New Jersey Department of Environmental Protection
COMMUNICATION CENTER NOTIFICATION REPORT

Received: 6/5/05 09:10:00 | Comm. Center #: 05-06-05-0935-55

Operator: 26 | Reviewed By:____________________

Reporter Type: Facility Rep.

Reported By: PETER GLAZEWSKI | Affiliation: BP MARINE AMERICAS | Phone: 973-465-2427

Street Address: BLDG 350 COASTAL STREET, | Municipality: Newark | State: NJ

Incident Category: Facility

Location Description: BP MARINE AMERICAS

Address: BLDG 350 COASTAL STREET

Municipality: Newark | County: Essex | State: NJ | Zip Code: 07114

Location Type: Industrial | Occurred Date: 06/05/2005 | Occurred Time: 08:30 AM

Substance Released: OIL FUEL #2 | Amount Released: 200 | Units: gallons | Estimated

ID: Known | State: Liquid | CAS#: | Incident Status at Time of Report: Terminated

Substance Contained: Yes | HAZMAT: Yes | TCPA: No | Haz Waste: No

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Incident Type: Spill | Incident Type 2:

Injuries: No | Public Evac: No | Facility Evac: No | Public Exposure: No | Police At Scene: Yes

Firemen At Scene: No | Dep Requested: No | Road Closure: No | Wind Speed/Direction:

Contamination Of: Land

Watershed: | Other Watershed:

Incident Description: PIPE HAD A LEAK IN IT THAT CAUSED A SPILL. CLEAN UP WILL BE DONE BY CLEAN VENTURE. 908-354-0210

Responsible Party Name: BP MARINE AMERICAS | Responsible Party Phone: 973-465-2427

Responsible Party Street Address: BLDG 350 COASTAL STREET,

Municipality: Newark | County: Essex | State: NJ | Zip Code: 07114

Officials Notified

Name	Affiliation	Phone	Date	Time	Action
	Case Assignment Section		06/05/2005	0:00	Notification - Fax
DISP 92	NEWARK CITY	973-733-7400	06/05/2005	9:20	Notification - A310
	Haz Waste - HQ		06/05/2005	0:00	Notification - Fax

Comments:

BAA000001

920920004 19

TIERRA-D-018818

07/40 183/002

BP MARINE

RECEIVED
DISCHARGE PREVENTION
99 FEB 17 AM 10:29

BP Marine Americas
Building 350
Coastal Street
Port Newark, New Jersey 07114

Direct Line: (973) 465-2425

February 11, 1999

New Jersey Department of
Environmental Protection
Bureau of Discharge Prevention

Re : Spill Incident on
January 14, 1999
at Port Newark NJ.
Ref. Case # 99-01-14-1643-35

Gentleman :

This letter is to confirm our reported spill incident that occurred on January 14, 1999.

Owner/Operator : BP Marine Americas Inc.
Division of BP Exploration and Oil Inc.
200 Westlake Blvd.
Houston, Texas 77079
Lease Holder : Port Authority of NY. & NJ.
Discharge Location : BP Marine Americas Port Newark Terminal, Berth 21
Bldg. 350 Coastal Street, Port Newark
New Jersey 07114
Telephone : 973-465-2425
EPA ID # : NJD98059138
Reported By : Terminal Supervisor - Mr. Joseph Jeannetti
BP Marine Port Newark Terminal
Bldg. 350 Coastal Street
Port Newark, New Jersey 07114
Telephone : 973-465-2425
Berth 21 Location : North Channel, Newark Bay
Name of Street : Gillgan Street
Latitude : 40 deg. 41 min. 40 sec. North
Longitude : 74 deg. 08 min. 15 sec. West
Source of Discharge : BP Marines 2,500 Gallon Vacuum Tank Truck
Substance : No. 6 Fuel Oil Cas No.68476-31-3
Amount Released : Approximately 300 US Gallons
Discovered at : 16:25 hours on January 14, 1999
Release stopped at : 16:26 hours on January 14, 1999
NJDEP Notified at : 16:43 hours on January 14, 1999

BAA000014

On the evening of January 14, 1999, BP Marine terminal supervisor, Joseph Jeannetti and operator, Carlos Cajeira were in the process of loading 7,740 barrels of IF-380 onto the Eklof barge Newark Bay. The mooring location of the barge, Berth 21, Port Newark Channel, riser connection #3.

