EPA WORK ASSIGNMENT NO: 076-2JZZ
EPA CONTRACT NO: 68-W8-0110
FOSTER WHEELER ENVIRONMENTAL CORPORATION
ARCS II PROGRAM

FINAL
SITE SCREENING INSPECTION (SSI)
PAUL UHLICH COMPANY SITE
HASTINGS-ON-HUDSON, WESTCHESTER COUNTY, NEW YORK
CERCLIS NO.: NYD986882686

APRIL 1996

VOLUME I OF III

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FOSTER WHEELER ENVIRONMENTAL CORPORATION

April 8, 1996
ARCS II-96-076-0042

Ms. Catherine Moyik
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US Environmental Protection Agency
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SUBJECT: ARCS II PROGRAM - EPA CONTRACT NO. 68-W8-0110
WORK ASSIGNMENT 076-2JZZ
SITE SCREENING INSPECTION (SSI) REPORT
PAUL UHLICH COMPANY SITE

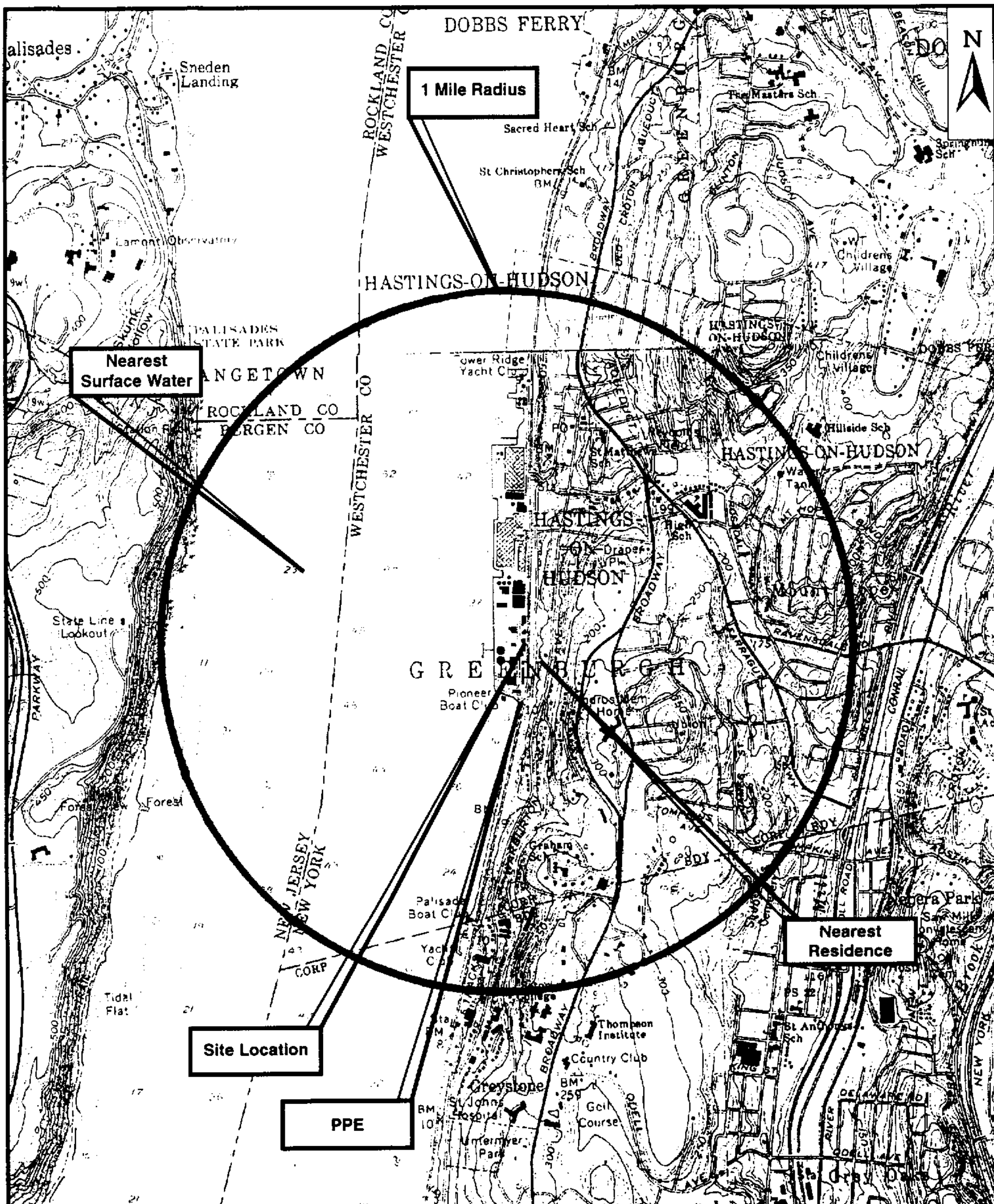
Dear Ms. Moyik:

The following is a summary of the Site Screening Investigation (SSI) evaluation of the Paul Uhlich Company site CERCLIS No. NYD986882686, located at One Railroad Avenue in Hastings-on-Hudson, Westchester County, New York.

General Description and Site History

The Paul Uhlich (Uhlich) site is an approximately 6.3-acre facility located on the east bank of the Hudson River in an area of mixed industrial, commercial, and residential land use (latitude: 40E59' 15.5" longitude: 73E53'10.0") (Ref. 3, p. 1 of 1; Ref. 4, p. 5 of 8). The site is bordered to the north by the former Anaconda Wire Mill, to the south by the Pioneer Boat Club and to the west by Mobil Oil (Ref. 4, p. 5 of 8; Ref. 5, pp. 11 and 12 of 84). Figure 1 illustrates the site location and Figure 2 illustrates a detailed site sketch.

The site is built on fill material, initially laid down in 1897 and subsequently expanded. The origin of the fill material is unknown (Ref. 6, p. 12 of 24). The fill consists primarily of crushed stone, brick, ash, sand, silt, glass and wood (Ref. 6, p. 12 of 21). Hazardous waste is not known to have been disposed of at the site (Ref. 6, p. 12 of 21). The fill area was created, owned, and operated by Zinsser & Company, Inc. (Zinsser) (Ref. 5, p. 15 of 84). Zinsser manufactured dyes, pigments, and fine chemicals used mainly in photographic processes from 1897 to 1955 (Ref. 5, p. 15 of 84). Zinsser used organic chemicals such as monomethylamine, aniline, methylene chloride, trichloroethylene, tetrachloroethylene, ethers, lead sulfate, lead chromate, iron sulfate, copper sulfate, copper, and manganese dioxide in their operations (Ref. 6, pp. 15 and 16 of 24). Harshaw Chemical Company (Harshaw) acquired Zinsser in 1955 and continued operations until 1961 (Ref. 5, p. 15 of 84). In 1961, Tappan Tanker Terminal (TTT) purchased the entire southern fill area. TTT operated a fuel



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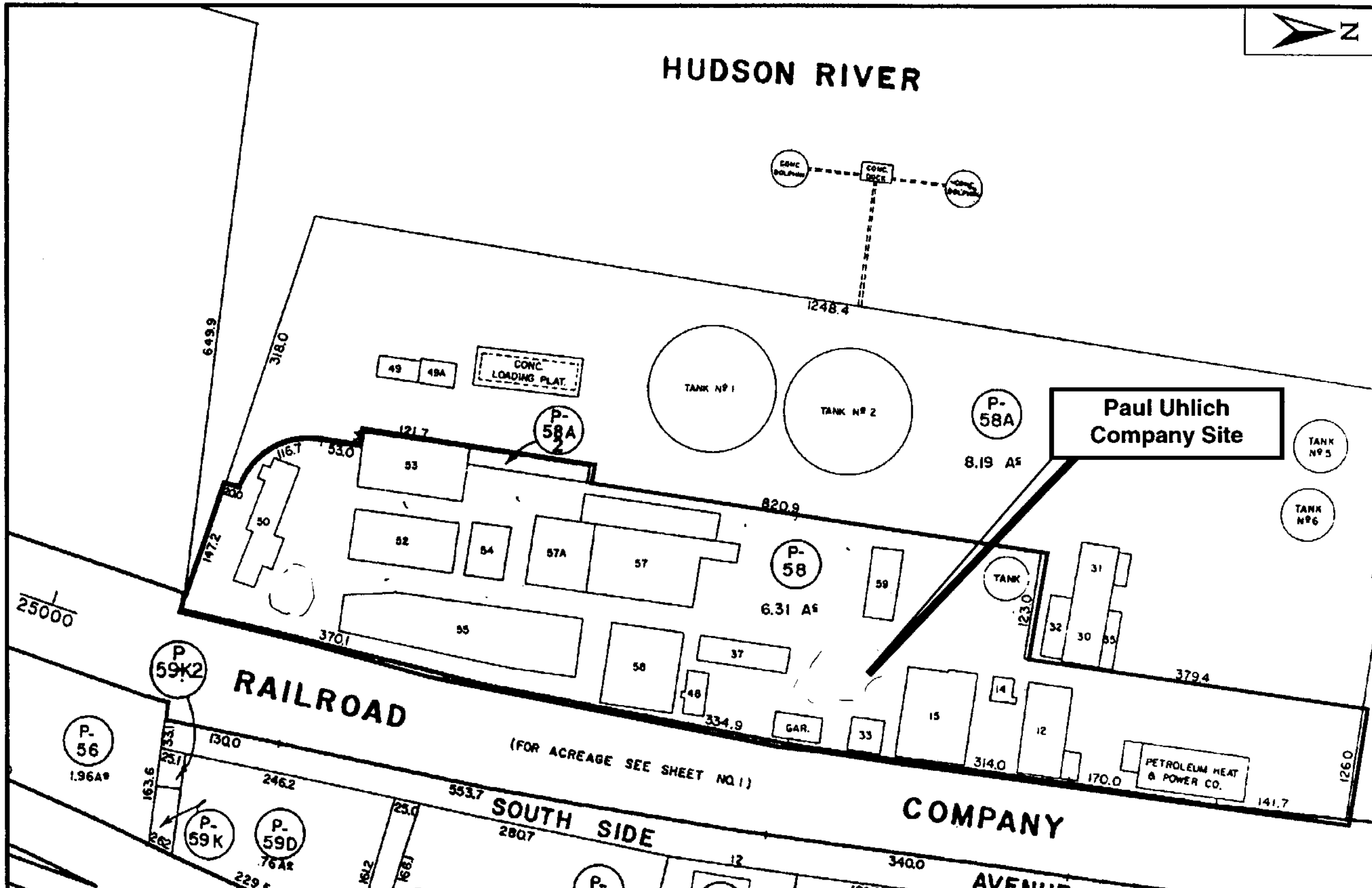
U.S.G.S. Topographic Map
7.5 Minute Series
Quadrangle: Yonkers, NY
Mount Vernon, NY; Nyack, NY;
White Plains, NY

Figure 1
Site Location Map

Paul Uhlich Company Site
Hastings-on-Hudson, NY



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SOURCE:
Revised Greenburgh Tax Map,
Sheet 4, Lot 58
November 1960
NOT TO SCALE

Figure 2
Site Sketch

Paul Uhlich Company Site
Hastings-on-Hudson, NY

storage facility and leased space to various companies (Ref. 5, p. 16 of 84). TTT also had authorization to pipe certain waste products such as toluene, benzene, pyridene, alpha and beta picoline, 2RCN, and 3RCN from storage tanks to ships for disposal at sea (Ref. 5, p. 16 of 84; Ref. 7, p. 4 of 15).

Beginning in October of 1964, Paul Uhlich Company, Inc. leased buildings 50, 52, 53, 55, and 49A in the eastern portion of the southern fill area (Ref. 5, p. 16 of 84). In 1975 Uhlich purchased the property it now owns from TTT and leased or rented several buildings to various businesses (Ref. 5, p. 16 of 84). Since 1964, Uhlich has manufactured water based organic pigments (Ref. 5. p. 16 of 84; Ref. 8, p. 1 of 1).

Mobil Oil Corporation leased the western portion of the southern fill area from TTT in July 1970, until purchasing the property in 1974 (Ref. 5, p. 17 of 84). Mobil was engaged in storing, wholesaling and distributing Nos. 2, 4, and 6 fuel oil until 1986 when the site was abandoned (Ref. 5, p. 17 of 84 ; Ref. 9, p. 6 of 9).

Petroleum Heat & Power and Whaleco Fuel Oil leased buildings and property from Uhlich as office space and a maintenance garage (Ref. 5, p. 17 of 84). Hastings Roofing Inc., Caldara Movers, Ricci Bros, Donald Brown Roofers, Koski & Schmidt Services, J.F. Macri, and Villard Contracting Company all leased or rented buildings and property from Uhlich as offices or storage space (Ref. 5, pp. 17 and 18 of 84).

Awards Etc. rented space from Uhlich for the purpose of manufacturing trophies and storing electroplating chemicals (Ref. 5, p. 19 of 84; Ref. 7, p. 4 of 15). Geigy Chemical Corp. stored agricultural pesticides on Uhlich's premises (Ref. 5 p. 19 of 84). Quirk, Lawler & Matusky Engineers rented space for an analytical laboratory conducting analyses on wastewater and fish samples (Ref. 5, p. 19 of 84; Ref. 7, p. 4 of 15). Phillip Eades Trucking & Hauling and Steri Research Laboratory, Inc. also leased portions of Uhlich's property; however, their activities are unknown (Ref. 5, p. 20 of 84).

In November 1989, Uhlich engaged the services of Lawler, Matusky, and Skelly Engineers (LMS) to document history of land use and perform a subsurface investigation of their property (Ref. 5, p. 9 of 84). LMS also conducted a sampling analysis at both the Uhlich and Mobil properties (Ref. 5, p. 37 of 84). Four monitoring wells, LMS 1-4, were installed on Uhlich property and were sampled in March of 1989 (Ref. 5, p. 37 of 84). The monitoring wells were installed to intercept groundwater flow downgradient of the site adjacent to Mobil property (Ref. 5, pp. 30 and 31 of 84). No background samples were collected and all metal samples were filtered on-site immediately following sample collection (Ref. 5, p. 38 of 84). The groundwater analytical results indicated the presence of antimony (10 ug/l); arsenic (5-14 ug/l); copper (20-320 ug/l); lead (20-670 ug/l); silver (10 ug/l); zinc (20-680 ug/l); iron (440-7,700 ug/l); manganese (40-890 ug/l); chlorobenzene (33-8,100 ug/l); toluene (19-140,000 ug/l); tetrachloroethylene (27-43 ug/l); benzene (43 ug/l); methylene chloride (1,400 ug/l); 2-chlorophenol (12 ug/l); benzo(b)fluoranthene (23 ug/l) (Ref. 5, p 56 of 84).

Soil samples were collected during January and February 1989, however no background samples were collected (Ref. 5, p. 51 of 84). The samples were collected at various depths between 2 and 16 feet indicating widespread contamination. Uhlich samples indicated the presence of the following:

chlorobenzene (1.2-2 mg/kg); toluene (0.3 mg/kg); trichloroethylene (0.4 mg/kg); arsenic (3.2-27 mg/kg); copper (345-9,800 mg/kg); iron (6,100-49,800 mg/kg); lead (100-1960 mg/kg); manganese (55-505 mg/kg) and zinc (72-3,600 mg/kg) (Ref. 5, pp. 54, 56 of 84; Ref. 11, pp. 1 through 45 of 45). Mobil samples also contained chlorobenzene (0.4-120 mg/kg); toluene (0.37-0.4 mg/kg); arsenic (5-15 mg/kg); copper (325-630 mg/kg); iron (16,000-30,700 mg/kg); lead (33-3,140 mg/kg); manganese (119-1,530 mg/kg); and zinc (265-2,000 mg/kg) (Ref. 5, pp. 54, 56 of 84; Ref. 11, pp. 1 through 45 of 45).

In June 1989, LMS conducted a sampling analysis of seven on-site monitoring wells (LMS 1-7) and four monitoring wells (OW 12, OW 17-19) at the adjacent Mobil property (Ref. 5, p. 58 of 84; Ref. 11, pp. 1 through 45 of 45). Uhlich samples indicated the following VOCs and filtered metals: chlorobenzene (190-4,000 ug/l); benzene (5-11 ug/l); toluene (1 ug/l); ethylbenzene (3 ug/l); xylene (7 ug/l); 1,4-dichlorobenzene (32 ug/l); arsenic (3-4 ug/l); copper (30-510 ug/l); iron (180-5,000 ug/l); lead (4-16 ug/l); manganese (70-1,800 ug/l); and zinc (20-160 ug/l) (Ref. 5, p. 58 of 84; Ref. 11, p. 1 through 45 of 45). The Mobil groundwater samples contained chlorobenzene (1,000-7,000 ug/l); arsenic (4 ug/l); copper (20-150 ug/l); iron (250-23,000 ug/l); lead (5-110 ug/l); manganese (610-2,220 ug/l); and zinc (20-2,400 ug/l) (Ref. 5, pp. 36 and 58 of 84; Ref. 11, pp. 1 through 45 of 45).

LMS also collected soil samples at various depths between 2 and 16 feet during June 1989 at the Uhlich and Mobil properties. No background samples were collected. Uhlich samples contained the following parameters: arsenic (1.9-31 mg/kg); copper (20-244 mg/kg); iron (11,350-30,000 mg/kg); lead (40-1,760 mg/kg); manganese (169-485 mg/kg); zinc (60-870 mg/kg); and chromium (16 mg/kg) Ref. 5, p. 56 of 84; Ref. 11, pp. 1 through 45 of 45). Mobil samples collected indicated arsenic (1-36 mg/kg); copper (15-250 mg/kg); iron (4,270-18,050 mg/kg); lead (50-920 mg/kg); manganese (22-770 mg/kg); and zinc (44-320 mg/kg) (Ref. 5, p. 56 of 84; Ref. 11, pp. 1 through 45 of 45). The analytical results of iron and manganese appear to be consistent with naturally occurring levels (Ref. 12, pp. 1 and 2 of 2). The chemical constituents do not appear to be consistent with Uhlich's raw materials list except possibly manganese sulfate (Ref. 13, pp. 1 through 3 of 3).

In January 1990, ChemRisk conducted a risk assessment evaluation for possible remediation and future development of the Uhlich/Mobil Hastings-on-Hudson site (Ref. 6, p. 7 of 21). ChemRisk evaluated the following chemicals associated with the former Zinsser operations: chlorobenzene, diethylether, isopropyl ether, monomethylamine, lead, trichloroethylene, 2-chlorophenol and tetrachloroethylene (Ref. 6, p. 7 of 24). Based on the health risk analysis, the potential risks to workers, residents, and children was determined to be negligible (Ref. 6, pp. 22 through 24 of 24).

In February 1990, NUS Corporation conducted a preliminary assessment at the Paul Uhlich site (Ref. 7, pp. 1 through 15 of 15). NUS identified three areas of concern, the former chlorobenzene tank, the former aniline tank and the former monomethylamine tank (Ref. 7, p. 4 of 15). The chlorobenzene tank is located in the vicinity of the transformer area on Mobil property (Ref. 5, p. 67 of 84; Ref. 7, p. 6 of 15). Since it is known that Zinsser/Harshaw engaged in solvent recovery operations, the widespread presence of chlorobenzene in Mobil and Uhlich monitoring wells can be attributed to this source area (Ref. 5, p. 15 of 84). The analine and monomethylamine tanks were situated south of buildings B62 and building 66 on Uhlich property (Ref. 5, p. 13 of 84; Ref. 7, pp. 7 and 8 of 15).

Evaluation of Existing Information

Existing information and analytical data were used to evaluate the Uhlich site. The soil and groundwater analytical data did not include any background samples nor has it been validated in accordance with USEPA procedures. Therefore, the site is evaluated on a potential-to-release basis.

The soil samples indicate widespread contamination at various depths throughout the site area. However, no comparison can be determined among the samples. The origin of the fill material is unknown and the depths of contamination are as great as 16 feet below grade; therefore, the analytical results may represent the entire fill area. The current owner, Paul Uhlich, manufactures organic water-based pigments and claims never to have used organic solvents in their processes. The former tenant, Zinsser, however, manufactured both dyes and pigments using organic chemicals such as monomethylamine, aniline, methylene chloride, trichloroethylene, tetrachloroethylene, ethers, lead sulfate, lead chromate, iron sulfate, copper sulfate, copper, and manganese dioxide. The groundwater and soil analytical results are consistent with the former tenants activities. The only constituent consistent with Uhlich's raw materials is possibly manganese sulfate.

Hazard Assessment

Updated additional information and data collected to further evaluate the site to determine the need for CERCLA remedial action included groundwater population data, wetlands information, 4-mile radius population data, the off-site reconnaissance field notebook, the Hastings-on-Hudson floodplain map, various correspondence, analytical data, sensitive environment information, and municipal water company information. Several agencies were also contacted to obtain information about the Uhlich site. These contacts included the Westchester County Department of Health Services, and the state and local Department of Environmental Conservation.

Source Description

Based on the available information one source was identified at the Uhlich site as contaminated soil. The soil samples were collected at various depths at seven locations. No uniformity exists between sample locations and depth. Therefore, for the purpose of this evaluation, the source area cannot be accurately determined and is taken as a default value of one square foot per sample location. Furthermore, there is no documented evidence of any environmental controls such as a liner of runoff collection system in use at the site, and the contamination is subsurface below 2 feet.

Groundwater Pathway

The aquifers of concern underlying the site are the overburden aquifer, which is composed of unsorted clays, silts sands, pebbles and boulders (Ref. 14, p. 10 of 10; Ref. 15, p. 1 of 1) and the Fordham Gneiss aquifer, which is composed of fractured Precambrian metamorphic rock (Ref. 14, pp. 8 and 9 of 10; Ref. 15, p. 1 of 1). The groundwater in the shallow aquifer beneath the site is generally found three to six feet below the land surface, and flows in a westerly direction toward the Hudson River (Ref. 5, p. 48 of 84; Ref. 6, p. 12 of 24). There is, however, a southern flow through the center of the Uhlich property which travels east and west towards the railroad and Mobil property (Ref. 6, p. 12 of 24). Depth to the Fordham Gneiss formation is approximately 70 feet (Ref. 15, p. 1 of 1).

Groundwater in the site area is not used for public water supply (Ref. 16, p. 1 through 3 of 3). No drinking water wells exist on-site (Ref. 6, p. 12 of 24). Available information indicates there are 183 persons using private wells within 4 miles of the site as follows: 0-¼ mile, 0; ¼-½ mile, 0; ½-1 mile, 0; 1-2 miles, 15; 2-3 miles, 8; and 3-4 miles, 0, for wells in the Fordham Gneiss aquifer, and: 0-¼ mile, 0; ¼-½ mile, 0; ½-1 mile, 0; 1-2 miles, 57; 2-3 miles, 62; and 3-4 miles, 41, for wells in the overburden aquifer (Ref. 17, p. 1 of 2; Ref. 18, pp. 7, 8 of 26). Wells on the west side of the Hudson River were not included, because the Palisades diabase formation acts as a groundwater barrier preventing any potentially contaminated groundwater from the eastern side of the Hudson from migrating to aquifers on the western side of the Hudson (Ref. 19, p. 1 of 1). The remainder of the residents within 4 miles of the site receive water from sources outside of the 4-mile radius (Ref. 16, p. 1 of 3). There are no known designated wellhead protection areas or uses of groundwater as a resource within 4 miles of the site (Ref. 20, p. 6 of 6).

Surface Water Pathway

Surface water and/or sediment samples have not been collected in connection with any investigation conducted at the site, and there have been no direct observations of releases to surface water. Therefore, the surface water pathway is evaluated on a potential-to-release basis.

The Uhlich site is connected to a Westchester County operated sewer system (Ref. 23, pp. 1 through 4 of 4). Previously, Uhlich was tied into the Anaconda Wire Mill's existing connection (Ref. 24, p. 1 of 1). However, the flow was too great and there was excess residue in the trunklines. Therefore, Uhlich was asked to transfer to a direct connection in the sewer system (Ref. 24, p. 1 of 1). Potential runoff is most likely south and west toward the river (Ref. 4, p. 5 of 8).

The nearest surface water body is the Hudson River, which is immediately to the west of the Mobil property (Ref. 33, p. 1 of 1). There is a drainage ditch leading into the Hudson River from the site, and a drainage area of approximately two acres (Ref. 4, p. 4 of 8; Ref. 25, p. 10 of 32). The Hudson River is tidally influenced below Poughkeepsie, New York; therefore, the 15-mile Target Distance Limit (TDL) extends 15-miles upstream as well as downstream of the site (Ref. 26, p. 6 of 12). The flow rate of the Hudson River measured at Poughkeepsie (60 miles upstream) is 250,000 cubic feet per second (cfs) (Ref. 27, p. 4 of 4).

The Hudson River is designated as Class SB saline surface waters (Ref. 26, p. 7 of 12; Ref. 28, p. 1 of 1). The best usage of Class SB waters are primary and secondary contact recreation and fishing (Ref. 26, p. 11 of 12). These waters are suitable for fish propagation and survival (Ref. 26, p. 11 of 12; Ref. 28, p. 1 of 1). The DEC does not stock any fish species in the Hudson River (Ref. 28, p. 1 of 1). Fish most likely caught for human consumption are American Shad, Blueback Herring, Atlantic Sturgeon, Smelt, Striped Bass, Large Mouth Bass and Small Mouth Bass (Ref. 29, p. 1 of 1).

Westchester County depends solely on the New York City Aqueduct system as their potable public water supply (Ref. 16, p. 1 of 3). There are no surface water intakes on the Hudson River along the

15-mile upstream and 15-mile downstream or 30-mile TDL. The Uhlich site is located in an area of minimal flooding known as Zone C which is outside the 500-year floodplain (Ref. 30, p. 2 of 2). The 2-year, 24-hour rainfall in the site vicinity is approximately 3.5 inches (Ref. 31, p. 2 of 2).

Wetland frontage within the 15-mile upstream and downstream pathway from the site is approximately 5.8 miles (Ref. 32, p. 1 of 1; Ref. 33, p. 1 of 1). No wetlands are present on the Paul Uhlich site (Ref. 33, p. 1 of 1). Seven sensitive environments have been identified along the 15-mile surface water pathway including brackish intertidal mudflats, brackish tidal marshs, anadromous fish concentration areas, waterfowl concentration area, Peregrine Falcon, warm water fish concentration area (Ref. 34, p. 1 of 1; Ref. 35, pp. 4 through 7 of 7). Furthermore, the lower Hudson reach is designated as a significant Coastal Fish and Wildlife habitat (Ref. 37, pp. 1 through 11 of 11). These significant habitats typically support populations of endangered, threatened, or special concern species; support populations of species that have significant commercial, recreational, or educational value; represent a habitat non-indicative to the state or coastal area; and one essential to the survival of extensive populations of fish and wildlife (Ref. 37, p. 2 of 11).

Soil Exposure Pathway

There are no areas of observed contamination on the Uhlich site. Most of the site is paved or covered with buildings. Soil samples were taken at various intervals between 2 and 16 feet. No uniformity exists between sample depths; therefore, contamination between sample locations cannot be accurately compared and no background samples were collected.

It is unlikely that potential runoff from the site would travel to nearby residents due to area topography. In order for potential site runoff to reach the nearest residences approximately 80 feet east of the site, runoff would have to travel upgradient across two large berms, railroad tracks, Southside Ave., and a 15-foot incline above which the homes are situated (Ref. 4, pp. 2 and 3 of 8). Furthermore, the site slopes toward the southwest (Ref. 4, p. 5 of 8).

There are no schools or day-care centers within 200 feet of the site. There are approximately six residences within 200 feet of the Uhlich site (Ref. 4, p. 4 of 8). There are 352 people within 1/4 mile of the site, 2,248 between 1/4 and 1/2 mile, and 6,907 between 1/2 and 1 mile (Ref. 17, p. 1 of 2, Ref. 18, pp. 7, 8, 25 and 26 of 26). Uhlich employs approximately 60 people (Ref. 36, p. 1 of 1). The site is surrounded by other industries, railroad tracks, and the Hudson River (Ref. 4, pp. 4, 5 of 8). The site can only be accessed by a small bridge crossing the railroad tracks (Ref. 4, p. 4 of 8). Most of the site is paved and covered with buildings, and the property is fenced (Ref. 4, p. 4 of 8). There are no terrestrial sensitive environments located on or within 200 feet of the site (Ref. 34, p. 1 of 1; Ref. 35, p. 4 through 7 of 7).

Air Pathway

Air samples have not been collected in connection with any investigations conducted at the site, and there have been no direct observations of releases to air from contaminated soils, nor were any airborne particulates or dust clouds noted during the off-site reconnaissance (Ref. 4, p. 4 of 8). The closest residence is approximately 80 feet from the eastern portion of the site (Ref. 4, p. 2 of 8; Ref. 38, p. 1 of

1). There are approximately 168,768 persons living within a 4-mile radius of the site, as follows: 0-¼ mile, 352; ¼-½ mile, 2,248; ½-1 mile, 6,907; 1-2 miles, 19,498; 2-3 miles, 48,451; and 3-4 miles, 91,311 (Ref. 17, p. 1 of 2, Ref. 18, pp. 7, 8, 25 and 26 of 26). There are approximately 842 acres of wetlands within the 4-mile TDL of the site, as follows: 0-¼ mile, 0; ¼-½ mile, 1; ½-1 mile, 6; 1-2 miles, 54; 2-3 miles, 206; and 3-4 miles, 575 (Ref. 32, p. 1 of 1).

