PROPOSED PLAN OF REMEDIAL ACTION
FOR

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250 South Madison Street
Wilmington, Delaware

December, 1996

DNREC Project DE-1055

Prepared by:
Delaware Department of Natural Resources & Environmental Control
Division of Air and Waste Management
Site Investigation & Restoration Branch

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250 SOUTH MADISON STREET
PROPOSED PLAN OF REMEDIAL ACTION

I. INTRODUCTION

In January 1996, CND, Inc., entered into an agreement with the Department of Natural Resources and Environmental Control ("DNREC" or "Department") under the authority granted by the Hazardous Substance Cleanup Act (7 Del. C., Ch. 91) ("HSCA") to conduct a Voluntary Cleanup Program Facility Evaluation ("FE") at their property located at 250 South Madison Street, Wilmington, Delaware (Tax Parcel 26-042.00-13) (the "Site" or "Property") and to perform remedial actions as necessary to protect public health, welfare and the environment.

The purpose of the FE was to determine the nature and extent of contamination of the surface and subsurface soils and shallow groundwater at the Site, evaluate risks to the public and the environment associated with identified contamination at the Site and recommend remedial action, if required, that will be protective of public health and the environment.

All work was performed in accordance with the approved 250 South Madison Street Work Plan (WIK, April, 1996); DNREC's March 1, 1996 letter regarding analytical methods for the FE; the Delaware Regulations Governing Hazardous Substances Cleanup ("HSCA"), the Delaware Standard Operating Procedures for Chemical Analytical Program, July 1994 ("SOPCAP") and the Facility Evaluation Guidance Manual (DNREC, 1994).

This document is the Department's Proposed Plan of Remedial Action for the property. This Proposed Plan is issued under the provisions of HSCA and the Regulations Governing Hazardous Substance Cleanup ("Regulations"). It presents the Department's assessments of the risks to public health and the environment posed by the Site and a comparison of the remedial alternatives.

The Proposed Plan of Remedial Action presents a summary of the background and history of the property, describes the Focused Feasibility Study and the results of the investigation, presents a discussion of the remedial action objective and a review of applicable local, state and federal regulations, and provides a detailed analysis of remedial alternatives, including identification of and rationale for selection of alternatives.

The Proposed Plan of Remedial Action also includes a comparison of the remedial alternatives with respect to the following criteria; protection of public health, welfare and the environment; compliance with applicable laws and regulations; community acceptance; compliance monitoring requirements; permanence; technical practicality; restoration time frame; reduction of toxicity, mobility and volume of contamination; long-term effectiveness; short-term effectiveness; capital, operation and maintenance costs.

The Department will provide public notice and opportunity to comment on the Proposed Plan in accordance with Section 12 of the Regulations. At the conclusion of the comment period,

the Department, after review and consideration of the comments received, shall issue a Final Plan of Remedial Action which shall designate the selected remedial action. The Proposed Plan, the comments received from the public, responses to the comments and the Final Plan will constitute the "Remedial Decision Record".

II. SITE DESCRIPTION AND HISTORY

The site is located at 250 South Madison Street, southeast of the intersection of South Madison Street and Roundhouse Lane. The 1.58± acre property, roughly triangular in shape, is found on the United States Geological Survey (USGS) Wilmington South Quadrangle Topographic Map (7.5 minute series) at Latitude 39°44'16" and Longitude 75°33'38" (Figures 1 and 2).

The property is part of the historical Harlan and Hollingsworth Shipyard, later owner by the Bethlehem Steel Company and the United Steel Barrel Company. The property, currently vacant, was formerly a railcar and trolley repair facility. A roundhouse present at the site since approximately 1900 was demolished in August, 1995. The property has been owned by CND, Inc. since October, 1983. The New Castle County tax parcel number for the property is 26-042.0-013.

Surrounding land uses include Roundhouse Lane and SAC Tire Center to the north; Bell Supply Company (a plumbing and heating supplier) and Delmarva Power and Light Company to the east; the City of Wilmington Department of Public Works to the south and South Madison Street to the west. The Christina River is located approximately 600 feet south and east of the site. According to Planning Department maps, the property is currently zoned M-2, Manufacturing.

2.1 Previous Investigations

In March 1993, a Phase I Environmental Site Assessment (ESA) was conducted by WIK Associates, Inc. (WIK) at the site. According to the ESA the property was maintained as a trolley and railcar repair facility from the early 1900's until the mid-1950's. The roundhouse was vacant from the 1950's until it was demolished in 1995. The surrounding area has been used for heavy industrial uses including shipbuilding and railcar manufacturing since the early 1800's.

In November 1995, Tetra Tech, Inc. conducted a Phase II Environmental Assessment at the property. The investigation included the collection of 8 shallow soil samples (0 - 2' BLS) and 1 deep soil sample (7 - 9' BLS) (Figure 3). The samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver and zinc). The results of analysis, when compared to DNREC HSCA reporting levels for industrial surface soils and subsurface soils indicated the following:

- VOCs were not detected above DNREC reporting levels in any soil sample.
- One SVOC, benzo(a)pyrene, was reported above DNREC reporting levels in 7 of the 8 surface soil samples.

- SVOCs, including benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene and benzo(a)pyrene were reported above DNREC reporting levels in the deep soil sample.
- PCBs were not detected above DNREC reporting levels in any soil sample.
- One metal, lead, was present in one surface soil sample above the DNREC reporting level.

Three metals; arsenic, barium and chromium, were detected above DNREC reporting levels for subsurface soils in the deep soil sample. Lead and silver were also detected in the deep soil sample, however, no reporting levels have been established for these metals.

III. FACILITY EVALUATION

WIK Associates, Inc. was retained by the property owner to perform a Facility Evaluation at 250 South Madison Street. Soil and test pit excavation and monitor well installation was conducted on April 3, 1996. Monitor well sampling took place on April 17, 1996.

Soil sampling and descriptive logging of the test pits was conducted by geologists from WIK and overseen by the DNREC Site Investigation and Restoration Branch ("SIRB") Project Manager. Five test pits were excavated on the site. Fifteen soil samples were collected during the investigation consisting of three shallow test pit soil samples, six deep test pit soil samples (including a field duplicate, and six additional soil samples for confirmation of previous VOC analysis. Sample locations are shown in Figure 3.

Soil samples taken during the sampling event were field screened in the SIRB mobile laboratory to determine which samples should be sent to the DNREC Environmental Services laboratory for analysis. Each sample was analyzed for PCBs and toxaphene using Omicron and Millipore Immunoassay test kits, respectively. Gas Chromatography/ Mass Spectroscopy (GC/MS) was performed on all samples using a Bruker instrument for the analysis of pesticides, and VOCs and SVOCs. Metals analysis was performed using the mobile labs X-Ray Fluorescence (XRF) instrument.