At approximately 16:25 hours, Eklof Marine employee (making a delivery to the barge) Tom Sullivan arrived at the loading berth and discovered #6 fuel oil leaking form BP Marines 2,500 gallon Vacuum truck that was parked on Gillagan Street, adjacent Berth 21.

He immediately reported the leak to BP Marine operator Carlos Cajeira. Carlos responded to the area and noticed the lower site glass on the tank truck was missing and leaking product. Temporary action taken to stop the flow of product, Carlos quickly inserted a sorbent pad into the missing site glass opening.

Estimate 300 gallons had leaked onto the paved surface of Gillagan Street and Berth 21. Containment and cleanup operations were initiated by deploying several types of sorbent material (spill pads, speedy dry, sausage boom) and two (2) vacuum trucks.

BP Marine's Oil Spill Response Plan was activated at 16:29 hours by terminal supervisor Joseph Jeannetti.

New Jersey Department of Environmental Protection was notified of the incident at 16:43 hours, Case No. 99-01-14-1643. S&D Environmental was notified and activated at 16:45 hours. Port Authority Police was notified at 17:15 hours (officer Hammer).
Port Authority operations representative, Ray Hennessey notified at 17:30 hours.
US Coast Guard notified at 18:10 hours, Case No. 470-624 - PO Gauthier.
New Jersey Marine Police notified at 18:30 hours, Officer Badge # 5437.

Cleanup contractor S&D Environmental arrived on location at 18:05 hours to assist in cleanup operation. Sever weather conditions (snow, rain and ice), delayed the cleanup process for several days. Precautionary containment boom was deployed in the area of Berth 21 and the spill. No spilled product entered the Newark Channel. Cleanup operations complete by releasing S&D Environmental on January 19, 1999.

BP

Clean contractor S&D Environmental furnished two (2) roll off containers to dispose cleanup material and debris.
New Jersey Non Hazardous Manifest Number : SD-3289 SD-3288

S&D Environmental Inc.
11 Elkins Road
East Brunswick, NJ. 08816
EPA : NJD982744260
Phone : 732-432-5566
Fax : 732-432-5757

Disposal Site : Ellesor, Inc.
(Incineration) 864 Julia Street
Elizabeth, NJ. 07201
Facility ID 2004D2
Phone : 908-289-3222

Investigation conducted by BP Marine to determine why the site glass had failed and the necessary remedial actions to prevent recurrence . The truck was built and purchased in 1980. During this period BP has never experienced a site glass failure. The missing site glass or fragments of the glass could not be found.
Remedial actions : The three (3) site glasses were removed and covered over with ¾ inch (thick) steel plate. The steel plates were welded in place. The entire 2,500 gallon tank was pressure tested to 100 p.s.i. In the future, tank level indication will be determined by internal float device.

Should you have any questions regarding this matter, please contact me at 973-465-2427.

Sincerely,

Bueford Williams
Terminal Manager

cc : New Jersey DEP Site Remediation Program

Attachments

Division of Waste Compliance & Enforcement & Release Prevention
Bureau of Discharge Prevention
P.O. Box 424
Trenton, NJ 08625-0424
Tel: 609 984-7573 Fax 609 633-7031

FACILITY SITE INSPECTION REPORT

Facility ID 120100090001

Date of Assignment: 11/30/00
Date of Inspection: 1/9/01
Inspection Time In: 0900 hrs
Out: 1515 hrs

Type of Inspection:

. Storage Capacity	. Booming	. Compliance
. Incident	. Technical	. Upgrade Schedule
. Tertiary Containment	X Annual Audit	. Other

Business Name: BP Marine Americas
Facility Name: BP Oil – Port Newark Terminal
Facility Address: Coastal St., Bldg 350
Newark, NJ 07114