The closest sensitive environment is located outside the 4-mile TDL and is identified as a waterfowl concentration area (State endangered) (Ref. 34, p. 1 of 1).

Summary

The existing information was sufficient to evaluate the Paul Uhlich Company site. Groundwater and soil samples indicate the presence of organic and inorganic compounds. No background soil or groundwater samples were available. There is no documented contamination or observed migration at the site. Furthermore, there are no areas of observed contamination within 200 feet of any schools, day-care centers, or terrestrial sensitive environments. Approximately 18 people live within 200 feet of the site and 168,768 people within a 4-mile radius of the site. There are no sensitive environments identified within the 4-mile air pathway of the site, and the nearest wetland is located about 1/4 mile from the site. However, no documentation is present to indicate that any of these areas have been contaminated as a result of site activities, nor are any of these areas located on the Uhlich property.

The nearest surface water is the Hudson River, located 500 feet west of the site. Westchester depends solely on the New York City Aqueduct system and therefore, there are no surface water intakes located within the 15-mile target distance limit. Potable water is supplied by municipal water supplies located outside the 4-mile TDL and residents utilizing private domestic wells. The nearest well is located approximately 1 mile away from the site. The aquifers underlying the site provide limited potable water to 183 people.

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38. U.S.G.S. 7.5 Minute Topographic Map, 4-mile Radius Vicinity Map, Quadrangles: Havestraw, Ossining, Park Ridge, Nyack, White Plains, Hackensack, Yonkers, Mount Vernon, Weehawken, Central Park, Flushing.

REFERENCE 1

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federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

REFERENCE 2

United States
Environmental Protection
Agency

Solid Waste and
Emergency Response
(5204G)

9360.4-18
PB94-963506
EPA 540-R-94-0C
June 1994

EPA

Superfund Chemical Data Matrix

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REFERENCE 3

Ref. 3
p. 1 of 1

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #1
LI USING CUSTOM RULER OR COORDINATOR™

SITE NAME: Paul Uhlich Co. CERCLIS #: 9/12/95

AKA: ______ SSID: 8310 0076 0000 40022

ADDRESS: Southside Ave

CITY: Hastings-on-the-Hudson STATE: NY ZIP CODE: 10706

SITE REFERENCE POINT: ______

USGS QUAD MAP NAME: Yonkers TOWNSHIP: ___ N/S RANGE: ___ E/W

SCALE: 1:24,000 MAP DATE: 1966 SECTION: ___1/4 ___1/4 ___1/4

MAP DATUM: (1927) 1983 (CIRCLE ONE) MERIDIAN: ______

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 7.5' MAP (attach photocopy):

LONGITUDE: 73 ° 52 ' 30 " LATITUDE: 40 ° 52 ' 30 "

COORDINATES FROM LOWER RIGHT (SOUTHEAST) CORNER OF 2.5' GRID CELL:

LONGITUDE: 73 ° 52 ' 30 " LATITUDE: 40 ° 57 ' 30 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) ALIGN THE BOTTOM OF THE SCALE WITH BOTTOM OF GRID. ALIGN THE TOP OF THE SCALE WITH THE TOP OF GRID. POSITION EDGE OF RULER OVER SITE REFERENCE POINT WHILE KEEPING TOP AND BOTTOM ALIGNED.

B) READ TICS ON RULER AT 1- OR 0.5-SECOND INTERVALS (INTERPOLATE).

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 1 ' 45.5 "

D) ADD TO STARTING LATITUDE: 40 ° 57 ' 30.0 " + 1 ' 45.5 " =

SITE LATITUDE: 40 ° 59 ' 15.5 "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) ALIGN THE BOTTOM OF THE SCALE WITH RIGHT SIDE OF GRID. ALIGN THE TOP OF THE SCALE WITH THE LEFT SIDE OF GRID. POSITION EDGE OF RULER OVER SITE REFERENCE POINT WHILE KEEPING TOP AND BOTTOM ALIGNED.

B) READ TICS ON RULER AT 1- or 0.5-SECOND INTERVALS. (INTERPOLATE)

C) EXPRESS IN MINUTES AND SECONDS (1'= 60"): 0 ' 40.0 "

D) ADD TO STARTING LONGITUDE: 73 ° 52 ' 30.0 " + 0 ' 40.0 " =

SITE LONGITUDE: 73 ° 53 ' 10.0 "

INVESTIGATOR: CKovari DATE: 9/12/95

REFERENCE 4

Name Foster Wheeler Environmental
E.C. Kovari

Address

Phone

Projects Paul Uhlich Site 1/24/96
8310.0076.0000.40022

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Projects (continued)

Paul Ullrich Site 1/24/96
83100076 0000400ZZ

1030 Travel down Southside ave. to Paul Ullrich Site Park outside of the railroad ave bridge which crosses over Conrail train tracks to the Ullrich Metal sites.

C. Kovari : Task leader
Climate : raining, cold 20°C, overcast

1045 Note the nearest homes to the Paul Ullrich site : (80 ft) they are located on the opposite side (northeast) of Southside ave. above a large 10-15 foot incline. There are approx 6 homes within 200 feet of the site. There is no way that any potential runoff from

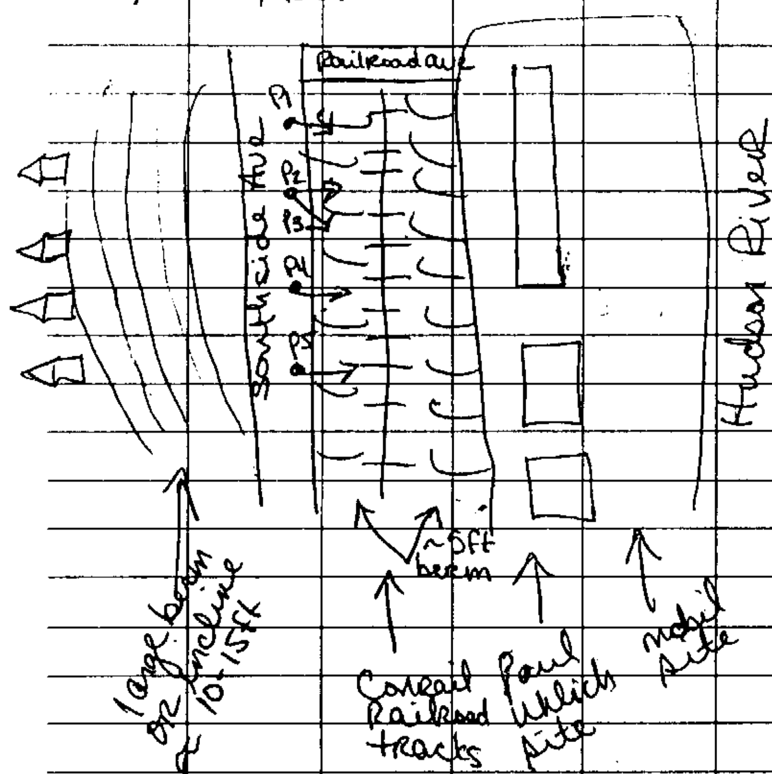
C Kovari 1/24/96

(1)

Ref. 4
p. 2 of 8

Paul Ulrich Site 1/24/96
8310 0076 0000 40022

Site Sketch:



(2)

Paul Ulrich Site 1/24/96
8310 0076 0000 40022

the site would reach these homes because any potential runoff would have to travel upgradient over two ≈ 5 foot berms (on either side of the railroad tracks) upgradient over Southside ave and upgradient to an approx 15 foot incline above which the homes are situated.

1055 The site is approx 6.3 acres

1100 P1 from Southside ave to the Ulrich site

1110 no visible signs of tanks except for Mobil's in the distance.

1125 no signs of stressed

C Kovari 1/24/96

(3)

Ref. 4
p. 3 of 8 [illegible]

Paul Uhlich Site 1/24/96
8310 0076 0000 40022

Vegetation, discolored soils, foul odors or dust clouds, no drums evident

1140 Access to the site is only by the covered bridge, or by boat through Mobil property

1155 the entire site is either covered by buildings, paved or fenced, the 5 foot railroad berm borders Uhlich's eastern property line.

1200 P23 from Southside Ave to Uhlich site.

Chustnekova
1/24/96

(4)

Paul Uhlich Site 1/24/96
8310 0076 0000 40022

1205 the ~~site~~ Hudson River is located less than 500 ft west of the site

1210 travel along Southside to other businesses in the area = an autoparts garage, recycling center, Northeast of the property line. Area is mixed residential commercial, industrial

1215 6 homes w/in 200 feet times County average (2.96) = 18 persons

1220 Drainage area = approx 8 acres

1225 drainage from site most likely west toward the Hudson River

Chustnekova

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p. 5 of 8

Paul Ullrich Site 1/24/96
8310 0076 000040022

1230 facility slopes south and west toward the Hudson River so runoff most likely in that direction

1240 the site is bordered by Mobil Oil - west
Former Anaconda Wire Mill - North
Hudson River - South
Conrail Railroad tracks - east, boat club - south

1245 P4 from Southside Ave to Ullrich site

1250 P5 from southside ave to Ullrich site

1300 leave Ullrich site to find nearest school

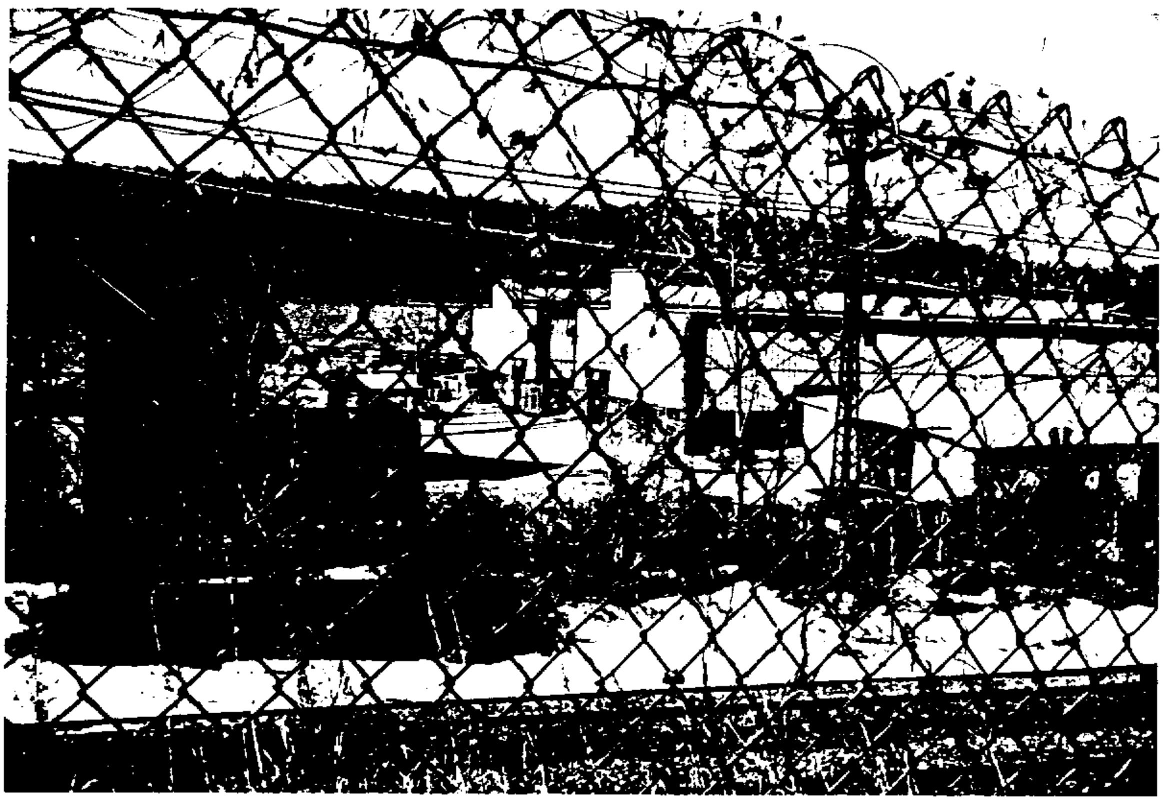
Christine Coran 1/24/96

Paul Ullrich Site 1/24/96
8310 0076 000040022

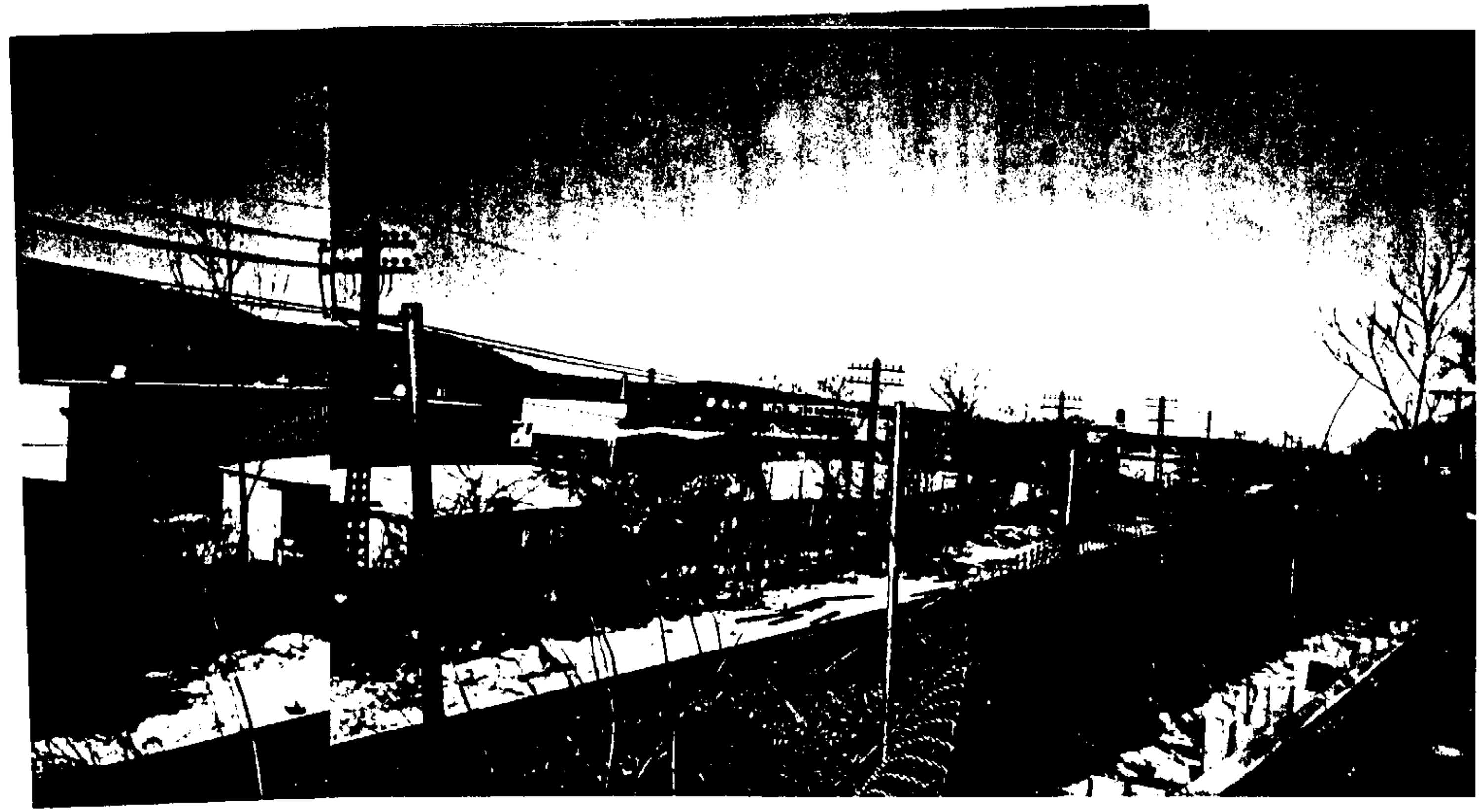
1320 nearest schools:
Hastings-on-Hudson High School and middle school located approx 0.2 mile from the site

1330 leave site area and travel to County Offices

Coran 1/24/96



P1: The Paul Uhlich site facing west, as seen from Southside Ave. behind the fence and about 5 feet above the railroad tracks.



P2,3: The Paul Ullich site facing northwest from Southside Ave., above the railroad tracks.

P.4: The Paul Uhlich site facing west from Southside Ave.

P5: The Paul Uhlich site facing west from Southside Ave.

REFERENCE 5

Prepared at the Request of Legal Counsel
Whiteman, Osterman and Hanna
Albany, New York

TAPPAN TERMINAL - HASTINGS-ON-HUDSON, NEW YORK
NYSDEC INACTIVE HAZARDOUS WASTE SITE CODE 360015
EPA TECHNICAL DIRECTIVE DOCUMENT NO. 02-8809-01

REPORT ON SUBSURFACE INVESTIGATION AT ADJACENT PAUL UHLICH AND CO. PLANT PROPERTY

Volume I

November 1989

LAWLER, MATUSKY & SKELLY ENGINEERS
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, New York 10965

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Prepared at the Request of Legal Counsel
Whiteman, Osterman and Hanna
Albany, New York

TAPPAN TERMINAL - HASTINGS-ON-HUDSON, NEW YORK

NYSDEC INACTIVE HAZARDOUS WASTE SITE CODE 360015

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REPORT ON SUBSURFACE INVESTIGATION

AT ADJACENT

PAUL UHLICH AND CO. PLANT PROPERTY

Hastings-on-Hudson, New York

VOLUME I

November 1989

LMSE-89/0651&442/095

LAWLER, MATUSKY & SKELLY ENGINEERS
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, New York 10965

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CHAPTER 1

INTRODUCTION

1.1 OBJECTIVE

The purpose of this report is to document a subsurface environmental investigation conducted in 1989 by Lawler, Matusky & Skelly Engineers (LMS) at the Paul Uhlich and Co. (Uhlich) plant property at One Railroad Avenue, Hastings-on-Hudson, New York, which is adjacent to the Tappan Terminal (NYSDEC Inactive Hazardous Waste Site Code 360015; EPA Technical Directive Document No. 02-8809-01; see Figure 1-1). The field investigation entailed the following activities:

- Advancing borings with a drill rig and collection of soil samples
- Construction, development, slug testing, and sampling of groundwater monitoring wells
- Construction and sampling of soil gas probes
- Installation of well points to measure water table depth
- Horizontal and vertical survey of the subsurface test locations
- Magnetometry survey of the reported site of an underground gasoline tank
- On-site and laboratory testing of soil, groundwater, and soil gas samples

The investigation was conducted in two phases. The first phase (January-April 1989) included 19 soil borings, four of which were completed as groundwater monitoring wells. The soil gas probes, well points, and magnetometry activities were conducted during this phase. Except as noted in Chapter 2, Phase 1 was conducted in con-

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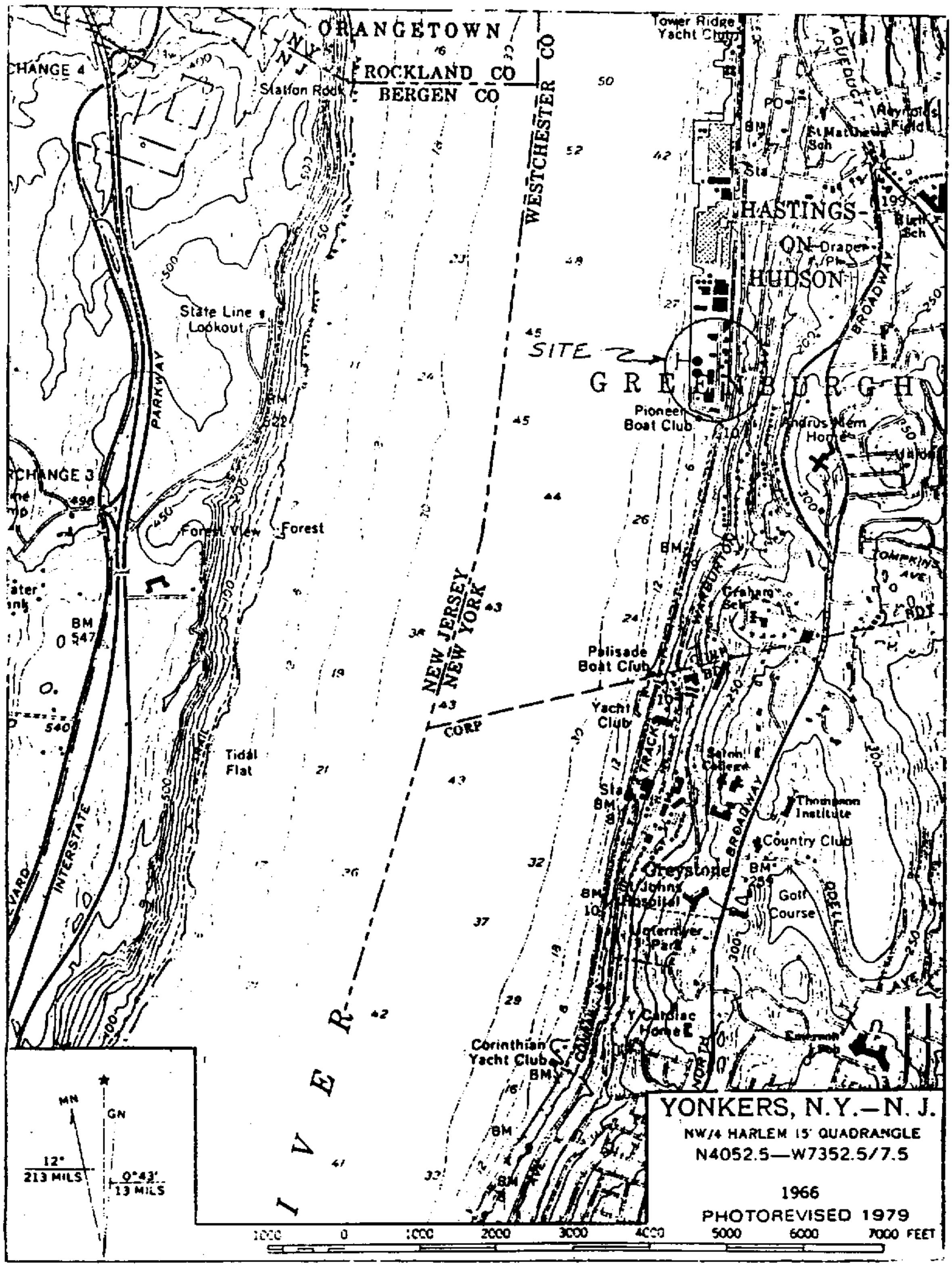
FIGURE 1-1

LOCATION MAP



1-1A

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formance with the Proposed Plan for Environmental Investigation at Paul Uhlich and Co. Plant Property (LMS 1988).

The second phase (June-July 1989) entailed seven additional borings, three of which were completed as groundwater monitoring wells. The locations for these borings and wells were selected based on the findings from the first phase. In all, there were 26 borings and seven monitoring wells on the Uhlich property. Also in June, LMS sampled four monitoring wells on the adjacent Mobil Oil Corporation (Mobil) property. The scope of these activities is fully documented in Chapter 2.

1.2 BACKGROUND

Except for Subsection 1.2.1, this section of the report is provided by Uhlich. The information set forth was developed from a variety of sources, including the direct knowledge of Uhlich personnel concerning activities of third parties who occupied the site, and old documents, including maps relating to the history of the site and its occupants which are in the public record or to which Uhlich has had access. Uhlich believes that, on the basis of the information available to it, the information presented is accurate in all respects.

NOT LMS

1.2.1 Development of the Site

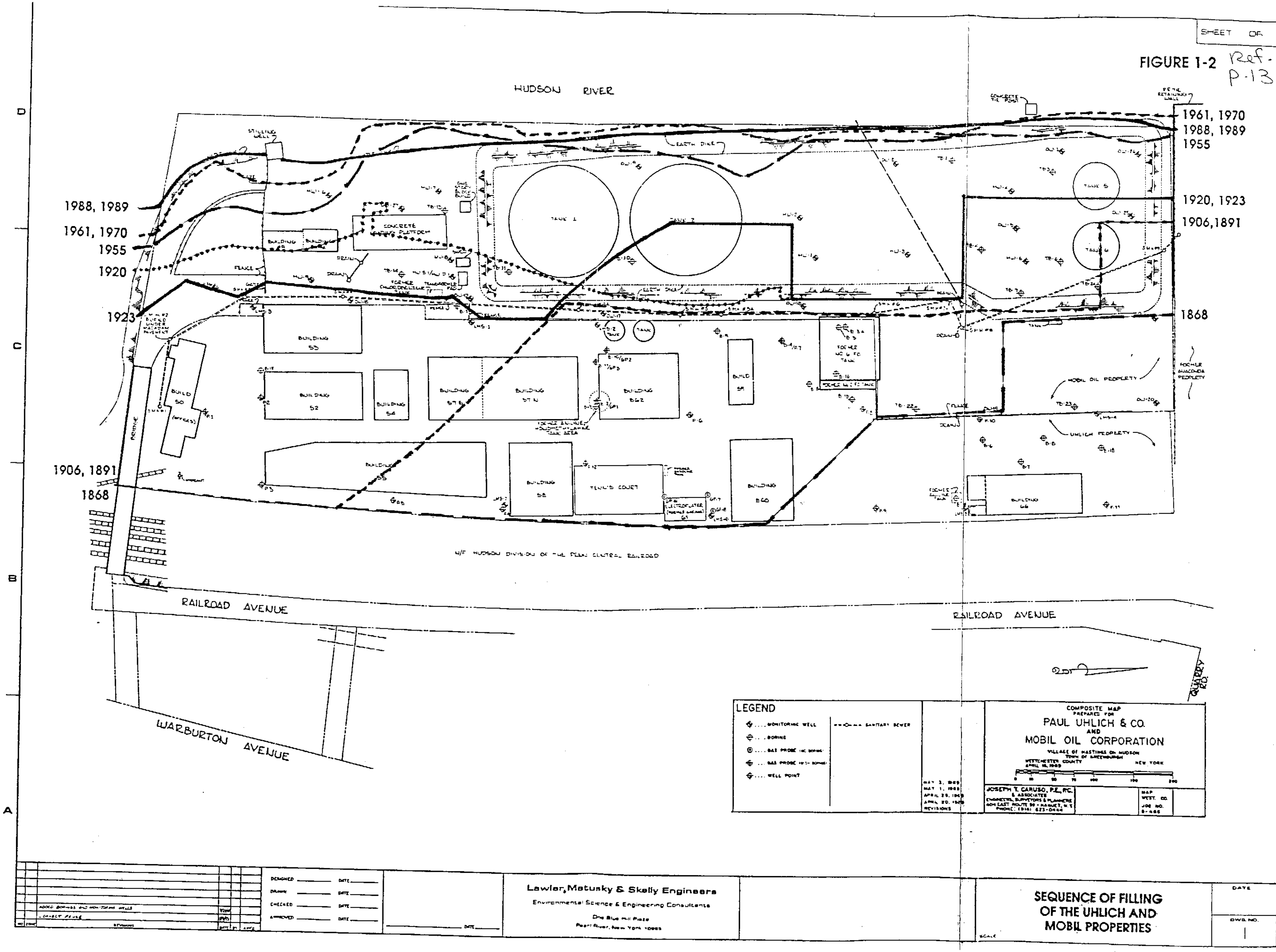
1.2.1.1 Overview. The property on which the subsurface investigation was conducted by LMS is part of a fill area in the Hudson River. The bulk of the fill area is now owned by three separate parties. The northern portion, formerly owned by the Anaconda Wire & Cable Company (Anaconda), is apparently owned by the Harbor at Hastings Associates. The southern portion, formerly owned by Zinsser & Company, Inc. (Zinsser), and its successor, Harshaw Chemical Co. (Harshaw), is referred to as the Southern Fill Area and is now subdivided into two parcels. The western portion adjacent to the Hudson River is owned by Mobil. The eastern portion is owned by Uhlich (see Drawing 1, a foldout map at the back of this report).

The Southern Fill Area was filled at various times. Figure 1-2 depicts the fill sequence of the former Zinsser/Harshaw property, now owned by Uhlich and Mobil. The following information was used in preparing the historical shoreline configurations for this figure. Reproductions of the source drawings are presented at the back of this report.

1.2.1.2 Shoreline 1868. The information on this shoreline was taken from the Harbor at Hastings 1989 draft environmental impact statement (DEIS) prepared by Parish & Weiner, Inc. It comes from a reproduction of Plate 35, Historic Background of Hastings Waterfront - 1868, found in the Beers Atlas. The delineation of the shoreline for the properties is at best a rough estimate because of the poor quality of the map, the small scale (1 in. = 600 ft), and the distortion of certain prominent features, such as the railroad. Drawing 2 (in the back of this report) is a reproduction of this map.