As a result of the screening, four soil samples (two shallow test pit samples and two deep test pit samples) were selected for submission to the laboratory due to significant levels of SVOCs, however, no significant levels of PCBs, pesticides of VOCs were detected. The four selected samples were delivered to the DNREC laboratory on April 4, 1996 to be analyzed for the semivolatile component of the EPA Target Compound List (TCL). All groundwater samples were delivered to the DNREC laboratory on April 17, 1996 for full EPA TCL and Target Analyte List (TAL) analysis.

IV. FACILITY EVALUATION RESULTS

The data generated during the FE indicates that soils at the property have been impacted by historic operations at the site, including the deposition of fill materials. Fill materials observed at the site consisted of unconsolidated, fine to coarse orange-brown sands, mixed with dark gray silts, clays and gravels. Miscellaneous debris consisting of brick, wood, ash, slag and rock were also noted.

The analytical results are shown in Tables 1 through 6. The results of analysis indicated the following contaminants exceeding DNREC reporting levels or EPA Region III Risk-Based Concentrations (RBC):

Surface Soil

Lead was detected above the DNREC reporting level in four shallow samples. The highest concentration detected was 8008 mg/Kg (by XRF) in TP-3.

Polycyclic aromatic hydrocarbons (PAHs) were detected above reporting levels in both shallow samples analyzed in the DNREC laboratory. The highest concentrations were found at sampling location TP-3.

Subsurface Soil

Arsenic, barium, chromium, nickel and selenium exceeded the DNREC reporting levels for subsurface soils at several sampling locations.

PAHs exceeded reporting levels in both subsurface soil samples.

Groundwater

Tetrachloroethylene was detected above the Federal Maximum Contaminant Level (MCL) in monitor well MW-3.

Lead was detected above the MCL in the duplicate filtered groundwater sample from MW-3.

Manganese was detected above the EPA Region III RBC for tap water in all three on-site wells.

Thallium was detected above the MCL in the groundwater sample from MW-1.

The PAH Benzo(a)pyrene was detected above the MCL in the groundwater sample from MW-1. Benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene and indeno(1,2,3-cd)pyrene, also PAHs, were detected above the RBC for tap water in the sample from MW-1.

V. REMEDIAL ACTION OBJECTIVES

According to Delaware's Hazardous Substance Cleanup Act ("HSCA") regulation, Section 9.4, when a release of hazardous substances occurs, treatment, removal or containment measures must be implemented to reduce the levels of hazardous substances in soils.

> "Soil cleanup levels and the depth to which the cleanup levels will apply, shall be based on estimates of the facility use and the reasonable maximum exposure expected to occur under both current and future facility use conditions or may otherwise reasonably be determined by the Department to abate the threat to public health, welfare and the environment."

According to HSCA regulation 9.4(2)(b), soil cleanup levels are established as follows:

> "When the natural background level is less than the 10E-5 cancer risk level or a level corresponding to hazard index value of one, for direct exposure or inadvertent ingestion, then the 10E-5 cancer risk level or a level corresponding to a hazard index value equal to one becomes the cleanup level."

According to HSCA regulation 8.4(1), during a remedial investigation, remedial action objectives must be established. For the 250 South Madison Street site, remedial action objectives were developed based on the findings and risks identified during the Facility Evaluation. These findings are:

- The site is currently vacant industrial land. Most of the site surface is currently covered with concrete, a remnant of the property's use as a railroad locomotive storage and repair facility.

- Surrounding land uses are manufacturing and commercial.

- The site is within 1,000 feet of human populations; however, these populations consist of workers involved in commercial and industrial jobs including welding, road maintenance, warehousing and manufacturing. There are no residential dwellings within 1,000 feet of the property.

- The site overlies water-bearing geologic materials. These materials consist of unconsolidated sediments that have weathered from igneous and metamorphic rocks of the Wilmington Complex.

- Shallow groundwater has been locally impacted by lead, manganese, thallium, tetrachloroethylene and PAHs at levels exceeding DNREC and EPA criteria. Local groundwater in the area is not used as a drinking water supply and the area is served by a water utility.

- Surficial soil at the site has been locally impacted by lead and benzo(a)pyrene (a polycyclic aromatic hydrocarbon, or PAH) at levels which exceed DNREC and EPA criteria. The characteristics of these compounds and their health effects are described as follows:

  > Lead, as an element, is a heavy, ductile, soft, gray solid. The physical and chemical properties of lead vary with the form (i.e. oxides, salts, organics, etc.). In general, lead is more soluble under acidic conditions and is much less soluble under normal conditions. Lead solubility is highly dependent on pH and Eh.
  >
  > Polycyclic Aromatic Hydrocarbons (PAHs) are composed of fused benzene rings. Physical and chemical properties vary regularly with molecular weight. PAHs are frequently found in fuels, tar, and asphalt, and are used in manufacturing other chemicals and in pesticides (Moore, 1984). In general, PAHs tend to have very low solubilities, high partition coefficients, and very low mobilities. Aqueous solubility and volatility decrease with increasing molecular weight.

The primary contaminant migration pathways are airborne migration of dust containing benzo(a)pyrene and/or lead, and transport of sediment containing benzo(a)pyrene and/or lead.

The future site use is planned to be commercial. After sale of the property, the buyer plans to construct a self-storage warehouse on the property.

Based upon these findings, the Qualitative remedial action objectives for the site are as follows:

1. Control potential human contact (dermal, ingestion and inhalation) with contaminated soil.

2. Control soil erosion and the subsequent transportation of contaminated soil.

Based on the above qualitative remedial action objectives, the following quantitative remedial action objectives were developed:

- Prevent contact with soil that has a lead concentration greater than 1,000 mg/Kg.

- Prevent contact with soil that has a benzo(a)pyrene concentration greater than 0.78 mg/Kg.

VI. POTENTIAL REMEDIAL ALTERNATIVES

To accomplish the remedial action objectives, four potential remedial alternatives were identified. These are listed below:

1. Removal of all contaminated soil.

2. Permanently capping the site with a new building and paved parking area.

3. Temporarily capping the site until a building can be constructed.

4. No further action. This alternative was eliminated from further consideration because it will not meet the cleanup levels in section 9 of the Regulations, to protect human health, welfare and the environment.

Alternative 1: Removal would involve excavating the impacted soils and transporting the material to an appropriate disposal facility. Confirmation samples would then be collected at the site to ensure that all of the contaminated soil had been removed. If all of the contaminated soil had not been removed, another round of excavating and sampling would be implemented. Upon completion of removal, clean fill would be brought in to bring the site back to grade.