Mailing Address: same as above

County: Essex **Municipality:** Newark **TaxBlock/Lot:** 6000/88, 5078/15

Facility Contact(s): Bueford Williams **Telephone Number(s):** (973) 465-2425

Meeting/Interviews/Other Person(s) Involved in Inspection:
Name: Bueford Williams **Affiliation:** BP – Terminal Mgr.
Name: **Affiliation:**

Field Inspector(s) Name(s):
Name: Darin L. Shaffer **Title:** Principal Environmental Engineer
Name: **Title:**

Report Prepared By: Darin L. Shaffer **Title:** Principal Environmental Engineer
Signature: Darin L Shaffer **Date:** 1/12/01

Report Approved By: Darryl C. Jennus **Title:** Chief, Field Verification Section
Signature: Darryl C. Jennus **Date:** JAN 11 2001

BAA000017

920920055

BP Oil – Port Newark Terminal.
Newark, NJ
1/9/01 annual audit

DOCUMENT REVIEW

This facility is a petroleum storage and distribution facility, handling various oils (#2 oil, #4 oil, #6 oil, diesel and kerosene). Product enters the facility via pipeline and vessel and leaves the facility via tank truck and vessel. This facility was last audited by David Helfrich on 1/27/00.

RECORD KEEPING

DRILLS

This facility conducted a drill for the 1999 calendar year on 12/9/99. The table top drill scenario involved a tank failure and 96,000 barrel discharge of #6 oil. Additionally, the facility conducted a drill for the year 2000 on 11/13/00. This table top drill involved a hose failure during a marine transfer. Both drills were described in writing and the 1999 drill was critiqued in writing, but the critique for the 2000 drill had not yet been sent to BP by the consultant that conducted the drill. However, BP did obtain the critique prior to the preparation of this report. Additionally, the facility has conducted and documented several other drills each year to satisfy OPA requirements. The other drills included notification drills, equipment deployment drills, and actual events evaluated as drills.

HAZARDOUS SUBSTANCE INVENTORIES

A computerized inventory is kept for all materials at the facility in tanks. The inventory is auto-gauged daily and manually gauged daily for each active tank. Each inactive tank is manually gauged weekly. The inventory is reconciled daily and both paper and computer records of the inventory are retained for greater than 3 years. I reviewed examples of the paper and computer inventory records for random periods during 2000.

DISCHARGE CONFIRMATION REPORTS

The facility stated that they have had no reportable or non-reportable discharges since the time of the last audit. However, I noted that an actual event utilized as an OPA drill involved a discharge to water and had been phoned in to the NJDEP hotline. The event was assigned case # 00-09-29-0900-58. A barge owned by K-Sea Transportation was offloading marine diesel oil to the BP Terminal when a barge pump seal failed and resulted in a 2 gallon discharge to the Newark Bay Channel. The facility phoned in the discharge, but did not submit a written DCR because they believed the barge was at fault. I explained that the discharge occurred at the BP dock and was phoned in by BP, so a DCR submission was appropriate. The required DCR was provided by BP prior to the preparation of this report.

VISUAL INSPECTIONS

This facility performs and documents visual inspections according to the following schedule: prior to use – marine transfer equipment; twice daily - all tank truck unloading areas; monthly - storage tanks, aboveground piping/valves/connections, secondary containment and security. I did note that tanks A – H, Q and T had been left off the inspection documentation. This was corrected by BP prior to the preparation of this report. I reviewed the documentation of the above noted inspections for 1999 and 2000 year to date and found no recurring pattern of leaks which needs to be addressed. However, as noted below, I did identify several small leaks (leaking or weeping valves) throughout the tank farm which appear to have existed for some time and which were not identified on the visual inspection documentation. I encouraged Williams to better educate those employees conducting the inspections to ensure that these problems can be quickly identified and corrected.

