-21	6/10/80	Runoff	ND	Brandywine tributary, southern invert
2078-23	6/10/80	Runoff	0.0036	East boundary ditch, 150 feet north of ditch divide, in center of ditch

TABLE 4 (cont'd-2)

Sample No.	Date Collected	Type	Concentration (mg/l)	Location of Sample
2078-25	6/10/80	Runoff	0.0065	Sewer outfall to Shellpot Creek, east of Amtrak mainline tracks
2078-74	6/25/80	Runoff	ND	Brandywine tributary invert
2078-75	6/25/80	Runoff	ND	West ditch, southern invert
2078-76	6/25/80	Runoff	ND	Brandywine tributary, 200 feet north of Brandywine tributary invert, northwest side of intersection of Amtrak access tracks and Brandywine tributary
2078-77	6/25/80	Runoff	ND	Brandywine tributary, northern invert
2078-78	6/25/80	Runoff	ND	Brandywine tributary, 200 feet south of ditch divide, center of ditch
2078-79	6/25/80	Runoff	0.0020	East boundary ditch, 150 feet north of ditch divide, in center of ditch
2078-80	6/25/80	Runoff	ND	East boundary ditch flow pipe, 600 feet south of Shellpot Creek, north end of pipe
2078-81	6/25/80	Runoff	ND	Shellpot Creek, 100 feet west of Conrail tracks, center of creek
2078-82	6/25/80	Runoff	ND	Shellpot Creek, 100 feet west of Amtrak mainline, center of creek
2078-83	6/25/80	Runoff	0.00255	Sewer outfall to Shellpot Creek, east of Amtrak mainline tracks
2078-84	6/25/80	Runoff	ND	West ditch, northern invert
2078-85	6/25/80	Runoff	ND	City drainage ditch, 250 feet northwest of the southern Brandywine tributary invert, east bank of ditch

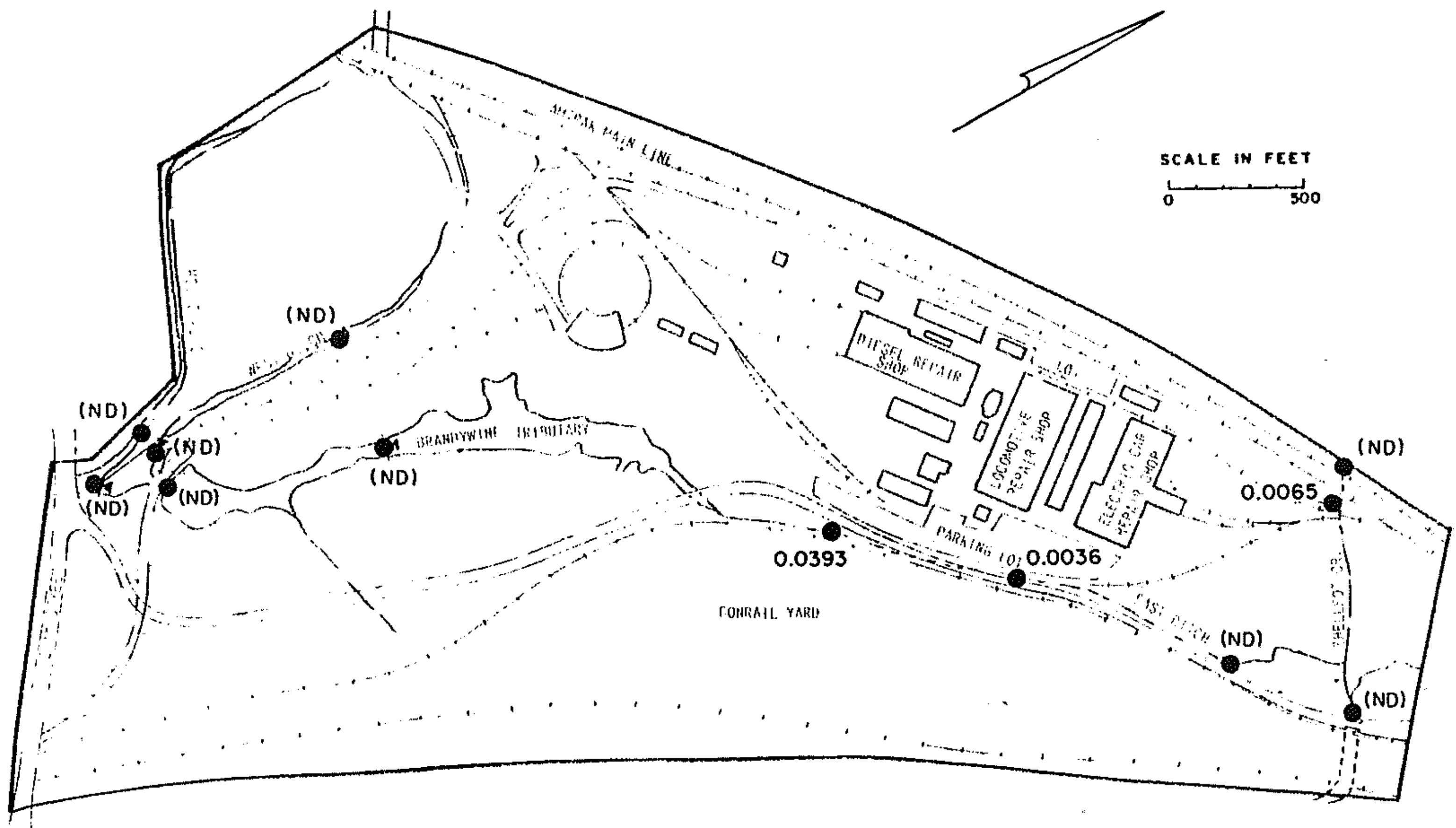

FIGURE 8 - Concentration of PCBs in surface water samples collected on June 10, 1980, at the Wilmington Maintenance Facility in Wilmington, Delaware. Precipitation at the Wilmington Airport was 0.7 inches during the two day period preceding June 10, 1980. Values are expressed in mg/l. ND means not detectable.

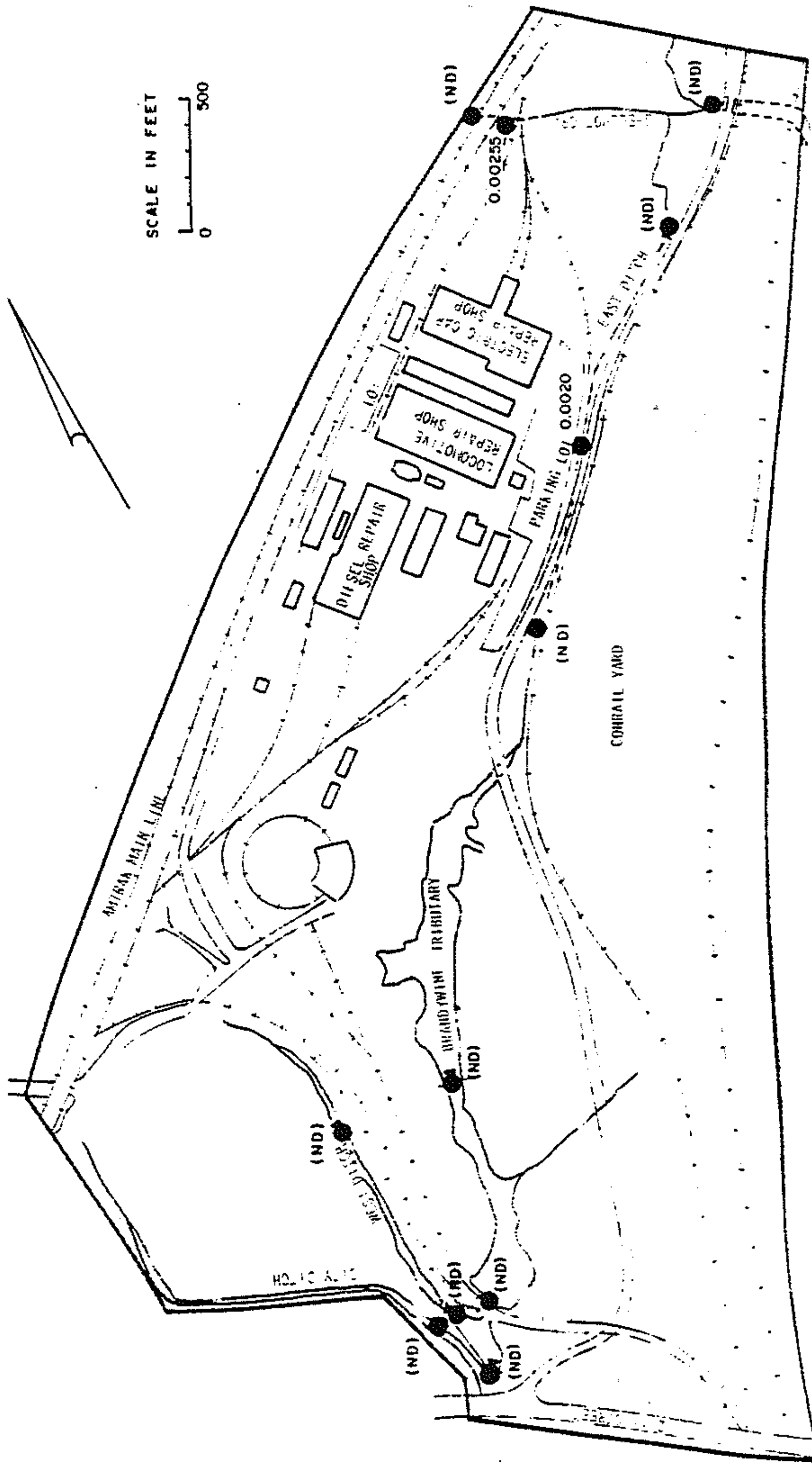

FIGURE 9 - Concentration of PCBs in surface water samples collected on June 25, 1980. No precipitation was recorded in the five day period preceding collection. Values are expressed in mg/l. ND means not detectable.

TABLE 5 - Concentration of PCBs in sediments collected below surface water bodies at the Wilmington Maintenance Facility. Location of samples is shown in Figure 10.

Sample No.	Date Collected	Concentration (mg/kg)	Description	Location of Sample
2078-2	6/10/80	0.0112	Fine to medium grain tan sand, trace silt	Shellpot Creek, 100 feet west of Amtrak mainline
2078-4	6/10/80	6.46	Fine to medium grain tan sand and silt	Shellpot Creek, 100 feet west of Conrail tracks, center of stream
2078-5	6/10/80	0.507	Fine grain sand, some organic peat	Shellpot Creek, 100 feet west of Conrail tracks, south bank
2078-10	6/10/80	0.0144	Red to gray soft clay, trace silt	West ditch, 250 feet northwest of southern Brandywine tributary invert, west bank
2078-15	6/10/80	1.65	Black peat, little silt	Brandywine tributary, 100 feet north of northern invert, east bank
2078-17	6/10/80	1.34	Black medium grain sand and fill	West ditch, 25 feet north of northern invert, east bank
2078-20	6/10/80	7.09	Brown clay and silt, little brown peat	City ditch, 300 feet northwest of Brandywine tributary invert, east bank
2078-24	6/10/80	0.0116	Brown to black fine grain sand, some traces of coarse grain sand and fill	East boundary ditch, 150 feet north of ditch divide, east bank
2078-26	6/10/80	39.9	Brown clayey silt, some plant material	Sewer outfall to Shellpot Creek, 20 feet south of Shellpot Creek
2078-27	6/10/80	0.512	Brown silt and sand	Shellpot Creek, east side of mainline, south bank
2078-28A	6/10/80	23.9	Black fine to medium grain sand and fill, trace silt	East boundary ditch, 600 feet south of Shellpot Creek, east bank

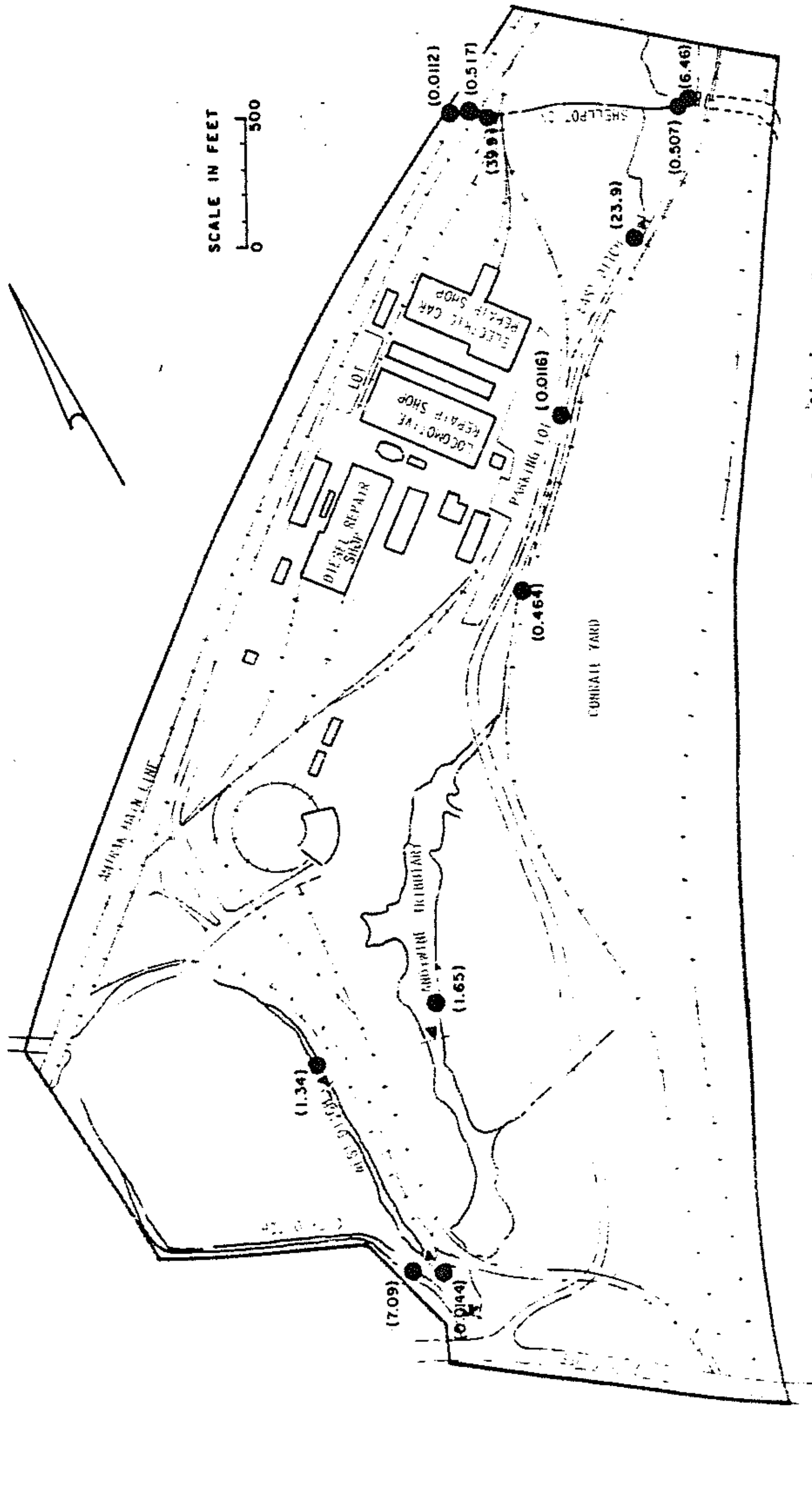

FIGURE 10 - Concentration of PCBs in sediment collected from ditches or streams at the Wilmington Maintenance Facility. Values are expressed in mg/kg.