1.2.1.3 Shoreline 1891/1906. In Figure 1-2 the 1906 shoreline configuration (Drawing 3) was derived from a U.S. Army Corps of Engineers (COE) blueprint titled Pierhead and Bulkhead Line for the Easterly Shore of the Hudson River at the Village of Hastings, New York (COE 1906). The scale appears fairly accurate (within 9%). However, shoreline and property lines are not clearly differentiated. The information on the 1891 shoreline was derived from a reproduction in the DEIS of a historical plate from the Atlas of the Hudson River Valley (Drawing 4). This drawing (Plate 36, Historical Background of Hastings Waterfront - 1891) appears to match the plotted contours of the 1906 plot. However, the shoreline con-

FIGURE 1-2



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figuration in Figure 1-2 should be considered a rough estimate because of the poor quality and lack of scale on the source map.

1.2.1.4 Shoreline 1920/1923. The 1920 configuration (see Drawing 5) was derived from a 1935 letter and map to attorneys Kelly, Hewitt & Harte by J.L. Berstron of Zinsser. Because this map appears to have been generated to emphasize building layout and not shoreline position, the shoreline configuration may be arbitrary, not the result of a detailed survey. The 1923 shoreline in Figure 1-2 was based on a blueprint titled Map A in the Application of Zinsser and Company, Inc., for a Grant of Land Under the Waters of the Hudson River, Hastings-on-Hudson, Westchester County, New York (see Drawing 6). This map shows a metes and bounds survey of the high water line. Both the 1920 map and the 1923 map fully match the placement of the water line on the northern portion of the Southern Fill Area. However, the maps suggest that a portion of the southern shoreline was dredged. Given the history of continuous filling at the site, it is possible that no dredging took place from 1920 to 1923 and that one or both of the maps are inaccurate on the south.

1.2.1.5 Shoreline 1944/1955. In Figure 1-2 the 1945 shoreline (Drawing 7) is derived from an insurance report (American Appraisal Company 1945). The 1955 shoreline (Drawing 8) was based on a blueprint labeled the Harshaw Chemical Company, Zinsser and Company Plot Plan Showing Outdoor Storage Tanks (Harshaw Chemical Company 1955). The poor quality of these prints precludes accurate measurement of the shoreline. Furthermore, the information on the shoreline may be inaccurate because the map appears to have been prepared primarily to document the contents of bulk storage tanks.

1.2.1.6 Shoreline 1961/1970. The 1961 shoreline in Figure 1-2 was based on a map (Drawing 9) by surveyor Harold Becker prepared for Tappan Tanker Terminal, Inc. (TTT) (Becker 1961). The 1970 shoreline (Drawing 10) was based on a map by surveyor A.E. Kolenda prepared for Mobil (Kolenda 1970). Both drawings show that the northern shoreline is the bulkhead. However, the alignment of the high water line in the southern portion of the site may have been arbitrary, not an actual measurement because the map was prepared primarily for building and property line placement. The 1970 shoreline, near the stilling well (southwest corner), closely follows the 1988 shoreline.

1.2.1.7 Shoreline 1988. The 1988 configuration of the shoreline is derived from the Mobil base map updated by Leggette, Brashears & Graham (LBG) for its groundwater and soil quality investigation of the Mobil property (LBG 1987). Although this map is not presented here, the features of the Mobil property depicted on the LMS base map (Drawing 1) are traced from the LBG map.

1.2.2 Prior Owners and Users of the Southern Fill Area

The following is a summary of information known to Uhlich concerning occupants of the Southern Fill Area.

1.2.2.1 Zinsser & Company, Inc. Zinsser created a substantial portion and owned all of the Southern Fill Area from approximately 1897 until 1955. When the U.S. entered World War I, Zinsser leased the southern half of their property to the U.S. government. This lease ended in 1920. Zinsser manufactured dyes and pigments, and also fine chemicals used mainly in photographic processes. Documents and maps depicting locations of storage facilities, tanks, and process areas (including a solvent recovery operation) were supplied to LMS for its use in designing and carrying out its subsurface investigation (Drawings 5 through 8). 1897/1961

1.2.2.2 Harshaw Chemical Co. Harshaw acquired Zinsser in 1955 and continued the operations until September 1961.

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1.2.2.3 Tappan Tanker Terminal, Inc. TTT purchased the entire Southern Fill Area from Harshaw in September 1961. The sanitary sewer on what is now the Mobil property was constructed in 1961 or 1962 (see Drawing 1 for the alignment of this sewer). Westchester County approved the already constructed sewer on 10 December 1964. Some time prior to 1964 TTT constructed the large fuel oil storage tanks located on the portion of the area currently owned by Mobil. TTT operated a fuel oil storage facility until early 1971 and leased space to various enterprises. Uhlich understands that from October 1968 to at least 30 December 1970 TTT held an authorization from COE for the disposal at sea of certain liquid waste products of Nepera Chemical Co., Inc. The waste products appear to have been toluene, benzene, pyridene, alpha and beta picoline, 2 RCN, and 3 RCN. Uhlich understands that TTT stored these liquid waste products in the easterly one of the two smaller fuel oil storage tanks located on the north end of the property now owned by Mobil and piped the waste from this tank to ships for disposal at sea. From April 1971 to July 1975 TTT, under the name TTT Properties, Inc., leased and sold off portions of the Southern Fill Area (see below).

1.2.2.4 Paul Uhlich and Company, Inc. Through Uhlco Realty Corp. (a wholly owned subsidiary merged into Uhlich in 1986), Uhlich leased buildings and property in the eastern portion of the Southern Fill Area from TTT from October 1964 to July 1975. Uhlich has manufactured organic pigments since 1964. Uhlich occupied portions of Buildings 50, 52, 53, 55, and 49A during the lease period. This property represented approximately one-half of the property currently owned by Uhlich. Uhlich purchased the property it now owns from TTT in July 1975. Since 1975 Uhlich has also leased and rented buildings on its property to various tenants as described below. For locations of buildings referred to above and elsewhere in this report, see Drawing 1. Uhlich reports that since its pigment manufacturing operations use only water as a carrying medium and since it has never manufactured dyes, it has never used chlorobenzene, aniline, monomethylamine, ethyl ether, isopropyl ether, benzene, trichloroethylene, or tetrachloroethylene.

1.2.2.5 Mobil Oil Corporation. Mobil leased the western portion of the Southern Fill Area from TTT from July 1970 to December 1974, purchasing it in December 1974. Mobil was engaged in storing, wholesaling, and distributing (directly and through Robison Oil, an affiliate of Mobil) Nos. 2, 4, and 6 fuel oils from 1975 until 1985. Mobil operated two large steam boilers on its premises and maintained both a No. 6 fuel oil storage tank on Uhlich's property and a sewer line running north-south on the Mobil side of the border between the Uhlich and Mobil properties. This sewer services both Uhlich and Mobil. Maintenance of the sewer is the responsibility of Mobil, according to the 1974 Bridge, Roads and Utilities Agreement between TTT Properties, Inc., and Mobil. Mobil reports that it has never used chlorobenzene, aniline, ethyl ether, monomethylamine, isopropyl ether, benzene, trichloroethylene, or tetrachloroethylene.

1.2.2.6 Petroleum Heat & Power (Petro). This fuel oil distributor leased Building 66 from TTT between 1962 and 1975, and continued to lease the building from Uhlich from 1975 to September 1979. The premises were used for offices and a maintenance garage. Fuel delivery trucks were parked and serviced on these premises. Fuel oil was drawn from the TTT and Mobil oil distribution rack.

1.2.2.7 Whaleco Fuel Oil. This company assumed Petro's lease from Uhlich in September 1979 and used the premises in the same manner until February 1986.

1.2.2.8 Hastings Roofing, Inc. This company rented Building 59 from TTT for a period of years until 1975 and from Uhlich from 1975 until 1984. The building was used for offices and for storing roofing materials. Pickup trucks were parked and maintained on the premises.

1.2.2.9 Hastings Moving & Storage. Under leases from Uhlich, this company has stored home furniture and maintained offices in Build-

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ings 58 and 57N from July 1975 to the present. Prior to 1975 the company leased these premises from TTT. It leased (but did not occupy) Building 66 from August 1986 to May 1987 when the lease was transferred to Caldara (see below).

1.2.2.10 Caldara Movers (Caldara). Under lease from Uhlich Caldara has stored household goods and trucks in Building 66 from May 1987 to the present.

1.2.2.11 Ricci Bros. (Ricci). Ricci, a general contractor, occupied Building 57S from 1972 to 1979 and former Building 12 from 1979 to April 1985 under leases from Uhlich. The premises were used for storage and maintenance of earthmoving and paving equipment. Since April 1985 Ricci has rented vacant land north of Building 60 for the same purpose.

1.2.2.12 Donald Brown Roofers. This company occupied Building 57S from 1975 until 1979 and occupied Building 12 from 1979 to 1981. It stored trucks and roofing material on the premises.

1.2.2.13 Koski & Schmidt Services (K&S). This company, which was in the machinery transport and rigging business, rented Building 61 and adjacent land from Uhlich from 1975 to 1983. K&S stored machinery and trucks on the leased premises and used Building 61 for offices and storage.

1.2.2.14 J.F. Macri (Macri). From 1966 to 1975 this company rented office space from Uhlich in Building 50 and stored trucks and equipment in Building 57N. Macri was in the machinery moving business.

1.2.2.15 Villard Contracting Co. (Villard). Villard was a general contractor and carpenter. From 1964 to 1974 it leased space from Uhlich in Building 57S for storage of trucks and equipment.

1.2.2.16 Awards Etc. (Awards). From 1977 to December 1982 this company rented the first floor of Building 50 from Uhlich and manufactured trophies. Since January 1983 Awards has leased Buildings 60 and 61 for the same purpose. Awards stores small quantities of electroplating chemicals in Building 61. Awards' effluent is monitored by the Westchester County Sewer Department. Uhlich is not aware of any failure of Awards to be in compliance with environmental regulations.

1.2.2.17 Geigy Chemical Corp. (Geigy). From December 1967 to 1970 Geigy leased Building 59 from TTT. Uhlich understands that Geigy stored (but did not manufacture) nonexplosive, noncombustible agricultural pesticides in this space. Uhlich does not know the specific pesticides stored by Geigy.

1.2.2.18 Quirk, Lawler & Matusky Engineers (QLM). QLM, predecessor firm of LMS, rented the first floor of Building 50 from TTT between July 1967 and June 1972. The rental space was used primarily as an sanitary analytical laboratory to conduct wet chemistry analyses (BOD, TSS, pH, etc.) on natural water and wastewater samples. During the 1970s, biological studies were conducted on fish samples preserved with formalin on the property.

1.2.2.19 William Hall. Prior records indicate that this individual was granted access to the property by TTT. His status as a possible tenant and his activities, if any, are unknown to Uhlich.

1.2.2.20 George Smith. Prior records indicate that this individual was granted access to the property by TTT. His status as a possible tenant and his activities, if any, are unknown to Uhlich.

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1.2.2.21 Phillip Eades Trucking & Hauling. This company rented Building 57N from TTT for an unknown length of time beginning in September 1964. The nature of the trucking is unknown.

1.2.2.22 Steri Research Laboratory, Inc. Uhlich understands that this company leased the westerly portion of the first floor of Building 50 from TTT for an unknown period commencing in 1962. Their activities are unknown to Uhlich.

1.3 PRIOR RELEVANT SUBSURFACE INVESTIGATIONS

1.3.1 Leggette, Brashears & Graham, Inc.

In March 1987 LBG issued a report on an environmental investigation of the Mobil property conducted at Mobil's request (LBG 1987). Groundwater and subsurface soil samples were collected to detect any soil or groundwater contamination on the Mobil property. Of the 38 borings advanced, 26 were completed as groundwater monitoring wells. Since that report was issued, LBG reportedly conducted additional investigations. Appendix A presents summary tables based on their original analyses. LBG's boring and monitoring well locations are depicted on Drawing 1 (foldout at the back of this report).

LBG found chlorobenzene in the groundwater near the eastern boundary (Uhlich side) of the Mobil site. LBG attributed this to chemicals emanating from the Uhlich property. Uhlich advises that chlorobenzene, which is used in dye manufacturing, is not used in pigment manufacturing and that they have not used chlorobenzene. Both Mobil and LBG appeared to be unaware of the 1955 Zinsser map (Drawing 8) that records a former chlorobenzene tank on what is now the Mobil property near the eastern boundary.

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LBG also found petroleum hydrocarbons (PHC) in three soil areas in the northern half of the Mobil site. Two of the zones bordered the Uhlich property. Diethyl ether and isopropyl ether were found in the groundwater in the northern half of the Mobil property bordering the Uhlich and former Anaconda properties and near the center of the western side of that property.

Colored subsurface soils were found along the Mobil-Uhlich property line. LBG attributed the staining to leakage from the sanitary sewer that services the two properties and to overland flow. No hazardous chemicals were present in the stained soils.

The New York State Department of Environmental Conservation (NYSDEC) placed the Mobil property on the registry of inactive hazardous waste sites (Site Code 360015) after it received a copy of the LBG report.

1.3.2 U.S. Environmental Protection Agency

During the investigation, LMS acquired from the U.S. Environmental Protection Agency (EPA) a report on a preliminary assessment of the Mobil property prepared by NUS Corporation (NUS) in December 1988 (NUS 1988). EPA involvement was initiated after the LBG report was released. Attached to the NUS report was a report prepared for Mobil on a June 1987 sampling at the Mobil property (Mobil Research and Development Corporation 1987). Uhlich advises that NUS erroneously characterized it as a dye manufacturer. Uhlich advises that it has only manufactured pigments for which water, rather than organic chemicals, is used as a carrying medium.

In October 1989 EPA released a NUS report of a screening site investigation (SSI) during which four Mobil monitoring wells (OW-1, MW-4, OW-25, and OW-19; see Drawing 1) were sampled on the northern portion of the Mobil property (NUS 1989). NUS also collected six soil samples on the property. Tables 1-1 and 1-2 summarize the analytical results for groundwater and soil, respectively.

No organics were detected in the groundwater samples. No chemicals were detected in OW-19, which is just downgradient of the Uhlich-Mobil property line. NUS collected one soil sample from a drainage way that directs storm water from the Uhlich property to the Mobil property. Low levels of PCBs and four semivolatile compounds were measured in this sample; barium was the only metal detected, at a concentration of 1300 mg/kg. There was no assessment for petroleum hydrocarbons. NUS concluded that concern about air, groundwater, and on-site exposure pathways "is minimal" for this site. No mention was made about the chlorobenzene in the wells on the southern portion of the site. Because of adjacent or nearby striped bass and blue crab fisheries, NUS expressed a concern about surface water contamination of the Hudson River originating from the soils (apparently from erosion). NUS therefore recommended that the site be given high priority for further evaluation in a Listing Site Inspection (LSI). The LSI would include additional on-site sampling and investigation of blue crabs in the vicinity of the site.

1.3.3 Former Anaconda Property

Harbor at Hastings Associates, apparent owners of the former Anaconda property, have proposed a residential and mixed-use development for the land north of the Mobil and Uhlich properties. In compliance with New York's State Environmental Quality Review Act (SEQRA), the developers submitted a DEIS on the proposed project to the Village of Hastings-on-Hudson in January 1989. The DEIS documents past investigative work concerning industrial contaminants detected in the soil and groundwater: volatile organic compounds (VOCs), polyaromatic compounds (PAHs), PCBs, and heavy metals. Where relevant, the findings of the DEIS have been integrated into the Uhlich investigation. As of this writing, a final EIS has

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TABLE 1-1

EPA ANALYTICAL RESULTS FOR MOBIL MONITORING WELLS

	CONCENTRATION (ug/l)				
			OW-25		
PARAMETER	OW-1	MW-4	SAMPLE	DUPLICATE	OW-19
Metals					
Silver	33.6	4.4	-	-	-
Cadmium	16.3	6.4	-	-	-
Arsenic	-	69.5	-	49.3	-
Lead	-	1880	-	1000	-
Mercury	-	-	-	8.4	-
Others	-	-	-	-	-
Volatiles	-	-	-	-	-
Semivolatiles	-	-	-	-	-
PCBs/Pesticides	-	-	-	-	-

- compound not detected.

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TABLE 1-2

EPA ANALYTICAL RESULTS FOR MOBIL SOIL SAMPLES

PARAMETER	CONCENTRATION (mg/kg)					
	S-1 BETWEEN TANKS 5 & 6	S-2 DRAINAGE PATH FROM UHLICH PROPERTY	S-3 TRANSFORMER AREA	S-4 DUPLICATE SAMPLE OF S-3	S-5 DRAINAGE PATH SW OF BLDG. 1	S-6 BANK OF HUDSON RIVER
Metals						
Arsenic	-	-	31.3	32.7	-	-
Barium	-	1300	-	-	-	1160
Cobalt	60.2	-	-	-	-	-
Copper	1800	-	974	1070	350	416
Lead	1050	-	-	-	-	1600
Mercury	-	-	-	-	2.5	1.3
Vanadium	-	-	112	122	-	-
Zinc	4190	-	2080	1810	-	-
Others	-	-	-	-	-	-
PCBs/Pesticides						
Aroclor 1260	0.33	0.38	-	-	-	0.25
Endosulfan I	-	-	0.043	0.043	-	-
Others	-	-	-	-	-	-
Volatiles						
Semivolatiles						
Phenanthrene	-	0.81	2.3	0.2	0.44	-
Anthracene	-	-	0.48	-	-	-
Fluoranthene	-	-	-	-	-	11.1
Pyrene	-	-	-	-	-	2.4
Benzo(a) anthracene	-	0.81	2.4	2.2	0.41	0.85
Chrysene	-	-	-	-	-	0.87
Bis(2-ethylhexyl) phthalate	-	-	-	-	-	0.91
Benzo(b) fluoranthene	-	2.9	3.0	3.5	0.74	1.2
Benzo(a)pyrene	-	1.4	-	1.8	-	0.87
Others	-	-	-	-	-	-

- compound not detected.

PAH

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apparently been submitted, but LMS has not had the opportunity to review this latest submission.

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CHAPTER 2

FIELD INVESTIGATION

2.1 PRELIMINARY ACTIVITIES

As indicated previously, the LMS field investigation was conducted in two phases. Planning for Phase 1 specified that four monitoring wells be constructed on the west side of the Uhlich property adjacent to the Mobil property line. To avoid confusion with the LBG wells, these four wells were labeled LMS-1, LMS-2, LMS-3, and LMS-4. LMS-1 was located opposite (just east of) the former Zinsser/Harshaw chlorobenzene tank. LMS-2 was located downgradient of a former Zinsser/Harshaw solvent recovery operation. According to Drawing Z-1009-5 for the equipment layout of Zinsser facilities (Harshaw Chemical Co. 1958), this operation was near the southwest corner of Building 62. LMS-3 was located to describe the groundwater expected to be flowing west from the southwest corner of the Uhlich property. LMS-4 was located in the northern portion of the property in the vicinity of the ether groundwater plume described by LBG.

Fourteen additional borings were planned for Phase 1. B-1 was located southeast of the former chlorobenzene tank. B-2 was located in the vicinity of former aniline and monomethylamine tanks shown in the 1955 Zinsser/Harshaw map (Drawing 8); this boring was completed as a soil gas probe (GP-1). Borings B-3, B-4, and B-5 were located near former bulk petroleum storage vessels and areas of suspected petroleum spills. Borings B-6, B-7, and B-8 were located to describe petroleum levels in the soil in the northern leased areas of the Uhlich property. Boring B-9 was located to describe subsurface conditions near new construction contemplated by Uhlich. Borings B-10 and B-11 (completed as gas probes GP-2 and GP-3, respectively) were located to describe subsurface conditions around the previously mentioned Zinsser/Harshaw solvent recovery

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operation. Borings B-12 and B-13 (planned to be completed as gas probes GP-4 and GP-5, respectively) were located around an underground gasoline storage tank shown in the 1955 Zinsser/Harshaw map (Drawing 8). (As detailed in Section 2.2.1, these borings were not drilled.) Boring B-14 was located in the vicinity of a former Zinsser/Harshaw aniline tank. Boring B-15 was planned to describe the subsurface near a former electrical transformer that may have contained PCBs.

Four soil gas probes (GP-6, GP-7, GP-8, and GP-9) were planned for the area around Building 61, which is leased by Awards, Etc.; three were finally constructed. These probes were planned as a cost-effective means of initially screening possible subsurface impacts of this establishment.

Eleven water level probes (essentially well points) were also constructed during Phase 1 to measure water table elevations.

Three additional groundwater monitoring wells were installed during Phase 2. LMS-5 and LMS-6 were located to describe the condition of the groundwater flowing onto the Uhlich property from the east. LMS-7 was located to describe the condition of the groundwater flowing southeast from the Uhlich property toward the railroad tracks. The southeasterly direction of the flow, discovered during Phase 1, was unexpected.

During Phase 2, boring B-16 was located to confirm the reported petroleum concentrations in the soil of the former bulk petroleum storage area. Boring B-17 was advanced to confirm anomalous findings of monomethylamine in the soil samples collected from boring B-2 during Phase 1.

Borings B-18 and B-19 were located to collect soil samples for metals and semivolatiles analysis.

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Before subsurface drilling, LMS personnel walked the property with Uhlich representatives to mark underground utilities and designate locations for flush-grade curb boxes required for monitoring wells and well points. The ground elevation near each proposed well and well point was measured by Joseph Caruso and Associates (Caruso), a licensed surveyor retained by LMS. This preliminary survey allowed the water table to be mapped as the subsurface activities progressed, and thereby helped in the selection of the final locations of probes/wells yet to be installed. A health and safety plan (HASP) was prepared at this time for the protection of the field crews during the investigation (Appendix B).

2.2 GEOPHYSICAL INVESTIGATION

2.2.1 Magnetometry

In January 1989 a magnetometry survey was conducted by Alpine Ocean Seismic Survey, Inc. (Alpine), in the vicinity of a reported underground Zinsser/Harshaw gasoline tank (Appendix C). The location of the tank is shown on Drawing 8 (at the back of this report). Anomalous readings attributed to subsurface metal scrap precluded an accurate conclusion about either the existence or the location of the tank. Consequently, LMS decided that the contemplated borings and gas probes in the vicinity (B-12/GP-4 and B-13/GP-5) could not be installed safely, and that aspect of the field program was suspended. A backhoe will be mobilized if further investigation of the tank is warranted.

2.2.2 Groundwater Occurrence

Uhlich personnel have reported a soil formation that they describe as having a pronounced underground water flow from east to west beneath the property. (As noted below, no such formation was found during this investigation.) The general alignment of this formation was thought to be from the approximate center of Building 55 (where distinct structural settlement can be observed from the roof and fascia lines) toward the alley between Buildings 54 and 57S (see Drawing 1 at the back of this report). If such a formation exists, it might be a permeable subsurface zone that directs groundwater flow from east of the property west through the Uhlich property to the Mobil property. The formation would then be expected to influence the movement of chemicals in the groundwater.

Resistivity and electromagnetic (EM) techniques were considered for mapping the water-bearing formations at the property. Alpine inspected the property and concluded that overhead electrical lines, subsurface water distribution pipes, and buildings would interfere with both types of surveys. A resistivity survey would be further hindered by the large number of holes that would have to be cut into the pavement covering much of the property. These limitations, coupled with the difficulties encountered with subsurface metal scrap during the magnetometry survey, forced the cancellation of this portion of the investigation. It should be noted that one well point (P-5) and one monitoring well (LMS-1) were installed in the reported alignment of the formation and that the former chlorobenzene tank on the Mobil property is also in this alignment.

2.3 SOIL BORINGS

Phase 1 drilling was conducted between 31 January and 10 February 1989 with a Diedrich D-50 drill rig operated by an LMS subcontractor, Kendrick Drilling, of Chester, New York. Phase 2 drilling was conducted with the same rig during 7-13 June 1989. All activities were supervised by an LMS geologist. The locations of the 26 borings (19 in Phase 1; seven in Phase 2) are depicted in Drawing 1.

Borings were advanced by driving a 2-in. outside diameter (O.D.) split spoon with a 140-lb hammer in accordance with the standard penetration test procedure (ASTM D-1586). Continuous split-spoon sampling was conducted in each boring to at least 2 ft below the water table and deeper where required by the plan of study. Above the water table the borehole was sufficiently stable to allow drilling to proceed without advancing augers or casing. The split spoons were decontaminated with steam at a designated area on-site.

Each split-spoon sample was scanned with an HNU Model PI 101 photoionization detector (PID) fitted with a 10.2 eV lamp. An MSA 361 combustible gas indicator (CGI) was used during Phase 1 to monitor selected open boreholes for explosive gases. The fill/soil characteristics, PID readings, sheens, and odors were logged for each sample by an on-site LMS geologist.

Dedicated, laboratory-cleaned stainless steel spoons were used to place soil samples into laboratory-cleaned sample containers for subsequent analysis. Volatiles samples were placed in pairs of 40-ml vials fitted with Teflon-lined septums. Samples for other types of analyses were placed in wide-mouth amber glass containers (minimum 100-g) fitted with Teflon-lined lids. If there was sufficient recovery, an additional sample collected from every split spoon was retained on-site in drillers' jars. Appendix D contains the geologist's logs for all 26 soil borings.

Seven of the borings were completed as groundwater monitoring wells to allow for the collection of groundwater samples and the observation of water table elevations. Soil gas probes were constructed in three of the borings to allow for the detection of volatile constituents in the surrounding soil pore spaces.

2.4 MONITORING WELL INSTALLATION

During Phase 1, four groundwater monitoring wells were installed to intercept groundwater moving downgradient from the Uhlich property toward the adjacent Mobil property (Drawing 1). Except for LMS-2, which had to be relocated about 40 ft south to avoid interference with a newly constructed acid bulk storage tank system, the wells were located as initially planned. However, the new location still allowed for a description of the groundwater downgradient of the former Zinsser/Harshaw solvent recovery operation. During Phase 2, two upgradient wells and one downgradient well were installed on the east side of the property.

Before the monitoring wells were installed, continuous split-spoon sampling was conducted to locate the depth to water and to study the subsurface lithology (Section 2.3). Once the split-spoon sampling was completed, temporary, 4-in. inside diameter (I.D.) hollow-steel casing was driven to 10 ft below the water table. This casing was steam cleaned before each use. The subsurface materials trapped within the casing were drilled out with a roller bit. Air and clean water were constantly circulated down the drill bit to ensure that the casing was cleared of all sediments. Once cleared, 1 ft of No. 2 Morie sand was placed at the bottom of the borehole. A 2-in. I.D. schedule 40 PVC 0.010 slot screen with 2-in. I.D. schedule 40 PVC riser was placed down the hollow-steel casing and allowed to rest on the sand at the bottom of the boring. This placement was designed to allow the PVC screen to extend to at least 1 ft above the water table so that any floating material could be sampled; none was observed, however. The water table at LMS-5 is about 0.2 ft above the top of the screen. The annular space between the screen and the borehole was gradually filled with No. 2 sand as the casing was raised. The sand surrounding the well screen acts as a filter, keeping fine-grained sediments from entering the well. The sand was filled to at least 0.5 ft above the top of the well screen.

During retraction of the temporary casing at LMS-3, the bottom 2-ft section of hollow-steel casing became detached in the sand-packed annular space of the well. As the casing had been decontaminated with steam, it should not impact upon the integrity of any water samples drawn from this well. Because the casing section is below the water table, any material floating on top of the water table can still be observed.

A minimum 1-ft-thick bentonite pellet seal was placed above the sand pack. The remainder of the annular space was sealed with concrete grout. LMS-2, LMS-3, and LMS-7 have locking protective steel stickup casings set in the concrete grout over the PVC risers. LMS-1, LMS-4, LMS-5, and LMS-6 have watertight, flush-mount curb boxes set in the concrete over the PVC risers; the risers have locking watertight caps. Detailed diagrams of all four monitoring wells are included with the drilling logs in Appendix D.

2.5 GROUNDWATER LEVEL MONITORING PROBES

Twelve groundwater level monitoring probes (Drawing 1) were installed during Phase 1 to measure the depth to groundwater at different areas on the site. This information was used to calculate water table elevations so that groundwater flow direction could be determined.

The probes are screened galvanized steel well points, driven by the drill rig into the ground below the water table. The points are 1.25 in. I.D. and 3 ft long with 2 ft of screen. Galvanized steel riser pipe extends from the screen to the ground surface. Approximately 2 ft of stickup above grade was allowed; locking caps were designed and installed by Uhlich personnel. Four probes (P-3, P-9, P-10, and P-11) were finished in flush-grade curb boxes secured with watertight locking caps. Probe P-1, initially completed with a standard stickup, was destroyed by vehicular traffic and subsequently reconstructed in a flush-grade curb box during Phase 2.

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Also during Phase 2, probe P-4 was removed and replaced by monitoring well LMS-7.

2.6 SOIL GAS

On 7 February 1989 six soil gas probes (Drawing 1) were installed and monitored on the Uhlich property: three (GP-6, GP-7, GP-8) around the perimeter of the electroplater garage; two (GP-2, GP-3) at the former Zinsser/Harshaw solvent recovery operation; one (GP-1) at the former aniline/monomethylamine tank location. GP-9, a probe planned for the area near the electroplating shop, was not constructed because there was insufficient space between the fence and building to allow access by the drill rig. Because three gas probes were installed in this general vicinity, the loss of GP-9 did not significantly impact upon the investigation of the electroplating area. As described previously, the existence and location of the putative underground gasoline tank could not be confirmed. Therefore, for safety reasons, the gas probes planned for this area (GP-4 and GP-5) were not constructed.