BP Oil – Port Newark Terminal.
Newark, NJ
1/9/01 annual audit

INTEGRITY TESTING

The facility is following the API 653 protocol. The facility has an integrity testing schedule based on the results of previous API 653 inspections. I reviewed the inspection/testing results completed since the time of the last audit. Tanks #101, 104, 105, 112 and 113 received internal and external API 653 inspections during June and July 2000 (tank #101 inspections were completed 10/2000). Minor repairs or upgrades were recommended for each tank except tank #101 (a new floor and roof were recommended for this tank). The repairs to tank #101 were on-going at the time of this inspection and the facility stated that the minor repairs to all other tanks had been completed. Many of the repairs were identified during the visual inspection of the site. I encouraged the facility to document in the tank files what was done to satisfy the minor repair recommendations in order to have a complete repair history for each tank. All inspection/testing scheduled for completion during 2000 was completed in accordance with the tank integrity testing schedule in the DPCC/DCR plan with the exception of Tank #103. The facility requested of BDP and was granted an extension to conduct the testing of tank #103 by the end of February 2001. The facility also conducts and documents monthly visual inspections as required by API 653 with the exception of tanks A, B, C, D and E. Those tanks were immediately added to the list of tanks that are visually inspected and the facility promptly conducted the required inspections. The inspections and documentation also satisfy part of the DPCC required inspections. Tanks 102, 103, 106, 107, 108, 109, 114, A, B and D are scheduled for internal and/or external API inspection/testing during 2001.

MAJOR MAINTENANCE/REPAIR

The facility indicated that it has not performed any major maintenance or repair to tanks or process equipment since the time of the last audit with the exception of the currently on-going repairs to tank #101. The facility noted that all the repairs will be well documented and the tank will be re-inspected prior to being returned to service.

FINANCIAL RESPONSIBILITY

The facility uses liability insurance to demonstrate financial responsibility and the facility had a properly worded endorsement to an existing policy that was valid for the period 1/1/01 through 1/1/02.

EMPLOYEE TRAINING PROGRAM

The facility has approximately 14 employees that handle hazardous substances and has hired 3 new contractor employees since the time of the last audit. I reviewed documentation that showed that each employee received annual refresher training in site-specific hazwoper (8 hour) as well as other health/safety topics during monthly safety meetings. The new contractor employees are hired as short term employees that may be later assigned to full-time positions. I reviewed documentation that showed the new employees received comprehensive classroom and on-the-job training and final qualification will be granted after one year (quarterly assessments are also documented). The plant manager or plant supervisor provides most of the training and is responsible for ensuring that no employees miss required training topics.

The facility has a training film and booklet with a sign-off sheet to verify that all outside contractors are trained in site-specific emergency response, health and safety issues.

STANDARD OPERATING PROCEDURES

This facility has SOPs (in various forms) for what appears to be all operations at the facility involving the handling of hazardous substances with one exception. The facility was unable to provide an SOP for pipeline receipts. Williams noted that such an SOP did exist at one time, but he was unable to locate it at the time of the audit. The facility maintains several documents which serve as SOPs. For example, I reviewed the facility's SOP manual for barge unloading as well as the facility's Dock Manual and the Emergency Response plan. In combination, these three manuals covered the required topics for the barge unloading procedure. The SOPs are maintained in the main office as well as other locations (such as the dockhouse) as appropriate for employee access.