Concentrations of PCBs in the sediments of the Brandywine Tributary and the West Ditch ranged from 0.0144 to 1.65 mg/kg. Based on the few samples collected, the upstream parts of the ditches near potential sources are more highly contaminated than the downstream sediments.

A sample taken in the City Ditch contained 7.09 mg/kg of PCBs. The sample was taken about 300 feet upstream of the Brandywine Tributary invert.

2.5 GROUNDWATER

2.5.1 FIELD METHODS: Groundwater levels were determined and water samples collected from the installed piezometers on two occasions. Water samples were collected on July 29, 1980, after a five day period of no recorded precipitation, and on August 28 and 29 after 0.4 inches of precipitation was recorded in the four day preceding period at the U.S. Weather Bureau Station at the Wilmington Airport. Samples were collected utilizing a peristaltic pump.

Water sampling methods differed on the two occasions of collection. Samples collected on July 29 were collected with a peristaltic pump. Approximately two times the volume of water present in the well was pumped before a sample was collected. None of the samples were filtered in the field. Samples were placed on ice and returned to the analysis laboratory.

Amtrak requested that multiple samples for analysis by other laboratories be collected during the second sampling period. Because the volume of sample required was notably higher than the wells would deliver with the original sampling methods, the sampling procedure was modified. On the day preceding collection of the samples, all wells were bailed of three times the volume of water they contained or until the well was dry. On the following day, water samples were collected with the peristaltic pump and were filtered immediately. All samples were placed on ice and returned to the analysis laboratory.

2.5.2 RESULTS OF INVESTIGATIONS: Water level measurements in each of the piezometers were used to develop two water table maps (Figures 11 and 12). The water table slopes from the mainline tracks either to the East Ditch (elevation 2.0 feet) or to the Brandywine Tributary upstream of the northern invert (elevation 0.9 feet), at an approximate gradient of 0.002. During the precipitation period, the elevation of the water table was about one foot higher at the mainline tracks than during the non-rainfall period.

On both days when water level measurements were made, the head of the deeper piezometers was higher than the head in the nearby shallow water piezometers. The difference in head ranged from less than 1.0 foot to 2.9 feet. Based on these data, it was concluded that flow of groundwater is upward through the clay/silt stratum. It should be noted that intense and prolonged precipitation may cause the surficial water table to rise above the more slowly responding head in the underlying sands. During these periods of high water table conditions, the flow potential would be reversed from that noted above.

The concentration of PCBs in the groundwater was uniformly low (Table 6). Seven of the ten samples collected on July 29 contained concentrations of PCBs that exceeded 0.001 mg/l, but only 1 of 13 contained more than 0.001 mg/l PCBs during the second sampling period. This reduction may reflect the difference in sampling techniques, in that samples were filtered in the field during the second period of sampling. Well 7, located in the tie disposal area, contained 0.00852 mg/l PCBs during the second

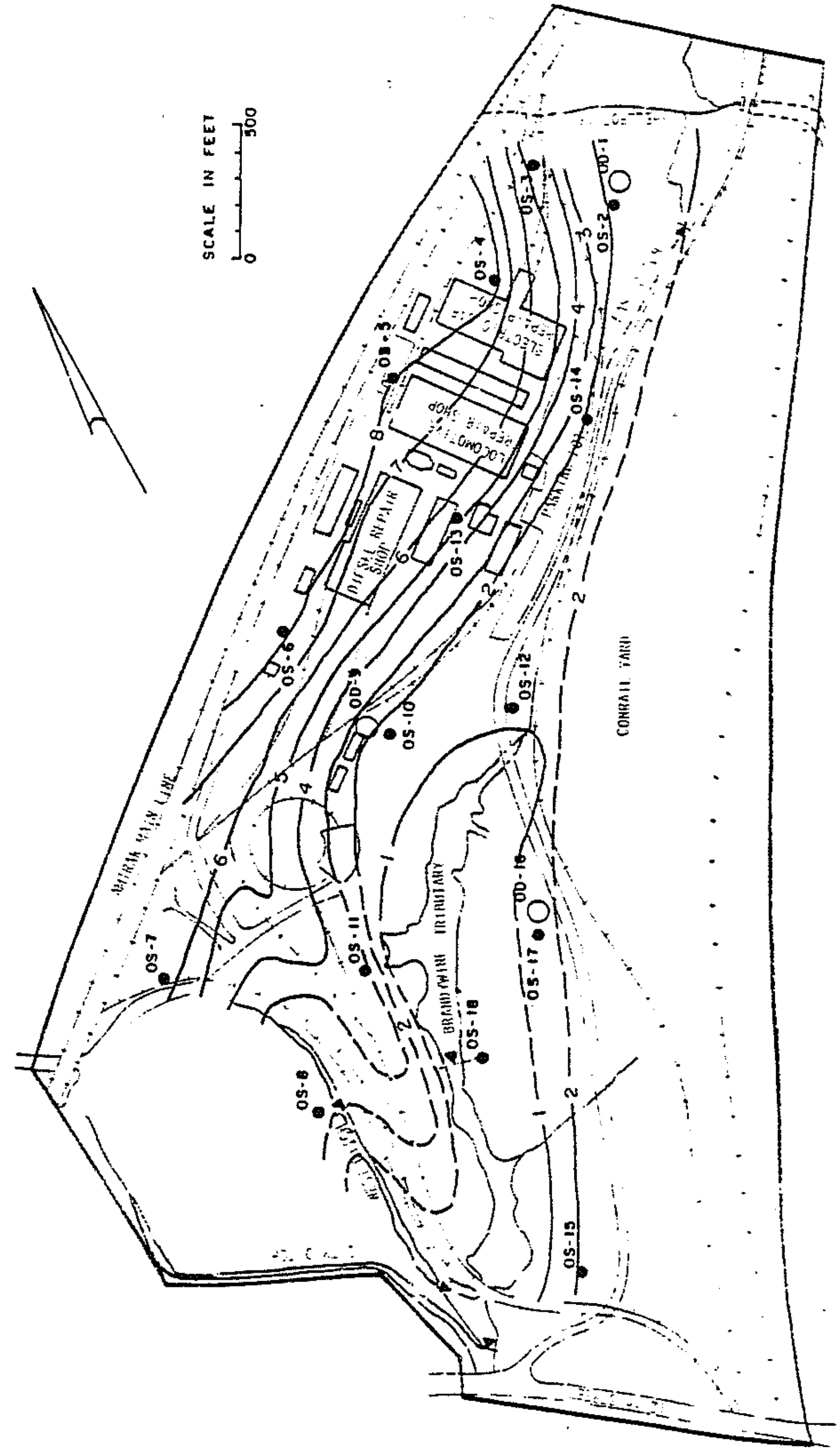

FIGURE 11 - Groundwater table contours at the Wilmington Maintenance Facility, July 29, 1980. Elevations are in feet.

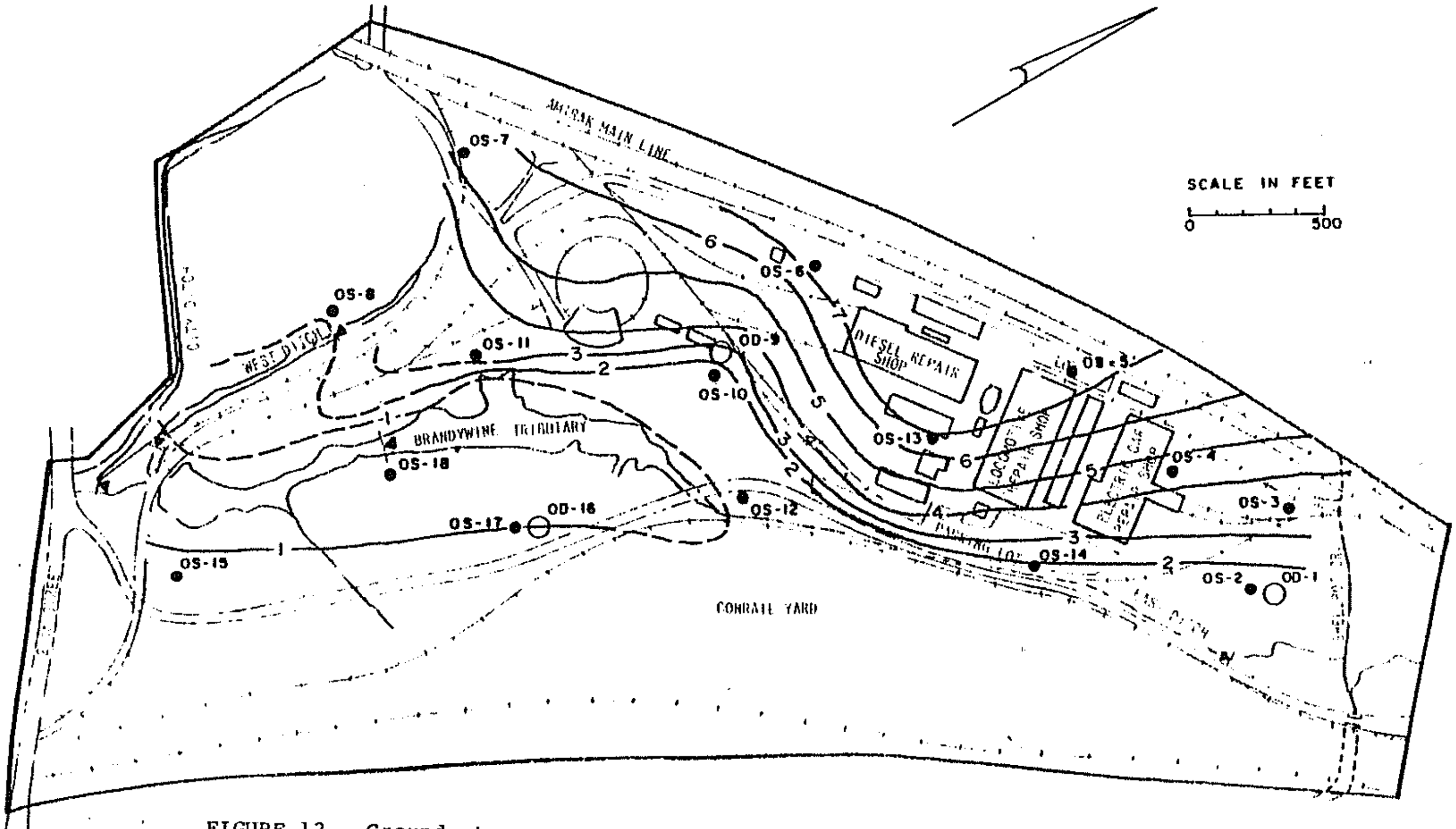

FIGURE 12 - Groundwater contours at the Wilmington Maintenance Facility, August 27, 1980. Elevations are in feet.

TABLE 6 - Concentration of PCBs in groundwater. Samples collected 8/28/80 were filtered in the field. ND means not detectable.

Date Collected	Well No.	Sample No.	Concentration (mg/l)
7/29/80	1	2078-121	0.00183
7/29/80	2	2078-123	0.0109
7/29/80	3	2078-121	0.00183
7/29/80	6	2078-131	0.00184
7/29/80	7	2078-129	0.00322
7/29/80	8	2078-130	0.000180
7/29/80	9	2078-125	0.000077
7/29/80	10	2078-126	0.00921
7/29/80	13	2078-132	0.000024
7/29/80	14	2078-124	0.000024
7/29/80	15	2078-127	0.000087
7/29/80	18	2078-128	0.00188
8/28/80	15	2078-135	0.000030
8/28/80	18	2078-132A	0.000188
8/29/80	1	2078-139	0.000115
8/29/80	2	2078-140	0.000040
8/29/80	3	2078-141	0.000266
8/28/80	6	2078-136	0.000750
8/28/80	7	2078-137	0.00852
8/28/80	8	2078-138	0.000667
8/28/80	9	2078-133	0.000124
8/28/80	10	2078-134	0.000089
8/29/80	13	2078-144	ND
8/29/80	14	2078-142	0.000053
8/29/80	16	2078-143	0.000535

sampling period. Because the soils at that depth also contained elevated concentrations of PCBs (Section 2.2), the groundwater in this area is considered to be the only area where PCBs possibly occur at levels exceeding 0.001 mg/l. The potential for flow would be toward the Brandywine Tributary or the West Ditch.

2.6 SEWERS

Two sewer lines with several connections are present at the Wilmington Maintenance Facility. The lines are terra cotta pipes with bell and spigot joints. In several places, the sewers are known to have broken; thus, there is ample opportunity for infiltration to occur. The sewers also serve as storm drains; thus, infiltration from runoff will occur.

The western sewer is a linear line that runs approximately from the area of the diesel repair shop to Shellpot Creek (Figure 13). It is a storm drain that intercepts the water table locally. It receives floor drainage from several shops and drainage from several roadway areas and catch basins that occur adjacent to several of the buildings in the western part of the site. Collapse of the terra cotta pipes reportedly has occurred at one location, but the permeable fill allows flow to continue.

The eastern sewer extends from the electric car repair shop southward to the Brandywine Tributary, where it enters the municipal sewer. The combined sewer collects essentially all of the sanitary drainage, as well as runoff and floor drainage from the shops.