The soil gas probes were constructed by first forming a borehole. At designated boring locations split spoons were advanced; 2-in.-diameter steel rods were driven elsewhere (GP-6, GP-7, GP-8). Polyethylene tubing (0.25 in.) was placed approximately 1 ft above the water table. The boreholes were backfilled with No. 2 Morie sand and sealed at the top with bentonite pellets.

Upon completion, each soil gas probe was purged of three borehole air volumes with a Masterflex peristaltic pump. During and immediately following this activity, the soil gas was monitored with the PID. The 10.2 eV lamp used in the PID is satisfactory for detecting most of the solvents used in electroplating and metal finishing operations. Sensitivity of the lamp in responding to aniline, chlorobenzene, and monomethylamine, chemicals investigated especially at borings/gas probes B-1, B-2/GP-1, B-10/GP-2, B-11/GP-3, and B-13, are as follows:

CHEMICAL	IONIZATION POTENTIAL (eV)	SENSITIVITY (RELATIVE TO 10 ppm)
Aniline	7.70	11.3
Chlorobenzene	8.90	13.0
Monomethylamine	8.97	2.5

Field notes are presented in Appendix E; the results are discussed in Chapter 3.

2.7 PERMEABILITY TESTING

Permeability calculations are useful in determining the rate of groundwater movement. Permeability test results, expressed as hydraulic conductivity, give the rate of flow of water in gallons per day through a cross section of 1 ft^2 (gpd/ft^2). On 3 March 1989 LMS conducted permeability slug tests on each of the four Phase 1 monitoring wells. This test measures the time it takes for the well to reach equilibrium after a volume of water is displaced by a slug made of, in this case, solid stainless steel. A submersible pressure transducer coupled with a strip-chart recorder recorded the aquifer response to the instantaneous head displacement caused by the quick lowering of the slug below the static water table. The strip-chart recording plotted a continuous curve correlating the relative active falling head to time.

The field data from these slug tests were then used in a mathematical formula developed by Bouwer and Rice (1976). The calculation, based on the Thiem equation of steady-state flow to a well, is applicable to completely or partially penetrating wells in unconfined aquifers. The equation gives the hydraulic conductivity (gpd/ft^2) for the aquifer near the well. An example and results of the permeability calculations are included in Appendix F.

The aquifer in the vicinity of the monitoring wells was found to have permeabilities on the order of 10^3 gpd/ft^2 (10^{-1} cm/sec) detailed as follows:

LMS-1	7800 gpd/ft^2	(0.37 cm/sec)
LMS-2	5700 gpd/ft^2	(0.27 cm/sec)
LMS-3	2800 gpd/ft^2	(0.13 cm/sec)
LMS-4	1900 gpd/ft^2	(0.09 cm/sec)

On a scale that ranges from 10^{-8} gpd/ft^2 (10^{-12} cm/sec) for unfractured metamorphic rock to 10^5 gpd/ft^2 (10^1 cm/sec) for coarse gravel, these permeabilities are typical of coarse sands and fine gravels. These results are consistent with the coarse-grained fill and sands and gravel found in the borings for the four wells. Permeability results reported in the DEIS for the Anaconda development to the north are on the order of 10^1 gpd/ft^2 (10^{-3} cm/sec), typical of finer-grained sands, but reasonably close to those for the Uhlich property.

2.8 WELL DEVELOPMENT

The main objective of well development is to increase well productivity and sample quality. Because the wells were screened in fill consisting of ash and other material, well development had to be monitored carefully. Development was accomplished by intermittent pumping and surging. This was done on 21 February 1989 for the Phase 1 wells and 14 June 1989 for the Phase 2 wells. Pumping was accomplished with a 0.5 hp centrifugal pump fitted with well-dedicated polypropylene tubing. The pump was operated at the maximum rate at which the saturated material would produce sufficient head to maintain a constant flow of water. A stainless steel bailer was used to vigorously surge the water column. (LMS-1 was initially developed by hand with a bailer.) This process forced water back into the sand pack from the well and cleaned the borehole of fine-grained material that had been compacted along its walls during the drilling process. Surging water also moved the sand pack, and the settling that resulted decreased its porosity, which increased its filtering capabilities. Measurements were made and records were kept of turbidity (using a field nephelometer), temperature, pH, and specific conductivity of the purged groundwater. Also measured and recorded was the volume of water purged after each slug surge and at varying intervals during pumping. These measurements are reported in Appendix G, along with the equipment calibration data.

The purge volumes and turbidities at the end of development were as follows:

WELL	TOTAL VOLUME PURGED (gal)	TURBIDITY (NTU)
LMS-1	110	>1000
LMS-2	480	8.5
LMS-3	300	4
LMS-4	610	12
LMS-5	28	25
LMS-6	720	6
LMS-7	570	6

Except for LMS-1, which was developed by hand, development produced clear water, well within the New York State Department of Environmental Conservation (NYSDEC) monitoring well guidance of 50 NTU. LMS-1 was subsequently redeveloped by pumping for approximately 1 hr on 1 March, the day of the Phase 1 groundwater sampling; approximately 660 gal were purged to achieve a final turbidity of 10 NTU. LMS-5 was found to have a low yield (28 gal) and accordingly the final turbidity was higher, but still within the 50 NTU target.

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2.9 GROUNDWATER SAMPLING

Phase 1 sampling was conducted on four wells on 1 March 1989, approximately one week after development (except for LMS-1, which was redeveloped on 1 March). Phase 2 sampling was conducted during 20-21 June for the seven wells on the Uhlich property and the four wells on the Mobil property. LBG (Mobil's consultant) collected split samples from the Mobil wells. In addition, on 6 July, LBG collected samples from all seven Uhlich wells; LMS collected a split sample from one well on that day. As detailed below, the samples were analyzed for different parameters depending on the date of sampling.

Before sampling, the wells were purged of three to five volumes of water with a vacuum pump fitted with well-dedicated Tygon tubing. Turbidity, pH, conductivity, and temperature were measured during purging and later during sampling. Turbidity and pH calibration were monitored in the field and adjusted as required. (Conductivity meters are calibrated in the LMS laboratory on a weekly basis.) Two conductivity meters were used on site: one for measuring conductivity in every well and the other for assessing quality control with a duplicate sample. Field data sheets, including calibration records, are presented in Appendices H, I, and J for the March, June, and July sampling, respectively. For LMS-1, two different meters were used to measure conductivity during the Phase 1 and Phase 2 samplings; the measurements were within 3%. Turbidity was measured following sampling to help assess the impact of the sampling activities on well water clarity. All postsampling turbidities were below 50 NTU except at LMS-4, which increased from 6 to 90 NTU after sampling during Phase 1.

Because of the high permeability of the aquifer, the water levels in the monitoring wells recovered quickly following purging (Appendices H, I, and J), and sampling was conducted soon after. Non-

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volatiles were first sampled with a peristaltic pump and dedicated Tygon tubing. Volatiles samples were collected from the middepth of the water column with laboratory-cleaned Teflon bailers. This procedure and order of sampling ensured that water turbidity would be kept to a minimum.

During the Phase 2 sampling conducted during 20-21 June 1989, a filtered (dissolved) metals sample was collected from each well. Filtering was accomplished on-site with a vacuum apparatus immediately following collection of the well water. The apparatus consisted of a 0.45-micron filter, filter clamp, vacuum flask, and vacuum pump. Unused (fresh) filters and separate laboratory-cleaned filter clamps and vacuum flasks were used for each sample.

Before the bailers and peristaltic pump/Tygon tubing were used, a field blank was collected by running deionized water through the equipment. The volatiles field blank was subsequently analyzed; no compounds were detected. If sample contamination from the field equipment had been suspected, the analytical laboratory would have been authorized to analyze the nonvolatile fractions of the field blank. However, no evidence of sample contamination was found, and the blank was not analyzed during Phase 1. Though no contamination was suspected, the dissolved metals field blank was also analyzed during Phase 2 because of the number of procedures involved in conducting the filtering.

Sample containers were filled as follows:

PARAMETER	MINIMUM VOLUME (ml)	CONTAINER	PRESERVATIVE
Water Samples			
Metals	1000	P	HNO_3 to pH <2
PHC	1000	G	H_2SO_4 to pH <2
PCBs	1000	G	
VOCs	2-40	G	
AE/BN	1000	G	

P - Plastic
G - Glass container
PHC - Petroleum hydrocarbons
AE - Acid extractable organic compounds
BN - Base/neutral organic compounds

Immediately following collection, each sample was labeled with the well identification number, job number, date, time, parameters for which the container was specifically filled, and preservative added. Containers were placed in iced coolers to maintain a constant temperature at or close to 4°C. Sample custody was documented continuously (Appendices H, I, and J).

As previously mentioned, LBG collected samples from the Uhlich wells on 6 July. The sampling was observed by LMS and one split sample was collected from LMS-2. The field data sheets are presented in Appendix J.

Procedures employed by LBG were identical to those used by LMS except as follows:

1. Dedicated bailers rather than pumps were used to purge the wells prior to sampling.

2. In-line filters rather than a vacuum apparatus were used to collect the dissolved metals samples.

Conductivities were independently measured by both LBG and LMS. LMS equipment was used to monitor sample turbidity.

2.10 SURVEYING

Horizontal and vertical surveying of the drilling locations was conducted by Joseph Caruso and Associates. The vertical survey was correlated to the same arbitrary vertical 100-ft datum utilized by LBG so that there could be better coordination of investigations on the Mobil and Uhlich properties. The elevations of the wells and well points based on the LBG datum are presented in Table 2-1. Caruso also verified the locations and measured the vertical elevations of the sewer inverts at each manhole of the sanitary sewer that services the Uhlich and Mobil properties (Table 2-2).

From the horizontal survey and an earlier property survey map, Caruso prepared a base map for the Uhlich property. By superimposing this map on the LBG base map for the Mobil property, a single base map was produced for the two parcels. Selected Mobil wells bordering the Uhlich property were surveyed by Caruso to tie the Uhlich wells into the same vertical datum. The Mobil property was not surveyed, however.

2.11 ANALYTICAL PROCEDURES

2.11.1 PHC

All PHC analyses were conducted by Envirotest Laboratories (Envirotest) of Newburgh, New York. EPA infrared spectrophotometric

TABLE 2-1

VERTICAL SURVEY: WATER LEVEL PROBES AND MONITORING WELLS

LOCATION	TOP ELEVATION
P-1[a]	98.97
P-2	102.42
P-3	98.86
P-4[b]	102.12
P-5	101.08
P-6	101.53
P-7	98.27
P-8	99.07
P-9	99.63
P-10	98.73
P-11	99.80
P-12	101.34
LMS-1	100.22
LMS-2	101.21
LMS-3	100.50
LMS-4	98.54
LMS-5	99.39
LMS-6	100.07
LMS-7	103.06

TOP - Top of piezometer.
Elevations in feet relative to Mobil datum of 100.00.

[a]Reconstructed in flush-grade curb box in June 1989. Previously TOP elevation was 100.61.
[b]Removed in June 1989.

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TABLE 2-2

SANITARY SEWER MANHOLE ELEVATIONS

DESIGNATION	ELEVATION RIM	ELEVATION INVERT
SMH 1	98.68	96.01
SMH 2	Buried under macadam pavement	
SMH 3	98.02	95.26
SMH 4	98.49	94.34
SMH 4A	99.46	94.13
SMH 5	98.91	93.98 8-in. VCP 95.46 12-in. CIP
SMH 5A	99.56	93.90 94.40
SMH 6	98.06	93.41
SMH 7	98.17	92.9±
SMH 8	98.56	92.82
SMH 9	97.21	92.09

Elevations in feet relative to Mobil datum of 100.00.

VCP - Vitrified clay pipe.
CIP - Cast iron pipe.

Method 418.1 was used for both groundwater and soil samples (modified method for soil samples).

2.11.2 Soil Analyses

Envirotest analyzed one soil sample for PCBs with gas chromatography (GC) by EPA Method 8080.

All other laboratory analyses were conducted by CAMO Laboratories (CAMO) of Poughkeepsie, New York. For soil samples, parameter groups included priority pollutant volatile organic compounds (VOCs), priority pollutant acid extractable organic compounds (acid extractables), base/neutral organic compounds (base/neutrals), PCBs, and total and leachable metals. VOC soil samples were analyzed with GC/MS (mass spectrometry) by EPA Method 8240, a purge and trap method. CAMO performed a forward library search of the EPA/NIH/NBS mass spectral library to identify and quantify up to 15 nonpriority pollutant compounds of the greatest apparent concentration in the purgeable organic fraction of the priority pollutant scan. For Phase 1 analyses, the method was modified to include analytical standards for monomethylamine, which also required that the run time of the equipment be modified to encompass the early purge of this chemical. This procedure was added because of the reported bulk storage of monomethylamine north of Building 57 by Zinsser/Harshaw. For Phase 2, monomethylamine was separately analyzed by direct injection into a flame ionization detector to avoid the problems of carryover into the GC that were experienced during Phase 1.

Analysis for AE compounds in soils was conducted with GC/MS by EPA Method 8270, a capillary column method, modified to incorporate an additional aniline standard for soil samples collected near former aniline bulk storage tanks. This procedure resulted in the analysis of all priority pollutant acid extractables and a tentative

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identification/quantification of nonpriority pollutant acid extractables, as noted above for VOCs. Soil was analyzed for acid extractables only during Phase 1.

Two soil samples were analyzed for base/neutrals during Phase 2. Analysis was conducted with GC/MS by EPA Method 8250. Also during Phase 2, several selected soil samples were analyzed for EP toxicity (arsenic, cadmium, and lead only). The extract was also analyzed for copper, iron, manganese, and zinc, referred to here as leachable metals. The soil samples were also analyzed for total metals. Table 2-3 lists the methods used for the metals analyses. As detailed in Chapter 3, some of the Phase 2 metals analyses were conducted on soil samples collected during Phase 1 and archived in drillers' jars by Uhlich. The absence of chemical cleaning of these jars does not materially impact upon these types of analyses. The sample selection was biased so that mostly samples containing ash and/or slag would be analyzed.

2.11.3 Water Analyses

During Phase 1 the VOC analyses on water samples were conducted with GC/MS by EPA Method 624, modified to incorporate additional standards for monomethylamine, diethyl ether, ethyl ether, and ispropyl ether. The ether standards were included because of LBG's report of ether in the groundwater on the northern portion of the Mobil property and near the center of the western side of that property. During Phase 2 the VOC analyses were conducted by EPA Methods 601 and 602 (GC methods). This changed protocol for VOCs allowed a lower laboratory dilution of some samples during analysis and also provided two separate measurements of chlorobenzene, analyzed by both Method 601 and Method 602. As with the Phase 2 analyses for soils, monomethylamine was analyzed separately from the other volatiles by direct injection into a flame ionization detector.

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TABLE 2-3

ANALYTICAL PROCEDURES FOR METALS

PARAMETER	EPA METHOD WATER	EPA METHOD SOIL
Antimony	204.1	
Arsenic	206.2	7060
Beryllium	210.1	
Cadmium	213.1	7130
Chromium	218.1	7190
Copper	220.1	7200
Iron	236.1	7380
Lead	239.1	7421
Manganese	243.1	7460
Mercury	245.1	
Nickel	249.1	
Selenium	270.2	
Silver	272.1	
Thallium	279.2	
Zinc	289.1	7950

Blank - metals not tested.

Base/neutrals and acid extractables were analyzed for with GC/MS by EPA Method 625, modified to include the additional aniline standard. As with the soil samples, a tentative identification/quantification of nonpriority pollutant compounds was also made.

PCBs were analyzed with GC by EPA Method 608 during Phase 1 only; cyanide was analyzed by EPA Method 335 during Phase 1 only. All Phase 1 groundwater samples were analyzed for priority pollutant metals plus iron and manganese (see Table 2-3 for analytical methods) and chlorides (EPA Method 325.2). During Phase 2 the metals analyses on groundwater samples were limited to arsenic, copper, iron, lead, manganese, and zinc.

The samples collected by LBG during June and July 1989 were apparently delivered to the Mobil laboratory in Paulsboro, New Jersey. As of this writing, Mobil has not released a report on these samples, and LMS does not know whether the samples were ever analyzed.

2.12 Water Level Measurements

Static water levels were measured several times in selected Uhlich and Mobil monitoring wells and water level probes during the course of the investigation. The information is summarized in Appendix K.

LMS and LBG measured water levels in all Uhlich and Mobil wells on 20 June. It took approximately 3 hrs to complete the measurements on the Mobil property. LBG indicated that continuous measurements were made at the Mobil wells in 1987 to determine lag times between the tidal fluctuations and water level response in the wells, but that information has not been formally reported. As a result, most of the 20 June data on the Mobil wells cannot be interpreted. Therefore, the groundwater flow patterns estimated by LMS are limited to the Uhlich wells and the Mobil wells along the Mobil-Uhlich property line that appear to exhibit minimal tidal fluctuations.

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CHAPTER 3

FINDINGS

3.1 GEOLOGY AND HYDROGEOLOGY

3.1.1 Geology

The bedrock underlying the Uhlich property is identified as the Inwood Marble and Fordham Gneiss formations, according to the 1970 U.S. Geological Survey (USGS) geologic map of New York. The principal rock of the Inwood Marble formation, which overlies the Fordham Gneiss, is a dolomitic marble. "Dolomitic" refers to the presence of the mineral dolomite, a calcium and magnesium carbonate (Schuberth 1968). According to the NUS report, the fracture zones in the bedrock occur at a depth of 350 ft. Borings advanced to bedrock on the former Anaconda property north of the Uhlich property indicate that the bedrock consists predominantly of gneiss, with several limestone intrusions. Depth to bedrock in these borings ranged from 50 to 100 ft. LMS advanced borings to a maximum depth of 18 ft without encountering bedrock.

According to the NUS report, there is only one water supply well penetrating the Fordham Gneiss within a 4-mile radius of the Tappan Terminal. This well serves the Andrus Memorial Home, 0.3 miles southeast of the property. The direction of groundwater flow in the rock in this vicinity is undoubtedly from east to west toward the Hudson River. Therefore, the bedrock aquifer below the Tappan Terminal is downgradient of this supply. (Note that "no significant contaminants" were detected in a 1989 NUS sample of water from this well.)

The native overburden identified in the Anaconda DEIS consists of 10- to 50-ft-thick sands overlain by organic silts and clays 7 to 26 ft thick. The Anaconda findings are similar to LBG's findings for the Mobil property. LBG reported a silt and clay lens 2 to 4 ft below grade at drill site OW-12. The clay was not found elsewhere at that site. Because LMS observed no clay at nearby borings B-1 and LMS-1, it appears to be limited. Some thin layers of clay and silt and clay were found in the fill elsewhere (B-3, B-3A, and B-5) on the Uhlich property.

Historical maps uncovered during this investigation (Figure 1-2) show that the northern quarter of the Uhlich property was filled no later than 1868. A survey of the Hudson River shoreline (COE 1906) indicates that the southern half of the Uhlich property and most of the Mobil property was still underwater until 1906. Most of the remainder of the Uhlich property was filled in by 1923, and the Mobil property by 1942. LMS encountered only fill, which consisted primarily of crushed stone and brick and ash along with sands, silts, glass, and wood, except at the easternmost side of the property, where native sediments were encountered at LMS-5 and LMS-6 (Figure 1-2). The 14-16 ft sample from LMS-5 was a clayey silt with gravel, grading to all clayey silt. The 13-15 ft sample from LMS-6 had a small recovery (0.1 ft) of gray silt. These silts and clays are most likely native sediments of the Hudson River. There was no recovery for the deep sample (16-18 ft) at LMS-7, probably because of the soupy texture of the subsurface material.

3.1.2 Hydrogeology

The depth to the water table is relatively shallow throughout the site (Appendix K), ranging from approximately 3 ft to 6 ft below grade. A water table contour map (Figure 3-1) has been constructed from water level data collected on 20 June 1989. Because the water

FIGURE 3-1

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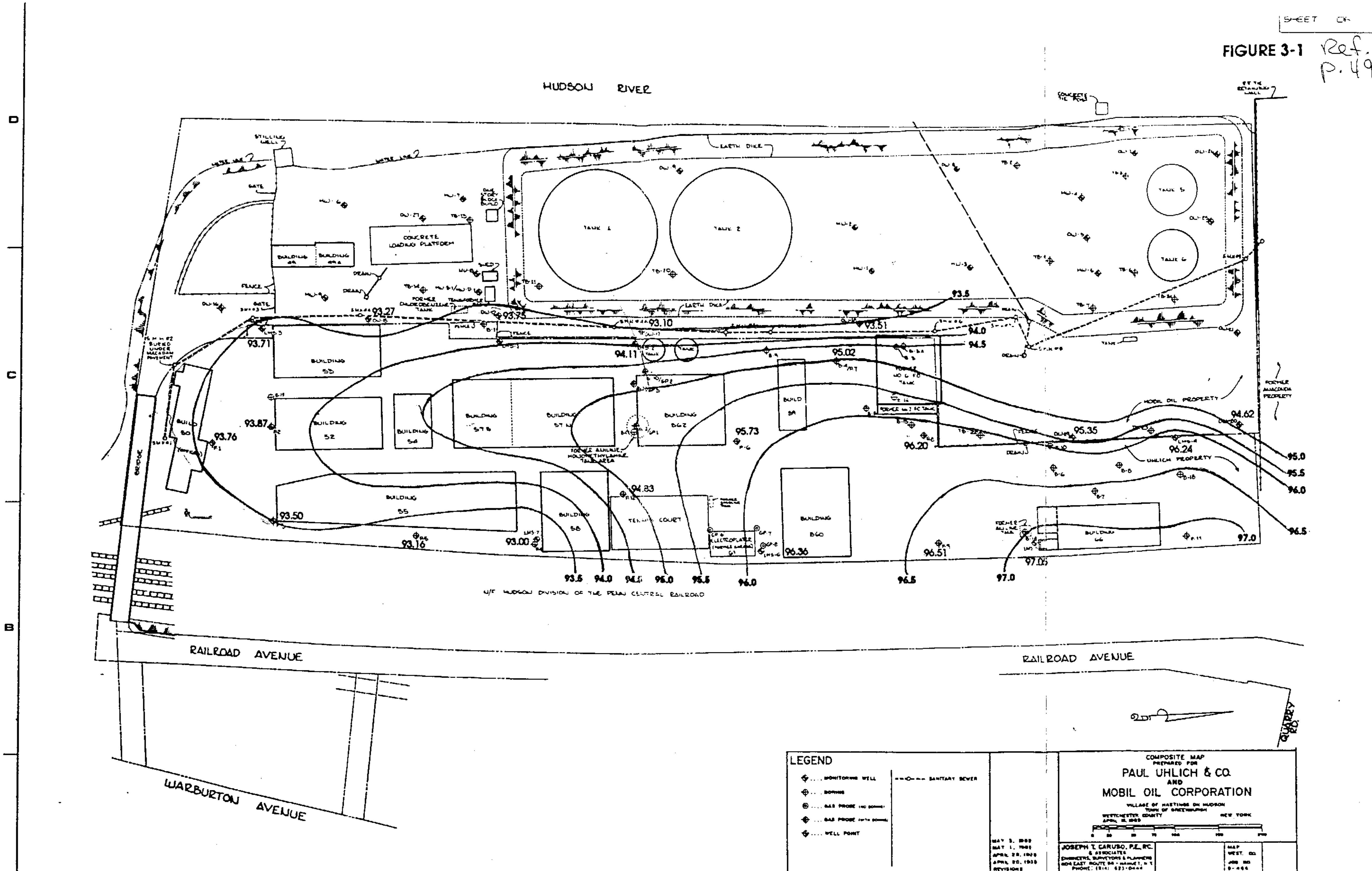

COMPOSITE MAP
PREPARED FOR
PAUL UHLICH & CO.
AND
MOBIL OIL CORPORATION
VILLAGE OF HASTINGS ON HUDSON
WESTCHESTER COUNTY, NEW YORK

JOSEPH T. CARUSO, P.E., P.C.

Lawler, Matusky & Skelly Engineers
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, New York 10965

20 JUNE 1989

WATER TABLE ELEVATION AT THE UHLICH PROPERTY

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level data from the Mobil wells were collected over a 3-hr period, only the data from the least tidally influenced Mobil wells closest to the Mobil/Uhlich property line were incorporated into the contouring.

As indicated in Figure 3-1, direction of groundwater flow is generally from inland toward the Hudson River and Mobil property. There is, however, a north to south flow through the center of the Uhlich property that eventually trends both west toward the Mobil property and east toward the railroad tracks. The eastward flow of groundwater from the center of the Uhlich property has a comparatively steep gradient in the area of Building 58. However, measurements taken along the eastern Uhlich property line indicate that groundwater flows north to south along the railroad, possibly a result of the highly permeable fill commonly used for railroad construction. Old storm sewers in that area may also impact on the groundwater movement. Several inquiries made to determine the availability of information on the subsurface of this portion of the railroad produced nothing. Copies of the correspondence are presented in Appendix L.

Because most of the property is covered with asphalt, the groundwater is likely recharged from upgradient areas to the northeast. The existence of the westward-flowing underground formation reported by Uhlich personnel between Buildings 54 and 57S is not confirmed by the water table map.

LBG studied the influence of Hudson River tidal fluctuations on the water levels in the Mobil monitoring wells. Although the tidal influence on the water table is significant in areas close to the Hudson River, it decreases with distance from the river and becomes negligible (0.1 to 0.2 ft) at the Uhlich/Mobil property line. Therefore, the continuous water level recording contemplated for the LMS investigation was not initiated for the Uhlich property.

The water table elevation and sanitary sewer are profiled in Figure 3-2. The water table is below the invert line along the southern two-thirds of the sanitary sewer (SMH 1 through 6). There is possible leakage (exfiltration) here from the sanitary sewer to the groundwater. The water table intersects the invert between SMH 6 and 7 and is above the invert line along the northern one-third of the sanitary sewer. Potential leakage (infiltration) here is from the groundwater into the sewer.

3.2 CHEMISTRY RESULTS - OVERVIEW

The chemistry results for groundwater sampled in March, June, and July are presented in Appendices H, I, and J, respectively. The chemistry results for soil samples are presented in Appendix M. Tables 3-1 through 3-4 (soil samples) and 3-5 through 3-8 (groundwater samples) summarize the results as follows:

- Table 3-1. Soil Sampling Results - Petroleum Hydrocarbons Samples. This table summarizes Envirotest's PHC results for 21 soil samples and observations made during sample collection (PID measurements and presence of odors or staining), as noted in the drill logs.

- Table 3-2. Soil Sampling Results - Volatiles. This table summarizes CAMO's volatiles results for soil samples along with observations made during drilling. Chlorobenzene, toluene, and trichloroethylene were present in these samples. (Section 3.7.8 discusses the monomethylamine results.) No other volatiles were detected and there were no additional nonpriority pollutant peaks in the chromatograms for these samples.

- Table 3-3. Soil Sampling Results - Base/Neutrals. Two samples collected in June were analyzed for base/neutrals.