VISUAL INSPECTION

SECONDARY CONTAINMENT/DIVERSION SYSTEMS/STORAGE/PIPING

During this inspection, storage tanks, piping, drum/tote storage areas, tank truck loading/unloading areas and vessel loading/unloading areas were inspected. Upon inspection such areas were found to be provided with adequate secondary containment and/or diversion systems. Existing systems were found to be maintained in good order structurally and were free of cracks through which leaks could become discharges. I did note that tanks 109-112 had old piping attached near the top of the tank and which were cut-off near the base of the tank, outside of containment. Some of the lines were plugged with expanding rubber plugs, while others were not plugged or capped. The lines were formerly used to enable the facility to inject fire foam into the top of the tanks. In the event of a high-level situation, the lines would currently act as overfill lines and any overfill would result in a discharge. The facility agreed and stated their intention to remove the lines or install threaded caps. Tanks had readily accessible valves within containment and overfill protection is provided through high-level alarms and radio/phone communication between an automatic product gauger and the pumping station. I learned that five storage tanks (A, B, C, D and E) do not have high level alarms, although the DPCC/DCR plan states that all bulk storage tanks have high level alarms. The facility noted that the tanks are not in constant service. The tanks are used only for slop oil collection and generally only when cleaning out a tank. Williams indicated that the tanks are typically used less than 6 months out of the year. As such, the facility did not believe that the tanks warranted high level alarms. Piping in the facility is color coded at the racks and all other piping is not specifically labeled because it can carry any of the facility's various grades of fuel oil.

HOUSEKEEPING AND MAINTENANCE

Hazardous substances were found to be stored in appropriate containers and in an acceptable manner. Loose quantities of hazardous substances were evident in several locations within the tank farm containment area. Typically, the cause was leaking or weeping valve packing. I explained the requirement to repair leaking equipment immediately or control with drip pans until the repairs can be completed (up to 15 days). Secondary containment/diversion systems were found to be maintained adequately. Sorbent materials and cleanup-tools were maintained in a storage building near the truck rack, central to the facility.

SITE SECURITY

This facility utilizes fencing around the perimeter of the property to limit access to the facility. The fencing was in good condition at the time of this inspection, where I was able to view it. Fixed lighting was provided for outdoor hazardous substance storage and transfer areas.

MARINE TRANSFER

This facility has two berths that can handle up to three barges or one ship and the facility has recently been handling approximately 24 barges/month and 2-3 ships/month. The facility maintains permanent boom along the dock bulkhead and deploys booms to encircle vessels during transfers. Booming services are provided by Miller Marine, who operates from an office within the facility property. Additionally the facility maintains boats and 1,100 feet of boom, sufficient to completely boom across the Port Newark Channel. At the time of this inspection, the facility was offloading #6 oil from Barge BFT no.38. The vessel was properly boomed and the boom was connected via tide slides to ensure proper contact with the water surface.

BP Oil – Port Newark Terminal.
Newark, NJ
1/9/01 annual audit

SCHEDULE OF UPGRADES

There are no upgrades identified in the DPCC/DCR plan for this facility.

CONCLUSIONS/RECOMMENDATIONS

- The following violations were discussed at the exit conference and must be addressed by the facility.

1) Leaking valves throughout the facility must be repaired and the leaked hazardous substances must be cleaned up. I recommend a grace period to address this violation. A Notice of Violation (NOV) was written with a compliance deadline of 1/26/01.
2) The former fire foam lines must be capped or directed into containment. I recommend a grace period to address this violation. A NOV was written with a compliance deadline of 1/26/01.
3) A standard operating procedure must be prepared for Pipeline Receipts. I recommend a 90 day grace period to address this violation. A NOV was written with a compliance deadline of 4/9/01.
4) Tanks A, B, C, D and E must have high level alarms. This is a 90 day grace period violation. A NOV was written with a compliance deadline of 4/9/01.

- Copies of the NOVs have been filed in the facility's enforcement file and follow-up inspections will be conducted as necessary to ensure the violations have been appropriately addressed.

- Annual audit should be performed in one year.

bp marine

RECEIVED

2005 MAY -4 PM 3:13

BUREAU OF RELEASE PREVENTION

BP Marine Americas
Building 350 Coastal Street
Port Newark, New Jersey 07114

Direct Line: (973) 465-2425

April 29, 2005

New Jersey Department of
Environmental Protection
Bureau of Discharge Prevention

Re : Discharge Confirmation Report
Ref. Case # 050425115128

Gentleman :

This letter is to confirm our reported non-compliance (excursion) that occurred on March 30, 2005.