2.6.1 FIELD METHODS: Samples of sewered flow were collected on two occasions, once after a period of rainfall and once after a period of no rainfall, at 11 stations that were accessible. Rainfall of 0.73 inches was recorded at the U.S. Weather Bureau Station in the five day period prior to September 19; none was

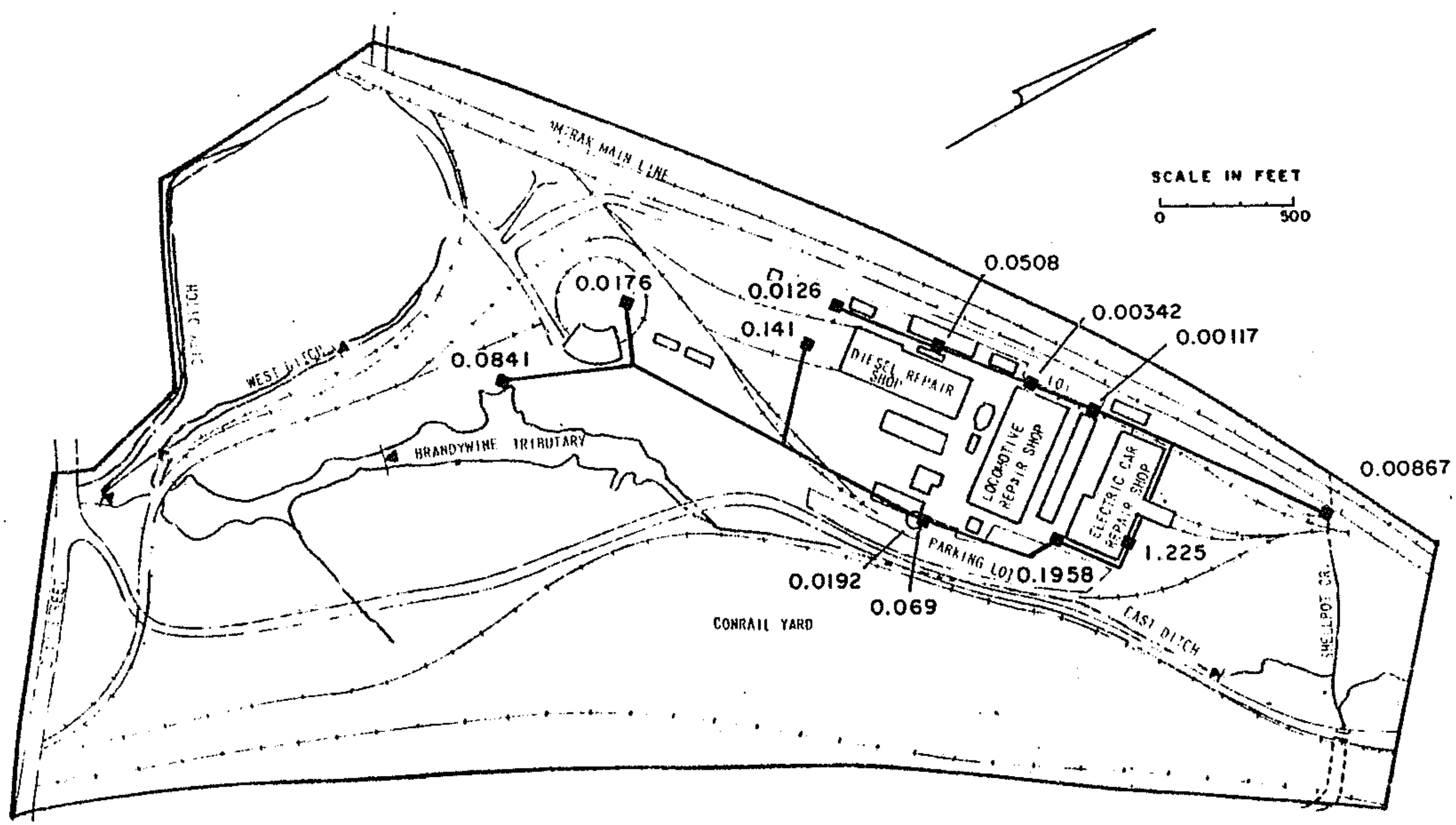

FIGURE 13 - Concentration of PCBs in sewered flow, September 3 to 5, 1980, at the Wilmington Maintenance Facility in Wilmington, Delaware. Concentration is in mg/l.

recorded in the five day period preceding September 3, 1980. Samples of sewered flow were collected on October 3; sewered flow and sewer sediment samples were collected on September 19, 1980. Samples were collected utilizing pre-cleaned sample containers, placed on ice, and returned to the analysis laboratory within 24 hours.

2.6.2 RESULTS OF ANALYSES: Analyses of sewered flow samples and sewer sediment samples are provided in Table 7 and Figures 13 and 14.

WESTERN SEWER: The concentration of PCBs in sewered flow was less than 0.1 mg/l in all flow samples collected, except for the sample of flow collected near the drum storage area following a period of precipitation. A concentration of 12.9 mg/l was measured in an unfiltered sample of sewered flow north of the drum storage area. A sewer sediment sample collected at the same location contained 148 mg/kg of PCBs.

Two samples of outfall to Shellpot Creek were collected on September 19. One sample was filtered in the field, while the second was not filtered. The unfiltered sample contained 0.01 mg/l of PCBs, which was about five times the concentration of PCBs contained in the filtered sample.

PCBs in sewered flow evidently occur mostly in the transported sediments, and less in solution. Evidence for this conclusion is based not only on the difference in concentration of the filtered versus unfiltered flow, but also in the rapid reduction in PCB concentration in relatively short distances from the drum storage area downstream. Within a distance of less than 500 feet, the concentration of PCBs decreased from more than 12 to less than 0.1 mg/l in the sewered flow.

TABLE 7 - Concentration of PCBs in sewers at Wilmington Maintenance Facility. Concentration in mg/kg for sediment and mg/l for sewered flow. Location of sampling stations shown in Figures 13 and 14.

Date Collected	Sample No.	Type	Concentration	Location of Sample
9/03/80	2078-144A	Flow	0.00117	Catch basin; northwest of tin shop
9/03/80	2078-145	Flow	0.00867	Sewer outfall to Shellpot Creek
9/03/80	2078-146	Flow	1.225	Pump pit, northeast side of electrical car repair shop
9/03/80	2078-147	Flow	0.196	Southeast corner of electrical repair shop
9/03/80	2078-148	Flow	0.00342	Northwest of locker room
9/03/80	2078-149	Flow	0.0508	Northeast side of main office
9/03/80	2078-150	Flow	0.0126	Northeast side of drum storage, southeast corner of main office
9/03/80	2078-151	Flow	0.0690	East corner of air brake shop, influent pipe from west to main sewer
9/03/80	2078-152	Flow	0.0192	East corner of air brake shop, influent pipe from north to main sewer
9/03/80	2078-153	Flow	0.0841	Sewer outfall to city sewer
9/05/80	2078-154	Flow	0.142	Southwest of diesel repair shop, east of oil house
9/05/80	2078-155	Flow	0.0176	Abandoned engine house
9/05/80	2078-157	Flow	0.00088	East Ditch outfall to Shellpot Creek
9/19/80	2078-158	Flow	0.0105	Southwest of electrical car repair shop, northwest of changing table

TABLE 7 (cont'd)

Date Collected	Sample No.	Type	Concentration	Location of Sample
9/19/80	2078-159	Flow	0.0106	Northwest of locker room
9/19/80	2078-160	Flow	0.0180	Northeast side of main office
9/19/80	2078-161	Flow	12.9	Northeast of drum storage, southeast corner of main office
9/19/80	2078-162	Sediment	148	Southeast of main office, northeast of drum storage area
9/19/80	2078-163A	Flow	0.0101	Sewer outfall to Shellpot Creek, nonfiltered
9/19/80	2078-163B	Flow	0.00241	Sewer outfall to Shellpot Creek, filtered
9/19/80	2078-164	Flow	2.09	Pump pit, northeast side of electrical car repair shop
9/19/80	2078-165	Flow	0.350	Southeast corner of electrical car repair shop
9/19/80	2078-166	Flow	0.0178	East corner of air brake shop, influent pipe from west to main sewer line
9/19/80	2078-167	Flow	0.00878	East corner of air brake shop, influent pipe from north to main sewer
9/19/80	2078-168	Flow	0.0902	Southwest of diesel repair shop, east of oil house
9/19/80	2078-169	Sediment	311	Southwest of diesel repair shop, east of oil house
9/19/80	2078-170	Sediment	159	Abandoned engine house
9/19/80	2078-171	Flow	0.0899	Sewer outfall to city sewer

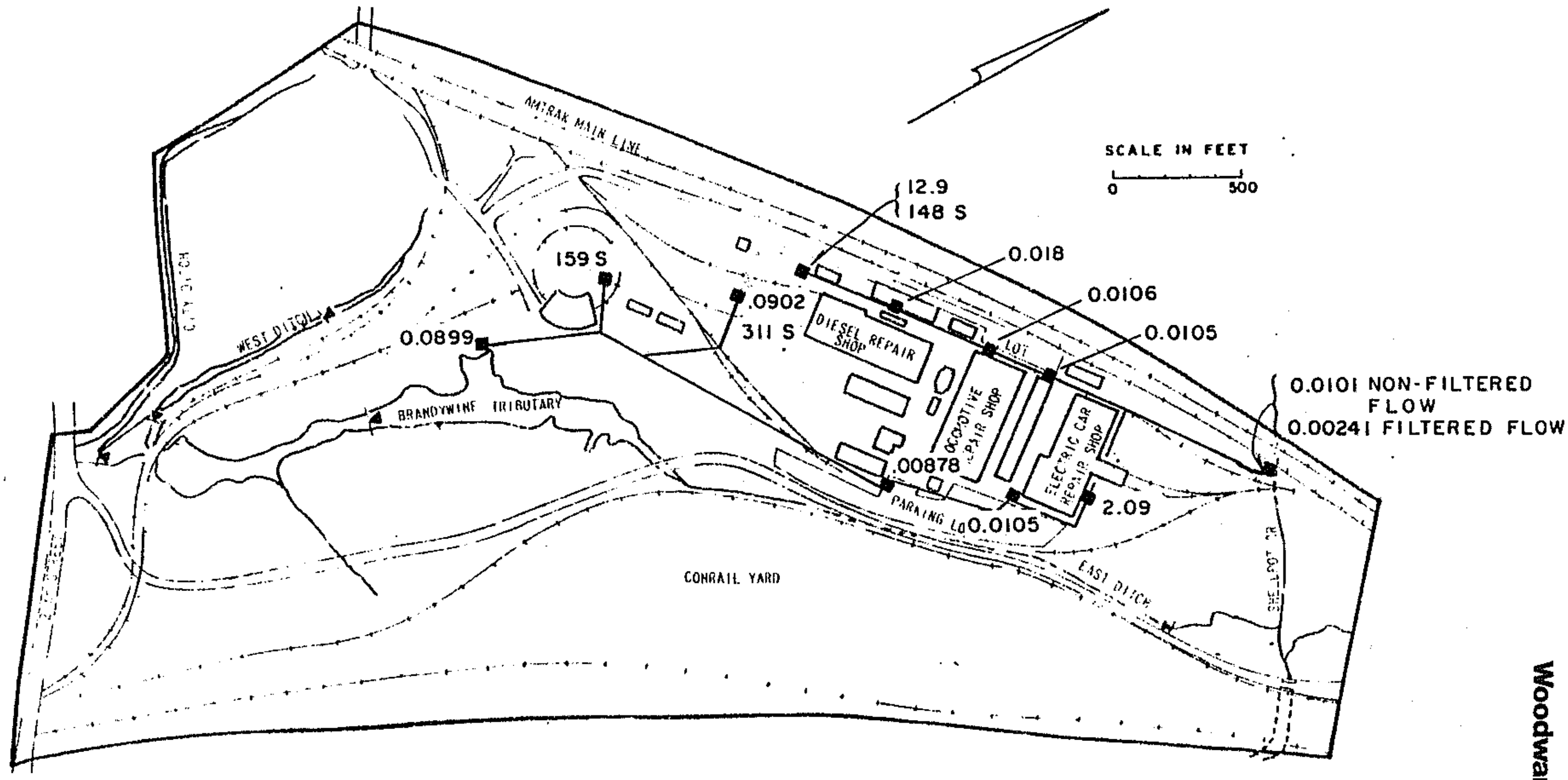

FIGURE 14 - Concentration of PCBs in sewered flow and sediments, September 18, 1980, at the Wilmington Maintenance Facility in Wilmington, Delaware. "S" means value is for sediment. Concentration is in mg/l for flow; mg/kg for sediment.

EASTERN SEWER: The eastern sewer begins at the northeast side of the electric car repair shop and flows southward to the municipal sewer interceptor. The concentration of PCBs in the sewered flow was greatest at the electric car repair shop, where it exceeded 1 mg/l on both occasions of sampling. Except for one sample of sewered flow collected southwest of the diesel repair shop on September 3, the concentration of PCBs was less than 0.1 mg/l in all samples analyzed. Less than 0.09 mg/l of PCBs was measured in the outfall to the municipal sewer.

Two samples of sediment in the sewer were collected on September 19. Both samples contained more than 100 mg/l of PCBs. The concentration of PCBs was 159 mg/l in a catch basin in the round house area, even though PCBs are not known to have been used in that area.

2.7 PCBs ON CONRAIL PROPERTY

Samples of soil, soils beneath puddles, and one groundwater seep sample were collected on Conrail property utilizing the methods described previously in Section 2.0. All of the samples collected contained detectable levels of PCBs (Table 8; Figure 15). The concentration of PCBs ranged from 0.085 to 2.07 mg/l in the four soil samples collected. The concentration of PCBs in surface water ranged from 0.0036 to 0.0132 mg/l.

The sample of groundwater collected was from a seep on the east side of the East Ditch. The concentration of PCBs was measured to be 0.0076 mg/l. A sample of ditch water collected simultaneously about 15 feet upstream of the seep was measured to contain 0.0036 mg/l (Sample 2078-23, Table 4). These few data suggest that groundwater discharge from the Conrail property may contribute to the PCB load in the upper part of the East Ditch.

TABLE 8 - Concentration of PCBs in samples collected at Conrail facilities adjacent to the Wilmington Maintenance Facility. Concentrations of water samples given in mg/l; of sediment samples in mg/kg. Figure 14 shows location of sample stations.

CONRAIL (soil)

Sample No.	Date Collected	Concentration	Description	Location of Sample
2078-69	6/18/80	0.0850	Black fill	Conrail property, 3 feet north of telephone pole at Switches 7 and 8
2078-70	6/18/80	2.07	Fine to coarse brown sand	Conrail property, 10 feet south of ditch divide, east bank below ballast
2078-71	6/18/80	0.691	Black fill	Conrail property, 75 feet north of high tension Tower 7, from center of 3rd track to the front of 12th Street
2078-72	6/18/80	0.271	Black fill	Conrail property, 50 feet east of 12th Street ramp to Route I-95

CONRAIL (surface water)

Sample No.	Date Collected	Concentration	Type	Location of Sample
2078-6	6/10/80	0.0132	Puddle	50 feet south of the intersection of Shellpot Creek and Conrail access road, east side of road
2078-8	6/10/80	0.0037	Puddle	Puddle in drainage ditch tributary to Brandywine Tributary, 200 feet west of Conrail maintenance shed, east side of 12th Street access road to Amtrak and Conrail
2078-22	6/10/80	0.0076	Groundwater	East boundary ditch, 150 feet north of ditch divide, seepage to ditch from Conrail yard