- Table 3-4. Soil Sampling Results - Metals. This table summarizes the analyses for total metals and EP toxicity for arsenic and lead. The extracts for the toxicity tests were also analyzed for

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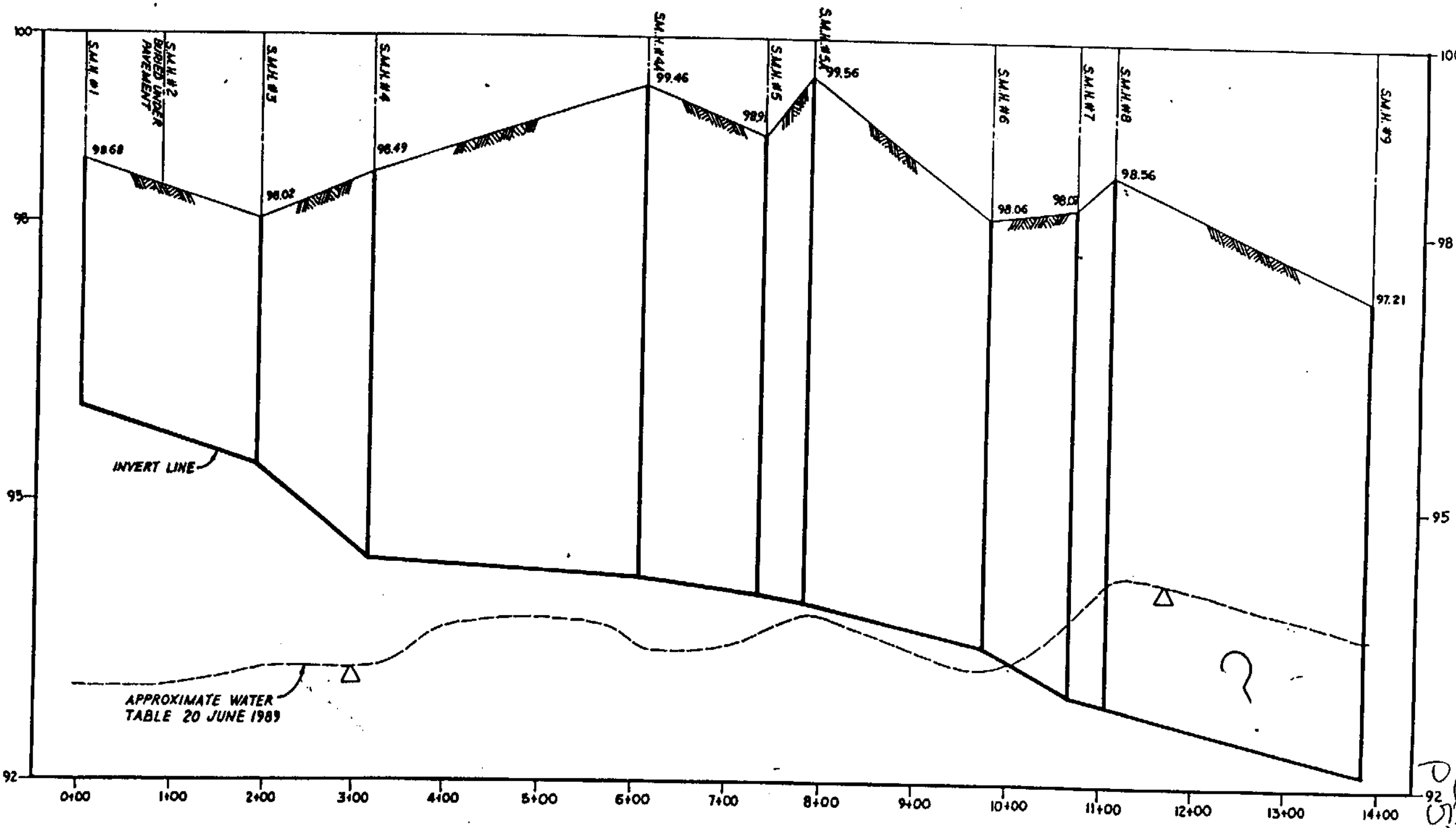
FIGURE 3-2
SANITARY SEWER PROFILE



ELEVATION (FEET)

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TABLE 3-1

SOIL SAMPLING RESULTS - PETROLEUM HYDROCARBONS

LOCATION		DEPTH (ft)	PHC CONCENTRATION (mg/kg)	DRILLING OBSERVATIONS		
				PID (ppm)	ODOR	STAINING
B-3	Previous No. 6 FO tank	4-6	330	0	P	
		8-10	12,000	0	SP	Oily sheen
B-4	100 ft S of B-3 (oil spill area)	0-2	2,200	0		
		2-4	46	0-4	P	
		4-6	<23	0-2	P	
B-5	100 ft SE of B-3 (former No. 2 FO tank)	0-2	580	0		
		2-4	390	0-10	SP	
		4-6	120	200	VSP	
B-6	Northern site (lease area)	0-2	840	0		
		4-6	<20	0-6	SP	
B-7	Northern site (lease area)	0-2	8,200	1-16	P	
		4-6	1,000	0		
B-8	Northern site (lease area)	0-2	3,000	0	P	
		4-6	76	0	P	
B-9	Contemplated pH system	2-4	230	1	a	
		8-10	<23	0-1		Sheen on water
B-10	Zinsser/Harshaw solvent recovery area	2-4[b]	11,800	1-20	SP	
B-16	Previous No. 6 FO tank	2-4	3,700	0		Saturated with oil. Black.
		4-6	16,000	1		
LMS-2		2-4	350	7	VSP	
		4-6	6,400	7	VSP	

[a]Slight unpleasant (chemical) odor.
[b]Also analyzed for volatiles (Table 3-3).

FO - Fuel oil
P - Petroleum
SP - Strong petroleum
VSP - Very strong petroleum

Note: All analyses performed on January-February 1989 samples except B-16 (June 1989).

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TABLE 3-2

SOIL SAMPLING RESULTS - VOLATILES

LOCATION		CONCENTRATION (mg/kg) CHLORO-BENZENE	TOLUENE	TRICHLORO-ETHYLENE	MONOMETHYL-AMINE	OTHERS[a]	DRILLING OBSERVATIONS PID (ppm)	ODOR	STAINING
B-1	3-5 ft	0.4	0.37	<0.1	b	<0.1	1-14	SIC	
B-1	9-11 ft	2.9	0.4	<0.1	b	<0.1	0.5		
B-2	2-4 ft	<1	<1	<1	b	<1	0		
B-2	6-8 ft	<1	<1	<1	b	<1	0	DO	
B-10	2-4 ft[c]	120	<0.1	<0.1	b	<0.1	1-20	SP	
B-10	4-6 ft	42	<0.1	<0.1	b	<0.1	30	SP	
B-10	8-10 ft	89	<0.1	<0.1	b	<0.1	20		
B-11	6-8 ft	0.2	<0.1	<0.1	b	<0.1	-	P	
B-17	2-4 ft				<250		-		
LMS-1	2-4 ft	1.2	0.3	0.4	b	<0.1	0		
LMS-1	8-10 ft	21	<0.1	<0.1	b	<0.1	0.5		

B-1 and LMS-1 located near former chlorobenzene tank.
B-2 located near former monomethylamine tank.
B-10 and B-11 located near former solvent recovery and downgradient of B-2.

SIC - slight chemical
DO - decaying organic
SP - strong petroleum
P - petroleum

[a]Detection limits for some volatiles, e.g., acrolein, are higher than shown in this table. See Appendix H for detection limits for each chemical. No additional nonpriority pollutant peaks were present in the chromatograms for these samples.
[b]See Section 3.7.8 for discussion of monomethylamine results.
[c]Also analyzed for PHC - 11,800 mg/kg (Table 3-2).

Note: All analyses performed on January-February 1989 samples except B-17 (June 1989).

TABLE 3-3

SOIL SAMPLING RESULTS - BASE/NEUTRALS

PARAMETER	CONCENTRATION (mg/kg) B-19 (6-8 ft)	B-16 (2-4 ft)
Bis(2-ethylhexyl)phthalate	<1.0	3.6
Fluoranthene	<1.0	5.3
Chrysene	<1.0	3.4
Pyrene	<1.0	9.6
Phenanthrene	<1.0	6.0
Anthracene	<1.0	1.7
Benzo(a)anthracene	<1.0	2.4
Benzo(b)fluoranthene	<1.0	1.4
Benzo(a)pyrene	<1.0	1.5
Others	<1.0	<1.0

Note: All analyses performed on June 1989 samples.

TABLE 3-4

SOIL SAMPLING RESULTS - METALS

BORING	DEPTH (ft)	TOTAL METAL (mg/kg) As	Cu	Fe	Pb	Mn	Zn	LEACHABLE METALS (ug/l) As	Cu	Fe	Pb	Mn	Zn
LMS-1	4-6[a]	27	9800	49800	570	111	300	<5	69000	460	<500	360	530
LMS-1	10-12[a]	20	345	25200	200	55	72	<5	60000	90	<500	350	610
LMS-2	6-8[a]	3	2040	6100	1960	62	3600	7	290	1560	<500	570	23000
LMS-3	4-6[a]	5	920	13550	100	66	2400	<5	9200	330	<500	140	38000
LMS-4	2-4	6	590	8900	550	505	530	<5	200	100	<500	250	2100
LMS-5	14-16	4	20	20400	40	485	60	<5	30	170	<500	5950	140
LMS-6	2-4[b]	19	187	11350	190	169	870	21	90	<50	<500	120	700
LMS-7	2-4	2	126	30000	110	240	144	5	160	90	<500	2400	900
LMS-7	4-6[a,b,c]	31	244	28400	1760	244	104	<5	120	<50	3900	1130	450
B-2	4-6[a]	15	550	17000	33	148	265	<5	780	110	<500	570	4800
B-9	4-6[a]	5	630	30700	3140	1530	2000	<5	2100	80	1000	32000	1800
B-10	4-6[a]	10	325	16000	480	119	740	<5	80	470	<500	1200	1700
B-16	2-4[a,b]	24	199	4620	880	770	184	11	50	790	<500	2060	4600
B-16	6-8	1	51	16600	60	234	61	6	60	1780	<500	3980	170
B-18	2-4	3	74	12300	100	420	57	<5	100	60	<500	5000	400
B-18	6-8	1	16	5650	50	169	44	<5	120	1400	<500	2480	260
B-18	10-12	9	15	4270	60	258	44	<5	40	2830	<500	2700	230
B-19	4-6	36	250	18050	920	22	320	<5	6550	90	<500	180	3300
EP toxicity limit:								500			5000		

[a]Ash present (drill log).
[b]Slag present (drill log).
[c]Chromiumlike flakes present (drill log). Sample also analyzed for chromium: 16 mg/kg and <30 ug/l.

Note: All analyses were performed on June 1989 samples except that LMS-1, LMS-2, LMS-3, LMS-4, B-2, B-9, and B-10 samples were collected during January-February 1989 and analyzed in June 1989.

TABLE 3-5

GROUNDWATER SAMPLING RESULTS

19 March 1989

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PARAMETER	CONCENTRATION (ug/l unless otherwise noted) LMS-1	LMS-2	LMS-3	LMS-4	TOGS[a]
Metals					
Antimony	10	<10	<10	<10	3
Arsenic	5	8	8	14	25
Copper	20	300	320	270	1,000
Lead	20	97	89	670	25
Silver	10	10	<10	10	50
Zinc	20	120	300	680	5,000
Iron	440	740	2,200	7,700	300
Manganese	450	890	40	760	300
On-Site Chemistries					
pH (SU)	6.2	6.6	6.4	7.1	6.5-8.5
Conductivity (umhos/cm)	1,897	1,640	996	989	
Temperature (°C)	13.1	9.7	10.5	7.9	
Turbidity (NTU)	16	18	54	6	
PHC	<500	<500	<500	<500	
PCBs[b]	<10	<10	<10	<10	0.1
Chlorides (mg/l)	320	320	178	116	250
Volatiles					
Chlorobenzene	8,100	1,000	240	33	20
Toluene	<100	28	19	140,000	50
Tetrachloroethylene	<100	27	31	43	0.7
Benzene	<100	<10	43	<5	ND
Methylene chloride	<100	<10	<10	1,400	50
Monomethylamine	<1,000	<1,000	<1,000	<1,000	
Ethers[c]	<50	<50	<50	<50	
Others[d]	<100	<10	<10	<5	
Semivolatiles					
2-Chlorophenol	12	<10	<10	<10	1
Benzo(b)fluoranthene	<10	<10	23	<10	2
Others[e]	<10	<10	<10	<10	

Not detected - beryllium (<10 ug/l), cadmium (<10 ug/l), chromium (<10 ug/l), mercury (<0.2 ug/l), nickel (<50 ug/l), selenium (<5 ug/l), thallium (<10 ug/l), cyanide (<20 ug/l).

ND - none detectable.

pH, conductivity, and temperature measured on site by LMS; PHC by Envirotest; all others by CAMO.

[a]The Class GA guidance values, presented for general reference only, are not considered appropriate for this area, which has the characteristics of a Class GSA or GSB aquifer.
[b]See Section 3.3 for a discussion of sample interferences.
[c]Diethyl ether, ethyl ether, isopropyl ether.
[d]Detection limits for some volatiles, e.g., acrolein, are higher than shown in this table. See Appendix H for detection limits for each chemical. No additional nonpriority pollutant peaks were present in the chromatograms for these samples.
[e]No other semivolatiles, including aniline as an acid extractable, were detected (10 ug/l detection limit for most compounds - see Appendix H). No additional nonpriority pollutant peaks were present in the chromatograms for these samples.

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TABLE 3-6

GROUNDWATER SAMPLING RESULTS

20-21 June 1989

PARAMETER	CONCENTRATION (ug/l) unless otherwise noted)											
	LMS-1	LMS-2	LMS-2[a]	LMS-3	LMS-4	LMS-5	LMS-6	LMS-7	OW-12	OW-17	OW-18	OW-19
EPA Method 602 VOCs												
Chlorobenzene	4000	1700	800	190	<1	<1	<1	<1	7000	4000	1000	<1
Benzene	<100	<10	11	<1	<1	5	<1	<1	<100	<100	<100	<1
Toluene	<100	<10	<10	<1	<1	1	<1	<1	<100	<100	<100	<1
Ethylbenzene	<100	<10	<10	<1	<1	3	<1	<1	<100	<100	<100	<1
Xylenes	<300	<30	<10	<3	<3	7	<3	<3	<100	<100	<100	<1
1,4-Dichlorobenzene	<300	<30	<10	<3	<3	32	<3	<3	<300	<300	<300	<3
Others	<300	<30	<10	<3	<3	<3	<3	<3	<300	<300	<300	<3
EPA Method 601 VOCs												
Chlorobenzene	5200	1500	900	200	<1	<1	<1	<1	10000	4800	1300	<1
Dichlorodifluoromethane	<100	<10	<10	<1	<1	13	<1	<1	<100	<100	<100	<1
Trans-1,2-dichloroethylene	<100	<10	<10	<1	<1	2	<1	<1	<100	<100	<100	<1
Others	<100	<10	<10	<1	<1	<1	<1	<1	<100	<100	<100	<1
Monomethylamine (mg/l)	<10	<10	<10						<10	<10		
Metals (Total)												
Arsenic	3	<3	<5	<3	4	<3	<3	3	<3	4	<3	<3
Copper	70	70	510	120	30	40	40	40	150	30	40	20
Iron	180	440	1100	1500	890	5000	510	1200	23000	570	800	250
Lead	4	<3	38	16	11	10	5	10	28	110	5	10
Manganese	390	1320	1100	150	440	1800	70	340	610	960	1020	2220
Zinc	70	30	110	160	30	20	70	40	2400	60	140	20
Metals (Dissolved)												
Arsenic	<3		<5			<3		<3	<3			
Copper	50		30			40		20	30			
Iron	220		850			2900		270	18000			
Lead	<3		<5			5		<5	27			
Manganese	390		1100			200		220	540			
Zinc	50		30			60		50	170			
Chlorides (mg/l)	400	340	247	420	110	4420	215	720	218	560	760	680
Turbidity (NTU)	2	4.5	10	2.5	5	11	2.5	20	25	5	9	8.5
pH (SU)	6.2	6.4	6.6	6.5	7.0	7.1	7.1	7.3	5.6	6.5	6.7	7.1
Conductivity (umho/cm)	2200	2580	1520	2710	990	11500	1470	2600	1830	2570	3170	2070

[a]Sampled 6 July 1989.

Note: LMS-5 sample analyzed for PHC (<500 ug/l).

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TABLE 3-7

COMPARISON OF ANALYTICAL RESULTS - UHLICH WELLS

March, June, and July 1989

PARAMETER	CONCENTRATION (ug/l unless otherwise noted)								
	LMS-1		LMS-2			LMS-3		LMS-4	
	MAR	JUN	MAR	JUN	JUL	MAR	JUN	MAR	JUN
Volatiles									
Chlorobenzene (Method 624)	8100		1000			240		33	
Chlorobenzene (Method 601)		5200		1500	900		200		<1
Chlorobenzene (Method 602)		4000		1700	800		190		<1
Tetrachloroethylene	<100	<100	27	<10	<10	31	<1	43	<1
Methylene chloride	<100	<100	<10	<10	<10	<10	<1	1400	<1
Benzene	<100	<100	<10	<10	11	43	<1	<5	<1
Toluene	<100	<100	28	<10	<10	19	<1	14000	<1
Metals (Total)									
Arsenic	10	3	<10	<3	<5	<10	<3	<10	4
Copper	20	70	300	70	510	320	120	270	30
Iron	440	180	740	440	1100	2200	1500	7700	890
Lead	20	4	97	<3	38	89	16	670	11
Manganese	450	390	890	1320	1100	40	150	760	440
Zinc	20	70	120	30	110	300	160	680	30
Chlorides (mg/l)	320	400	320	340	247	178	420	116	110
Turbidity (NTU)	16	2	18	4.5	10	54	2.5	6	5
pH (SU)	6.2	6.2	6.6	6.4	6.6	6.4	6.5	7.1	7.0
Conductivity (umhos/cm)	1897	2200	1640	2580	1520	996	2719	989	990

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TABLE 3-8

COMPARISON OF ANALYTICAL RESULTS - MOBIL WELLS

November 1986 and June 1989

PARAMETER	CONCENTRATION (ug/l unless otherwise noted)							
	OW-12		OW-17		OW-18		OW-19	
	1986	1989	1986	1989	1986	1989	1986	1989
Volatiles								
Chlorobenzene (Method 624)	12380		9520		907		<6	
Chlorobenzene (Method 601)		1000		4800		1300		<1
Chlorobenzene (Method 602)		7000		4000		1000		<1
1,2-Dichlorobenzene[a]	<1.9	<300	64.3	<300	48.4	<300	<1.9	<300
1,3-Dichlorobenzene[a]	<1.9	<300	<1.9	<300	22.7	<300	<1.9	<300
1,4-Dichlorobenzene[a]	BMDL 4.4	<300	154	<300	74.9	<300	<4.4	<300
Metals (Dissolved)								
Arsenic	<5	<3	<5		<5		6	
Copper	<50	30	<50		<50		<50	
Iron		18000						
Lead	<50	27	<50		<50		<50	
Manganese		540						
Zinc	2070	170	<60		<50		70	
pH (SU)	5.8	5.6	6.4	6.5		6.7	7.1	7.1
Conductivity (umho/cm)	73	1830	120	2570		3170	60	2070

June 1989 chlorobenzene concentrations calculated from average of Methods 601 and 602 results.
BMDL 4.4 - Chemical present below 4.4 ug/l method quantification limit.

[a]Base/neutral (EPA Method 625) analysis for 1986 sample.

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copper, iron, manganese, and zinc. Most of the samples contained ash and slag. One sample was tested for chromium.

- Table 3-5. Groundwater Sampling Results (1 March 1989). This table summarizes CAMO's results for priority pollutant metals, iron, manganese, cyanide, chlorides, volatiles, and semivolatiles as well as LMS' results for pH, conductivity, temperature, and turbidity. Envirotest's results for PHC are also shown. Because of the elevated chloride and conductivity levels in the groundwater and because the groundwater is in an estuarine segment of the Hudson River, the fill might be either a Class GSA or GSB aquifer. Because there are no GSA water quality criteria, NYSDEC regional staff have used GA criteria as a frame of reference to evaluate similar sites along the Hudson. Therefore, the NYSDEC TOGS 85-W-38 guidance values for Class GA groundwaters are presented for general information. However, LMS does not consider these values to be appropriate to the site because the aquifer is high in chlorides and is man-made fill in an estuarine segment of the Hudson River.

- Table 3-6. Groundwater Sampling Results (20-21 June 1989). This table summarizes CAMO's laboratory report and LMS' field measurements. Four samples (LMS-1, LMS-2, OW-12, and OW-17) were tested for monomethylamine. Four dissolved metals samples (LMS-1, LMS-5, LMS-7, and OW-12) were analyzed; the remainder have been temporarily archived. These samples were selected to cover a range of turbidities and to obtain at least one dissolved metals analysis for each property. As indicated previously, chlorobenzene was analyzed by two methods.

- Table 3-7. Comparison of Analytical Results - Uhlich Wells (March, June, and July 1989). This table summarizes the comparable March and June analyses for LMS-1, LMS-2, LMS-3, and LMS-4 and the July analyses for LMS-2.

- Table 3-8. Comparison of Analytical Results - Mobil Wells (November 1986 and June 1989). This table summarizes the comparable November 1986 analysis reported by LBG and the June 1989 analysis by LMS for OW-12, OW-17, OW-18 and OW-19.

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In the four soil samples (B-2: 2-4 ft and 6-8 ft; B-14: 0-2 ft and 4-6 ft) analyzed for acid extractables (plus aniline), none were detected at the detection limits of 10 or 50 ug/kg, depending on the compound.

The following sections of this chapter discuss these findings. For ready reference, Table 3-9 summarizes the organic gas measurements and other observations during drilling and also shows the PID measurements for the gas probes.

3.3 PCBs

3.3.1 Soil

One soil sample was analyzed by Envirotest Laboratories for PCBs (B-15: 2-4 ft). None were detected at a 0.58 mg/kg detection limit. (See Appendix M for the laboratory's data sheet.)

NUS reported trace (0.38 mg/kg) PCBs in the surficial soil sample collected from the nearby drainage way from the Uhlich to the Mobil property. Therefore, trace levels may also be present on the adjacent Uhlich property, but the source of the PCBs on the Mobil drainage way is unknown.

The June 1987 Mobil report reproduced in the 1988 NUS report also indicated that PCBs were present on the Mobil property. Concentrations in the 3.6 to 8.6 mg/kg range were attributed to transformers. That report indicated that PCBs may have migrated onto the Mobil property from the former Anaconda property, but no data were presented.

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TABLE 3-9

SUMMARY OF VAPOR MEASUREMENTS DURING DRILLING

LOCATION	OPEN BOREHOLE CGI (% LEL)	OPEN BOREHOLE PID (ppm)	PID GAS PROBE (ppm)	PID MEASUREMENTS OF SPLIT-SPOON SAMPLES (ppm) 0-2 ft	2-4 ft	4-6 ft	6-8 ft	8-10 ft	10-12 ft
South of Site									
B-19				0	0	0	0		
LMS-3				0	0	0	0		
LMS-7				2-3	5	3	5		
Near Former Chlorobenzene Tank									
B-1				0	0	1-14[a]	0	0	0.5
LMS-1	0			0	0	0	0	0	0.5
Near Former Zinsser/ Harshaw Solvent Recovery Area and Aniline/Monomethylamine Tanks									
B-2/GP-1			0.0	0	0	0	0		
B-10/GP-2			2.8	0	1-20[b]	30[b]	14[b]	20[b]	
B-11/GP-3			1.1	0			0[b]		
B-17									
LMS-2	25			7[b]	7[b]	7[b]	13[b]	7[b]	
Northern Half of Site									
B-3				0		0[b]	0-1[b]	0[b]	
B-3A				0	0	0-7[b]			
B-4				0	0-4[b]	0-2[b]			
B-5				0	0-10[b]	200[d]			
B-6	0			0	0	0-6[b]			
B-7	0	0		1-16	0	0			
B-9	30	0		0	1[a]	0-1[a]	0-1[a]	0-1[a]	
B-14[c]				4[a]	1[a]	0			
B-15				0	0				
B-16				0	0	1	1	0	0
B-18									
LMS-4	0			0	0	0			
LMS-5									
Electroplater									
GP-6			1.3						
GP-7			2.8						
GP-8			0.2						
LMS-6				0	0	0	0		

[a]Chemical odor.
[b]Petroleum odors.
[c]Aniline tank area.
[d]See Section 3.6.1.

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3.3.2 Groundwater

None of the Uhlich monitoring wells contained detectable levels of PCBs, although CAMO reported a high level of interference in the PCB extracts and a 100-fold dilution was required to complete the analyses. As a result, the detection limit was high (10 ug/l).

According to the 1987 Mobil report appended to the NUS report, PCBs were detected (28 ug/l) in one Mobil groundwater sample collected from OW-1. The 1989 NUS sample from this well contained no PCBs.

3.4 ANILINE AND ACID EXTRACTABLES

3.4.1 Soil

Four soil samples were analyzed for aniline and other acid extractables:

B-2 (monomethylamine/aniline tank area): 2-4 ft and 6-8 ft
B-14 (aniline tank area): 0-2 ft and 2-4 ft

At a 0.01 mg/kg detection limit, no aniline or other acid extractables were detected in the soil samples.

3.4.2 Groundwater

No aniline or other acid extractables were detected in the groundwater samples, although 12 ug/l of 2-chlorophenol was present in the LMS-1 sample. This chemical was detected at higher concentrations in two downgradient Mobil monitoring wells (OW-12: 44.7 ug/l; OW-17: 79.3 ug/l). No use of 2-chlorophenol was reported by either Mobil or Uhlich. The only other acid extractable measured in a Mobil well was 2,4-dichlorophenol (4.4 ug/l).

3.5 BASE/NEUTRALS

3.5.1 Soil

No base/neutrals were detected in one soil sample (B-19: 6-8 ft). Bis(2-ethylhexyl)phthalate was reported in the B-16, 2-4 ft sample. The reported presence of this compound may be a result of laboratory contamination, however, which is common, rather than actual environmental conditions. Eight other compounds were detected in the B-16 sample. The drill log for this boring indicates that a portion of this sample was saturated with tar. Benzo(a)-fluoranthene, one of the nine base/neutral compounds present in this soil sample, was also detected in February in downgradient well LMS-3 (23 ug/l).

All four base/neutrals reported by NUS in the sample collected from the Mobil swale that drains from the Uhlich property were present in the B-16 sample. Benzo(a)fluoranthene was present in the B-16 sample, but not in the NUS sample. Uhlich reports that these chemicals are not used in its pigment manufacturing. No documentation has been uncovered linking the chemicals to Zinsser/Harshaw. It is likely that the base/neutrals in the NUS sample are derived from asphalt particles as the Uhlich property is largely paved.

3.5.2 Groundwater

Benzo(b)fluoranthene, the only base/neutral detected in the Uhlich groundwater samples (23 ug/l in LMS-3), was not present in any of the Mobil wells.

Other base/neutrals, most notably 1,2-, 1,3-, and 1,4-dichlorobenzene, were present in Mobil wells in OW-17 and OW-18. As noted above, these chemicals were not present in the Uhlich wells, one of which (LMS-2) is directly upgradient of OW-17.

3.6 PHC

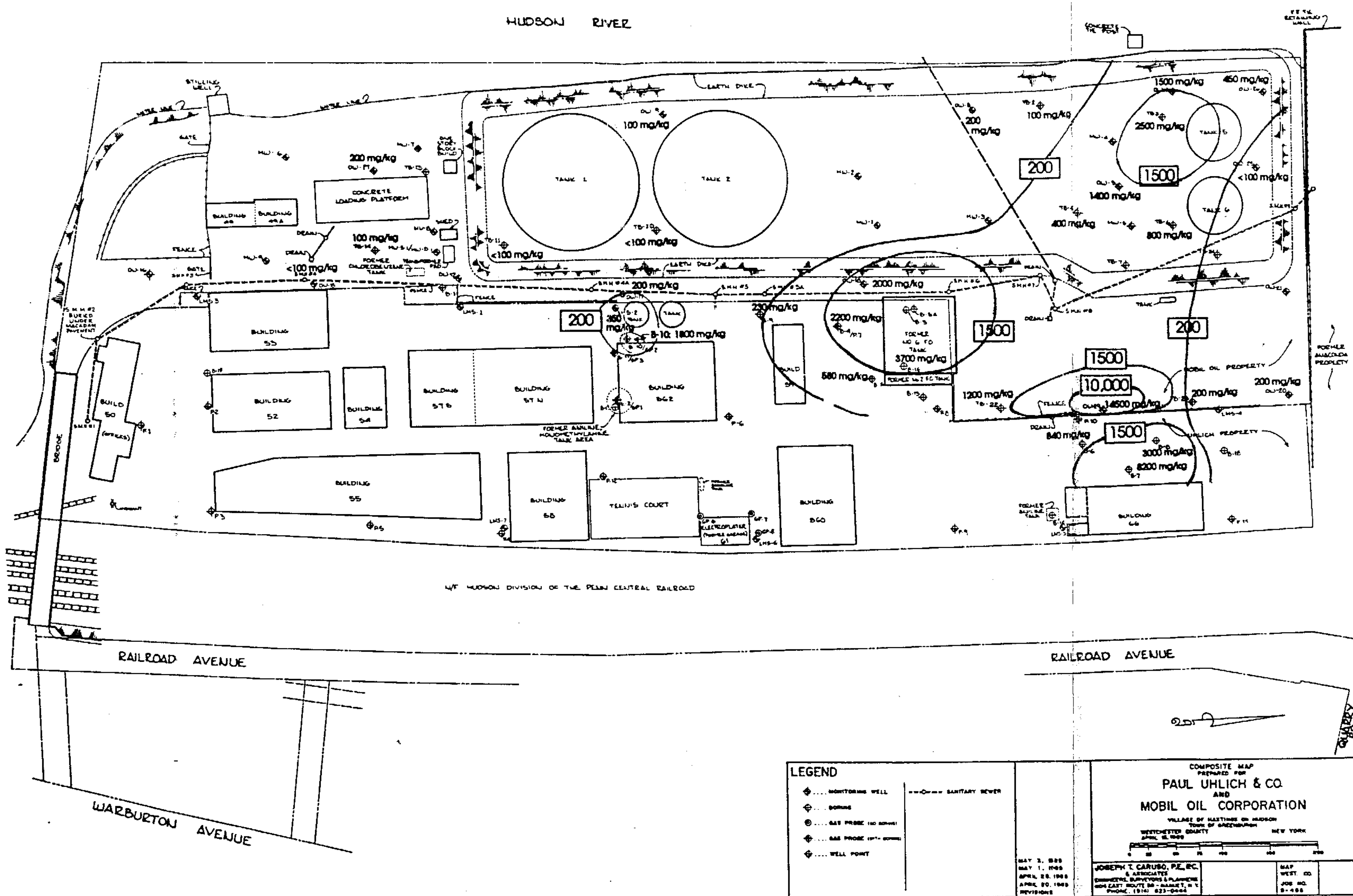
3.6.1 Soil

Petroleum hydrocarbon (PHC) is the indicator parameter for petroleum products, such as fuel oils, and also for some petrochemicals. Most of the soil samples contained measurable concentrations of PHC, some at near-saturation levels (as a rule of thumb, 30,000 mg/kg is considered saturated). Envirotest Laboratories' quality control data, which show good precision and accuracy, are presented in Appendix H.