Alternative 2: Permanent Capping would involve building a new structure (the planned self-storage facility) on the site and capping any remaining uncovered soil with asphalt to form a parking area. Where the building was not present, the cap would consist of a thick layer of asphalt over a prepared base of crushed stone and/or a geotextile. According to the DNREC-commissioned Summary Report for the General Remedial Technology Cost Project; South

Wilmington Area (TetraTech, 1995), this is the most appropriate containment technology for soil contaminated with metals and PAHs. In addition, a deed restriction would be placed on the property by the current owner which restricts usage of the property to either commercial or industrial purposes. The Department shall also place a Groundwater Management Zone (GMZ) on the property which would prohibit use of the local groundwater.

Alternative 3: Temporary Capping would involve covering the areas of exposed site soil to prevent erosion and dust emission until the planned building is constructed. The temporary cap would include either vegetated soil (over a plastic or fabric layer) or a layer of asphalt as decided by DNREC and the site owner. The soil would be covered with a combination of asphalt (over areas that would later be covered with the building or parking lot) and plastic or fabric and clean soil with a vegetative cover (over areas that would later be vegetated). Temporary capping would be used to prevent dust and erosion during the transfer of the property to a new owner. The new owner will then permanently cap the site by building a new structure on it and covering any remaining soils with asphalt over a prepared base. According to the Summary Report for the General Remedial Technology Cost Project; South Wilmington Area (TetraTech, 1995), capping is the most appropriate containment technology for soil contaminated with metals and PAHs. In addition, a deed restriction would be placed on the property by the current owner which restricts usage of the property to either commercial or industrial purposes. The Department shall also place a Groundwater Management Zone (GMZ) on the property which would prohibit use of the local groundwater.

VII. REMEDIAL ALTERNATIVES EVALUATION

The remedial alternatives evaluation criteria set forth in the HSCA regulations are summarized in Table 7. A brief discussion of the criteria follows:

Protection of public health, welfare and the environment - Alternatives 1, 2 and 3 introduce an increased risk of exposure during implementation due to increased material handling. In addition, off-site disposal (alternative 1) presents an exposure risk during transportation. Alternatives 1, 2 and 3 are protective of public health, welfare and the environment.

Compliance with all applicable local, state and federal laws - Alternatives 1, 2, and 3, are believed to comply with all applicable local, state and federal laws.

Community acceptance - Alternatives 1, 2, and 3 are anticipated to be acceptable to the community.

Monitoring required - Alternative 1 does not require any additional monitoring upon completion. Alternatives 2 and 3 would require some long term maintenance of the cap.

Use of a permanent remedy - Alternative 1 is essentially a permanent remedy. Alternatives 2 and 3 remove the threat of direct contact and minimize transport of contaminants off site.

Technical practicability - Alternatives 1, 2, and 3 are technically feasible. However, Alternative 1 is not technically practicable because of the high cost for a minimal improvement in protection (see HSCA Regulation 8.5(3)(b)(vi)(B)).

Restoration time frame - Alternatives 1, 2, and 3 will take several months to implement.

Reduction in toxicity, mobility and volume - Alternative 1 would effectively reduce the toxicity, mobility and volume of the contaminated soils. Alternatives 2 and 3 would reduce mobility and minimize exposure to potentially toxic material; the volume of contaminated material would remain the same.

Long term effectiveness - Alternatives 1, 2, and 3 are effective in protecting public health, welfare and the environment.

Short term effectiveness - Alternatives 1, 2, and 3 are protective of public health, welfare and the environment.

As shown in Table 1, the remedial alternatives have been compared with each of the evaluating criteria. Table 1 also provides a preliminary cost estimate for each of the alternatives reviewed.

VIII. CONCEPTUAL REMEDIAL ACTION PLAN

Based on the above criteria, each of the alternatives were reviewed for their technical practicability and their cost-effectiveness. This review resulted in a conceptual plan of remedial action for the 250 South Madison Street site.

Alternatives 1 (removal) is not a viable alternative for the following reasons:

- Alternative 1 (removal) is not a viable alternative based on the increased potential for off-site air and direct contact exposures during excavation and transportation. In addition, the cost associated with this alternative makes it impractical.

Alternatives 2 (permanent capping) and 3 (temporary capping) are both acceptable alternatives for the following reasons:

- Alternative 2 (permanent capping with a building and paved parking lot) makes the most economic sense because the capping activities would only need to be accomplished once.

- However, in the interim, until the building can be built, Alternative 3 (temporary capping) provides a cost effective means of meeting all remedial objectives while satisfying the evaluation criteria. The cap installed as Alternative 3 (temporary capping) would be removed at some point in the near future when the new owners build a structure on site and pave the remaining soil for use as a parking lot.

IX. PROPOSED REMEDIAL ACTION PLAN

Based on the above criteria, Alternative 3 (temporary capping, deed restriction, GMZ) is the proposed remedial action to be undertaken at the property at the present time, followed by Alternative 2 (permanent capping with building and paved parking lot, deed restriction, GMZ) at a future date.

Under this alternative, areas of exposed soil at the property will be covered to prevent erosion and dust emissions until a building and parking lot planned for the site is constructed. The cap will consist of a combination of either vegetated soil over a plastic or fabric membrane layer; or asphalt over areas that would later be covered by the building and parking lot. This alternative will allow the property to be transferred to the new owner, who will then permanently cap (Alternative 2) the site with the planned structure and asphalt over a prepared base.

X. PUBLIC PARTICIPATION

The Department actively solicits public comments or suggestions on the Proposed Plan and welcomes opportunities to answer questions. Please direct written comments to:

DNREC Site Investigation & Restoration Branch
ATTN: Lawrence J. Jones
715 Grantham Lane
New Castle, Delaware 19720

or call (302)323-4540. The public comment period begins on December 10, 1996 and closes on December 30, 1996. Requests for a public meeting must be received by the close of business at 4:30 PM on December 30, 1996. Requests should be addressed to Lawrence Jones, DNREC-Site Investigation & Restoration Branch, located at 715 Grantham Lane, New Castle, Delaware 19720.