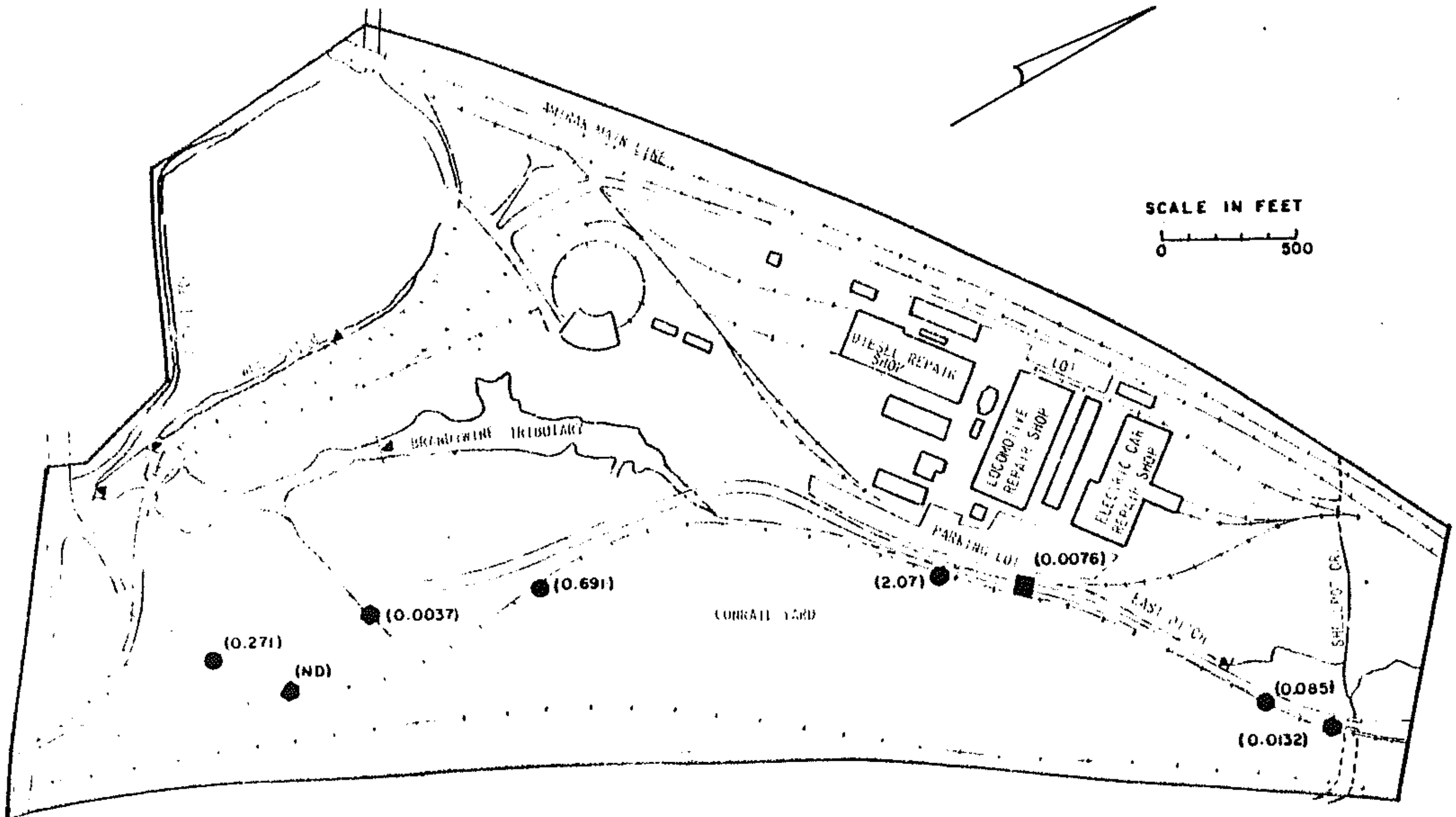

FIGURE 15 - Concentration of PCBs in samples collected on or near Conrail facilities. Circles are locations of soil samples, hexagons are puddle samples, and the square is a seep sample. Values of soil samples are expressed in mg/kg, water samples in mg/l. ND means not detectable.

3.0 ASSESSMENT OF PCB CONTAMINATION

Polychlorinated biphenyls are a series of biphenyl compounds with varying percentages of chlorine in their molecular structure. They have been used widely as dielectrics in transformer oil. Manufactured by the Monsanto Chemical Company, PCBs were called Arochlors, among which Aroclor 1242 with about 42 percent chlorine, Arochlor 1254 with about 54 percent chlorine, and Arochlor 1260 with about 60 percent chlorine were common PCBs used in the synthesis of transformer oil.

PCBs are extremely stable, both chemically and physically, under normal environmental conditions. Although they are highly soluble in common solvents, their solubility in water is very low and their volatility is also low. Because of these characteristics, they are extremely persistent once they are released to the environment.

Because PCBs were used extensively for several decades prior to concern of their environmental effects, PCBs have become widespread in the environment. At sites where their use was extensive, the concentration of PCB contaminants may be notably high. Such sites also may constitute a continuing source of PCBs that can spread from these source areas. This assessment section outlines (1) areas within the site in which PCB concentration is notably high, and (2) pathways of PCB migration from the site.

3.1 AREAS OF NOTABLY HIGH PCB CONCENTRATION

Detectable levels of PCBs were measured in essentially all surface soil samples, including areas where transformer oil was known to have been used, discarded or accidentally lost, as well as areas where there is no known direct source of PCBs. The drum storage, locomotive storage, and transformer storage areas are examples of the former. Additional areas included in this category are the sumps in the vicinity of the electric car repair shop, the fill area northeast of the electric car repair shop, and roadways and parking lots, which have been identified as areas where the potential for PCB contamination is greatest. The latter category of sites or areas includes the tie disposal area, the mainline tracks, Conrail property, and the remainder of the site in general where PCBs were detected but no known direct source of PCBs can be deduced.

To evaluate the severity of soil and sediment contamination, levels of contamination are categorized into four levels as follows:

High - equal to or greater than 50 mg/kg
Low - equal to or greater than 10 mg/kg, less than 50 mg/kg
Slight - equal to or greater than 1 mg/kg, less than 10 mg/kg
Trace - less than 1 mg/kg

The basis for this classification includes the EPA criterion for removal of soils, which is 50 mg/kg.

Table 9 categorizes the concentration of PCBs measured in surface and subsurface soils, surface sediment and sewer sediment at the Wilmington Maintenance Facility. As a first approximation of the level of contamination in each area, the highest category is used to compare contamination levels between areas. Concentrations of PCBs in the drum storage area are classified as slight to high. Soils in roadways and parking lots and in the East Ditch are classified as having a trace to low contamination of PCBs. Sewer sediments are classified as having a low to high contamination of PCBs. Soils in other parts of the site, including the subsurface soils, are categorized as having no detectable PCB levels to being slightly contaminated.

TABLE 9 - Levels of contamination in soils and sediments at the Wilmington Maintenance Facility, Wilmington, Delaware.

Area	Level High (>50 mg/kg)	Low (10-50 mg/kg)	Slight (1-10 mg/kg)	Trace (<1 mg/kg)	Not Detected
Drum Storage	X	X	X		
Tie Disposal			X	X	
Transformer Storage				X	
Locomotive Storage			X	X	
Roadways and Parking Lots		X	X	X	
Mainline Tracks				X	
Fill Area, northeast of electric car shop			X	X	
Subsurface (5- 6.5 feet)			X	X	X
Subsurface (10-11.5 feet)			X	X	X
Subsurface (15-16 feet)				X	X
Subsurface (>15 feet)					X
East Ditch		X		X	
West Ditch			X		
Brandywine Tributary			X	X	
City Ditch			X		
Shellpot Creek			X	X	
Sewer, eastern interceptor	X				
Sewer, western interceptor	X	X			
Other Areas (unspecified)			X	X	X
Conrail Area			X	X	X

In terms of potential surface sources for PCBs, the drum storage area and the roadways and parking lots are the areas with the greatest potential for being surface source areas for PCBs. Drainage from the drum storage area leads both to the eastern sewer and the western sewer. Drainage from roadways and parking lots is obviously variable. Some surface drainage leads to catch basins of either the eastern or western sewer, while other surface drainage is toward the ditches or the Brandywine Tributary.

3.2 PATHWAYS OF PCB MIGRATION

PCBs can be transported from the Wilmington Maintenance Facility in surface water, groundwater or sewered flow. Mechanisms not addressed in this assessment are fugitive dust and volatilization, both of which are considered unimportant. Soil containing PCBs also can be transported from the site physically.

3.2.1 SURFACE WATER: No detectable levels of PCBs were measured on the two occasions of sampling of surface water from the site. Nevertheless, detectable levels of PCBs were measured in sediments of the City Ditch and in Shellpot Creek outside of the site proper, as well as in the sediments of the on-site ditches that drain the site. Therefore, it is possible that PCBs have been transported to areas outside of the site by runoff during periods following intense rainfall and rapid runoff, when suspended sediments are abundantly present.

Data to support the possibility that PCBs are carried outside of the site area during or following intense rainfall include (1) the concentration of PCBs in sediment samples collected from ditches, and (2) the difference in concentration of PCBs in filtered and unfiltered water samples. As described in Sections 3.2.2 and 3.2.3, PCBs are preferentially adsorbed onto organic-rich sediments, and the concentration of dissolved PCBs can be reduced substantially in water that contains such sediments. The sediments in the site areas are oily and black, and contain abundant organic matter; thus, PCBs dissolved in sediments can be readily adsorbed onto them, as they can be on the soils of the area. During periods of intense rainfall, the suspended sediment load increases substantially, thereby increasing the opportunity for PCBs to be transported from the site as sediment transport. The difference in the concentration of PCBs between filtered and unfiltered samples of flow and groundwater, and the high concentrations of PCBs in sewer sediments, are supportive of the probability.

3.2.2 GROUNDWATER: Groundwater is not an important pathway of PCB migration from the site. Except for one sample of filtered groundwater from Well 7, data from which are considered anomalous, the concentration of PCBs was less than 0.001 mg/l in samples measured. In addition, data from other studies in which the role of soils in PCB attenuation was evaluated show that soils with a high total organic content (organic matter) effectively remove PCBs from in situ water, both in saturated and unsaturated zones (Lee et al, 1979; Griffin et al, 1979). The soils at the site include peaty organic beds, as well as soils that are coated with oil and greases from spillage of fuel oil and other oils throughout the site. The marked decrease in the concentration of PCBs with respect to the depth in the soil borings supports the conclusion that PCBs are relatively immobile in soils at the site.

3.2.3 SEWERED FLOW: Sewered flow contained detectable levels of PCBs at all stations measured, including (1) the outfall to Shellpot Creek and (2) the outfall to the Wilmington city sewer. Unfiltered outfall to the city sewer was about 0.085 mg/l on the two occasions of sampling. Based on the analyses of filtered and unfiltered samples from the western sewer, in which the concentration of the unfiltered sample was about five times that of the filtered sample, and the affinity of PCBs to organic sediments, the

PCBs are considered to be transported primarily as part of the sediment load of sewered flow.

The immediate sources of PCBs in sewered flow probably are the sediments in the sewers that are severely contaminated with PCBs. These were identified in the vicinity of the drum storage area, the electric car repair shop, the diesel car repair shop, and the round house. Because each sewer sediment sample collected was severely contaminated, it is probable that other sewer sediments are also severely contaminated.

Sewered flow at the site includes storm drainage. No sample of sewered flow was collected during intense rainfall, but sediment in the sewers could be partially dislodged and transported during these periods. Thus, it is likely that transportation of PCBs in sewers is greatest during infrequent events of intense precipitation and runoff into catch basins.

3.2.4 PHYSICAL TRANSPORT: Roadways and parking lots are identified as areas that are highly contaminated with PCBs. PCBs tentatively were identified in one sample of fugitive dust (Section 3.2.4). Because the soils in the roadways are known to be contaminated, and they adhere to vehicles, particularly when wet, PCBs probably are being carried by vehicles outside of the site. No sample was taken of mud adhering to a vehicle. The rate of transport or the amount of PCBs lost by this pathway is not known.

4.0 CONCEPTUAL REMEDIAL ACTIONS

Remedial actions to reduce or eliminate PCB contamination may be required at the Wilmington Maintenance Facility where locally the concentration of PCBs is so high that removal or some other action is warranted, or there are one or more transport mechanisms that are actively transporting PCBs from the site. This section describes conceptual remedial actions that address the areas of greater present known concern.

4.1 DRUM STORAGE AREA

The drum storage area is the only area on the surface where PCB contamination exceeds 50 ppm. The area is limited in size (about 50 by 200 feet), and the depth of severe contamination is less than five feet, and probably less than two feet. Therefore, it is recommended that the soils contaminated severely be removed and disposed at a hazardous waste landfill. As a first step, additional soil samples should be collected so as to delineate the soil volume (area and depth) in the drum storage area that is severely contaminated.

4.2 ROADWAYS AND PARKING LOTS

Roadways and parking lots contain soils that are contaminated with PCBs. These areas are sources for PCB migration in runoff water flows, and may be sources for fugitive dust and mud that adhere to vehicles when they leave the site. Because these areas will probably continue to be a source of PCBs, a remedial action to eliminate these areas as sources of PCBs is required.

Two alternatives are evaluated: (1) removal of contaminated soil beneath roadways and parking lots, or (2) paving of these areas. The former alternative would require the removal of soil from about five acres of the area and replacement with a suitable roadbed material. During excavation, there will be a substantial increase in the rate of the release of pollutants, including PCBs, as the contaminated roadbed material is exposed to the air and to precipitation. Although structures to reduce erosion can be built, there undoubtedly will be an increase in pollutant release during excavation.

Alternatively, roadways and parking lots that are highly contaminated can be paved without radical disturbance of the contaminated soils or operations. The beneficial effects would include isolation of PCB contaminated soils from the surface, as well as the elimination of pollutant release during paving. The ultimate results of paving are considered identical to that of excavation. PCBs are considered to be immobile in soils at the site; thus, paving these areas would prevent the loss of PCBs from the surface, reduce the rate of infiltration on paved roads, and eliminate the paved surfaces as sources of PCB contaminated runoff.

4.3 SEWERS

Sewered flow includes storm drainage in which sediment with adsorbed PCBs is entering sewers and eventually is transported from the site. To reduce the loss of PCBs by such drainage, a new or modified sewer design needs to be implemented. The alternatives that need to be evaluated include (1) the separation of storm and sanitary drainage, (2) the installation of sand traps at each catch basin, (3) the utilization of detention (sedimentation) ponds prior to outfall from the site, and (4) abandoning the sewers by sealing them and installing new sewers. The present sewers are old and designed so that prevention of infiltration or inflow could be accomplished only by sealing the sewers.

The data collected to date show that sewers have been severely contaminated with PCBs and that the municipal sewage system receives PCB contaminated sewered flow. The present sewer system could continue to be used as a storm drainage system, if the outfalls flow into ponds that serve as sediment traps. The outfall of the eastern sewer to the municipal system is now at the edge of the Brandywine Tributary that recently was ponded by newly installed inverts at two locations; thus, efforts to divert flow to the pond would be minimal. Such a plan would require an evaluation of the detention time of the ponds, periodic sediment removal, and construction of a new sanitary collection system as well.

The western sewer flows freely to Shellpot Creek. Flow from this system could be stopped entirely, or a small detention basin could be built northwest of the electric car repair shop to reduce the sediment load to Shellpot Creek. Blockage of the sewer entirely would eliminate the loss of PCBs drained from the site by the sewer, but the effect on the groundwater would need to be evaluated. The western sewer now serves as a line drain for the groundwater. If the flow were stopped, the groundwater table could be expected to rise in the area of the sewer, which may interfere with operations at the site when the water table is at a seasonal high.