Surficial (0-4 ft) PHC concentrations are depicted in Figure 3-3, in the deeper soils in Figure 3-4. These figures also show the concentrations reported by LBG on the Mobil property. In the northern portion of the Uhlich property (B-6, B-7, and B-8) surficial PHC concentrations were in the 840-8200 mg/kg range. The lowest concentration (840 mg/kg in B-6) was detected in the soil closest to the Mobil property. The surficial concentrations increase toward Building 66, which at one time housed a fuel oil distributor. With the exception of OW-19 adjacent to B-6, where 14,500 mg/kg was measured, concentrations decrease toward the Mobil property in this area. PHC concentrations rapidly attenuate with depth and decrease toward the Mobil property line (Figure 3-4), suggesting that separate sources account for the PHC on the Mobil and Uhlich properties in this area.

Borings B-3, B-4, B-5, and B-9 were advanced in the vicinity of two former No. 2 fuel oil tanks (5000 and 12,000 gal) and one former No. 6 fuel oil tank (250,000 gal) shown on the 1955 Zinsser map (Section 1.2.1.5). Uhlich further reports that this tank constantly leaked. As depicted in Figure 3-2, surficial PHC concentrations center around this tank. The relatively low PHC concentration (120 mg/kg) for the B-5, 4-6 ft sample is not believed

FIGURE 3-3 Ref. 5 p.67 of 84



COMPOSITE MAP PREPARED FOR PAUL UHLICH & CO. AND MOBIL OIL CORPORATION

VILLAGE OF HASTINGS ON HUDSON, TOWN OF GREENBURGH, WESTCHESTER COUNTY, NEW YORK

JOSEPH T. CARUSO, P.E., P.C. & ASSOCIATES

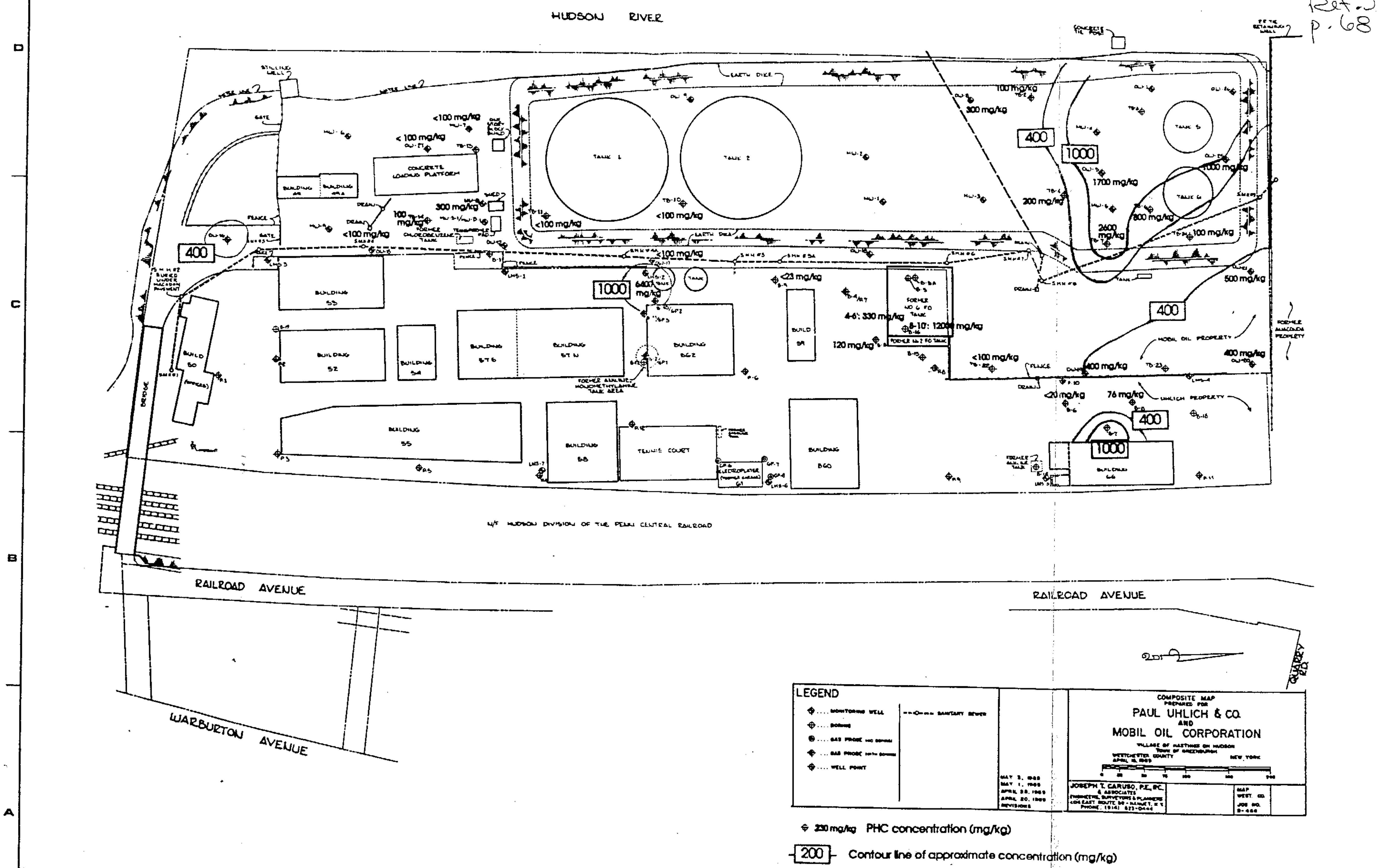
⊕ 230 mg/kg PHC concentration (mg/kg)

[200] Contour line of approximate concentration (mg/kg)

Lawler, Matusky & Skelly Engineers
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, New York 10965

PHC IN THE SOIL 0-4 FT DEEP

FIGURE 3-4



230 mg/kg PHC concentration (mg/kg)

200 Contour line of approximate concentration (mg/kg)

Lawler, Matusky & Skelly Engineers
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, New York 10965

PHC IN THE SOIL
GREATER THAN 4 FT DEEP

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to be representative because the nearby B-16, 4-6 ft sample contained 16,000 mg/kg, which conforms more closely to other samples from that area. The low B-5, 4-6 ft concentration may be a result of earth moving during the demolition of the former fuel oil tanks in that area. It is not understood why the concentration at this depth would be so low when such a high PID measurement was recorded for that same sample.

Because concentrations generally attenuate with depth (Figure 3-4), one of the highest PHC concentrations found on the Uhlich property (12,000 mg/kg) was in the 8-10 ft deep soil at B-3, well below the water table. Because soils from only one nearby boring (B-9: <23 mg/kg) and none from any nearby Mobil borings were collected for PHC analysis at this depth, the extent of the PHC at this depth is unknown.

PHC is also centered around the former Building 62 Zinsser/Harshaw solvent recovery (B-10 and LMS-2). Based on LBG's results for the two soil samples analyzed at boring OW-17 (2-4 ft: 200 mg/kg; 10-12 ft: <100 mg/kg), the hydrocarbons in this zone of PHC in the soil do not extend to the Mobil property.

3.6.2 Groundwater

Although PHC was present in the soil, no floating product was present in the Uhlich monitoring wells and no PHC was detected (0.5 mg/l detection limit) by Envirotest in the groundwater samples. These findings are consistent with the June 1987 Mobil report. The Mobil study, which achieved a lower detection limit of 0.1 mg/l, indicated that Mobil groundwater samples contained low levels of PHC: 2.2 mg/l in OW-5 and 0.2 mg/l in OW-16, which is adjacent to the southern end of the Uhlich site. Floating product at OW-18 on the Mobil property is 0.5 in. thick.

3.7 METALS

3.7.1 Soils

Based on the Phase 1 sampling results for metals in groundwater, 18 soil samples were analyzed in Phase 2 for six metals (arsenic, copper, iron, lead, manganese, and zinc). The results for total and leachable metals in soil are summarized in Table 3-4. Most of the samples contained copper and lead at concentrations higher than typically measured in native soils. Zinc was also elevated in half of the samples (compared to native soils); iron and manganese were typical of concentrations commonly seen in native soils.

For the most part, samples containing ash or slag were selected for analysis. Those containing ash or slag tended to contain and leach more metals than non-ash samples, although there were exceptions. None of the samples were EP toxic. The LMS-7, 4-6 ft sample leached 3.9 mg/l of lead; the toxicity limit is 5 mg/l.

3.7.2 Groundwater

Copper, lead, zinc, iron, and manganese were detected in all seven Uhlich wells. Arsenic was present at trace concentrations in LMS-1 and LMS-4. CAMO's quality control data for metals (Appendix H) show good precision and accuracy. Beryllium, cadmium, chromium, mercury, nickel, selenium, and thallium were not detected in either the Uhlich or the Mobil wells. Neither LMS nor LBG tested any samples for barium, the only metal detected by NUS in the soil sample collected from the Mobil drainage way near the Uhlich property (see Table 1-2). Antimony was present at the 10 ug/l detection limit in only one well (LMS-1); silver at the 10 ug/l detection limit in three wells (LMS-1, LMS-2, and LMS-3). Although these elements were not detected in the Mobil wells, the Mobil detection limits were higher for those samples. The concentrations for antimony, lead, manganese, and iron were higher than the GA criteria in at least one Uhlich well. (As stated previously, the area groundwater is not classified, but has the general characteristics of a GSA or GSB groundwater. Because there are no GSA or GSB criteria, the GA criteria are discussed to provide a general reference.) The highest manganese and iron concentrations were measured in upgradient well LMS-5.

It is suspected that infiltrating rainwater and groundwater flow leach lead and other metals from the ash fill observed in most of the Uhlich borings and that this leachate accounts for some of the metals concentrations in the monitoring well samples. As explained below, mixing of the site fill with the water in the monitoring wells can add metals to the groundwater samples and result in reported metals concentrations that are higher than actually exist.

The highest zinc concentration measured in Phase 1 (680 ug/l in LMS-4) was not verified by the Phase 2 sampling for that well (30 ug/l) in June. Otherwise the Uhlich zinc concentrations still ranged widely, from 20 to 300 ug/l, but were well within even GA criteria.

The Uhlich monitoring wells contained detectable levels of copper and lead:

	CONCENTRATION (ug/l)					
	COPPER		LEAD		TURBIDITY (NTU)	
	Mar	Jun	Mar	Jun	Mar	Jun
LMS-1	20	70	20	4	16	2
LMS-2	300	70	97	<3	18	4.5
LMS-3	320	120	87	16	54	2.5
LMS-4	270	30	670	11	6	5
LMS-5		40		10		11
LMS-6		40		5		2.5
LMS-7		40		10		2

Note: July 1989 LMS-2 sample contained 510 ug/l copper and 38 ug/l lead. Turbidity was 10 NTU.

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All of the copper concentrations and all of the June 1989 lead concentrations were within the TOGS criteria. Three out of four March concentrations and the one July concentration were above.

The temporal variation in lead concentrations appears to be at least in part the result of the variation in turbidity, best demonstrated by the findings for LMS-2. As noted in Section 2.8, the Uhlich well turbidities are low. In addition, the metals water samples collected by LMS were first drawn with a peristaltic pump (rather than with a bailer) to minimize any increase in turbidity. Though the turbidities are low, sample-to-sample variations are still unavoidable. High turbidity levels can produce higher measured metals concentrations than are actually present in the groundwater, especially for lead, which has a relatively high affinity for solids. Turbidity is an indicator for soil solids in the sample, and, as indicated in Section 3.7.1, the site soils contain relatively high concentrations of lead.

LBG did not detect lead and copper in the Mobil groundwater samples. However, LBG field filtered all the groundwater samples (presumably before preservation) except those from OW-5 and OW-18, which were laboratory filtered. Filtration removes suspended solids containing metals, thereby causing lower measured metals concentrations. The purpose of filtering is to remove those suspended solids that are found in the well but not in the groundwater. However, solids in the well might also scavenge metals in the groundwater, and filtering could result in lower measured concentrations than actually exist. Conversely, not filtering may result in overstating metals concentrations, particularly if the sample is turbid. NYSDEC typically does not accept filtered results for groundwater assessments.

The impact of filtering is demonstrated by the differences in the filtered and unfiltered samples (see Table 3-6). All filtered concentrations are lower except for two zinc results, attributable to normal analytical variability. Though the impact of filtering in reducing metals concentrations is apparent, there is only one instance where the reduction lowered the concentration from above the TOGS guidance to below the guidance. In this case, filtering lowered the lead concentration in the July 1989 LMS-2 sample from 38 to <5 ug/l.

3.7.3 June 1989 Field Blank

The CAMO Laboratories report shows substantial metals concentrations in the total metals field blank for June 1989, particularly for iron (310 ug/l), lead (99 ug/l), and manganese (40 ug/l). CAMO analyzed this sample in duplicate to confirm the findings. To help identify the cause of this contamination, CAMO was authorized to analyze the chlorides field blank (after preservation at the laboratory) and the dissolved metals field blank (preserved on-site) for these three metals. The results are summarized in Table 3-10. As indicated, the dissolved metals blank was free of metals, ruling out an improperly cleaned sample container or contaminated preservative as a contaminant source. As the chlorides blank was also free of metals, use of contaminated field blank water can be eliminated as a possible cause.

Laboratory contamination during sample digestion seems unlikely because the total and dissolved lead concentrations in the well samples are relatively low, in the <3-28 ug/l range, except for OW-17 at 100 ug/l.

By the process of elimination, it is suspected that the contamination is a result of either fugitive dust entering the container while it was open or inadvertent contact with the ground by one of the free ends of the Tygon tubing before the blank was col-

TABLE 3-10

METALS IN GROUNDWATER FIELD BLANKS

June 1989

PARAMETER	CONCENTRATION (ug/l) TOTAL METALS	DISSOLVED METALS	CHLORIDES[a]
Arsenic	<3		
Copper	10		
Iron	310	<50	<50
Lead	99	<5	<5
Manganese	40	<10	<10
Zinc	10		

[a]After preservation by CAMO.

lected. Thus, there is reason to believe that the June 1989 metals results are valid.

3.8 VOLATILES

3.8.1 Ethers

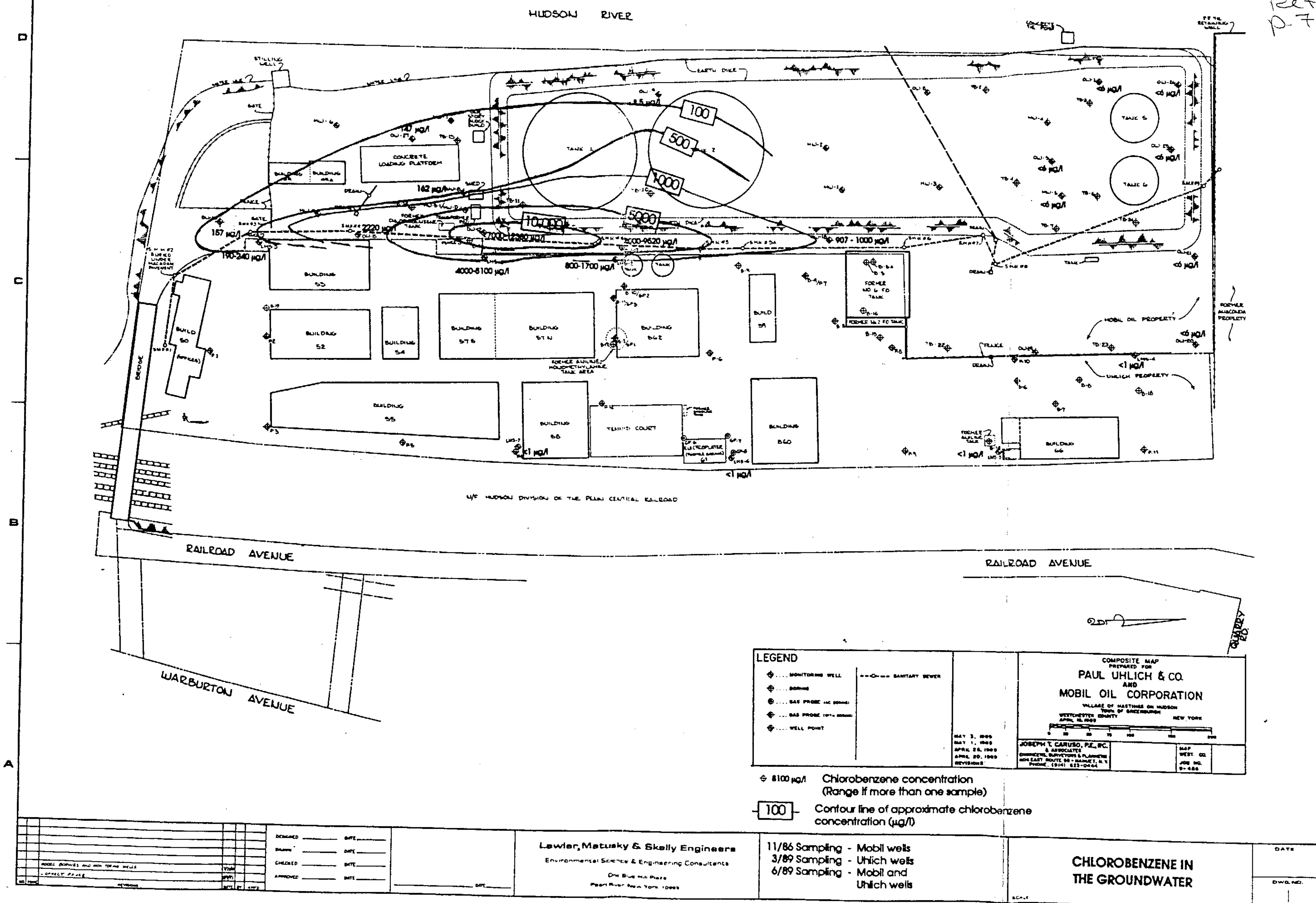
Ethers found by LBG on the Mobil property do not appear to measurably affect the Uhlich property. The CAMO detection limit, however, was 50 ug/l for the three ethers, and the concentrations in nearby Mobil wells OW-19 and OW-20 were 70 and 11 ug/l, respectively.

3.8.2 Chlorobenzene

3.8.2.1 Soil. LMS collected 10 soil samples for volatiles analysis (Table 3-2). No comparable soil test is documented in the Mobil reports. Low (less than 21 mg/kg) concentrations of chlorobenzene are present in soil around LMS-1, located near the former chlorobenzene tank. This finding, as explained in Section 3.8.2.2, suggests that the Uhlich chlorobenzene groundwater concentrations at this location are largely a result of diffusion and groundwater movement. Higher concentrations (42-120 mg/kg) were found at the western corner of Building 62, near the former Zinsser/Harshaw solvent recovery operation.

3.8.2.2 Groundwater. Figure 3-5 depicts chlorobenzene concentrations in the groundwater based on the November 1986 LBG sampling of the Mobil wells and the March, June, and July 1989 LMS samplings of the Uhlich wells. Concentrations are highest near OW-12 and the former chlorobenzene tank area, and consistently decline with distance from the tank.

FIGURE 3-5



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For the June analyses the Methods 601 and 602 chlorobenzene analyses agree for most of the samples. The relative percent differences (RPDs) were less than 6% for seven sets of samples; three (LMS-1, OW-17, and OW-18) RPDs were in the 18-26% range. There was less agreement for one set of samples from Mobil well OW-12 (RPD 35%).

With one exception, all positive concentrations are higher for Method 601 than for Method 602. Because the Method 601 spiked recovery was approximately 80%, actual concentrations may be even higher. No spiked chlorobenzene recoveries were reported by CAMO for Method 602 because chlorobenzene and xylenes co-elute.

The July (LMS-2 only) and June chlorobenzene concentrations are close to those measured by Method 624 in March 1989 (for Uhlich wells, see Table 3-7) and November 1986 (for Mobil wells, see Table 3-8). At most, concentrations dropped by one-half at LMS-1 and OW-17 since the previous samplings. The two June 1989 analyses for LMS-4 reported no chlorobenzene present; 33 ug/l had been measured in March 1989. The June findings are considered more representative of actual environmental conditions at LMS-4 since they better match those for nearby wells.

The likely source of this chemical in the groundwater is the former chlorobenzene tank area. The extent of chemical in the groundwater to the north suggests that chemical product may have flowed along a drainage swale that reportedly predated (before 1961 or 1962) the sanitary sewer servicing the two properties. Neither Uhlich, a pigment manufacturer, nor Mobil, a petroleum distributor, report using chlorobenzene. Its presence in the Uhlich groundwater may be in part a result of diffusion in the groundwater and stormwater runoff from west to east during the Zinsser/Harshaw tenure.

The concentration of chlorobenzene in LMS-2, the monitoring well immediately downgradient of the former Zinsser/Harshaw solvent recovery operation, was considerably less than the concentration in OW-17, the next farther downgradient well. Therefore, the soil in the vicinity of B-10 and B-11 (near the former solvent recovery operation) is at most a minor source of chlorobenzene to the groundwater.

3.8.3 Toluene

Trace concentrations (less than 0.4 mg/kg) of toluene were present in three of the 10 soil samples tested. For the March 1989 sampling the concentrations were <100, 28, 19, and 1400 ug/l, respectively. No toluene was detected in the water samples collected from these wells in June 1989, nor in the samples from LMS-5, LMS-6, and LMS-7. Because the March 1989 concentrations in LMS-4 (140,000 ug/l) appear high in light of the fact that toluene was not detected in any of the downgradient Mobil wells and no toluene was detected in June, the March detections are not considered an accurate reflection of the groundwater chemistry at LMS-4.

It should be noted, however, that CAMO's analysis of the March LMS-4 sample was initially conducted by analyzing a 50 ug/l standard, then a method blank, and then the sample itself subjected to a dilution factor (DF) of 10. The measured toluene concentration was too high to be measured (off-scale). A 30 ug/l standard was analyzed and then two method blanks were analyzed to verify that no residual contamination remained in the equipment. The final toluene analysis was then conducted with a DF of 1000. The measured output was 140 ug/l, resulting in a sample concentration (140 ug/l x 1000) of 140,000 ug/l. Though apparently valid, these results are still considered anomalous and were not confirmed by subsequent sampling.

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3.8.4 Methylene Chloride

This chemical was detected only in the LMS-4 groundwater sample (1400 ug/l) and not in any of the Mobil water samples in March. Since methylene chloride is a common laboratory contaminant, CAMO thoroughly reviewed their quality control data to verify the results. Confirmation was obtained with the multiple dilutions needed for the toluene analysis. At the DF of 10, the measured concentration was 135 ug/l; for the DF of 1000, 1.15 ug/l. These results are consistent, and CAMO reported the DF-10 run. As for toluene, the March analytical results, though confirmed by CAMO, are still anomalous in light of the concentrations in the nearby wells and no detectable methylene chloride in any of the June samples.

3.8.5 Tetrachloroethylene

This chemical was present in three March Uhlich well samples (LMS-2, LMS-3, and LMS-4) in the 27-43 ug/l range but was not detected in any of the June samples. No tetrachloroethylene was detected in any of CAMO's soil samples.

3.8.6 Trichloroethylene

A trace amount (0.4 mg/kg) of trichloroethylene was detected in only one of the 10 soil samples, but not in any groundwater sample.

3.8.7 Benzene

Benzene was not detected by either LBG or NUS in samples collected from the Mobil monitoring wells, only in the sample collected in March from LMS-3 at a concentration of 43 ug/l. It did not reappear in June. Benzene was detected just above the method detection limit (11 ug/l) in July in one of the three samples collected from LMS-2. The concentration in LMS-5 was 5 ug/l. The development water in LMS-5 had a fuel-like odor, suggesting the benzene might be the result of a gasoline spill. Neither Mobil nor Uhlich report using benzene.

3.8.8 Monomethylamine

As noted in Chapter 2, the standard purge and trap GC/MS analyses conducted in March 1989 for the volatiles of interest (Method 624 for groundwater and Method 8240 for soil) were modified to incorporate an additional standard for monomethylamine because a Zinsser/ Harshaw monomethylamine bulk storage tank was located between Buildings 57 and 62.

Monomethylamine is not easily detected by the analytical column method used by CAMO for the March analyses. As a result, the detection limits were high (1000 ug/l); no monomethylamine was detected in any of the groundwater samples. Selected June groundwater samples were analyzed for monomethylamine by direct injection into a flame ionization detector to achieve a lower detection limit of 10 ug/l; none was detected.

Boring B-17 was advanced in June 1989 to collect soil beneath the former monomethylamine tanks. The soil was analyzed similarly to the method used on the June groundwater sample. At a 250 mg/kg detection limit, no monomethylamine was detected. Based on the June chemistry, observations during drilling of the borings in the vicinity (no odors), and the soil gas tests, LMS concludes that the subsurface at the Uhlich property has not been materially impacted by monomethylamine.

CAMO's reported concentrations for monomethylamine in the 10 Phase 1 soil samples are presented in Appendix H on a wet weight basis. Conversations with CAMO personnel revealed significant problems

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with the analysis. The affinity of monomethylamine for the purge trap and the analytical column caused the standards and samples to carry over intermittently from one run to the next. Even though one blank would be run after analysis and would appear free from carryover, the next blank would have a contamination problem from carryover in the analytical system. The analyst was never certain whether the monomethylamine peak detected in the sample was due solely to the sample or whether it was influenced by some previous analysis.

3.9 CONDUCTIVITY AND pH

Reflecting the measured concentrations of chlorides and various metals, the conductivities in the Uhlich wells are relatively high and typically range from 1000 to 2600 umhos/cm. However, the groundwater at upgradient well LMS-5 had the highest conductivity (11,500 umhos/cm) and also the highest chlorides concentration (4420 mg/l).

The conductivities measured by LMS in the four Mobil wells were in the 1800-3200 umhos/cm range; the conductivities reported by LBG for these same wells are much lower, however (less than 120 umhos/cm). The cause of this difference is unknown. The LMS measurements are approximately the same from sampling to sampling and are also consistent with the elevated chlorides concentrations in the groundwater. Therefore, the higher conductivities measured by LMS are considered the accurate description of the groundwater.

The groundwater pH on the Uhlich property is in the 6.2 to 7.3 range. While pH tends to drop from upgradient to downgradient, the highest pH was recorded in LMS-7, the downgradient well located near the railroad track.

3.10 ELECTROPLATER

The gas concentrations registered by the probes installed around the electroplating operation in Building 61 were all low (0.2-2.8 ppm). The probes were constructed as a cost-effective means for describing possible impacts of the plating operations on the Uhlich property.

3.11 COLOR

Some green stains (LMS-3: 2-4 ft) and orange sand (B-19: 2-4 ft) were encountered during drilling at the Uhlich property. Most of the fill material was black, however, often because of the presence of petroleum. Therefore, colors associated with dyes and/or pigments could not be observed in the soil. LBG observed colors in the soil at several locations on the Mobil property and Mobil analyzed some soil samples for color in their laboratory. However, we do not understand why the LBG descriptions of some of these analyzed samples report no coloration whereas the as-received description by Mobil states that color is visible. LBG attributed the color in the deep Mobil soils to leakage from the sewer on the Mobil property. If LBG's allegation is correct, their findings would then be consistent with those of LMS.

When the three wells on the south side of the Mobil property were sampled, LMS observed that all had purple- or violet-colored water. Only LMS-1 and LMS-2 were reported as having colored water (purple and blue) when sampled. LBG's conclusion that the colors are not hazardous appears reasonable in light of the chemical analyses conducted on the Mobil and Uhlich soils and groundwater.

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RISK ASSESSMENT REPORT FOR FORMER ZINSSER OPERATIONS AT THE MOBIL/UHLICH HASTINGS ON HUDSON SITE

JANUARY 25, 1990

Prepared for:

CHEVRON CHEMICAL COMPANY
6001 BOLLINGER CANYON ROAD
SAN RAMON, CA 94583-0947

ChemRisk™
A McLaren Company

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APPENDICES

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Appendix B	Approach For Modeling Of Chemical Vapor Flux From Soil And Example Calculations
Appendix C	ISCST Model Outputs
Appendix D	Non-Carcinogenic and Carcinogenic Health Risk Tables

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1.0 INTRODUCTION

ChemRisk, a division of McLaren, was retained by Chevron Chemical Company to conduct a focused risk assessment evaluation for possible remediation and future development of the Mobil/Uhlich Hastings on Hudson site located in New York.

To ensure that a mutually acceptable approach was established for the risk assessment, ChemRisk developed a protocol that presented the various parameters, assumptions, and environmental data to be used (ChemRisk, 1990). Site data for use in the risk assessment was contained in the following reports supplied by Chevron Chemical Company:

- Sprangler, Carlson, Gubar, Brodsky, and Frishling, 1989.
- Lawler, Matusky, and Skelly Engineers, 1989.
- NUS Corporation, 1989.
- Leggette, Brashears, and Graham, Inc. 1987.
- Eldon Environmental Management Corp. 1989.