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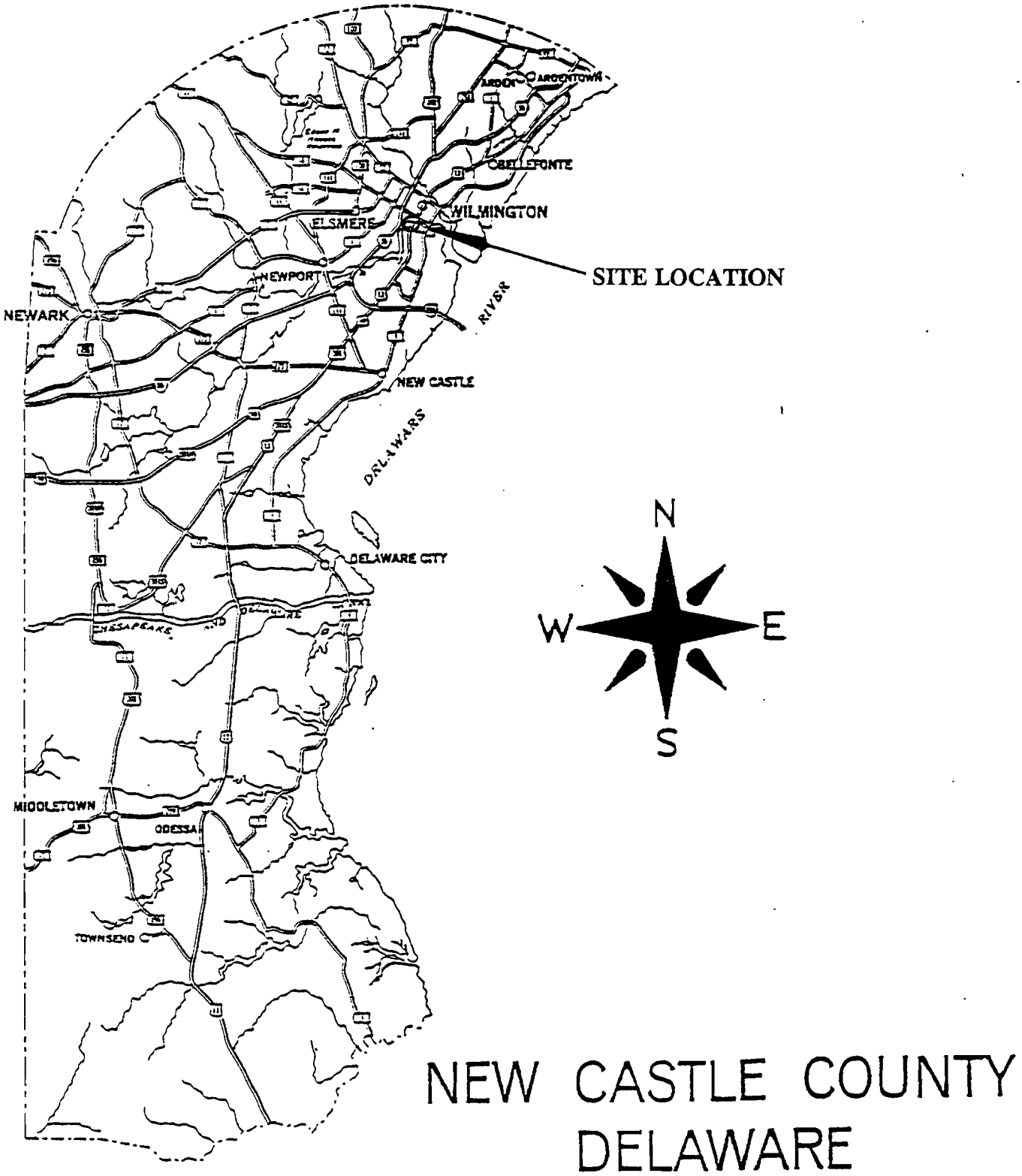
Location of 250 South Madison Street
New Castle County, Delaware