APPENDIX

A

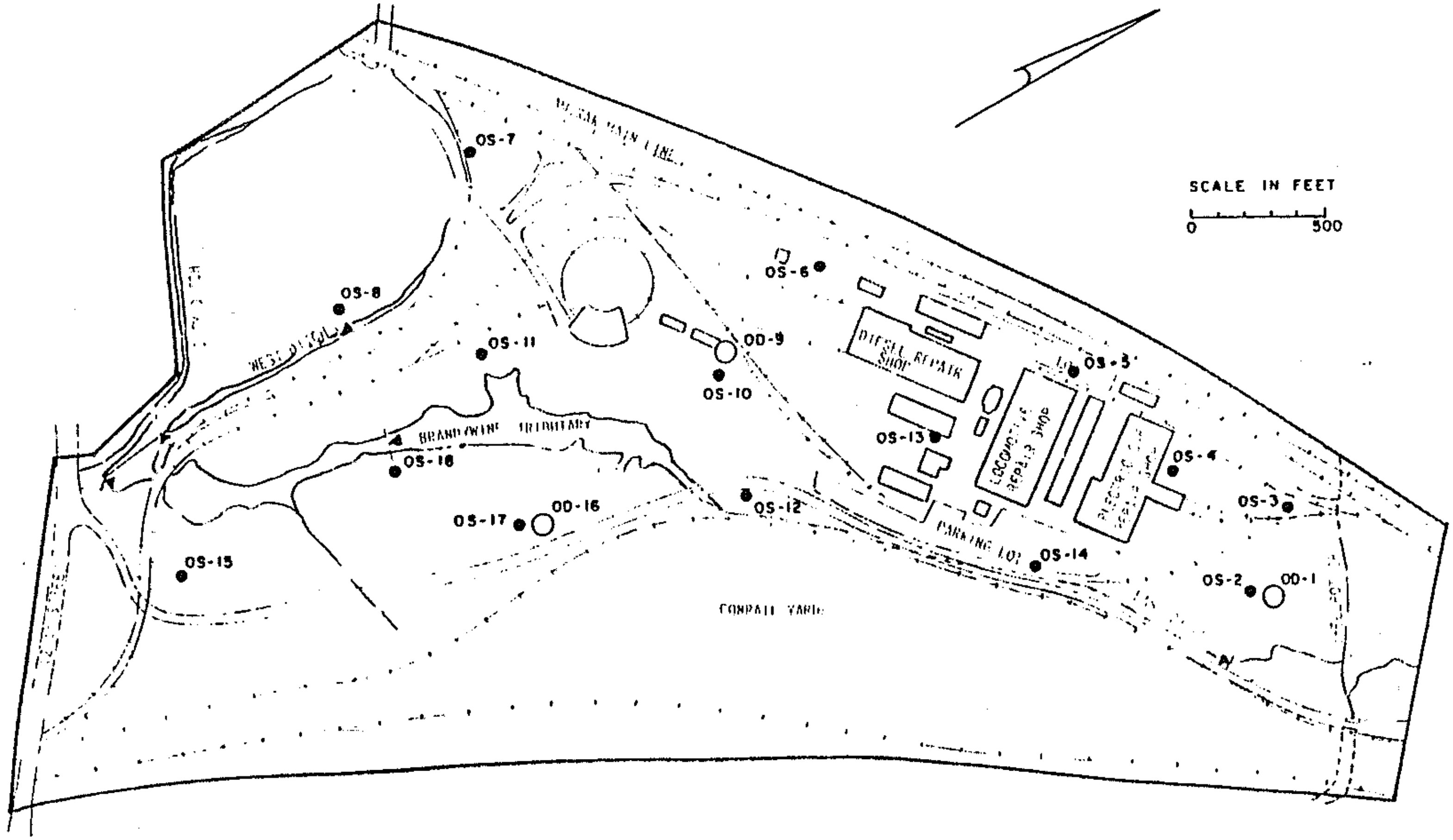

PLATE A - Location of Borings.

LOG of BORING No. OD-1

DATE 7/7/80 SURFACE ELEV. 7.4 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
		58	Loose black sand, bricks and wood fill					
5		5						X
10		2		-2.6				X
			Soft gray peaty silty clay (OL)					
15		2						
20		1						X
25		12		-16.6				X
30		34	Loose brown coarse to fine sand trace of gravel (SW-SM)					
35		9		-29.1				X
			Sand pack with well screen from 28.0 feet to 33.0 feet. Bentonite seal from 27.0 to 28.0 feet					

COMPLETION DEPTH 36.5 Water Depth 3.0 Date 7/7/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of piezometer 10.8

JOB NO 80 C 2078

LOG of BORING No. OS-3

DATE 7/8/80 SURFACE ELEV. 7.3 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS PCB
			Black sand and cinder fill	6.3				
		4	Loose brown coarse to fine sand, trace silt and gravel (SW-SM)	2.3				
5	▮	2	Very loose to medium dense gray clayey silt, little coarse to fine sand (SL-CL)					X
10	▮	16		-7.7				
15	▮	9	Loose brown coarse to fine sand to dense silt, clay; trace medium to fine sand (SW;CL)	-9.2				X
			Sand pack with well screen from 5.0 feet to 15.0 feet. Bentonite seal from 4.0 to 5.0 feet					

COMPLETION DEPTH 16.5 Water Depth 8.8 Date 7/8/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of piezometer 10.7

JOB NO 80 C 2078

LOG of BORING No. OS-4

DATE 7/8/80 SURFACE ELEV. 10.3 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS PCB
			Oily black sand and cinder fill	9.3				
			Loose brown coarse to fine sand (SW-SM)					
5	■	4		4.3				X
			Soft to firm gray silt and medium to fine sand, trace black clayey silt and peat seams (SM-SW;ML)					
10	■	3						X
15	■	5		-6.2				
			Sand pack with well screen from 5.0 feet to 15.0 feet. Bentonite seal from 4.0 to 5.0 feet					

COMPLETION DEPTH 16.5 Water Depth 1.3 Date 7/9/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of piezometer 11.4

JOB NO 80 C 2078

LOG of BORING No. OS-5

DATE 7/9/80 SURFACE ELEV. 10.6 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
			Black sand and cinder fill	9.6				
	■	2	Very soft to stiff red and gray clayey silt, trace coarse to fine sand (CL-ML)					
5	■	14						X
				0.6				
10	■	11	Loose brown coarse to fine sand trace gravel, silt and organic material (SW-SM)					
15	■	20		-5.9				X
			Sand pack with well screen from 10.0 feet to 15.0 feet. Bentonite seal from 9.0 to 10.0 feet					

COMPLETION DEPTH 16.5' Water Depth 6.5 Date 7/9/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 11.8

JOB NO 80 C 2078

LOG of BORING No. OS-6

DATE 7/9/80 SURFACE ELEV. 11.5 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS PBC
			Black sand and cinder fill	10.5				
	■	5	Loose brown coarse to fine sand and silt seams (SM)					
5	■	9						X
				1.5				
10	■	13	Medium dense gray fine sand and silt, trace medium sand (SM)					
				-4.7				
15	■		Red clayey silt to black clayey silt and peat, trace fine sand (CL-ML)	-5.2				X

Sand pack with well screen from 8.0 feet to 15.0 feet. Bentonite seal from 7.0 to 8.0 feet

COMPLETION DEPTH 16.5' Water Depth 7.4 Date 7/9/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 12.3

JOB NO 80 C 2078

LOG of BORING No. OS-7

DATE 7/9/80 SURFACE ELEV. 7.7 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
	■	16	Black sand, wood and cinder fill	2.7				
5	■	2	Very loose brown coarse to fine sand, silt (SW-SM)	-2.3				X
10	■	1	Very soft black silty clay to peat trace fine sand (CL, PT)					
15	■	WOR		-8.8				X

Sand pack with well screen from 5.0 feet to 12.0 feet. Bentonite seal from 4.0 to 5.0 feet

COMPLETION DEPTH 16.5' Water Depth 2.7 Date 7/9/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 8.5

JOB NO 80 C 2078

WCC RP

LOG of BORING No. OS-8

DATE 7/9/80 SURFACE ELEV. 5.5 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS
			Topsoil, rubble fill	3.5				
	■	2	Very soft gray to brown silty clay and woody peat					
5			(CL, PT)					
10	■	WOR						X
15	■	WOR		-11.0				X
			Sand pack with well screen from 10.0 feet to 15.0 feet. Bentonite seal from 9.0 to 10.0 feet					

COMPLETION DEPTH 16.5' Water Depth 1.5 Date 7/9/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezom-ter 6.4

JOB NO 80 C 2078

LOG of BORING No. OD-9

DATE 7/10/80 SURFACE ELEV. 6.7 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
			Black sand and cinder fill	5.7				
		14	Loose brown coarse to fine sand (SW-SM)	1.7				
5		4	Loose black sand and cinder fill	-3.3				
10		1	Very soft to firm brown gray interbedded clayey silt and peat (CL-ML, Pt)					X
15		2						
20		3						X
25		11						
30		24		-24.8				
			Medium dense gray coarse to fine sand, trace of silt interbeds					
35		9	(SW-SM)	-29.8				X
			Sand pack with well screen from 30 to 35 feet. Bentonite from 29.0 to 30.0 feet					

COMPLETION DEPTH 36.5' Water Depth 6.0' Date 7/10/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 7.3

JOB NO 80 C 2078

LOG of BORING No. OS-11

DATE 7/10/80 SURFACE ELEV. 9.0 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
			Oily black sand and cinder fill					
	■	3						
5	■	4						X
10	■	5		-2.5				
			Oily brown coarse to fine sand, trace silt (SW-SM)					
15	■	3		-7.0				X
			Brown peat (Pt)	-7.5				
			Sand pack with well screen from 10.0 feet to 15.0 feet. Bentonite seal from 9.0 to 10.0 feet					

COMPLETION DEPTH 16.5' Water Depth 7.0' Date 7/10/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 9.5

JOB NO 80 C 2078

LOG of BORING No. OS-12

DATE 7/10/80 SURFACE ELEV. 5.5 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
	■	2	Brown to black sand, cinder fill					
5								
10				-4.5				
	■	4	Brown clayey silt, trace peat (ML-CL)					X
15	■	1		-11.0				X
			Sand pack with well screen from 5.0 feet to 10.0 feet. Bentonite seal from 4.0 to 5.0 feet					

COMPLETION DEPTH 16.5' Water Depth 15.0' Date 7/11/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 6.0

JOB NO 80 C 2078

LOG of BORING No. OS-13

DATE 7/11/80 SURFACE ELEV. 11.3 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
			Road ballast, 4" concrete pad	10.3				
	■	11/6"	Dense brown clayey silt, little fine sand, trace coarse medium sand (CL-ML)	6.3				
5	■	8	Medium dense gray silty fine sand, trace coarse to medium sand, oil smell (SM)					X
10		14						
				-3.7				
15	■	34	Brown coarse to fine sand, trace of silt and gravel (SM)	-5.2				X
			Sand pack with well screen from 10.0 feet to 15.0 feet. Bentonite seal from 9.0 to 10.0 feet.					

COMPLETION DEPTH 16.5' Water Depth 7.0' Date 7/11/80

SAMPLER: 2" O.D. SPLIT BARREL SAMPLER Elevation top of Piezometer 12.1

JOB NO 80 C 2078

LOG of BORING No. OS-14

DATE 7/11/80 SURFACE ELEV. 7.6 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
		13	Black sand and rubble fill					
5		2						M
				-0.4				
10			Very loose red fine sand and silt (SM)					
15		2		-8.9				M
			Sand pack with well screen from 8.0 feet to 13.0 feet. Bentonite seal from 7.0 to 8.0 feet.					

COMPLETION DEPTH 16.5' Water Depth 8.3 Date 7/11/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 8.5

JOB NO 80 C 2078

LOG of BORING No. OS-15

DATE 7/11/80 SURFACE ELEV. 4.2 LOCATION see Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
			Top soil, concrete slab, black sand and cinder fill	-0.8				
5	■	1	Very soft brown silty clay and peat, oily smell (CL-ML, Pt)					X
10	■	1						
15	■	2		-12.3				X
			Sand pack with well screen from 5.0 feet to 15.0 feet. Bentonite seal from 4.0 to 5.0 feet					

COMPLETION DEPTH 16.5' Water Depth 14.7 Date 7/11/80

SAMPLER: 2" O.D. SPLIT BARREL SAMPLER Elevation top of Piezometer 4.9

JOB NO 80 C 2078

LOG of BORING No. OD-16

DATE 7/11/80 SURFACE ELEV. 3.7 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PCB OTHER TESTS
			Tan coarse to fine sand and top soil	2.7				
	■	18	Black sand and cinder fill	1.3				
5	■	1	Very soft brown to gray silty clay; trace of peat and coarse to fine sand (CL-ML)					X
10	■	1						
15	■	2						X
20								
25	■	25	Dense gray coarse to fine sand and gravel, trace of silt (SM)					X
30		40						
			Sand pack with well screen from 25 to 30 feet. Bentonite seal from 24.0 to 25.0 feet.					

COMPLETION DEPTH 31.5' Water Depth 8.7 Date 7/14/80

SAMPLER: 2" O.D. SPLIT-BARREL SAMPLER Elevation top of Piezometer 4.4

JOB NO 80 C 2078

LOG of BORING No. OS-17

DATE 7/14/80 SURFACE ELEV. 5.5 LOCATION See Plate A

DEPTH, FEET	SAMPLES	SAMPLING RESISTANCE	DESCRIPTION	ELEVATION	WATER CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	OTHER TESTS (PCB)
	■	13	Black sand, cinder and rubble fill					
5	■	19						X
10		11						
				-9.5				
15	■	2	Very soft brown silty clay, trace peat (CL-ML)	-11.0				X
			Sand pack with well screen from 15.0 feet. Bentonite seal from 4.0 to 5.0 feet					

COMPLETION DEPTH 16.5' Water Depth 13.3 Date 7/14/80

SAMPLER: 2" O.D. SPLIT BARREL SAMPLER Elevation top of Piezometer 6.3

JOB NO 80 C 2078

45' LOG

RP

APPENDIX

B

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FOR: Woodward Clyde
5120 Butler Pike
Plymouth Meeting, PA 19462

DATE OF REPORT: 7/14/80
PAGE: 1 of 1

SAMPLES DATED: 6/11/80
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ATTENTION: Al Hirsch

THE FOLLOWING REPORT COVERS THE LABORATORY EXAMINATION OF SAMPLES DELIVERED TO OUR LABORATORIES. PLEASE DO NOT HESITATE TO CONTACT US SHOULD ANY QUESTIONS ARISE.

VERY TRULY YOURS,

Frank J. Kernozek, PhD.
SECTION, MANAGER, LAB SERVICES

	PCB, ppb					
2078-028	280					
2078-029	386					
2078-030	9530					
2078-031	91.4					
2078-032	294					
2078-033	85.1					
2078-034	49.1					
2078-035	30.5					
2078-036	26.8					
2078-037	1600					
2078-038	77.5					
2078-039	11.7					
2078-014 (6/10/80)	*			*none detected		
*Detection limit 3ppb Archlor 1260) for solid samples						

LAB 21

C : Woodward Clyde

DATE OF REPORT: 7/14/80

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	PCB, ppb					
2078-006	13.2					
2078-013S	464					
2078-005S	507					
2078-015S	1650					
2078-004S	6460					
2078-024S	11.6					
2078-020S	7090					
2078-010S	14.4					
2078-027S	512					
2078-028S	23900					
2078-026S	39900					
2078-002S	11.2					
2078-017S	1340					

*Detection Limit 0.1 ppb (Arochlor 1260) for aqueous samples; 3 ppb (Arochlor 1260) ~~for solid samples~~

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Frank J. Kernozek, PhD.
SECTION, MANAGER, LAB SERVICES

	PCB, ppb					
2078-001W	*					
2078-007W	*					
2078-008P	3.7					
2078-009P	*					
2078-011W	*					
2078-003W	*					
2078-016W	*					
2078-022W	7.6					
2078-021W	*					
2078-018W	*					
2078-023W	3.6					
2078-012W	39.3		*none detected			
2078-019W	*					
2078-025W	6.5					
-continued						

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DATE OF REPORT: 7/21/80

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SECTION, MANAGER, LAB SERVICES

	PCB, µg/kg					
Soil 2078-040	23100					
Soil 2078-041	2680					
Soil 2078-042	46.7					
Soil 2078-043	894000					
Soil 2078-044	21000					
Soil 2078-045	1350					
Soil 2078-046	7500					
Soil 2078-047	3590					
Soil 2078-048	26000					
Soil 2078-049	6840					
Soil 2078-050	24800					
Soil 2078-051	37.3					
Soil 2078-052	9700					
Soil 2078-053	< 3.3					
-continued-						

Woodward Clyde

DATE OF REPORT: 7/21/80

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	PCB, µg/kg					
Soil 2078-054	18.5					
Soil 2078-055	9760					
Soil 2078-056	34.7					
Soil 2078-057	<3.3					
Soil 2078-059	4050					
Soil 2078-060	1580					
Soil 2078-061	<3.3					
Soil 2078-062	5950					

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F. J. Kernozek /SAN

Frank J. Kernozek, Ph.D.
SECTION, MANAGER, LAB SERVICES

Custody Samples

	PCB, µg/kg					
2078063	329					
2078064	18800					
2078065	30.7					
2078066	21.1					
2078067	48.3					
2078068	638					
2078069	85.0					
2078070	2070					
2078071	691					
2078072	271					
2078073	27.9					

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SECTION, MANAGER, LAB SERVICES

	PCB, ppb					
2078-074	<0.03					
2078-075	<0.03					
2078-076	<0.03					
2078-077	<0.03					
2078-078	<0.03					
2078-079	2.00					
2078-080	0.313					
2078-081	<0.03					
2078-082	<0.03					
2078-083	2.55					
2078-084	<0.03					
2078-085	0.0515					

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SECTION, MANAGER, LAB SERVICES

CUSTODY SAMPLES

	2078-086	2078-087	2078-088	2078-089	2078-090	
PCB, µg/kg	1680	1060	<1.5	<1.5	<1.5	

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Frank J. Kernozek, Ph.D.