Owner/Operator :	BP Marine Americas Inc. Division of BP Products North America Inc. 200 Westlake Blvd. Houston, Texas 77079
Lease Holder :	Port Authority of NY. & NJ.
Discharge Location :	BP Marine Americas Port Newark Terminal Bldg. 350 Coastal Street, Port Newark New Jersey 07114
Telephone :	973-465-2425
EPA ID # :	NJD98059138
Reported By :	Terminal Manager - Mr. Bueford Williams BP Marine Port Newark Terminal Bldg. 350 Coastal Street Port Newark, New Jersey 07114
Telephone :	973-465-2425
Location :	Bldg. 350
Name of Street :	Coastal Street
Latitude :	40 deg. 41 min. 54 sec. North
Longitude :	74 deg. 09 min. 23 sec. West
Source of Discharge :	Stormwater Outfall 001A
Substance :	Oil&Grease
Amount Released :	15.7 mg/L
Discovered at :	11:45 hour on April 25, 2005
Release stopped at :	07:15 hour on March 30, 2005
NJDEP Notified at :	11:45 hour on April 25, 2005

PIFF # 0714018310002
Newark City, Essex Co. BAA000019

920920061

TIERRA-D-018827

On April 25, 2005, BP Marine Americas terminal manager Bueford Williams notified the New Jersey Department of Environmental Protection of a non-compliance (excursion) stormwater discharge event. The BP Marine Port Newark terminal is authorized (NJPDES Permit No. NJ0034231) by the New Jersey Department of Environmental Protection, Division of Water Quality to discharge stormwater associated with industrial activities to surface waters of the State.

Within the current NJPDES permit, the facility is required to monitor and sample stromwater in accordance with the Departments "Field Sampling Procedures Manual" for Total Suspended Solids (TSS), Total Organic Carbon (TOC), Oil & Grease (O&G) and submit quarterly DMR's on the 25th calendar days after the end of each calendar quarter.

On March 30, 2005 the terminal monitored and collected multi-grab sampled at outfall location (DSN001A). Multi-Grab samples were collected and analyzed for Oil & Grease. The first grab sample was collected at 06:45 hour, the second grab sample collected at 07:00 hour and the third grab sample collected at 07:15 hour. NJ Certified laboratory data results of first grab sample (0502873) collected at 06:45, indicated 14.8 mg/L O&G. The second grab sample (0502874) collected at 07:00 hour, indicated 15.7 mg/L O&G. The third and final sample (0502875) collected at 07:15, indicated 9.7 mg/L O&G.
Grab sample (0502874) taken at 07:00 hour, indicated O&G level exceeding the numeric permit limitation of 15.0 mg/L max.

The BP Marine terminal was not aware of the non-compliance (excursion) until viewing the laboratory analysis report on April 25, 2005.

Upon discovery of the excursion, terminal manager Bueford Williams immediately notified the NJDEP Hot Line and NJDEP Enforcement Division, Cedar Knoll. Outfall DSN001A was not open at time of discovery. The two (2) Oil Water separators were immediately taken out of service, cleaned and returned to service on April 26, 2005. Bottom sludge generated form cleaning operations is currently stored in sealed certified 55 gallon drums waiting proper disposal in accordance with Federal, State and Local regulations.

Non-compliance duration:

Non-compliance occurred on March 30, 2005 @ 07:00 hour to March 30, 2005 @ 07:15 hour. Estimate duration of non-compliance, less then 15 minutes.

Notification:

New Jersey Department of Environmental Protection Hot Line was notified of non-compliance on April 25, 2005 at approximately 11:45 hour. Case No. 050425115128. NJDEP Northern Bureau of Water Compliance and Enforcement (Cedar Knolls) notified on April 25, 2005 at approximately 11:47 hour.