Figure 1



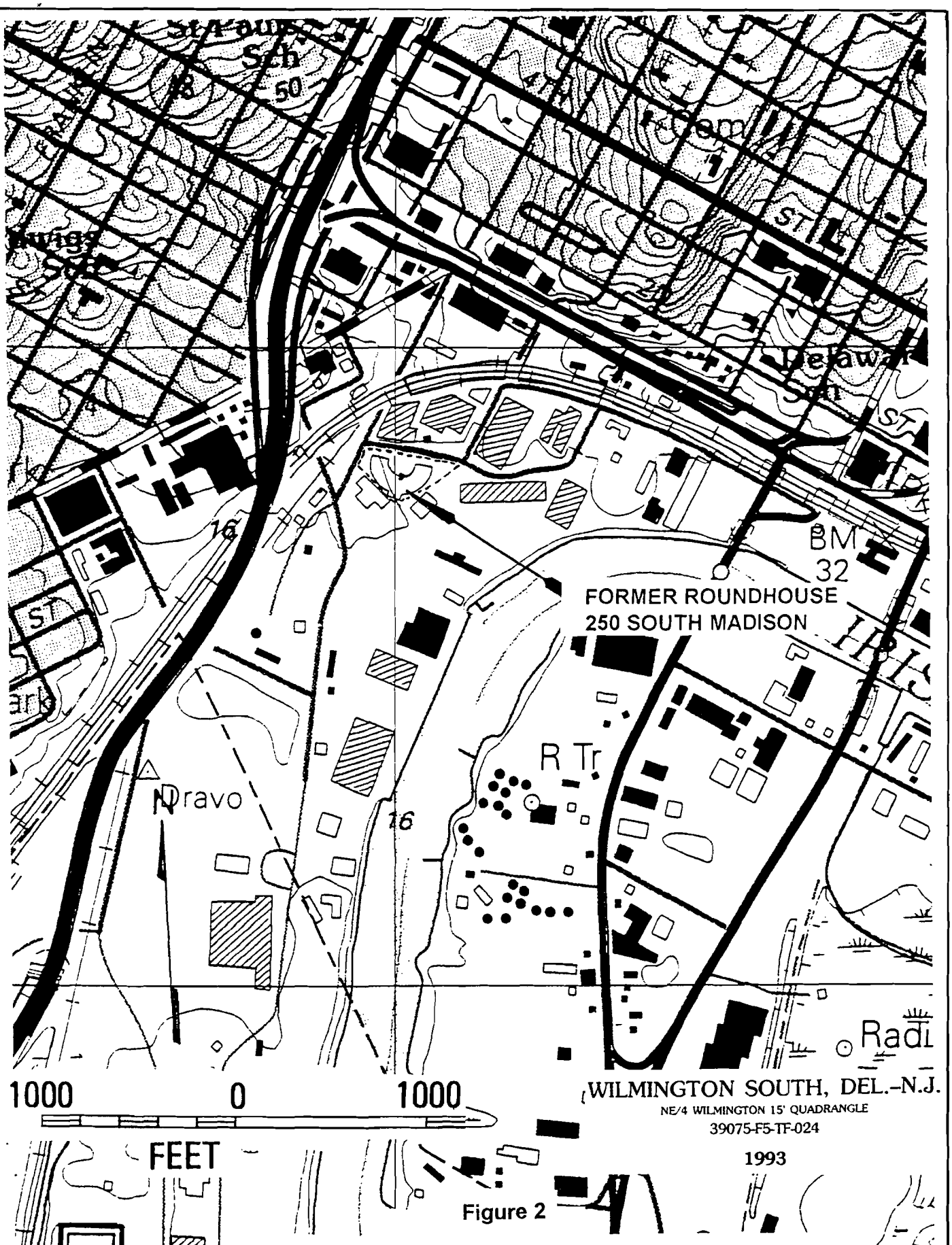


Figure 2

Location of 250 South Madison Street
New Castle County, Delaware

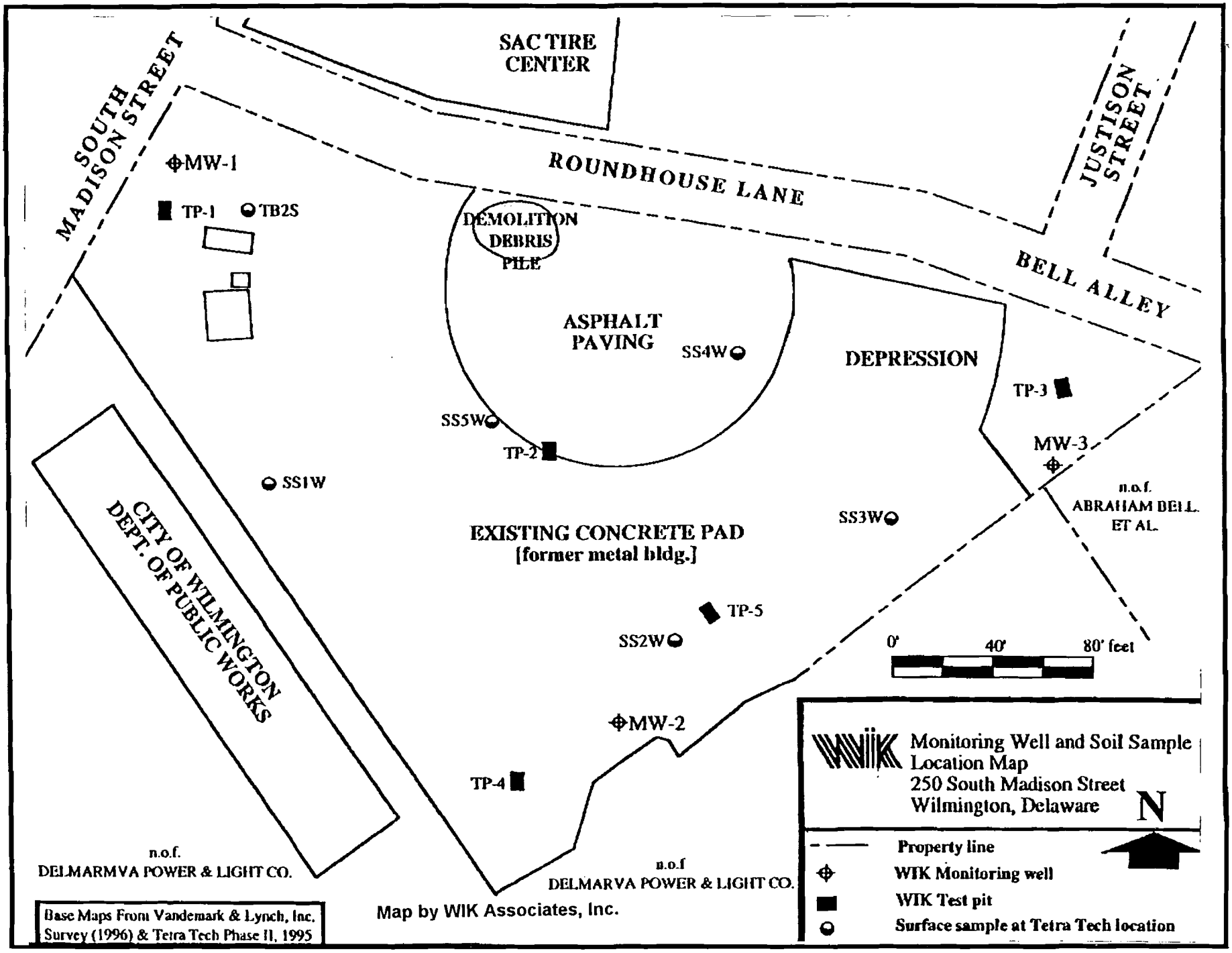

SAC TIRE CENTER
SOUTH MADISON STREET
JUSTISON STREET
ROUNDHOUSE LANE
BELL ALLEY
MW-1
TP-1
TB2S
DEMOLITION DEBRIS PILE
ASPHALT PAVING
SS4W
DEPRESSION
TP-3
MW-3
SS5W
TP-2
SS1W
n.o.f. ABRAHAM BELL ET AL.
SS3W
EXISTING CONCRETE PAD
[former metal bldg.]
TP-5
SS2W
0'
40'
80' feet
CITY OF WILMINGTON DEPT. OF PUBLIC WORKS
MW-2
TP-4
Monitoring Well and Soil Sample Location Map
250 South Madison Street
Wilmington, Delaware
N
Property line
WIK Monitoring well
WIK Test pit
Surface sample at Tetra Tech location
n.o.f. DELMARMVA POWER & LIGHT CO.
n.o.f DELMARVA POWER & LIGHT CO.
Base Maps From Vandemark & Lynch, Inc. Survey (1996) & Tetra Tech Phase II, 1995
Map by WIK Associates, Inc.