SECTION, MANAGER, LAB SERVICES

CUSTODY SAMPLES

	OS-3 5-6x5'	OS-3 15-16.5'	OS-4 5-6 1/2'B	OS-4A 10-11 1/2'		
PCB, µg/kg	< 1.5	< 1.5	156	< 1.5		

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SECTION, MANAGER, LAB SERVICES

CUSTODY SAMPLES

	2078 095	2078 096	2078 097	2078 098	2078 099	2078 100
PCB, µg/kg	76.2	2.6	22.9	233	4.3	100

LAB 21

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DATE OF REPORT: 7-31-80
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	2078 101	2078 102				
PCB, µg/kg	329	<1.5				

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SECTION: MANAGER, LAB SERVICES

	2078 110	2078 111	2078 112	2078 113	2078 114	2078 115
PCB, µg/kg	402	<1.5	140	286	2.8	<1.5

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	2078 116	2078 117	2078 118			
PCB, µg/kg	<1.5	<1.5	<1.5			

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SECTION, MANAGER, LAB SERVICES

	2078-119 05-18	2078-120 05-18				
PCB ,ppb as A-1242	<0.17	<0.17				

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Frank J. Kernozek, Ph.D.
SECTION, MANAGER, LAB SERVICES

CUSTODY SAMPLES

	2078 121	2078 122	2078 123	2078 125	2078 126	2078 127
PCB (A-1221), ppb	2.72	1.40	0.439	1.49	2.56	$\leq$0.104
PCB (A-1248), ppb	0.294	0.095	$\leq$0.012	$\leq$0.012	$\leq$0.014	$\leq$0.012
PCB (A-1260), ppb	1.83	$\leq$0.026	10.9	0.077	9.21	0.087

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	2078 128	2078 129	2078 130	2078 131	2078 132	2078 135
PCB (A-1221), ppb	< 0.104	1.41	0.938	0.529	0.104	< 0.104
PCB (A-1248), ppb	< 0.012	< 0.012	0.577	< 0.012	< 0.012	0.089
PCB (A-1260), ppb	1.88	3.22	0.180	1.84	< 0.024	< 0.024

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	PCB (A-1254), µg/l	PCB (A-1260), µg/l				
2078-144	<0.02	1.17				
2078-145	<0.03	8.67				
2078-146	1225	<0.07				
2078-147	11.4	184				
2078-148	<0.03	3.42				
2078-149	<0.03	50.8				
2078-150	<0.03	12.6				
2078-151	11.2	57.8				
2078-152	19.2	<0.06				

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SECTION, MANAGER, LAB SERVICES

	2078 153	2078 154	2078 155	2078 156	2078 157	
PCB, (A-1254), µg/l	55.6	7.63	3.33	<4.6 µg/kg	<0.03	
PCB, (A-1260), µg/l	28.5	134	14.3	44,800 µg/kg	0.88	

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SECTION, MANAGER, LAB SERVICES

CUSTODY SAMPLES	PCB, μg/l A-1242	PCB, μg/l A-1260				
OD-1	0.115	<0.019				
OS-2	0.040	<0.019				
OS-3	0.085	0.181				
OS-14	0.053	<0.019				
OD-16	0.535	<0.019				
OS-13	<0.016	<0.019				

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Frank J. Kernozek, PhD.
SECTION, MANAGER, LAB SERVICES

	PCB, µg/kg Arochlor 1260					
OS-5, 2-3.5'	<3.4					
OS-5, 10-11.5'	<3.4					
OS-6, 2-3.5'	<3.4					
OS-6, 10-11.5'	21.2					
OS-7, 2-3.5'	786					
OS-7, 5-6.5'	142					
OS-8, 2-3.5'	<3.4					

BCM Betz • Converse • Murdoch • Inc.

One Plymouth Meeting Mall • Plymouth Meeting, Pennsylvania 19462 • Telephone: 215 • 825-3800

FOR: Woodward-Clyde Consultants, Inc.
5120 Butler Pike
Plymouth Meeting, PA 19462

DATE OF REPORT: 9/15/80
PAGE: 1 of 1

SAMPLES DATED: 8/28/80
RECEIVED: 8/29/80

ATTENTION: Dr. Alfred Hirsch

THE FOLLOWING REPORT COVERS THE LABORATORY EXAMINATION OF SAMPLES DELIVERED TO OUR LABORATORIES. PLEASE DO NOT HESITATE TO CONTACT US SHOULD ANY QUESTIONS ARISE.

VERY TRULY YOURS,

Frank J. Kernozek, PhD.
SECTION, MANAGER, LAB SERVICES

CUSTODY SAMPLES	PCB, μg/l A-1242	PCB, μg/l A-1260				
OS-18	0.087	0.091				
OD-9	<0.016	0.124				
OS-10	0.089	<0.019				
OS-15	0.030	<0.019				
OS-6	0.407	0.343				
OS-7	<0.016	8.52				
OS-8	0.325	0.342				

1982 Sampling Results

INTRODUCTION

RMC Technical Services was contracted by Amtrak to collect soil samples and determine the level of polychlorinated biphenyl (PCB) and oil concentration at several suspected PCB-contaminated areas at Amtrak's maintenance facility at Wilmington, Delaware. In addition to PCB and oil and grease, four samples from a particular site in the maintenance yard were to be tested for "hazardous materials" in order to allow determination of the final disposition of the soil in that area. This document describes the methodology used by RMC and the results of the soil analyses.

MATERIALS AND METHODS

Soil samples were obtained at 12 sample locations with a stainless steel core sampler 3 ft in length and 1.1 inches in diameter. The coring device accepted polypropylene liners which were removed after the core was taken, labeled with the pertinent collection information, and sealed for transport to the Pottstown Environmental Chemistry Laboratory. Soil samples were taken by inserting the core sampler into the soil to a depth of 1 or 2 ft dependent upon the particular sample site. Sampling was performed between 0800 and 1700 hours on 23-24 June 1982.

At locations where the soil was too compacted to core readily or other persistent resistance to core penetration was encountered, a sample 1 ft square and to the appropriate depth (1 or 2 ft) was excavated by pick and shovel, mixed well, placed into a wide-mouth glass jar, and labeled appropriately before shipment to the laboratory. Sampling locations are depicted in Figures 1-9.

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.

ppm

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

to 12.5" (11A–11D)

to 12.5" (12A–12D)