Division of Waste Management
Facility Inspection Form

Time at Facility
Departed 141 Share
Arrived 125c hars

Facility Name: British Petroleum/N. American Trading
Address: Coastal Street, Port Newark 07102

Date: 10/14/83
Fac. Rep: Charlie Gulfare
Position: Plant Manager
Inspector: [illegible]

Facility Type: storage, transfer

EPA ID #: NJD980591838
Lot: 15, 5

Block: 78, 6000
Weather Conditions: - Clear -
Wind Direction: SW Temp: 64° Speed: 5-10 MPH: ____

Operating Authorization
Facility is operating under (type of authorization): Application pending with BHLW Engineering

Summary of Inspection (check appropriate statement)
Facility: is in compliance with operating authorization: ____
is not in compliance with operating authorization: ____ N/A

Facility: is in compliance with NJAC Title 7, Chapter 26: ✓
is not in compliance with the following statute provisions(s): ____

Overall housekeeping: Poor ____ Fair ____ Satisfactory ✓ Very Good ____

Inspection Observations

	Yes	No	N/A
1. Does the treatment process (including storage tanks) system show any signs of ruptures, leaks, or corrosion? If yes, explain.			
2. Spills. If yes, explain. - see comment #1 -	✓		
3. Odors. If yes, explain. - Oil odor in Tank Area -			

Container Storage: (7:26-9.4(d))
Drum No. 6 Stack Height 1 High Storage Method On Asphalt

	Yes	No	N/A
Do the containers appear to be in good condition, not in danger of leaking: If no, explain in detail.	✓		
Are all containers closed except those in use?	✓		
Are incompatible wastes stored separate from each other?	✓		
Adequate aisle space?	✓		
Are containers stored according to waste characterization?	✓		

fd 12-22-83 [illegible]

920920067

BAA000023

Charles Gulfont

TIERRA-D-018829

	Yes	No	N/A
Is each contianer marked or labeled with the words "Hazardous Waste" and in compliance with the DOT labeling requirements:			
- generator name	✓		
- address	✓		
- UN, NA number	✓		
- DOT shipping name	✓		
- EPA ID number	✓		
- manifest number		✓	
- accumulation start date	✓		

Vehicles: (7:26-7.1 and 7.5)

	Yes	No	N/A
Valid registration card			✓
Numbers displayed			✓
Properly placarded			✓

Manifests: (7:26-7.4, 7.5 and 7.6)

Does each manifest have the folliwng information?

	Yes	No	N/A
The generators name, mailing address, telephone number, EPA ID number and signature?	✓		
The transporters name, EPA ID number and signature?	✓		
SWA transporter registration number?	✓		
The name, address, EPA ID number of the designated facility and signature?	✓		
A description of the wastes (DOT)?	✓		
The total quantity of each hazardous waste?	✓		
Has the generator received signed copies (Fromthe TSDF) of all the manifests for waste shipped off site more than 35 days ago?	✓		

Record Keeping: (7:26-9.4 (f and i)

Are the following being kept properly?

	Yes	No	N/A
1. Daily inspection log?	✓		
2. Daily operating log?	✓		
3. Waste inventory log?	✓		

Samples taken: yes no number of samples
NJ DEP ID#

Photographs taken: yes no

Signature of Inspector

Signature of Facility Representative

920920068
TIERRA-D-018830

Facility Name BF / N. American Trading, Inc Date of Inspection 10/14/83

EPA ID No. NJD980591839 HW/EF No. 07/108

Comments, observations, summary

(1) As noted in previous facility inspections, BF had a #6 fuel oil spill on 2/2/83 (see attached map for location). BF was then given approval by DEM-Engineering through an ACO dated 7/15/83 to use dried bacteria culture (DBC) in order to degrade the spilled #6 fuel oil, and a 90 day period was given for clean-up project to be completed. However, according to Charlie Guilfoyle, a verbal sixty day extention was given by DEM-Engineering for clean-up; letter from state has not been received by BF. A vast improvement overall was noted in spill area.

(2) Six drums containing XT25 oil spill clean-up material was stored on-site. According to Charlie Guilfoyle, arrangements are being made for disposal.

(3) Last date sludge (tank bottoms) were sent off-site for disposal was on 8/30/83. Manifest used was NJ0170008, and TSD Facility used was BTL Oil-Newark.