Figure 3

Table 1 Summary of April 96 Soil Screening Data

SURFICIAL SOIL SCREENING RESULTS

	SAMPLE FIELD ID	TB2S	SS1W	SS2W	SS3W	SS4W	SS5W	TP-2	TP-3	TP-4	DNREC Reporting Level	EPA Region III RBCs
	Sample Interval (ft. BGS)	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0.5-1	0-1	0-1	0-1	Industrial Surface Soil (3/96)	Industrial Surface Soil (4/96)
Parameters	**Units**											
TPH-DRO	mg/kg	<1,000	>=1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	1,000*	-
TPH-GRO	mg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100	100*	-
Organics by GC/MS	qualitative	ND	TPH, diesel	PAHs	PAHs	ND	PAHs	ND	PAHs	ND	-	-
PCBs	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.74	0.74
Toxaphene	mg/kg	<1	<1	>2, <3	>1, <2	<0.5	>3,<4	>2, <3	>2, <3	<1	5.2	5.2
Antimony	mg/kg	ND	ND	ND	ND	ND	7.4	5.4	21.6	ND	820	820
Arsenic	mg/kg	34.7	30.0	37.5	10.3	41.2	119	23.3	216	129	610	610
Barium	mg/kg	499	299	340	327	497	688	364	748	705	140,000	140,000
Cadmium	mg/kg	ND	ND	ND	ND	2.5	7.1	ND	8.5	ND	1,000	1,000
Calcium	mg/kg	20,715	24,220	16,456	5,539	9,560	13,321	7,414	29,556	36,339	-	-
Chromium, total	mg/kg	86.5	139	78.7	52.6	93.1	305	106	71.5	125	10,000 (hex)	1,000,000 (tri) 10,000 (hex)
Cobalt	mg/kg	611	753	1,047	334	562	986	590	1,172	789	-	120,000
Copper	mg/kg	184	193	323	26.7	302	663	122	898	660	-	82,000
Iron	mg/kg	46,492	44,945	52,105	29,927	52,204	71,730	34,746	167,888	64,067	-	610,000
Lead	mg/kg	354	462	940	103	**1,427**	**4,648**	351	**8,008**	**1,238**	1,000	-
Manganese	mg/kg	355	362	745	300	303	889	413	477	358	-	10,000
Mercury	mg/kg	ND	13.5	15.0	ND	10.5	20.0	ND	52.2	30.4	610	610
Nickel	mg/kg	ND	ND	ND	ND	29.5	57.1	ND	ND	58.0	41,000	41,000
Selenium	mg/kg	ND	ND	10.6	ND	4.6	ND	5.1	ND	ND	10,000	10,000
Silver	mg/kg	ND	ND	ND	ND	2.5	ND	ND	ND	ND	10,000	-
Thallium	mg/kg	ND	ND	ND	ND	13.3	ND	ND	39.8	27.3	-	-
Vanadium	mg/kg	135.9	83.3	112.3	77.1	96.3	117.9	75.6	ND	201.0	14,000	14,000
Zinc	mg/kg	547	257	311	85.7	606	2,130	232	960	723	610,000	610,000

ND Compound was analyzed for, but not detected above the laboratory minimum detection limit.
- No action level has been established.
* DNREC UST Branch Action Level for "Category B" sites.
(tri) Trivalent chromium
(hex) Hexavalent chromium

Table 2 Summary of April 96 Soil Screening Data (Continued)

SUBSURFACE SOIL SCREENING RESULTS

	SAMPLE FIELD ID	TP-1	TP-2	TP-3	TP-4	TP-5	TP-6 (TP-5 dup)	DNREC Reporting Level Subsurface Soil (03/96)	EPA Region III Soil Screening Level (4/96)
	Sample Interval (ft. BGS)	4.5-5.5	4-5	4-5	4-5	3-4	3-4		
Parameters	Units								
TPH-DRO	mg/kg	<1,000	<1,000	<1,000	<1,000	<1,000	NA	-	-
TPH-GRO	mg/kg	<100	<100	<100	<100	<100	NA	-	-
Organics by GC/MS	qualitative	ND	TPH & Sulfur	PAHs	ND	ND	NA		
PCBs	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	NA	8.2	-
Toxaphene	mg/kg	>3, <4	>1, <2	<1	>5, <6	>2, <3	NA	0.04	0.04
Antimony	mg/kg	10.1	ND	ND	ND	5.6	3.4	-	-
Arsenic	mg/kg	**233**	**75.2**	11.6	**50.0**	12.6	7.3	15	15
Barium	mg/kg	**401**	**359**	**416**	**358**	**465**	**296**	32	32
Cadmium	mg/kg	ND	ND	ND	ND	ND	ND	6	6
Calcium	mg/kg	12,009	16,994	11,143	5,734	10,658	10,852	-	-
Chromium, total	mg/kg	**371**	**72.3**	**59.3**	**122**	**116**	**107**	19 (hex)	- (tri) 19 (hex)
Cobalt	mg/kg	589	662	533	1,442	794	906	-	-
Copper	mg/kg	185	85.2	63.4	2,460	193	174	-	-
Iron	mg/kg	49,586	43,477	37,546	108,464	43,461	35,757	-	-
Lead	mg/kg	732	360	99.2	552	268	255	-	-
Manganese	mg/kg	452	587	376	1,433	226	245	-	-
Mercury	mg/kg	ND	ND	ND	ND	**10.3**	**22.7**	3	3
Nickel	mg/kg	ND	ND	19.1	**46.4**	**50.9**	**48.5**	21	21
Selenium	mg/kg	ND	ND	ND	ND	**7.0**	**7.9**	3	3
Silver	mg/kg	ND	ND	ND	ND	ND	ND	-	-
Thallium	mg/kg	ND	ND	ND	ND	ND	ND	0.4	0.4
Vanadium	mg/kg	115	123	121	140	185	252	-	-
Zinc	mg/kg	400	129	80.9	503	151	204	42,000	42,000

ND Compound was analyzed for, but not detected above, the laboratory minimum detection limit.
NA Not analyzed.
\- No action level has been established.
(tri) Trivalent chromium (hex) Hexavalent chromium

Table 3

Summary of April 96 Soil Semivolatile Organic Analytical Data
SURFICIAL SOIL ANALYTICAL RESULTS