21" — 253

TOTAL 64 SAMPLE

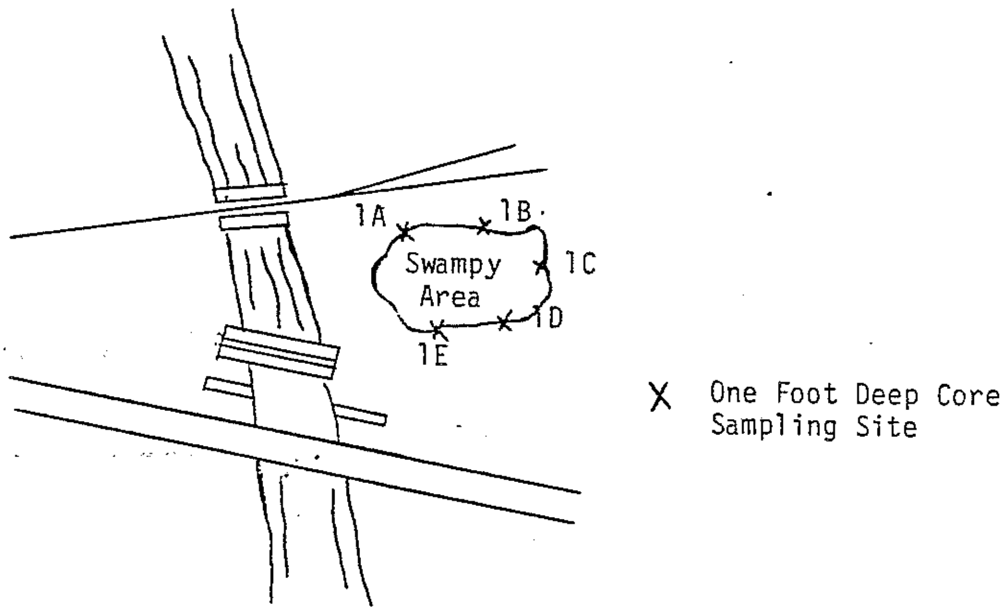

FIGURE 1: SAMPLING AREA 1

WMF

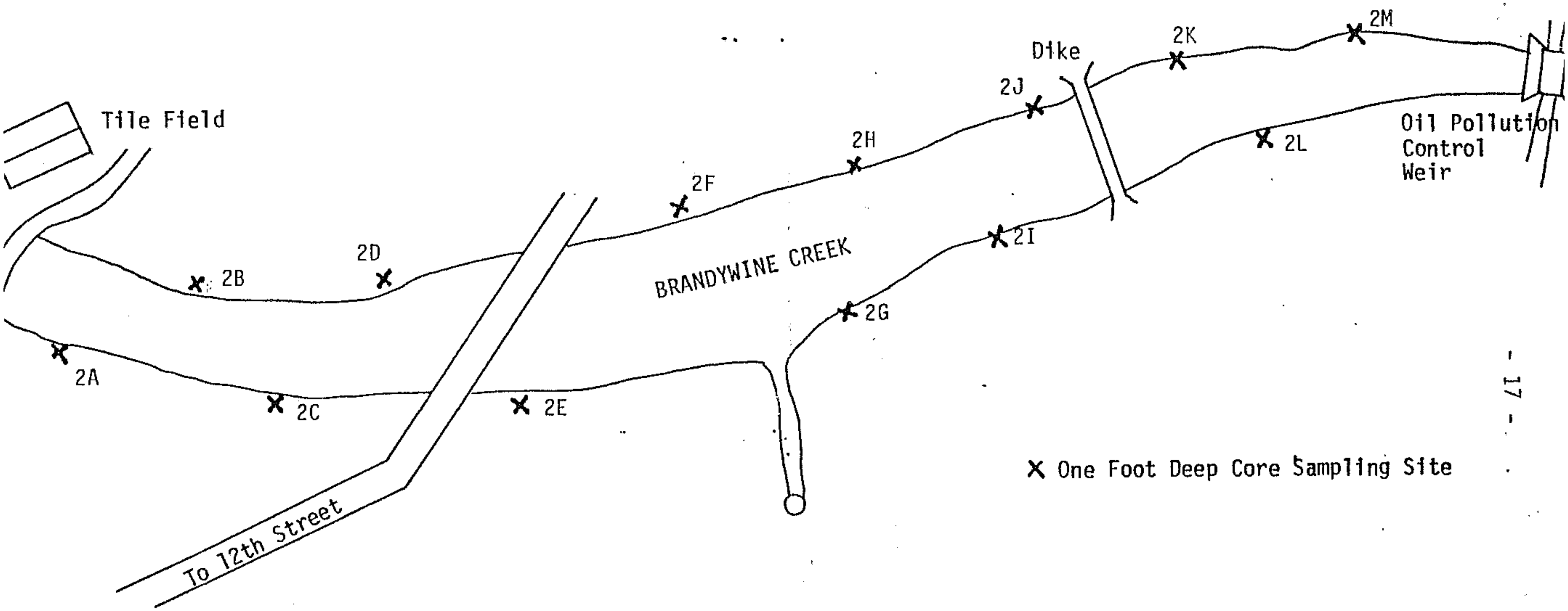

FIGURE 2: SAMPLING AREA 2

FFF

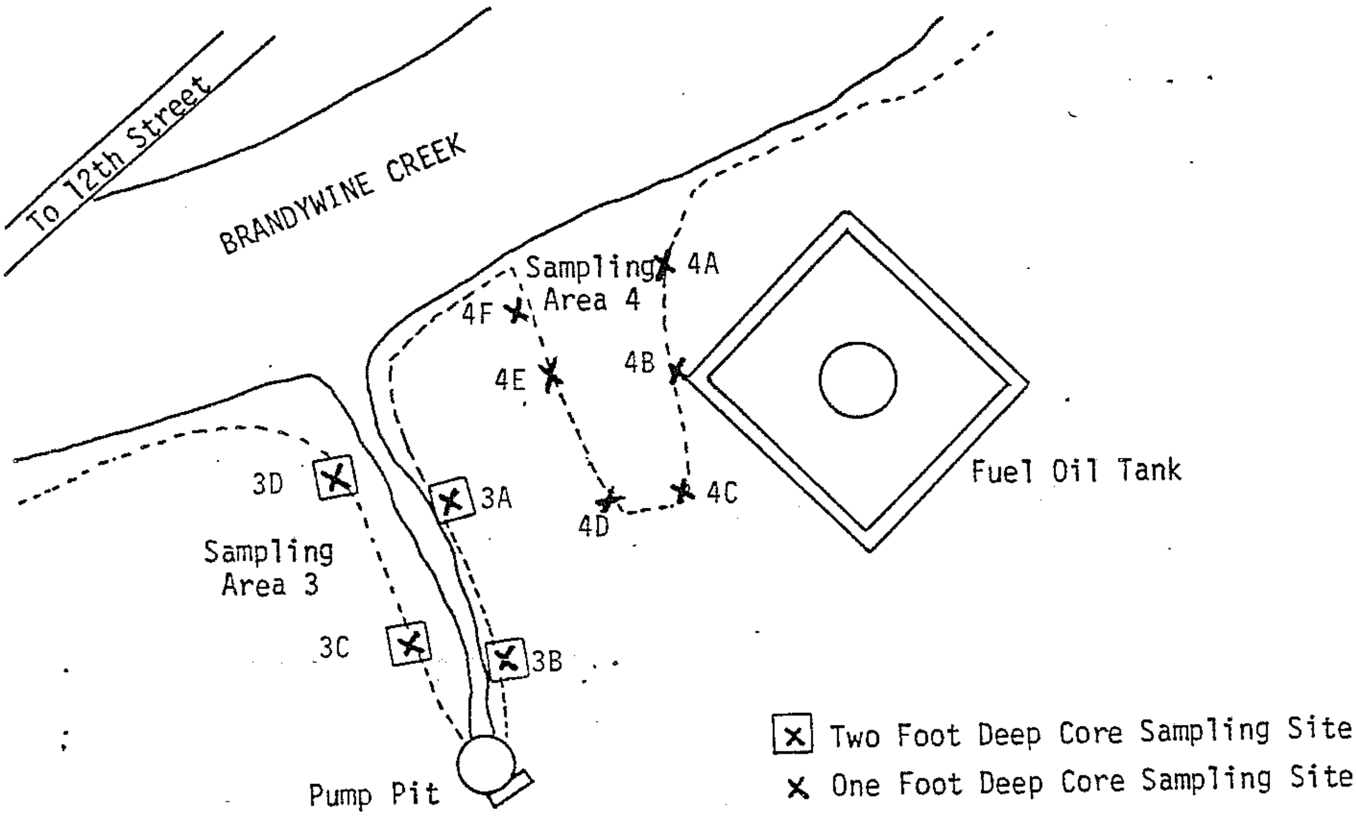

FIGURE 3: SAMPLING AREAS 3 & 4

FFF

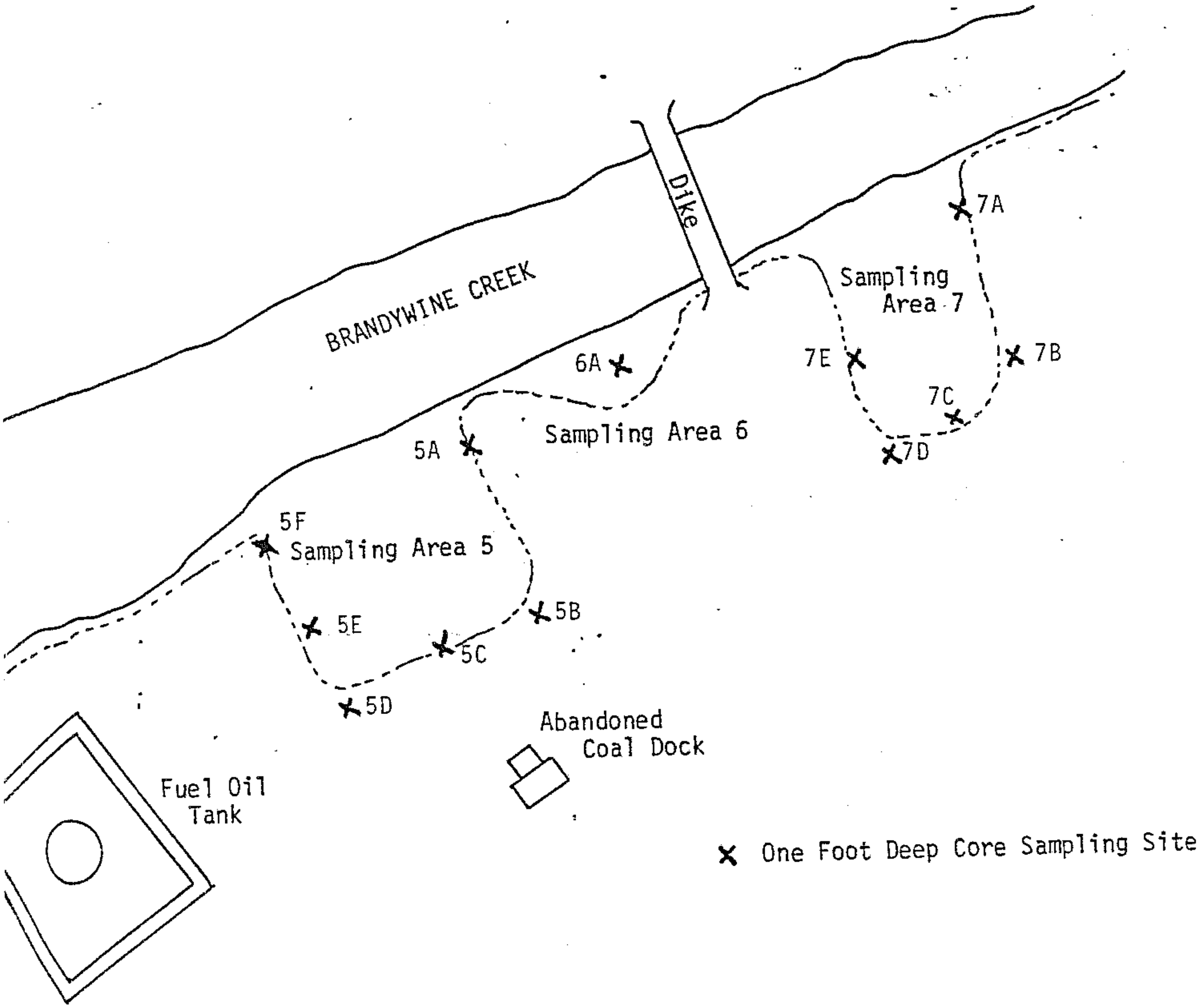

FIGURE 4: SAMPLING AREAS 5, 6, & 7

FFF

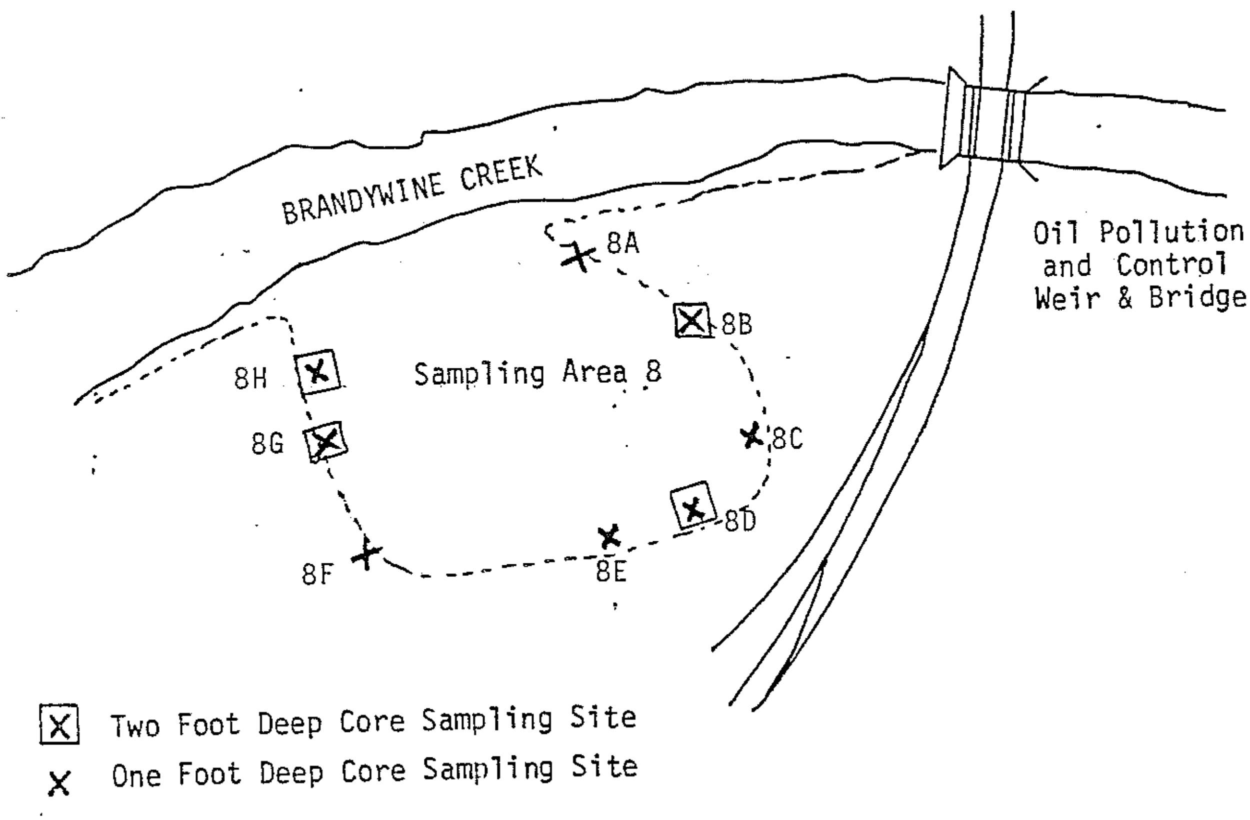

FIGURE 5: SAMPLING AREA 8

FFF

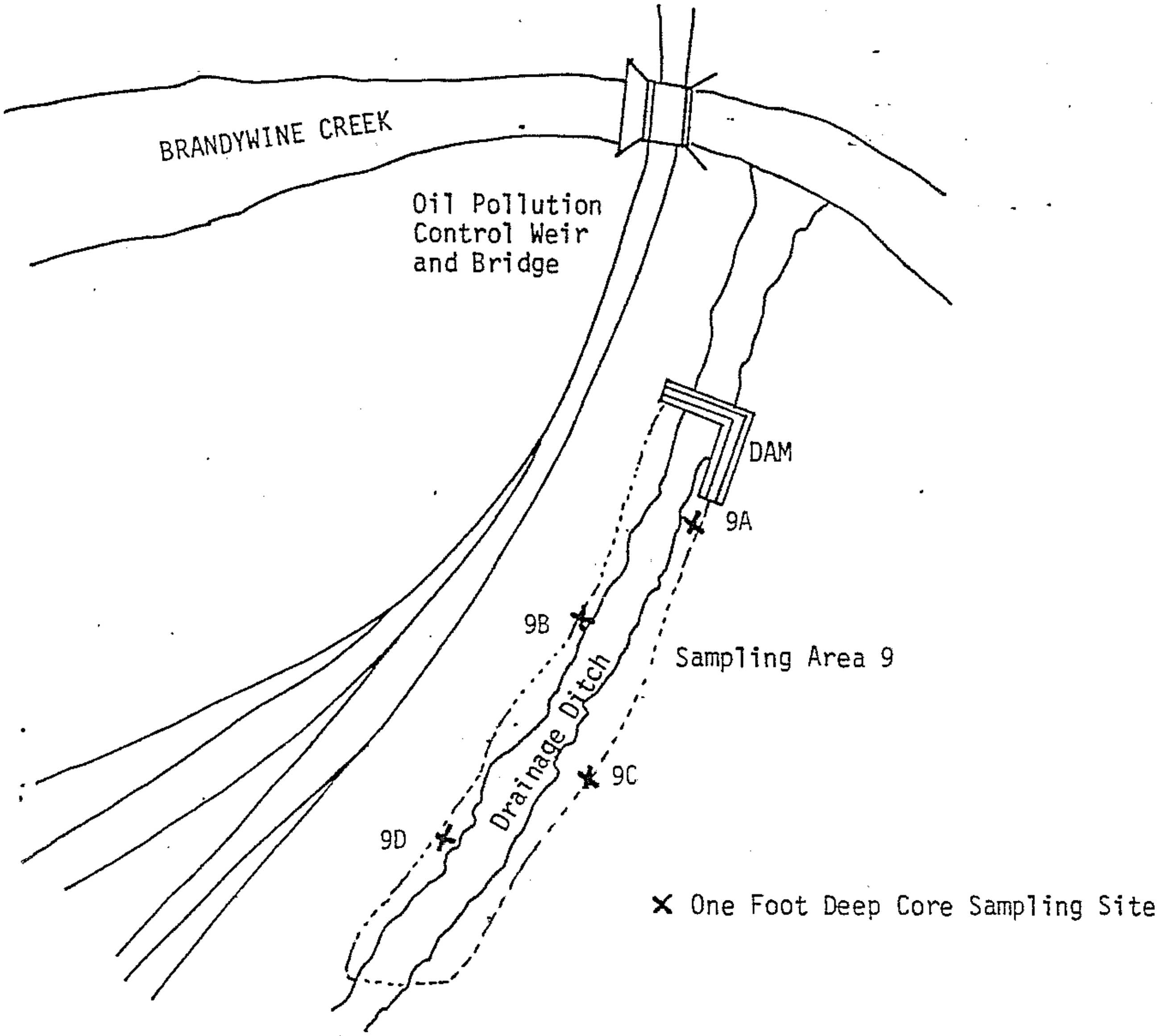

FIGURE 6: SAMPLING AREA 9

FFF

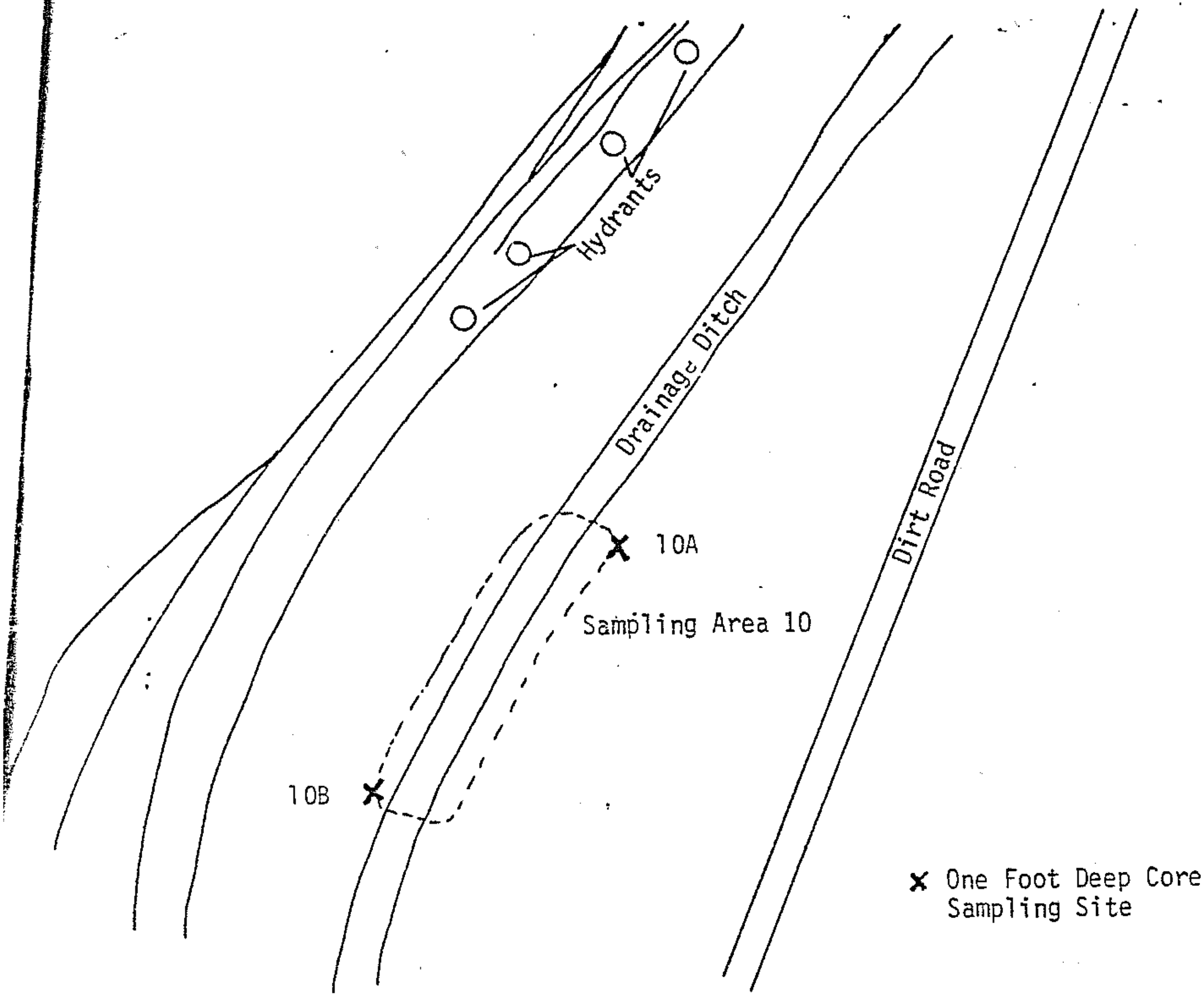

FIGURE 7: SAMPLING AREA 10

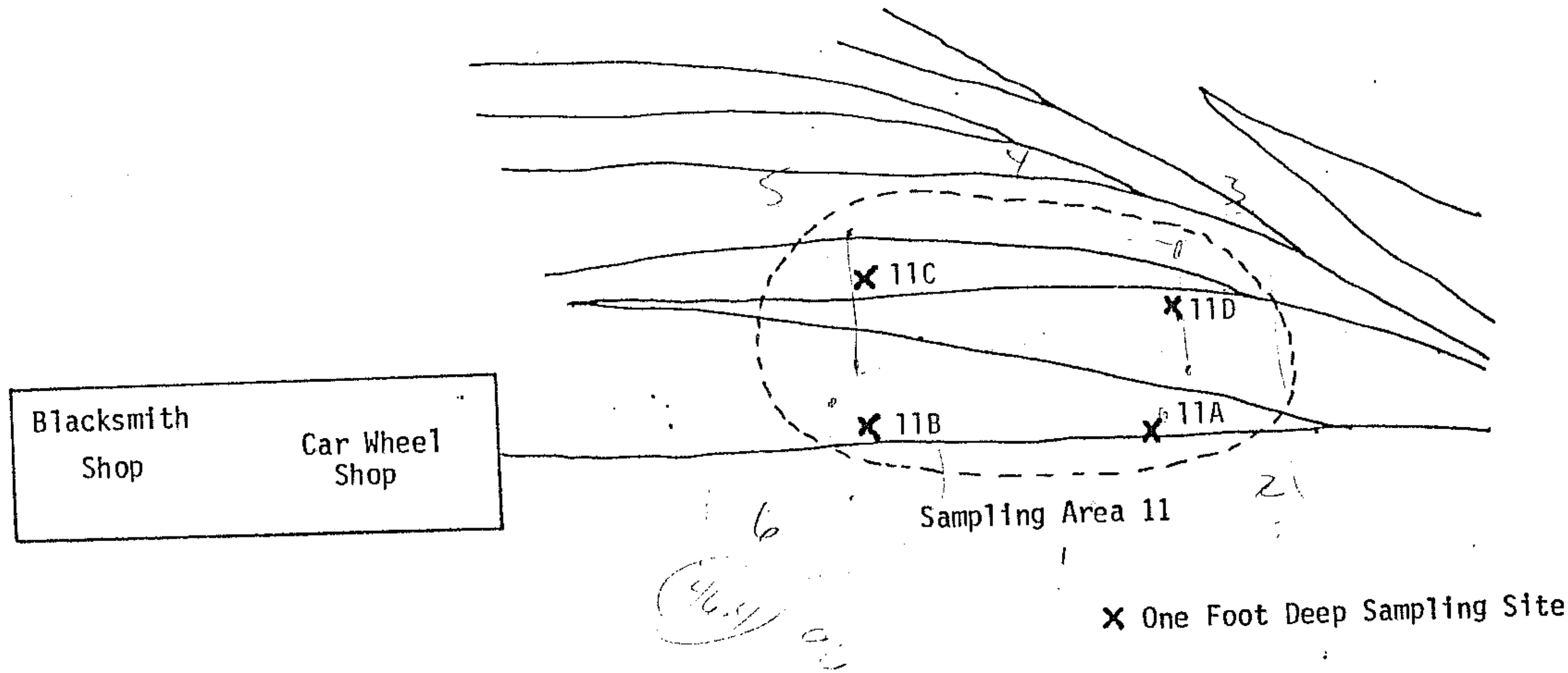

FIGURE 8: SAMPLING AREA 11

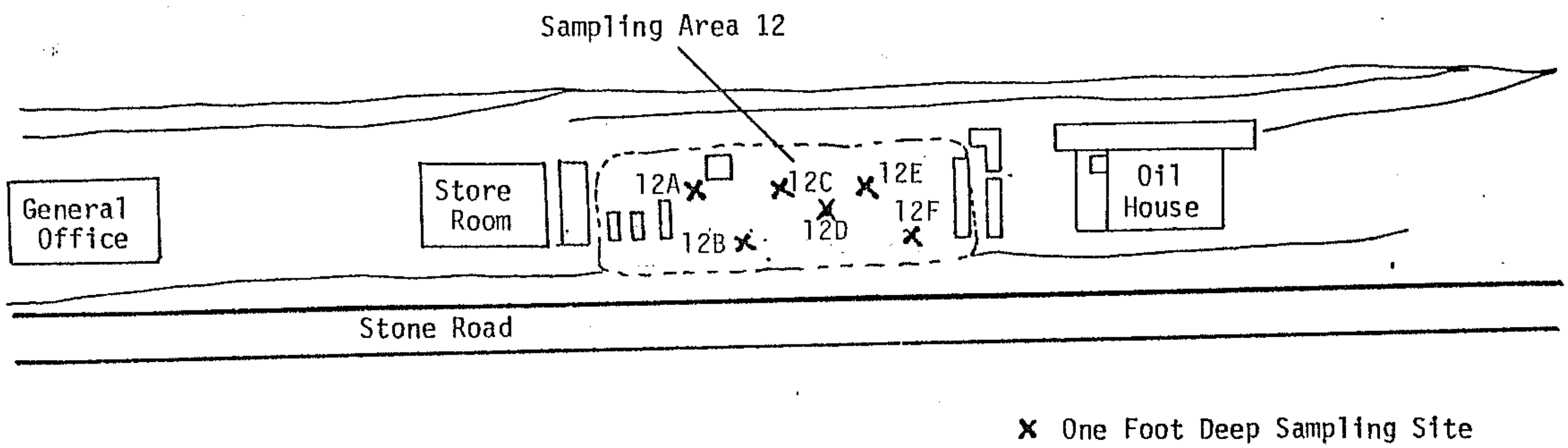

FIGURE 9: SAMPLING AREA 12

RECEIVED OCT 0 1 2007

CANBERRA
RMC
Environmental Services Division, Fricks Lock Rd., RD #1, Pottstown, PA 19464 (215) 326-9662

26 July 1984

Tadeusz W. Brzozowski
Environmental Section
National Railroad Passenger Corporation
400 North Capitol Street
Washington, DC 20001

Dear Mr. Brzozowski:

Enclosed please find the final report on the remedial PCB soil analyses performed on samples collected from the Wilmington Maintenance facility from 1 May through 2 July 1984. All samples were analyzed by the sonic method described in my letter of 25 April 1984 to Mr. Noonan. Samples over 50 ppm PCB were also analyzed by the soxhlet procedure also referenced in the 25 April 1984 letter. The soxhlet analyses were performed in order to provide a better base for comparison of the sonic results.

It has been a pleasure working with you and Al Sterne on this job. If you have any questions or require additional information, please contact me.

Sincerely,

Richard S. Rodgers
Manager
Environmental Chemistry
Laboratory

bsm
Enc.

Results of PCB in Soil Analyses Performed on AMTRAK Samples
Collected from the Wilmington Maintenance Facility
1 Through 24 May 1984

AMTRAK Sample Number	RMC Sample Number	Date Sampled	PCB Concentration (mg/kg)	
			Sonic	Soxhlet
1A-1	976-84	5/01	<1	
1A-2	977-84	5/01	<1	
1A-3	981-84	5/02	270	227
1A-4	982-84	5/02	<1	
1A-5	983-84	5/02	<1	
1A-3A	987-84	5/03	940	1091
1A-3B	988-84	5/03	<1	
1A-3C	989-84	5/03	6	
1A-3D	990-84	5/03	230	436
1A-3E	991-84	5/03	<1	
1A-3F	992-84	5/03	<1	
1A-3G	993-84	5/03	<1	
2A-1	994-84	5/03	<1	
1A-3H	1008-84	5/08	78	113
1A-3I	1009-84	5/08	<1	
1A-6	1010-84	5/08	5	
1C-1	1011-84	5/08	8	
1C-2	1012-84	5/08	89	129
1E-1	1013-84	5/08	16	
2A-2	1014-84	5/08	3	
2A-3	1015-84	5/08	39	
2B-1	1016-84	5/08	14	
2D-1	1017-84	5/08	45	35
2E-1	1018-84	5/08	2	
1C-3	1039-84	5/09	<1	
1C-4	1040-84	5/09	<1	
1C-5	1041-84	5/09	<1	
9-1	1042-84	5/09	1	
9-2	1043-84	5/09	20	
1-B	1094-84	5/14	122	126
1-D-1	1095-84	5/14	5	
1-D-2	1096-84	5/14	<1	
1-D-3	1097-84	5/14	<1	
1-B-1	1126-84	5/16	55	63
2F-1	1127-84	5/16	26	
21-1	1128-84	5/16	<1	
21-2	1129-84	5/16	2	
1-B-2	1145-84	5/17	1740	1132
21-3	1146-84	5/17	2	
21-4	1147-84	5/17	1	
17-1	1148-84	5/17	69	168
17-2	1149-84	5/17	47	29
1B-3	1155-84	5/18	15	

AMTRAK Sample Number	RMC Sample Number	Date Sampled	PCB Concentration (mg/kg)	