As requested by Chevron, the chemicals to be evaluated in the risk assessment included chlorobenzene, diethyl ether, isopropyl ether and monomethylamine. Based on further data review, ChemRisk identified the following additional compounds for evaluation: (1) lead, (2) trichloroethylene, (3) 2-chlorophenol, and (4) tetrachloroethylene.

Both human and aquatic populations were evaluated in the risk assessment. Exposure scenarios for human receptors involved two levels of screening; the maximally exposed individual (MEI) and the most likely exposed individual (MLEI). Potential human health impacts were evaluated for the following four exposure scenarios:

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- no action,
- construction activities,
- site development for recreational use, and
- site development for residential use.

The following risk assessment was prepared in a manner consistent with the current practice of risk assessment as described in guidance documents developed by the National Academy of Science (NAS, 1983) and U.S. Environmental Protection Agency Guidelines (USEPA, 1988a, 1988b, 1989c, and 1989d).

2.0 SITE CHARACTERIZATION

To aid in the identification of potential health impacts associated with the Hudson Mobil/Uhlich site, a site description and summaries of site history and regional soil, climate, and water characteristics are provided in the following sections.

2.1 Site Description

The Hastings on Hudson Mobil/Uhlich site is located on a fill area in the Hudson River. The site lies north of Yonkers and south of Hastings on Hudson. The site is now divided into three separate areas, each owned by separate parties. The northern portion is apparently owned by Harbor and Hastings Associates, the western portion, located adjacent to the Hudson river, is owned by Mobil Oil Corporation, and the eastern portion is owned by Paul Uhlich and Company. The eastern and western portions of the site once comprised a single, southern area formerly owned by Zinsser & Company, Inc., later it was acquired by Harshaw Chemical Company (Harshaw). Tappan Tanker Terminal, Inc. later acquired the property from Harshaw (LSME, 1989). The site map is presented in Figure 2-1.

2.2 History

Zinsser & Company, Inc. (Zinsser) occupied the southernmost section of the site from 1897 to 1955. Zinsser manufactured dyes, pigments, and chemicals used for photographic processes. During World War I, Zinsser leased the southern half of their property to the United States Government. The lease ended in 1920. The property was transferred to Harshaw in 1955 and pigment and dye manufacturing operations continued. Tappan Tanker Terminal, Inc. (TTT) purchased this southern portion of the entire fill area from Harshaw in 1961 (LMSE, 1989).

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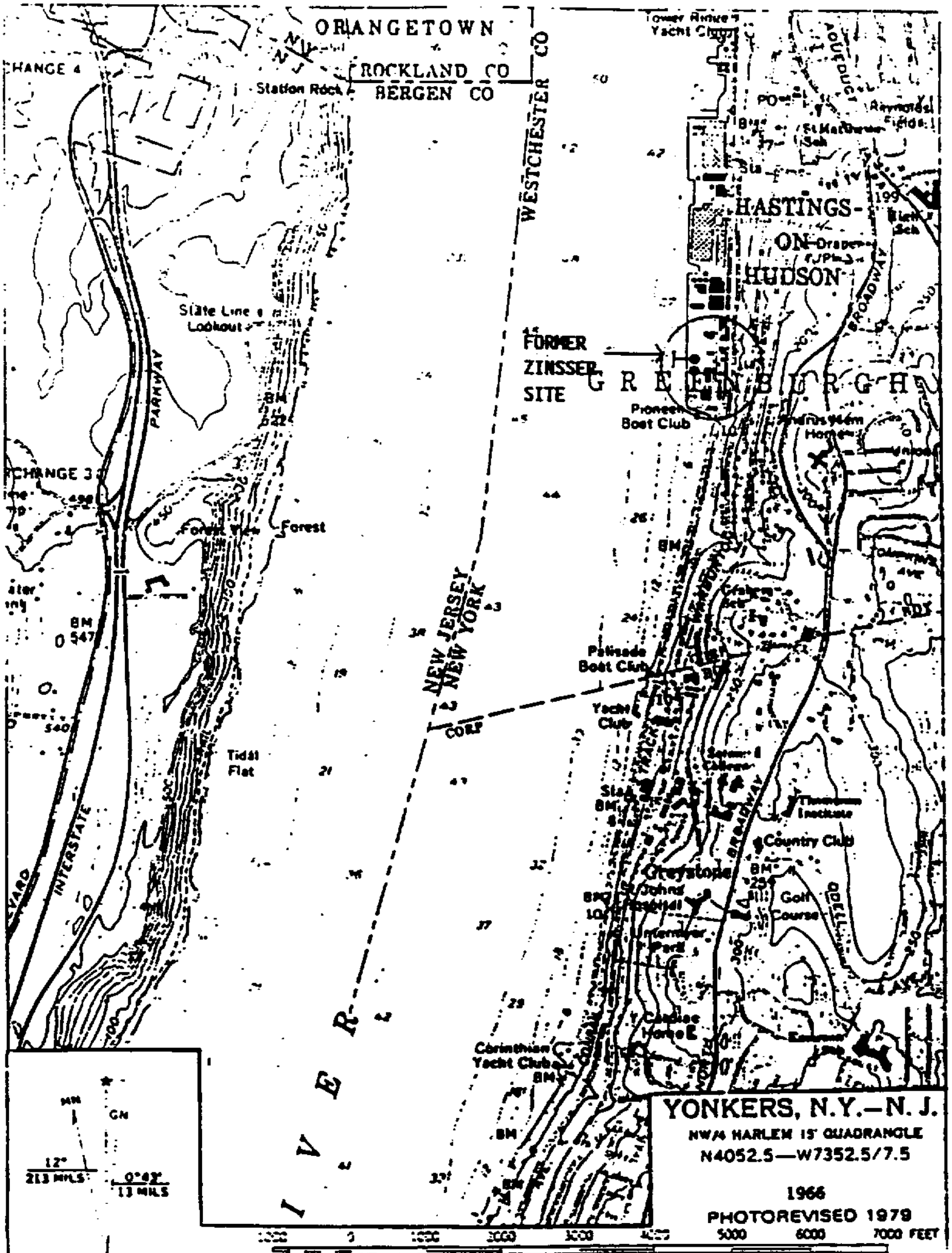
FIGURE 2-1
LOCATION MAP



Beginning in 1964, Paul Uhlich and Company (Uhlich) leased, and later purchased, the eastern portion of the TTT site, the majority of which had been filled in by 1923. The Uhlich Company continued operations as a pigment manufacturer. The western portion of the Zinsser property was filled by 1942, resulting in the formation of additional property. TTT utilized this area for storage and distribution of distillate and residual fuel oils. Beginning in 1970, Mobil Oil Corporation (Mobil) leased, and later purchased the western portion of the TTT site, and continued operations similar to those performed by Tappan (LMSE, 1989).

The northern portion of the fill area was formerly owned by Anaconda Wire and Cable Company (Anaconda). A variety of metals were used by Anaconda (NUS, 1989). The apparent current owners of this portion, Harbor and Hastings Associates, have proposed a residential and mixed use development for the land north of the Mobil and Uhlich properties (LMSE, 1989).

2.3 Climate

The climate of the Hastings on Hudson region has been described in a fact sheet prepared by the County of Westchester (Westchester, n.d.). The average precipitation in the County is 42.3 inches. However, net precipitation at the site is documented as 25.8 inches per year at Dobb's Ferry Station (NUS, 1989). The two year 24-hour rainfall is reported to be 2.8 inches (NUS, 1989). Average snowfall ranges from 25 to 50 inches (Westchester, n.d.). The average temperature is 30°F in January and 73°F in July (Westchester, n.d.). The typical weather pattern is characterized by clear skies 150 days and 199 cloudy days each year (Westchester, n.d.).

2.4 Soil Characterization

The site is comprised of fill material; the majority of the fill is of unknown source. The fill consists primarily of crushed stone, brick and ash along with sand, silts, glass and wood (LMSE, 1989). In the eastern most side of the property, native sediments have been observed (LMSE, 1989). Hazardous waste disposal has not been documented at this site (NUS, 1989).

2.5 Groundwater Characterization

The depth to groundwater ranges from three to six feet below grade (LMSE, 1989). Permeability measurements of monitoring wells on the aquifer located near the Mobil/Uhlich property line ranged from 0.09 to 0.37 cm/sec (LMSE, 1989). These permeabilities are typical of coarse sands and fine gravels (LSME, 1989). Groundwater recharge is likely occurring from the northeast, upgradient of the site, since most of the property is covered with asphalt (LMSE, 1989). Groundwater flows west to the Hudson River (NUS, 1989). There is, however, a southern flow through the center of the Uhlich property that turns west toward the Mobil property and east toward the railroad (LMSE, 1989).

No drinking wells exist on site nor are potable water wells likely to be drilled in the shallow aquifer in the future, due to the influence of the Hudson River.

Two drinking water wells are located 0.3 miles southeast and upgradient of the site. These wells are utilized by the Andrus Memorial Home and provide drinking water for 120 residents within a 4 mile radius (NUS, 1989). The location of these wells in relation to the site and the direction of groundwater flow, indicate that site groundwater quality can not affect the water in these wells. However, due to downgradient migration, site groundwater might influence the water quality in the Hudson River adjacent to the site.

2.6 Surface Water Characterization

2.6.1 Hudson River Description

The Hudson River is a complex water body which flows southward into upper New York Bay. It is approximately 315 miles in size. At the location of the Hudson Mobil/Uhlich site, the width of the river is approximately 5000 feet. The river receives a number of outfalls from various sources and is greatly influenced by tidal activity. The river is used for recreational fishing purposes.

2.6.2 Tidal Influence

Tidal influence appears to significantly affect the flow in the Hastings on Hudson region of the Hudson River. Although quantitative measurements were not available, NUS observed a strong current flowing north during one site investigation, and during another site visit, equally strong current was observed flowing south (NUS, 1989). However, tidal influence near the Uhlich/Mobil property line is negligible (0.1 to 0.2 feet) (LSME, 1989).

Tidal influence will affect the salinity of groundwater and may influence movement of chemicals to the receiving water. In addition, it could also carry contaminants slightly upgradient of the flow direction in both groundwater and the Hudson River.

2.6.3 Surface Water Runoff

Surface water runoff may mobilize contaminants in surface soils and release them to the Hudson River. If chemicals are released to surface

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water in significant concentrations, they may be bioconcentrated in aquatic organisms and these organisms may be adversely affected by the chemical uptake. In addition, if chemically tainted aquatic species are consumed by humans or avian species, they may also be adversely affected.

Runoff events are not likely to be common due to the porous nature of site soils. In addition, due to the presence of a dike north of the drainage pathway and a high curb at the south of the drainage pathway, runoff to the Hudson river is not considered a significant threat.

3.0 HAZARD IDENTIFICATION

In this section, the chemicals of interest and the methods used to select these chemicals are described.

3.1 Chemical Selection

Chemicals of interest were first identified by correlation of records with Zinsser operations. Zinsser's primary operations were the production of dyes and pigments. Further selection was based on the frequency of chemical detection and measured concentrations in the media. Selection was also based on the toxicological, physical and chemical properties of the chemicals which would indicate either a high degree of mobility, persistence and/or chemical toxicity.

3.2 Chemicals Associated with Zinsser Operations

Zinsser's primary operations were the production of dyes and pigments. The organic chemicals used in dye and pigment production included the following (SCGBF, 1989):

- Monomethylamine - associated with the production of the dye Disperse Blue 3 and, possibly, the photographic chemical p-methylaminophenol sulfate.
- Aniline - used in the production of a number of dyes and pigments.
- Solvents - a solvent recovery operation was located on the former Zinsser/Harshaw site. Solvents that may have been associated with this activity include methylene chloride, trichloroethylene and tetrachloroethylene.
- Ethers - used for extraction in the production of the dye, p-benzoquinone.

In addition, several metals have been reported as ingredients used in dye and pigment formation. These include:

- Lead sulfate - used in the production of Eosin Pigment and Phloxine Pigment.
- Lead chromate - associated with Chrome Red.
- Iron sulfate - used in the production of Pigment Green 8.
- Copper sulfate - used to produce Pigment Brown 5.
- Copper - used in the production of Oil Blue. Any copper identified at the site may be associated with the Anaconda Wire and Cable Company, which has been reported to have performed operations such as melting copper into wire (Eldon Env. Mgmt., 1989).
- Manganese dioxide - used in the production of Pigment Violet 5. Manganese sulfate has been used to produce Pigment Red 48 and Pigment Red 52.

It should be noted that the source of some of the pigments could potentially be Zinsser/Harshaw or Paul Uhlich and Company. However, contaminants associated solely with the production of dyes are most likely associated only with Zinsser and Harshaw activities.

A discussion as to how these chemicals were selected or deleted for further evaluation in the risk assessment is listed below. In addition, other chemicals reported to be detected in groundwater or soil at the site are also discussed.

3.2.1 <u>Monomethylamine</u>

Soil and groundwater samples were analyzed for monomethylamine due to the presence of a bulk storage tank between Buildings 57 and 62 associated with the Zinsser/Harshaw operations. Monomethylamine was not detected in the groundwater (flame ionization detection technique; limit of detection 10 ug/L). In addition, monomethylamine was not detected in the initial soil samples which were analyzed at a limit of detection of 250 mg/kg. Based on the fact that monomethylamine has not been detected on the Uhlich property (LSME, 1989), this chemical will not be considered further in this assessment.

3.2.2 Aniline

Soil samples were collected near former aniline bulk storage tanks. Analytical results indicated that aniline or other acid extractable chemicals were not detected at a limit of detection of 10 ug/kg. Aniline and other acid extractable chemicals were also not detected in groundwater. Therefore, this chemical is not considered further in this assessment.

3.2.3 Methylene Chloride

Methylene chloride was detected in one well in June 1989. This finding was considered anomalous by LSME (1989) and therefore this chemical is not considered further in this assessment.

3.2.4 Trichloroethylene (TCE)

Trichloroethylene was not detected in groundwater. One of ten soil samples contained TCE at 0.4 mg/kg (limit of detection 0.1 mg/kg). The low number of positive detections suggest that TCE is not a significant contaminant on site. However, since solvent operations may have been extensive on the Zinsser site, TCE exposures are considered in the assessment.

3.2.5 Tetrachloroethylene (PCE)

PCE was present in three of the March 1989 LSME groundwater samples (27-43 μg/L), but was not detected in more recent analyses (June 1989). As with the other solvents, PCE was detected in only a few groundwater samples and was not detected in soil. Therefore, this chemical will be considered only in the assessment of groundwater for this site.

3.2.6 Chlorobenzene (CB)

Chlorobenzene was reportedly stored on site. LMSE (1989) stated a 1955 Zinsser map documents the presence of a chlorobenzene tank on what is now the Mobil property near the eastern boundary.

Chlorobenzene was detected in groundwater near the former chlorobenzene tank area and in soil samples (LMSE, 1989). In addition, 1.0 mg/L of chlorobenzene was recovered in a well near the former Zinsser/Harshaw solvent recovery operation. The transport of chlorobenzene to groundwater and stormwater runoff could account for the presence of this chemical at the nearby Mobil property. Uhlich Co. representatives indicate that their company does not use chlorobenzene in its pigment manufacturing process. Due to its presence in soil and groundwater, chlorobenzene is considered a chemical of interest in this risk assessment.

3.2.7 Ethers

Groundwater samples were analyzed for ethers at the northern border of the Mobil property which lies adjacent to both the Anaconda and the Uhlich properties (LMSE, 1989). All samples were below the limit of detection of 50 ug/L.

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Both isopropyl ether and diethyl ether had previously been detected in groundwater during the LBG investigation (1987). Isopropyl ether and diethyl ether were found in groundwater at the northern portion of the Mobil property which borders the Uhlich and Anaconda property line (LSME, 1989). Due to the presence of ether compounds in the LBG investigation, they are considered in the risk assessment.

3.2.8 Petroleum Hydrocarbons (PHC)

Both No. 2 fuel oil and No. 6 fuel oil were apparently stored in several tanks during Zinsser operations (LMSE, 1989). Uhlich Co. reported that a 250,000 gallon tank of fuel oil No. 6 had leaked in the past (LSME, 1989). Petroleum hydrocarbon analyses were conducted in these areas. The highest PHC concentration reported was 12,000 mg/kg at 8-10 feet. Without the identification of the PHC constituents (i.e. concentrations of benzene), characterization of the risks associated with exposure to these chemicals is not possible. Therefore, the fuel oils are not considered in the risk assessment.

3.2.9 Gasoline

Benzene, toluene, ethylbenzene and xylene are typical aromatic hydrocarbon components of gasoline. These compounds were detected during the March sampling program (LSME, 1989). Their detection may have been a the result of a minor gasoline spill.

Benzene has only been detected once in groundwater (March, 1989). Toluene was detected in three of ten soil samples. Concentrations of benzene, ethylbenzene and xylene were apparently not evaluated in soil. The activities of Petroleum Heat and Power Co. (1962 to 1975) and Whaleco Fuel Oil Co. (1979 to 1986) (LSME, 1989) may be the source of gasoline components on this site. Because these chemicals were not directly tied to past site use by Zinsser, they are not considered in this assessment.

3.2.10 Chlorophenols

2-Chlorophenol was detected in one groundwater sample. Since 2-amino-4-chlorophenol was used in the manufacture of "Fast Mordant Blue B" and "Mordant Blue 13," it is conceivable this compound was associated with Zinsser operations. Analysis of this chemical was not done in soil, therefore, only the groundwater pathway is considered in the risk assessment.

3.2.11 Metals

Ash fill may account for some of the metals observed in soil at the Uhlich site. Iron, mercury, arsenic, zinc and manganese concentrations appear to be typical of native soil concentrations (LSME, 1989). Copper and lead were observed in higher concentrations than those present in native soils (LSME, 1989). However, the source of elevated copper is more likely to be the Anaconda Wire and Cable Company, since they have been reported to perform operations such as melting copper into wire (Eldon Env. Mgmt., 1989). In addition, copper is relatively nontoxic to humans and is not considered in this assessment.

In contrast, lead sulfate was used in the production of "Eosin Pigment" and "Phloxine Pigment", and lead chromate was used in the production of "Chrome Red" by Zinsser. Therefore, lead is considered to be a chemical of interest.

3.2.12 Other Contaminants

Other chemicals have been detected on site, but are not included in this risk assessment, since they are almost certainly present as a result of operations performed by other companies. These include base neutral compounds such as benzo(a)fluoranthene, benzo(a)pyrene, benzo(a) anthracene, anthracene, fluoranthene, chrysene, pyrene, phenanthrene, and bis-2-ethylhexyl phthalate, which may be related to the Mobil petroleum storage tanks (LSME, 1989). Polychlorinated biphenyls were detected in one soil sample on site. The source of the PCBs is unknown (LSME, 1989).

3.3 Chemicals of Interest

Based on the information presented in Section 3.2 the following chemicals are selected for evaluation in the Risk Assessment:

- diethyl ether,
- isopropyl ether,
- chlorobenzene,
- tetrachloroethylene,
- trichloroethylene,
- 2-chlorophenol,
- lead.

The media in which the chemicals of interest were detected and the likely routes of exposure are summarized in Table 3-1.

3.4 Toxicological Profiles for Chemicals of Concern

A brief review of the environmental fate and health effects data for each of the chemicals of interest is presented in Appendix A. The physical and chemical properties defining the persistence and volatility for the chemicals of concern are presented in Table 3-2.

9.0 CONCLUSIONS

In this analysis, the potential for adverse health effects associated with chemicals of interest at the former Zinsser operations at the Mobil/Uhlich, Hastings on Hudson site were evaluated. Each of the potential human populations of interest associated with the four end use alternatives were analyzed and the potential chronic aquatic toxicity associated with the site was also evaluated. Based on the analysis, the following conclusions can be made.

Chronic Non-carcinogenic Health Impacts

- For purposes of characterizing chronic non-carcinogenic health risks, the daily dose for each chemical and for each population of interest was compared to the maximally "acceptable" daily dose established by the EPA, and a margin of safety was calculated. For purposes of this assessment margins of safety greater than one were considered acceptable. Results indicated that individual margins of safety (MOSs) for all chemicals were greater than one, for both the MEI and MLEI regardless of exposure route, for all of the population groups (i.e., workers, residents, and visitors).

- The additive non-carcinogenic effects was also evaluated based on the cumulative hazard index method. A hazard index of less than one is indicative of acceptable levels of exposure for chemicals having an additive effect. Results indicated that hazard indices were less than one for all chemicals, for both the MEI and MLEI, regardless of exposure route, for all population groups.

- Based on this analysis exposure to on and off-site individuals should not result in chronic non-carcinogenic health effects.

Carcinogenic Health Risks

- Carcinogenic health risks are defined in terms of cancer risk levels. Governmental risk managers and regulatory agencies have frequently adopted a cancer risk of one in a million (1×10^{-6}) or less as negligible risk levels. Individual cancer risks associated with TCE were found to be below the one in a million risk level for all populations of interest, including on-site workers, off-site residents, construction workers, individuals associated with visiting the developed recreational property, and children and adults associated with living at the developed residential property.

- The overall cancer risks from TCE through all routes of exposure for each of the various population groups were found to be below the one in a million risk level.

- Based on this analysis, the potential health risk to workers, residents and children is less than one in a million and therefore the carcinogenic risk associated with the site is negligible.

Effects to Aquatic Organisms

- For purposes of characterizing potential effects to aquatic organisms, the groundwater concentrations were compared to aquatic criteria for each chemical of interest and a margin of safety was calculated. For purposes of this assessment a margin of safety greater than one was considered acceptable for this analysis.

- Margin of safety values ranged from 1.3 for chlorbenzene to 4280 for diethyl ether indicating the potential hazards associated with chemical migration in groundwater were within an acceptable level.

- This analysis contained some extremely conservative assumptions. It is virtually impossible for aquatic organisms to be exposed to groundwater concentrations, since dilution at the point of discharge would lower the concentrations to which aquatic organisms are actually exposed. Tidal influence to the groundwater as well as water hardness will also limit the bioavailability of some chemicals (e.g., lead).

Uncertainties

- The assumptions used in this assessment are those typically used in risk assessment. Some of the assumptions have significant scientific basis, while other have much less. However, some

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level of uncertainty is introduced into the assessment every time an assumption is made.

- This assessment was conservatively biased toward health protection and, therefore, assumptions were consistently made that tend to overestimate rather than underestimate exposure and risks. Actual levels of human and aquatic exposure and the associated risks as a result of former Zinsser operations should be much less than those described in this report.

REFERENCE 7

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FINAL DRAFT
PRELIMINARY ASSESSMENT
PAUL UHLICH COMPANY
HASTINGS-ON-HUDSON, WESTCHESTER COUNTY, NEW YORK

FIELD INVESTIGATION TEAM ACTIVITIES AT UNCONTROLLED HAZARDOUS SUBSTANCES FACILITIES — ZONE I

NUS CORPORATION
SUPERFUND DIVISION

Ref. 7
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02-8911-12-PA
REV. NO. 0

FINAL DRAFT
PRELIMINARY ASSESSMENT
PAUL UHLICH COMPANY
HASTINGS-ON-HUDSON, WESTCHESTER COUNTY, NEW YORK

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-8911-12
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

FEBRUARY 20, 1990

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY:

Anthony F. Culmone Jr.
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PROJECT MANAGER

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JOHN BULICH
SITE MANAGER

REVIEWED/APPROVED BY:

Charles [signature] for RN
RONALD M. NAMAN
FIT OFFICE MANAGER

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT

PART I: SITE INFORMATION

1. Site Name/Alias Paul Uhlich Company
   Street Southside Avenue
   City Hastings-on-Hudson State New York Zip 10706
2. County Westchester County Code 119 Cong. Dist. 22
3. EPA ID No. NYD986882686
4. Latitude 40° 59' 15"N Longitude 73° 53' 09"W
   USGS Quad. Yonkers, New York
5. Owner Paul Uhlich Company Tel. No. (914) 478-2000
   Street Southside Avenue
   City Hastings-on-Hudson State New York Zip 10706
6. Operator Paul Uhlich Company Tel. No. (914) 478-2000
   Street Southside Avenue
   City Hastings-on-Hudson State New York Zip 10706
7. Type of Ownership
   ☒ Private ☐ Federal ☐ State
   ☐ County ☐ Municipal ☐ Unknown ☐ Other ______
8. Owner/Operator Notification on File
   ☐ RCRA 3001 Date ______ ☐ CERCLA 103c Date ______
   ☐ None ☒ Unknown
9. Permit Information

Permit	Permit No.	Date Issued	Expiration Date	Comments
Unknown				

10. Site Status
    ☒ Active ☐ Inactive ☐ Unknown
11. Years of Operation 1964 to Present

12. Identify the types of waste units (e.g., landfill, surface impoundment, piles, stained soil, above- or below-ground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

(a) Waste Management Areas

Waste Unit No.	Waste Unit Type	Facility Name for Unit
1	Storage Tank	Former Chlorobenzene Tank
2	Storage Tanks	Former Aniline Tanks
3	Storage Tank	Former Monomethylamine Tank

(b) Other Areas of Concern

Identify any miscellaneous spills, dumping, etc. on site; describe the materials and identify their locations on site.

Mobil Oil Corp. maintained a No. 6 fuel oil (a viscous liquid) tank on Uhlich's property north of Building 59. This former 250,000-gallon storage tank, which is assumed to have been above ground because of its large size, was reported by Uhlich to have constantly leaked. In 1989, surficial (0-4 ft) soil samples were collected. Concentrations of petroleum hydrocarbons (PHCs) have been found in the soil centered around this former tank. PHCs are the indicator parameter for petroleum products, such as fuel oils, and also for some petrochemicals. A map of the Harshaw/Zinsser operation shows the existence of the No. 6 fuel oil tank in June, 1955.

Two former No. 2 fuel oil (used as diesel fuel or home heating oil) tanks, of which one was 5,000 gallons and the other was 12,000 gallons, were located north of Building 59 and on the east side of the No. 6 fuel oil tank. Both of these tanks are assumed to have been above ground because of their large size. On a map of the Harshaw/Zinsser operation in June 1955, one tank is shown to contain No. 6 fuel oil and the other to contain diesel fuel oil (No. 2 fuel oil). There is no reported information on any spills or leaks from these two former tanks.

Paul Uhlich Company understands that from October 1968 to at least December 30, 1970, Tappan Tanker Terminal, Inc. (TTT) held an authorization from the U.S. Army Corps of Engineers for the disposal at sea of certain liquid waste products of Nepera Chemical Co., Inc. The waste products appear to have been toluene, benzene, pyridine, alpha and beta picoline, 2 RCN, and 3 RCN. Uhlich understands that TTT stored these liquid waste products in the easterly one of the two smaller fuel oil storage tanks located on the north end of the property now owned by Mobil Oil Corp. and piped the waste from this tank to ships for disposal at sea.

From 1977 to December 1982, Awards Etc., which manufactures trophies, rented the first floor of Building 50 from Uhlich. Since January 1983, Awards has been leasing Buildings 60 and 61 for the same purpose. Awards stores small amounts of electroplating chemicals in Building 61. Awards' effluent is monitored by the Westchester County Sewer Dept. Uhlich is not aware of any failure by Awards to be in compliance with environmental regulations.

Quirk, Lawler & Matusky Engineers (QLM), predecessor firm of Lawler, Matusky and Skelly Engineers, rented the first floor of Building 50 between July 1967 and June 1972. QLM used the rental space primarily as an analytical laboratory to conduct wet chemical analyses on natural water and wastewater samples. During the 1970s, biological studies were conducted on fish samples preserved with formalin on the property.

A former underground gasoline storage tank was located just to the north of the present tennis court. This tank is shown on a map of the Harshaw/Zinsser operation in June 1955. The size of this tank is unknown. There is no reported information on any spills or leaks from this former tank.

The only hazardous waste generated by Uhlich is from a shop parts cleaner that is properly disposed of through an authorized transporter and disposal company.

13. Information available from

Contact Amy Brochu — Agency U.S. EPA — Tel. No. (201) 906-6802

Preparer John Bulich — Agency NUS Corp. Region 2 FIT — Date February 20, 1990

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following seven items.

Waste Unit No. 1 - Storage Tank , Former Chlorobenzene Tank

1. **Identify the RCRA permit status, if applicable, and the age of the waste unit.**

   A map of the Harshaw/Zinsser operation shows the existence of a mono chlor benzol (chlorobenzene) tank in June 1955. It is not known when this tank was installed and removed; therefore, the age of the waste unit cannot be determined. There was no RCRA permit application filed for this tank.

2. **Describe the location of the waste unit and identify clearly on the site map.**

   The former chlorobenzene tank was located west of Building 57S on what is now the Mobil Oil property.

3. **Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.**

   The size of the former chlorobenzene tank is unknown.

4. **Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.**

   The physical state of chlorobenzene is a liquid.

5. **Identify specific hazardous substance(s) known or suspected to be present in the waste unit.**

   Chlorobenzene is the only hazardous substance known to have been present in this waste unit.