	Sample Field ID	TP-3	TP-4	DNREC Reporting Level	EPA Region III RBCs
	Lab ID	96007370	96007380	Industrial	Industrial
	Sample Interval (ft. BGS)	0-1	0-1	Surface Soil (3/96)	Surface Soil (4/96)
Parameters	Units				
4-Methylphenol	mg/kg	<11.0	<4.2	-	10.000
Naphthalene	mg/kg	<11.0	0.088J	30	82.000
2-Methylnaphthalene	mg/kg	<11.0	<4.2	-	-
Acenaphthylene	mg/kg	1.6J	0.82J	-	-
Acenaphthene	mg/kg	1.4J	0.11J	10.000	120.000
Dibenzofuran	mg/kg	<11.0	0.32J	-	8.200
Fluorene	mg/kg	1.9J	0.54J	10.000	82.000
Phenanthrene	mg/kg	23.0J	6.5J	-	-
Anthracene	mg/kg	4.4J	0.13J	10.000	610.000
Carbazole	mg/kg	2.3J	0.39J	290	290
Di-n-butylphthalate	mg/kg	<11.0	<4.2	1.000	200.000
Fluoranthene	mg/kg	41.0J	12.0J	10.000	82.000
Pyrene	mg/kg	41.0J	11.0J	10.000	61.000
Benzo(a)anthracene	mg/kg	**20.0J**	6.8J	7.8	7.8
Chrysene	mg/kg	22.0J	6.0J	780	780
Benzo(b)fluoranthene	mg/kg	**23.0J**	5.4J	7.8	7.8
Benzo(k)fluoranthene	mg/kg	9.7J	4.3J	78	78
Benzo(a)pyrene	mg/kg	**17.0J**	**5.1J**	0.78	0.78
Indeno(1,2,3-cd)pyrene	mg/kg	**12.0J**	3.0J	7.8	7.8
Dibenzo(a,h)anthracene	mg/kg	**4.4J**	**1.3J**	0.78	0.78
Benzo(g,h,i)perylene	mg/kg	12.0J	2.4J	-	-
Tentatively Identified Compounds (TICs)					
9,10-Anthracenedione	mg/kg	6.0JN	1.3JN	-	-
Dibenzpyrene	mg/kg	ND	ND	-	-
Phenol, 2,4-bis(1,1-dimethyl)	mg/kg	ND	ND	-	-
4H-Cyclopental(Def) phenanthre	mg/kg	ND	ND	-	-
7H-Benz(de)anthracene-7-one	mg/kg	ND	1.0JN	-	-
Perylene	mg/kg	ND	3.6JN	-	-
Unknown Alkane	mg/kg	ND	ND	-	-
Unknown 3-ring PAH	mg/kg	15.5J	7.4J	-	-
Unknown 4-ring PAH	mg/kg	12.1J	1.1J	-	-
Unknown 5-ring PAH	mg/kg	13.0J	ND	-	-
Unknown PAH	mg/kg	15.6J	7.8J	-	-
Unknown	mg/kg	77.0J	7.83J	-	-

ND: Compound was analyzed for but not detected above the laboratory minimum quantitation limit.
NA: Not analyzed. -: No action level has been established
J: Compound was detected, but below the minimum sample quantitation limit. Quantitation is approximate.
B: Compound was detected in the associated blank as well as in the sample.
JB: Compound was detected in the associated blank as well as in the sample, but below the minimum sample quantitation limit. Quantitation is approximate.
N: Presumptive evidence of a tentatively identified compound based on a mass spectral library search.

Table 4

Summary of April 96 Soil Semivolatile Organic Analytical Data
SUBSURFACE SOIL ANALYTICAL RESULTS

	Sample Field ID	TP-1	TP-2	TP-8	DNREC Reporting Level	EPA Region III
	Lab ID	96007350	96007360	96007390		
	Sample Interval (ft. BGS)	4.5-5.5	4-5	Equip. Blank	Subsurface Soils (3/96)	Subsurface Soil Screening Levels (4/96)
Parameters	**Units**					
4-Methylphenol	mg/kg	<4.0	0.12J	<0.01	-	-
Naphthalene	mg/kg	0.24J	0.85J	<0.01	30	30
2-Methylnaphthalene	mg/kg	0.15J	0.1J	<0.01	-	-
Acenaphthylene	mg/kg	0.46J	0.092J	<0.01	-	-
Acenaphthene	mg/kg	0.55J	0.3J	<0.01	200	200
Dibenzofuran	mg/kg	0.42J	0.22J	<0.01	-	120
Fluorene	mg/kg	0.71J	0.33J	<0.01	160	160
Phenanthrene	mg/kg	9.1J	1.8J	<0.01	-	-
Anthracene	mg/kg	1.5J	0.48J	<0.01	4,300	4,300
Carbazole	mg/kg	**0.8J**	0.14J	<0.01	0.2	0.5
Di-n-butylphthalate	mg/kg	0.068J	<0.46	<0.01	120	120
Fluoranthene	mg/kg	13.0	2.4J	<0.01	980	980
Pyrene	mg/kg	13.0	3.1J	<0.01	1,400	1,400
Benzo(a)anthracene	mg/kg	**5.7J**	**1.4J**	<0.01	0.7	0.7
Chrysene	mg/kg	**6.9**	**1.4J**	<0.01	1	1
Benzo(b)fluoranthene	mg/kg	**7.0J**	1.6J	<0.01	4	4
Benzo(k)fluoranthene	mg/kg	4.0	0.75J	<0.01	4	4
Benzo(a)pyrene	mg/kg	**5.3**	1.3J	<0.01	4	4
Indeno(1,2,3-cd)pyrene	mg/kg	3.9J	1.0J	<0.01	35	35
Dibenzo(a,h)anthracene	mg/kg	1.3J	0.45J	<0.01	11	11
Benzo(g,h,i)perylene	mg/kg	3.4J	1.0J	<0.01	-	-
Tentatively Identified Compounds (TICs)						
9,10-Anthracenedione	mg/kg	1.8JN	ND	ND	-	-
Dibenzpyrene	mg/kg	3.6JN	ND	ND	-	-
Phenol, 2,4-bis(1,1-dimethyl)	mg/kg	ND	ND	0.005JN	-	-
4H-Cyclopental(Def) phenanthre	mg/kg	ND	0.35JN	ND	-	-
7H-Benz(de)anthracene-7-one	mg/kg	ND	ND	ND	-	-
Perylene	mg/kg	ND	ND	ND	-	-
Unknown Alkane	mg/kg	ND	1.62J	ND	-	-
Unknown 3-ring PAH	mg/kg	2.17J	0.31J	ND	-	-
Unknown 4-ring PAH	mg/kg	3.09J	ND	ND	-	-
Unknown 5-ring PAH	mg/kg	3.9J	1.3J	ND	-	-
Unknown PAH	mg/kg	6.29J	ND	ND	-	-
Unknown	mg/kg	10.3J	7.0J	0.057JB	-	-

ND: Compound was analyzed for but not detected above the laboratory minimum quantitation limit.
NA: Not analyzed. -: No action level has been established
J: Compound was detected, but below the minimum sample quantitation limit. Quantitation is approximate.
B: Compound was detected in the associated blank as well as in the sample.
JB: Compound was detected in the associated blank as well as in the sample, but below the minimum sample quantitation limit. Quantitation is approximate.
N: Presumptive evidence of a tentatively identified compound based on a mass spectral library search.