			Sonic	Soxhlet
1B-4	1156-84	5/18	2	
1B-5	1157-84	5/18	33	
17B-3	1158-84	5/18	<1	
17B-4	1159-84	5/18	187	144
17B-5	1160-84	5/18	153	98
1B-6	1167-84	5/21	<1	
3A-1	1168-84	5/21	<1	
3A-2	1169-84	5/21	<1	
3A-3	1170-84	5/21	72	55
17B-6	1171-84	5/21	2	
17B-8	1172-84	5/21	78	55
17A-1	1173-84	5/22	10	
3A-4	1174-84	5/22	<1	
3A-5	1175-84	5/22	72	82
17B-7	1176-84	5/22	<1	
20A-1	1177-84	5/22	20	
20A-2	1178-84	5/22	695	517
17B-9	1212-84	5/24	29	
17A-2	1213-84	5/24	174	180
17A-3	1214-84	5/24	<1	
5-1	1215-84	5/24	21	
5-2	1216-84	5/24	21	
3A-6	1217-84	5/24	27	
20A-3	1218-84	5/24	104	213
18B-1	1219-84	5/24	550	1030
NP-2	1220-84	5/24	8	
NP-8	1221-84	5/24	9	
NP-17	1222-84	5/24	<1	
NP-19	1223-84	5/24	29	
NP-27	1224-84	5/24	<1	
NP-30	1225-84	5/24	204	371
NP-32	1226-84	5/24	860	989
NP-34	1227-84	5/24	56	51
5-3	1243-84	5/29	15	
5-4	1244-84	5/29	2	
12A-1	1245-84	5/29	<1	
12B-1	1246-84	5/29	3	
NP30-2	1280-84	5/31	57	48/63
NP32-2	1281-84	5/31	2	
NP34-2	1282-84	5/31	13	
18B-2	1283-84	5/31	25	
17A-4	1284-84	5/31	3	
12C-1	1308-84	6/04	<1	
14A-1	1309-84	6/04	864	565
14B-1	1310-84	6/04	39	
14D-1	1311-84	6/04	238	147
19-1	1312-84	6/04	2	

AMTRAK Sample Number	RMC Sample Number	Date Sampled	PCB Concentration (mg/kg) Sonic	Soxhlet
20A-4	1313-84	6/04	<1	
20C-1	1314-84	6/04	10	
NP30-3	1315-84	6/04	5	
6-1	1333-84	6/05	<1	
6-2	1334-84	6/05	10	
12D-1	1335-84	6/05	330	372
14-A-2	1336-84	6/05	<1	
14-D-2	1337-84	6/05	<1	
22-1	1338-84	6/05	27	
28-A-1	1339-84	6/05	25	
29-A-1	1340-84	6/05	14	
31A-1	1341-84	6/05	152	118
33A-1	1342-84	6/05	2	
30A-1	1367-84	6/06	113	80
3-1	1368-84	6/06	<1	
3-2	1369-84	6/06	<1	
25D-1	1370-84	6/06	6690	8620
12D-2	1371-84	6/06	<1	
24-1	1374-84	6/07	18	
18A-1	1375-84	6/07	<1	
20B-1	1376-84	6/07	<1	
25-2	1377-84	6/07	6940	10440
13-1	1441-84	6/10	6570	6750
13-2	1442-84	6/10	65	33
13-3	1443-84	6/10	<1	
4A-1	1444-84	6/10	<1	
4C-1	1445-84	6/10	26	
16-1	1446-84	6/10	<1	
4B-1	1447-84	6/11	3	
25-3	1448-84	6/11	51	27
31A-1	1449-84	6/11	10	
8A-1	1700-84	6/19	30	
8B-1	1701-84	6/19	3	
8C-1	1702-84	6/19	<1	
8C-2	1703-83	6/19	4	
7-1	1734-84	6/20	<1	
7-2	1735-84	6/20	1	
23B-1	1736-84	6/20	210	390
11-1	1737-84	6/20	<1	
11-2	1738-84	6/20	140	330
11-3	1739-84	6/20	<1	
15A-1	1751-84	6/21	9	
15B-1	1752-84	6/21	4	
15D-1	1753-84	6/21	208	370
13-1-A	1754-84	6/21	10	

AMTRAK Sample Number	RMC Sample Number	Date Sampled	PCB Concentration (mg/kg) Sonic	Soxhlet
13-2-A	1755-84	6/21	8	
23-C-1	1756-84	6/21	<1	
9-1	1776-84	6/22	112	100
9-2	1777-84	6/22	<1	
9-3	1778-84	6/22	182	140
15D-2	1779-84	6/22	11	
11-2A	1780-84	6/22	<1	
23B-2	1781-84	6/22	28	
23F-1	1782-84	6/22	14	
9-1A	1799-84	6/25	4	
9-3A	1800-84	6/25	2	
10-1	1801-84	6/25	3	
13-4	1804-84	6/26	<1	
13-5	1805-84	6/26	<1	
13-5	1826-84	6/28	5	
13-6	1827-84	6/28	3	
12-DD-1	1838-84	6/29	33	
12-CC-1	1839-84	6/29	<1	
12-BB-1	1840-84	6/29	4	
23A-1	1864-84	7/02	54	130
23A-2	1865-84	7/02	<1	

Approved By: Richard S. Rodgers

Richard S. Rodgers, Manager
Environmental Chemistry Laboratory
11 July 1984