6. **Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.**

   It is unknown if the former chlorobenzene tank was above or below ground. There are no known containment features such as berms or diversion systems associated with this waste unit. Groundwater samples collected from the Mobil Oil property in 1986 were found to have chlorobenzene in concentrations as high as 12,380 ug/L. In 1989, chlorobenzene was found at concentrations as high as 8,100 ug/L in the groundwater samples collected from the Paul Uhlich property. Concentrations of chlorbenzene were the highest near the former chlorobenzene tank area and consistantly declined with distance from the tank area. Therefore, the groundwater contamination by chlorobenzene may be attributable to the chlorobenzene tank utilized during the prior occupancy by Harshaw/Zinsser.

   Ref. No. 1

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following seven items.

Waste Unit No. 2 - Storage Tanks Former Aniline Tanks

1. Identify the RCRA permit status, if applicable, and the age of the waste unit.

   A map of the Harshaw/Zinsser operation shows the existence of two aniline tanks in June 1955. It is not known when these tanks were installed and removed; therefore, the age of the waste unit cannot be determined. There was no RCRA permit application filed for these tanks.

2. Describe the location of the waste unit and identify clearly on the site map.

   One of the former aniline tanks was located near the south side of Building B62 and the other former aniline tank was located on the south side of Building 66.

3. Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.

   The size of the former aniline tanks is unknown.

4. Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.

   The physical state of aniline is a liquid.

5. Identify specific hazardous substance(s) known or suspected to be present in the waste unit.

   Aniline is the only hazardous substance known to be present in this waste unit.

6. Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.

   It is unknown if the former aniline tanks leaked, whether they were above or below ground and if there were any containment features such as berms or division systems.

   Ref. No. 1

Ref. 7
p. 8 of 15

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following seven items.

Waste Unit No. 3 - Storage Tanks Former Monomethylamine Tank

1. Identify the RCRA permit status, if applicable, and the age of the waste unit.

   A map of the Harshaw/Zinsser operation shows the existence of a monomethylamine tank in June 1955. It is unknown when this tank was installed and removed; therefore, the age of the waste unit cannot be determined. There was no RCRA permit application filed for this tank.

2. Describe the location of the waste unit and identify clearly on the site map.

   The former monomethylamine tank was located near the south side of Building B62.

3. Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.

   The size of the former monomethylamine tank is unknown.

4. Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.

   The physical state of monomethylamine is unknown. Monomethylamine is a gas at normal atmospheric conditions; however, it may have been stored as a liquid.

5. Identify specific hazardous substance(s) known or suspected to be present in the waste unit.

   Monomethylamine is the only hazardous substance known to be present ir this waste unit.

6. Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.

   It is unknown if the former monomethylamine tank leaked, whether it was above or below ground and if it had any containment features such as berms or diversion systems.

   Ref. No. 1

PART III: HAZARD ASSESSMENT

GROUNDWATER ROUTE

1. **Describe the likelihood of a release of contaminant(s) to the groundwater as follows: observed, alleged, potential, or none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminant(s) to the facility.**

Chlorobenzene has been found in the groundwater at concentrations as high as 8,100 ug/L on the Uhlich property in 1989 and at levels as high as 12,380 ug/L on the adjacent Mobil Oil property in 1986. The areas of highest concentration are around a former chlorobenzene tank located on the Mobil Oil property. The Uhlich and Mobil Oil properties were once owned by Zinsser & Company, Inc. and then by Harshaw Chemical Co. Both Zinsser and Harshaw used chlorobenzene in their dye manufacturing operations.

In 1987, soil from the drainage path that directs storm water from the Uhlich property to the Mobil property was found to contain low levels of polychlorinated biphenyls (PCBs), barium, and four semivolatile compounds. In 1986, petroleum hydrocarbons were found in the soil of the Mobil site and diethyl ether and isopropyl ether were found in the groundwater in the northern half of the Mobil property bordering the Uhlich and former Anaconda properties and near the center of the western side of the property.

Colored subsurface soils found along the Mobil-Uhlich property line in 1986 had no hazardous chemicals present. The colors in the soil are believed to be from the organic water-based pigments manufactured by Uhlich.

Soil samples contained chlorobenzene, toluene, and trichloroethylene. 2-chloropenol was present in the groundwater near the former chlorobenzene tank. Most of the soil samples contained copper and lead at levels higher than typically measured in native soils. Zinc was detected at elevated concentrations in half of the samples (compared to native soils). Copper, lead, zinc, iron, and manganese were detected in all seven Uhlich wells. Arsenic was present at trace concentrations in two wells along the Uhlich/Mobil Oil property line.

Ref. Nos. 1, 2

2. **Describe the aquifer of concern; include information such as depth, thickness, geologic composition, permeability, overlying strata, confining layers, interconnections, discontinuities, depth to water table, groundwater flow direction.**

The aquifer of concern is the Fordham Gneiss bedrock aquifer whose upper layer is 300 to 350 feet below ground surface. Two wells located 0.3 mile from the site are tapped into the Fordham Gneiss bedrock aquifer. These wells are screened in two fracture zones at 350 and 500 feet below ground surface. Gneiss is an impermeable, coarse-grained, crystalline rock. The Inwood Marble formation overlies the Fordham Gneiss bedrock and consists of loose permeable limestone (10^{-5} - 10^{-7} cm/sec) at a depth of 70 feet below ground surface. The limestone is interconnected with the gneiss fracture zones, including the aquifer of concern. Therefore, although the aquifer of concern is under locally confined conditions, the aquifer may be evaluated as a water table aquifer due to the assumed interconnection between the two aquifers. The native overburden consists of 10- to 50-foot-thick sands overlain by organic silts and clays 7 to 26 feet thick. The permeability of the native overburden is 10^{-5} - 10^{-7} cm/sec. Most of the Uhlich property is fill which consists primarily of crushed stone and brick and ash along with sands, silts, glass and wood, except at the easternmost side of the property where there are native sediments. The permeability of the fill may be greater than 10^{-3} cm/sec. The water table is 5 feet below ground surface. In this area, the general direction of groundwater flow is west towards the Hudson River.

Ref. Nos. 1, 3, 4

Ref. 7
P. 10 of 15

3. **Is a designated sole source aquifer within 3 miles of the site?**

There is no designated sole source aquifer within 3 miles of the site.

Ref. No. 5

4. **What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?**

Chemical waste has been found in monitoring wells at the Uhlich site that are 14 to 15 feet deep. If the water table aquifer is interconnected with the Fordham Gneiss bedrock aquifer, the potential for the aquifer of concern to be contaminated exists. If the two aquifers are not interconnected, the depth from the lowest point of waste disposal to the highest seasonal level of the saturated zone of the aquifer of concern may be as great as 336 feet.

Ref. Nos. 1, 2, 4

5. **What is the permeability value of the least permeable continuous intervening stratum between the ground surface and the aquifer of concern?**

The native overburden consists of 10-to 50-foot thick sands overlain by organic silts and clays which are 7 to 26 feet thick. Most of the Uhlich property is fill which consists primarily of crushed stone and brick and ash along with sands, silts, glass and wood, except at the easternmost side of the property where there are native sediments. The permeability of the organic silts and clays is 10^{-5} to 10^{-7} cm/sec. The permeability of the fill, which contains a large amount of sand, is greater than 10^{-3} cm/sec.

Ref. Nos. 1, 6

6. **What is the net precipitation for the area?**

The net precipitation in the vicinity of the site is approximately 18 inches per year.

Ref. No. 6

7. **Identify uses of groundwater within 3 miles of the site (i.e., private drinking source, municipal source, commercial, industrial, irrigation, unusable).**

The only drinking water wells are two private drinking wells, located 0.3 mile from the site, which are owned by the Andrus Memorial Childrens Home. There is no known use of groundwater for other purposes within a 3-mile radius of the site. Hastings-on-Hudson receives its drinking water from the New Rochelle Water Company which in turn receives their water from the City of New York. All of the water is surface water from the Catskill Aqueduct System except during the summer months when up to 2 percent comes from the Croton Aqueduct System.

Ref. Nos. 4, 7, 8, 14

8. **What is the distance to and depth of the nearest well that is currently used for drinking or irrigation purposes?**

Distance 0.3 mile **Depth** 350 feet

Ref. Nos. 7, 8

9. **Identify the population served by the aquifer of concern within a 3-mile radius of the site.**

The only drinking water wells within a 3-mile radius of the site are two wells owned by the Julia Dykman Andrus Memorial Childrens Home. These serve approximately 120 people.

Ref. No. 8

SURFACE WATER ROUTE

10. **Describe the likelihood of a release of contaminant(s) to surface water as follows: observed, alleged, potential, or none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminants to the facility.**

The soil at the site is contaminated with PCBs, chlorobenzene, volatile organic compounds (VOCs), four semivolatile compounds, and heavy metals. The surface water flow is into the Hudson River. The potential exists for these contaminants to migrate into the Hudson River through storm runoff. The Uhlich and Mobil Oil properties were once owned by Zinsser & Company, Inc. and then by Harshaw Chemical Co. Both Zinsser and Harshaw used chlorobenzene in their dye manufacturing operations. Paul Uhlich & Co., the current owner of the site, manufactures pigments which use water as the only solvent and the company is unlikely to release any contaminants to surface water.

Ref. No. 1

11. **Identify and locate the nearest downslope surface water. If possible, include a description of possible surface drainage patterns from the site.**

The Hudson River, which is tidal within the 3-mile radius of the site, is the nearest downslope surface water and is less than 500 feet from any part of the site. Surface water runoff would be west and south towards the Hudson River. Runoff to the east would be unlikely since it would be blocked by the railroad whose roadbed is 5 to 10 feet above the site and borders Uhlich's entire eastern property line.

Ref. Nos. 1, 7, 9, 10

12. **What is the facility slope in percent? (Facility slope is measured from the highest point of deposited hazardous waste to the most downhill point of the waste area or to where contamination is detected.)**

The facility has a slope of 0-3 percent to the south and west.

Ref. Nos. 7, 9

13. **What is the slope of the intervening terrain in percent? (Intervening terrain slope is measured from the most downhill point of the waste area to the probable point of entry to surface water.)**

The slope of the intervening terrain is 0-3 percent towards the Hudson River.

Ref. Nos. 7, 9

14. **What is the 1-year 24-hour rainfall?**

The 1-year 24-hour rainfall is approximately 2.8 inches in this region.

Ref. No. 6

15. **What is the distance to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.**

The distance to the nearest downslope surface water is less than 500 feet.

Ref. Nos. 1, 7

16. **Identify uses of surface waters within 3 miles downstream of the site (i.e., drinking, irrigation, recreation, commercial, industrial, not used).**

There is recreational fishing and crabbing just offshore of Hastings-on-Hudson. There is a commercial shad fishery in the area. A boat club is located on the southern border of the site. The Hudson River is not used for drinking downstream from the site.

Ref. Nos. 8, 10, 11, 14

17. **Describe any wetlands, greater than 5 acres in area, within 2 miles downstream of the site. Include whether it is a freshwater or coastal wetland.**

There are no wetlands, greater than 5 acres in area, within 2 miles downstream of the site.

Ref. No. 7

18. **Describe any critical habitats of federally listed endangered species within 2 miles of the site along the migration path.**

The shortnose sturgeon (Acipenser brevirostrum), a federally listed endangered species, inhabits the Hudson River in the area of the site; however, the area is not documented as a significant breeding area.

Ref. Nos. 10, 13

19. **What is the distance to the nearest sensitive environment along or contiguous to the migration path (if any exist within 2 miles)?**

There is no sensitive environment within 2 miles of the site.

Ref. Nos. 7, 10

20. **Identify the population served or acres of food crops irrigated by surface water intakes within 3 miles downstream of the site and the distance to the intake(s).**

There are no known water supply intakes along the Hudson River within 3 miles downstream of the site. Hastings-on-Hudson receives its drinking water from the New Rochelle Water Company which in turn receives their water from the City of New York. All of the water is surface water from the Catskill Aqueduct System except during the summer months when up to 2 percent comes from the Croton Aqueduct System. Surface water intakes for the City of Yonkers are located in the Saw Mill River and the Grassy Sprain Reservoir. These intakes are located within 3 miles of the site but not in the drainage pathway.

Ref. Nos. 8, 10, 14

21. **What is the state water quality classification of the water body of concern?**

Class "I" is the state water quality classification for the part of the Hudson River that is of concern. This classification allows for secondary contact recreation and any other usage except for primary contact recreation and shell fishing for market purposes.

Ref. No. 11

22. **Describe any apparent biota contamination that is attributable to the site.**

There has been no reported or observed biota contamination that is attributable to the site.

Ref. No. 9

AIR ROUTE

23. **Describe the likelihood of a release of contaminant(s) to the air as follows: observed, alleged, potential, none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminant(s) to the facility.**

Based on current existing conditions, there are no known leaks or spills associated with operation of the facility by Paul Uhlich Co. and most of the site is paved or covered by buildings. Therefore, no apparent potential for the release of contaminants to the air exists.

Ref. Nos. 1, 9

24. **What is the population within a 4-mile radius of the site?**

Approximately 169,000 people live within a 4-mile radius of the site.

Ref. No. 12

FIRE AND EXPLOSION

25. **Describe the potential for a fire or explosion to occur with respect to the hazardous substance(s) known or suspected to be present on site. Identify the hazardous substance(s) and the method of storage or containment associated with each.**

There is no evidence of a potential for a fire or explosion to occur at this site. The only hazardous waste generated by Uhlich is from a shop parts cleaner that properly disposed of in a timely manner. Most of the site is paved or covered with buildings.

Ref. No. 1

26. **What is the population within a 2-mile radius of the hazardous substance(s) at the facility?**

Approximately 31,200 people live within a 2-mile radius of the site.

Ref. No. 12

Ref. 7
p. 13 of 15

DIRECT CONTACT/ON-SITE EXPOSURE

27. Describe the potential for direct contact with hazardous substance(s) stored in any of the waste units on site or deposited in on-site soils. Identify the hazardous substance(s) and the accessibility of the waste unit.

There is little potential for direct contact with hazardous substances at this site. The site is currently mostly paved or covered with buildings and it is fenced. Therefore, exposure to any contaminated soils would be limited to those individuals having access to the facility.

Ref. No. 1

28. How many residents live on a property whose boundaries encompass any part of an area contaminated by the site?

There are no residental properties whose boundaries encompass any part of this site.

Ref. No. 1

29. What is the population within a 1-mile radius of the site?

Approximately 6,800 people live within a 1-mile radius of the site.

Ref. No. 12

Ref. 7
p. 14 of 15

PART IV: SITE SUMMARY AND RECOMMENDATIONS

Paul Uhlich Co. is an active, privately owned pigment manufacturer located on 6.4 acres of landfill in Hastings-on-Hudson, Westchester County, New York. The site is on the eastern portion of what is called the southern fill area along the eastern shore of the Hudson River. It is bounded to the west by the inactive Mobil Oil Tappan Terminal, to the north by the former Anaconda Wire Mill, to the south by the Hudson River and to the east by Conrail's Hudson Division tracks. Residential areas are across the railroad tracks to the east. The site is flat with a slight slope toward the south and west.

The Paul Uhlich Company Site as well as the adjacent Mobil Oil Tappan Terminal Site was first owned by Zinsser and Company. Zinsser was responsible for landfilling the river bank and bottom prior to beginning operations around 1900. Zinsser was a manufacturer of dyes and pigments and also fine chemicals used mainly in photographic processes. Harshaw Chemical Co. acquired Zinsser in 1955 and continued the operations until 1961. Tappan Tanker Terminal Inc. purchased the entire Southern Fill Area from Harshaw in September 1961 and operated a fuel oil storage facility until early 1971.

Paul Uhlich Company leased buildings and property in the eastern portion of the southern fill area from Tappan Tanker Terminal, Inc. from October 1964 to July 1975 prior to purchasing the property. Uhlich has manufactured pigments at this site since 1964. Five of the 11 buildings on the site are occupied by Uhlich. The other buildings are leased to other companies and/or individuals. Most of the site is covered with asphalt and buildings. The only hazardous waste generated by Uhlich is from a shop parts cleaner that is properly disposed of by an authorized transporter and disposal company. There are no hazardous waste permits on file with the NYSDEC or with the U.S. EPA for this site.

Soil samples taken at the site were found to contain PCBs, VOCs, four semivolatile compounds,and heavy metals. Groundwater samples taken at the site were found to contain chlorobenzene, VOCs and heavy metals. Chlorobenzene has been found in the groundwater at concentrations as high as 8,100 ug/L on the Uhlich property and at levels as high as 12,380 ug/L on the adjacent Mobil Oil property. The area of highest concentration is around the location of a former chlorobenzene tank which was located on the Mobil Oil property. Both Zinsser and Harshaw used chlorobenzene in their dye manufacturing operations. Paul Uhlich Co., the current owner of the site, manufactures pigments which use water as the only solvent and the company is unlikely to release any contaminants to surface water.

PART IV: SITE SUMMARY AND RECOMMENDATIONS (CONT'D)

Two drinking water wells owned by the Julia Dykman Andrus Memorial Childrens Home are located 0.3 mile from the site. Approximately 120 people are served by these wells. Recreational sport fishing and crabbing occurs throughout this area of the Hudson River. Approximately 150 different species of fish are in the Hudson River in this area including a federally listed endangered species, the shortnose sturgeon (Acipenser brevirostrum). A commercial shad fishery exists in the area of the site. The potential exists for the migration of contaminants from the groundwater and storm runoff into the Hudson River and for contamination of food chains. It is recommended that the Paul Uhlich Company Site receive a **MEDIUM PRIORITY** for a screening site inspection. Since further preremedial study has been recommended for the adjacent Mobil Oil Tappan Terminal Site and contamination exists along the common border of both sites, it is also recommended that any subsequent preremedial efforts be aggregated with those at the Mobil Oil Tappan Terminal Site.

REFERENCE 8

360QL2 Mobil Ref. 8 p.1 of 1
Cosue/Iete

PAUL UHLICH & CO., INC.

One Railroad Avenue, Hastings-On-Hudson, N.Y. 10706 / 914-478-2000

RECEIVED
APR 17 1987
ADMINISTRATIVE UNIT
REGION #3

RECEIVED
APR 17 1987
NYS DEC
REGION 3

April 16, 1987

Mr. C. L. Hagan
Mobil Oil Corporation
3225 Gallows Road
Fairfax, Virginia 22037-0001

Your Reference: Contamination of Mobil Oil Corporation
Tappen Terminal Property

Dear Mr. Hagan:

We have reviewed your letter dated April 6, 1987 and the Legette Brashears & Graham Report, which you sent to us. We note the materials identified in the LBG report, and, except as discussed below, we have concluded that it is impossible that any of these substances could have emanated from our operations.

This company produces color pigments which are manufactured in water. We are not a manufacturer of dyes. Because of the nature of our manufacturing processes we would have no occasion to use chlorobenzene, or any other organic solvent, and have never done so.

The remaining material identified in the LBG Report are petroleum based.

Accordingly, we are startled by the suggestion that we have any responsibility for the problems on the Mobil property.

We would be willing to meet with your representatives.

Yours truly,

Michael G. De Maio
President

MGD:hh
cc: Frances Mac Eachron, Mayor
Paul Keller, Regional Director, DEC

The Finest Dry Organic Pigments . . . Since 1895

REFERENCE 9

Add ✓
Modify
Reclassify
Delist

Ref. 9
p. 1 of 9

ADDITIONS/CHANGES TO REGISTRY OF INACTIVE HAZARDOUS WASTE DISPOSAL SITES

Site Name Tappan Terminal DEC ID Number 360015

Site Address Hastings-on-Hudson County Westchester

✓ Add New Site: (Potential hazardous waste site, Site Inspection Summary Report, EPA Preliminary Assessment Form and Registry Form must be completed and attached)

___ Modify Registry data (detail below)

___ Reclassify from class ___ to class ___. (justify below)

___ Delist (justify below)

(2)

Detail/Justification

See attached sheet.

P.A. form is attached...

Prepared by: See attached Date:

Approvals:

Reg. Haz. Waste Eng. See attached Date:

R. Tramontano NYSDOH [signature] Date: 12/9/87

V. Bryant DEE [signature] Date: 12/9/87

W. Demick/M.Chen [signature] Date: 12/1/87.

R.A. Olazagasti [signature] Date: 12/10/87

C.N. Goddard [signature] Date: 12/10/87

Add ✓
Modify
Reclassify
Delist

Ref. 9
p. 2 of 9

ADDITIONS/CHANGES TO REGISTRY OF
INACTIVE HAZARDOUS WASTE DISPOSAL SITES

Site Name *Tappan Terminal* DEC ID Number
Site Address *Hastings-on-Hudson* County *Westchester*

✓ Add New Site: (Potential Hazardous Waste Site Summary Form, EPA Preliminary Assessment Form and Registry Form must be completed and attached)

___ Modify data as follows:

(2)

___ Reclassify from class ___ to class ___
Justification:

___ Delist:
Justification:

Prepared by: *JAMES HARDY* Date: *11/10/87*
Approved by:
Regional Hazardous Waste Engineer: [signature] Date: *11/12/87*
Robert Olazagasti, Supervisor ______ Date:
Charles Goddard, Bureau Chief ______ Date:

cc: Region
Department of Health

Ref. 27, p. 7/9

Ref. 9
p. 3 of 9

Division of Solid and Hazardous Waste
New York State
Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233

RECEIVED
NOV 19 1987
BUREAU OF HAZARDOUS SITE CONTROL
DIVISION OF HAZARDOUS WASTE REMEDIATION

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION SUMMARY REPORT

MOBIL TAPPAN TERMINAL
[illegible]
Site Name

DEC Site ID Number
(Registry Sites Only)

VILLAGE OF HASTINGS-ON-HUDSON
Address/County
WESTCHESTER CO.

Date of Visit

SITE DESCRIPTION

In process of abandoning this oil terminal Mobil Oil has found chlorobenzene, and diethyl ether in groundwater and various dyes in soil. It is not known if these materials have come from Mobil, an adjoining property owner or a former property owner.

RECOMMENDED ACTION

Remedial Investigation / Feasibility Study

PRIORITY FOR FURTHER ACTION

High____ Medium ✓ Low____

ADD TO REGISTRY

✓ Yes ____ No 2 Suggested Classification

JUSTIFICATION (yes or no)

Up to 12,000 ppb of chlorobenzene in groundwater

Prepared by: Jim Hardy
of DEC

Date: 11/10/87

Ref. 27, p. 3/9

DIVISION OF SOLID AND HAZARDOUS WASTE
INACTIVE HAZARDOUS WASTE DISPOSAL REPORT

CLASSIFICATION CODE: 2 REGION: 3 SITE CODE: ______
EPA ID:

NAME OF SITE : TAPPAN TERMINAL
STREET ADDRESS: ______
TOWN/CITY: HASTING ON HUDSON COUNTY: WESTCHESTER ZIP: ______

SITE TYPE: Open Dump- Structure- Lagoon- Landfill- Treatment Pond-
ESTIMATED SIZE: Acres

SITE OWNER/OPERATOR INFORMATION:
CURRENT OWNER NAME....: MOBIL OIL + PREVIOUS OWNERS
CURRENT OWNER ADDRESS.: 3225 GALLOWS ROAD FAIRFAX VA 22037
OWNER(S) DURING USE...: Mobil + former owners
OPERATOR DURING USE...: Same
OPERATOR ADDRESS......: ______
PERIOD ASSOCIATED WITH HAZARDOUS WASTE: From [illegible] to 1986

SITE DESCRIPTION:

During process of abandoning the oil terminal Mobil Oil found up to 12,000 ppb of chlorobenzene and 1000 ppb of diethyl ether in onsite groundwater. Dyes were found in soil in concentrations between 1 and 11% by weight. Several other semi-volatile priority pollutants were also found in soil and groundwater at lower concentrations.

A sample was taken from adjoining Hudson River with no priority pollutants detected.

HAZARDOUS WASTE DISPOSED: Confirmed- Suspected-

TYPE	QUANTITY (units)
not known at this time	

Preliminary Assessment

EPA

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

I. IDENTIFICATION
01 STATE: XXXXX | 02 SITE NUMBER:

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): TAPPAN TERMINAL
02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER:
03 CITY: HASTING ON-HUDSON
04 STATE: NY | 05 ZIP CODE: 10706 | 06 COUNTY: WESTCHESTER | 07 COUNTY CODE: | 08 CONG DIST:
09 COORDINATES LATITUDE: | LONGITUDE:
10 DIRECTIONS TO SITE (Starting from nearest public road):

III. RESPONSIBLE PARTIES

01 OWNER (if known): MOBIL OIL *
02 STREET (Business, mailing, residential): 3225 Gallows Rd
03 CITY: FAIRFAX VA
04 STATE: VA | 05 ZIP CODE: 22037-0001 | 06 TELEPHONE NUMBER: ( )
07 OPERATOR (If known and different from owner):
08 STREET (Business, mailing, residential):
09 CITY:
10 STATE: | 11 ZIP CODE: | 12 TELEPHONE NUMBER: ( )
13 TYPE OF OWNERSHIP (Check one)
☑ A. PRIVATE ☐ B. FEDERAL: ________ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: ________ (Specify) ☐ G. UNKNOWN

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☐ YES ☐ NO DATE __/__/__ (MONTH DAY YEAR)
BY (Check all that apply) ☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR ☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: ________ (Specify)
CONTRACTOR NAME(S):

02 SITE STATUS (Check one)
☐ A. ACTIVE ☑ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
unknown (BEGINNING YEAR) | 1986 (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Chlorobenzene, diethyl ether, and several other semi volatile priority pollutants

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
priority pollutants in groundwater and soil

V. PRIORITY ASSESSMENT

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

VI. INFORMATION AVAILABLE FROM

01 CONTACT: JAMES HARDY
02 OF (Agency/Organization): NY DEC
03 TELEPHONE NUMBER: 914 255-5453
04 PERSON RESPONSIBLE FOR ASSESSMENT: JAMES HARDY
05 AGENCY:
06 ORGANIZATION:
07 TELEPHONE NUMBER: ( )
08 DATE: 11/10/87 (MONTH DAY YEAR)

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* previous owners may also be responsible parties

EPA — POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION — 01 STATE: XXXX | 02 SITE NUMBER:

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)
- A SOLID
- B POWDER, FINES
- C SLUDGE
- D OTHER: contam. soil (Specify)
- E SLURRY
- F LIQUID
- G GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)
- TONS: unknown
- CUBIC YARDS:
- NO. OF DRUMS:

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

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS	unknown amount		
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	unknown amount		
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

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

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	chlorobenzene		in groundwater	upt 12,37[illegible]	ppb
	diethyl ether		↓	1600	↓
	acenaphthene		↓	29	↓
	anthracene		↓	31	↓
	fluoranthene		↓	104	↓
	fluorene		↓	34	↓
	napthalene		↓	27	↓
	phenanthrene		↓	125	↓
	pyrene		↓	75	↓
	nitrobenzene		↓	25	↓
	N-nitrosodiphenylamine		↓	108	↓
	2-chlorophenol		↓	[illegible]	↓
	2-4, dichlorophenol		↓	4	↓

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

Summary of Groundwater and Soil Quality Investigation
Leggette, Brashears, and Graham Inc.

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

EPA

I. IDENTIFICATION
01 STATE: XXXX | 02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☑ A. GROUNDWATER CONTAMINATION — 02 ☑ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

01 ☑ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

01 ☑ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE ______) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

01 ☑ F. CONTAMINATION OF SOIL — 02 ☑ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED ______ (Acres) 04 NARRATIVE DESCRIPTION

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ______ 04 NARRATIVE DESCRIPTION

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EPA

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

I. IDENTIFICATION
01 STATE: XXXX | 02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

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

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (include name(s) of species)

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

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

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

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

01 ☑ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ________) ☑ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

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

III. TOTAL POPULATION POTENTIALLY AFFECTED: ________

IV. COMMENTS

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

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REFERENCE 10

Ref. 10
p. 1 of 1

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

JAN 13 1988

Thomas C. Jorling
Commissioner

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mobil Oil
3225 Gallows Road
Fairfax, Virginia 22042

Dear Sir/Madam:

As mandated by Section 27-1305 of the Environmental Conservation Law (ECL), copy enclosed, the New York State Department of Environmental Conservation (NYSDEC) must maintain a registry of all inactive disposal sites suspected or known to contain hazardous wastes. The ECL also mandates that this Department notify by certified mail the owner of all or any part of each site or area included in the Registry of Inactive Hazardous Waste Disposal Sites.

Our records indicate that you are the owner or part owner of the site listed below. Therefore, this letter constitutes notification of the inclusion of such site in the Registry of Inactive Hazardous Waste Disposal Sites in New York State.

DEC Site No.: 360015
Site Name: Tappan Terminal
Site Address: Hastings on Hudson, New York

Enclosed is a copy of the New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, inactive hazardous waste disposal site report form as it appears in the Registry and Annual Report, and an explanation of the site classifications. The law allows the owner and/or operator of a site listed in the Registry to petition the Commissioner of the New York State Department of Environmental Conservation for deletion of such site, modification of site classification, or modification of any information regarding such site, by submitting a written statement setting forth the grounds of the petition. Such petition may be addressed to:

Mr. Thomas C. Jorling
Commissioner
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-0001

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