Table 5

Summary of April 96 Groundwater Analytical Data (continued)

DISSOLVED (FILTERED) METALS CONCENTRATIONS

		EPA Drinking Water MCL (11/95)	MW-1	MW-2	MW-3	MW-5 Duplicate of MW-3	MW-4 Trip Blank	MW-6 Equip. Blank
			Lab ID 96008510	Lab ID 96008520	Lab ID 96008530	Lab ID 96008540	Lab ID 96008500	-
Aluminum	ug/l	37,000*	[32.9]B	[29.7]B	[19.6]B	225	NA	[27.8]B
Antimony	ug/l	6	ND	ND	[4.3]K	ND	NA	ND
Arsenic	ug/l	50	15.5K	33.6	ND	[5.0]K	NA	ND
Barium	ug/l	2,000	[34.8]	[117]	[156]	[166]	NA	ND
Calcium	ug/l	-	52,400	61,000	60,000	61,100	NA	[232]
Cobalt	ug/l	2,200*	ND	ND	[5.5]K	[5.3]K	NA	ND
Copper	ug/l	-	ND	ND	ND	ND	NA	[7.1]K
Iron	ug/l	11,000*	ND	117B	7,850	8,730	NA	137
Lead	ug/l	15	ND	ND	ND	**17.1**	NA	ND
Magnesium	ug/l	-	46,800	22,100	14,900	15,300	NA	[29.0]
Manganese	ug/l	180*	**520**	**202**	**1,440**	**1,460**	NA	[1.2]K
Nickel	ug/l	100	[1.7]B	[1.0]B	[1.5]B	[1.5]B	NA	[1.1]K
Potassium	ug/l	-	[3,940]	14,200	5,970	5,950	NA	ND
Sodium	ug/l	-	29,100	63,100	69,800	71,300	NA	[292]
Thallium	ug/l	2	**9.2J**	ND	ND	ND	NA	ND
Vanadium	ug/l	260*	[1.5]K	ND	ND	[1.2]K	NA	ND
Zinc	ug/l	-	38.0B	25.8B	36.8B	49.5B	NA	44.1
All others	ug/l	-	ND	ND	ND	ND	NA	ND

* EPA Region III Risk-based Concentrations (RBCs) for Tap Water (4/96).
K Reported value may be biased high; actual value is expected to be lower.
[ ] Values approach detection limit; the quantification may not be accurate.
B Results fall between the IDL and the CRDL.
ND Compound was analyzed for, but was not detected above the laboratory minimum detection limit.
NA Sample was not analyzed for this parameter.
J Sample concentration is estimated.

Table 6

Summary of April 96 Groundwater Analytical Data

		EPA Drinking Water MCL (11/95)	MW-1	MW-2	MW-3	MW-5 Duplicate of MW-3	MW-4 Trip Blank	MW-6 Equip. Blank
		Lab Sample ID	96008510	96008520	96008530	96008540	96008500	-
Volatile Organics								
Tetrachloroethene	ug/l	5	ND	ND	**7J**	**9J**	ND	NA
All others	ug/l		ND	ND	ND	ND	ND	NA
Semi-volatile Organics								
Phenol	ug/l	22,000*	ND	120E	ND	ND	NA	NA
4-Methylphenol	ug/l	180*	ND	110E	ND	ND	NA	NA
Naphthalene	ug/l	1,500*	1J	21	ND	ND	NA	NA
Phenanthrene	ug/l	-	2J	ND	1J	ND	NA	NA
Fluoranthene	ug/l	1,500*	3J	ND	1J	1J	NA	NA
Pyrene	ug/l	1,100*	3J	ND	1J	1J	NA	NA
Benzo(a)anthracene	ug/l	0.092*	**2J**	ND	ND	ND	NA	NA
Chrysene	ug/l	9.2*	2J	ND	ND	ND	NA	NA
Benzo(b)fluoranthene	ug/l	0.092*	**2J**	ND	ND	ND	NA	NA
Benzo(k)fluoranthene	ug/l	0.92*	**2J**	ND	ND	ND	NA	NA
Benzo(a)pyrene	ug/l	0.002	**2J**	ND	ND	ND	NA	NA
Indeno(1,2,3-cd) pyrene	ug/l	0.092*	**1J**	ND	ND	ND	NA	NA
SVOC Tentatively Identified Compounds (TICs)								
Unknown	ug/l	-	53JB	206J	54JB	51JB	NA	NA
UNK Aliphatic acid	ug/l	-	ND	13J	ND	ND	NA	NA
Benzoic acid	ug/l	150,000	ND	7JN	ND	ND	NA	NA
Benzeneacetic acid	ug/l	-	ND	56JN	ND	ND	NA	NA
Indole	ug/l	-	ND	5JN	ND	ND	NA	NA
Hexadecanoic acid	ug/l	-	ND	8JN	ND	ND	NA	NA
Sulfur	ug/l	-	14JN	33JN	6JN	5JN	NA	NA
Pesticides/PCBs	ug/l	-	ND	ND	ND	ND	NA	NA

ND: Compound was analyzed for, but was not detected above the laboratory minimum detection limit.
NA: Sample was not analyzed for this parameter.
MCL: Maximum Contaminant Level.
J: Compound was detected, but below the minimum sample quantitation limit. Quantitation is approximate.
B: Compound was detected in the associated blank as well as in the sample.
E: Compound was detected at a level above the calibration range of the GC/MS instrument.
-: No action level has been established.
N: Presumptive evidence of a tentatively identified compound based on a mass spectral library search.
* EPA Region III Risk-based concentrations for tap water (4/96).

Table 7

Evaluation of Potential Remedial Alternatives

250 South Madison Street
Wilmington, Delaware

Evaluation Criteria	Alternative 1 Soil Removal	Alternative 2 Permanent Capping With a Building and Parking Lot	Alternative 3 Temporary Capping with Asphalt and Soil Cover	Alternative 4 No Action
Protective of Human Health and the Environment	Yes, but potential for exposure during excavation and transportation	Yes, but potential for exposure during construction of building and installation of cap.	Yes, but potential for exposure during installation of cap.	No
Complies with Current Laws and Regulations	Yes	Yes	Yes	No
Acceptable to Community	Yes	Yes	Yes	No
Monitoring Requirements	No	Limited	Limited	Yes
Permanence of Remedy	Permanent	Limited O&M	Limited O&M	No
Technically Practicability	No	No	Yes	Yes
Remediation Time Frame	Several months	Several months	Several months	N/A
Reduction of Toxicity, Mobility and Volume	Yes, Yes, Yes	Yes, Yes, No	Yes, Yes, No	No, No, No
Long term Effectiveness	Yes	Yes	Yes	No
Short Term Effectiveness	Yes	Yes	Yes	No
Preliminary Cost Estimate	$3,818,000 (1.6 acres, 2 feet deep)*	$75,000 (building & parking lot construction)	$10,000**	None

* Assumes 1.7 tons/cubic yard at a cost of $435.00/ton (excavation, transportation and disposal at a RCRA "C" Facility).

** Assumes a combination of temporary asphalt (over exposed soil in central areas) & membrane & soil cover over exposed soil at edges of property.