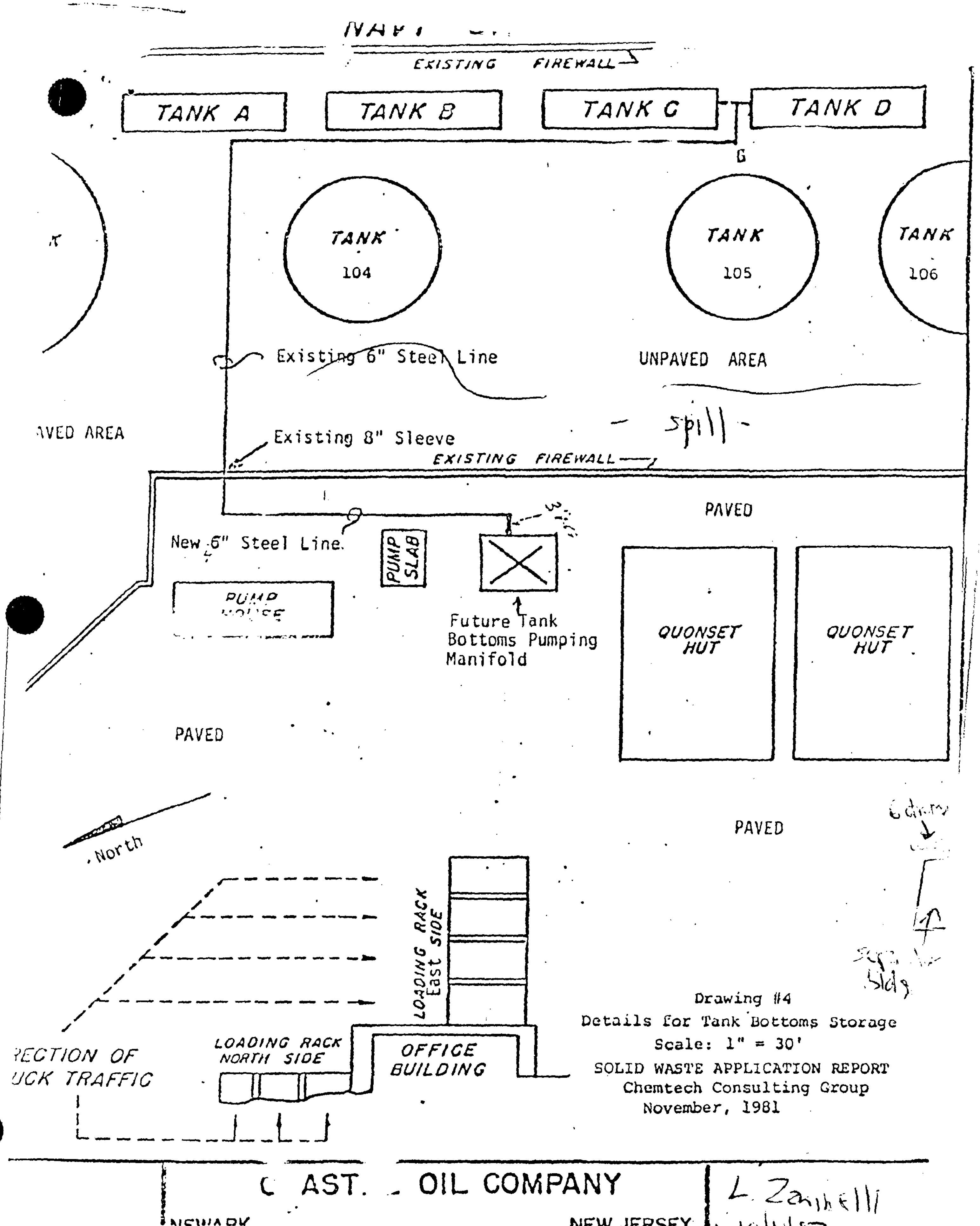
(4) Tank C is empty; D contains 25,000 gallons #6.

Linda Zannella — Signature of Inspector

Charles Guilfoyle — Signature of Facility Representative

920920069

TIERRA-D-018831



Drawing #4
Details for Tank Bottoms Storage
Scale: 1" = 30'
SOLID WASTE APPLICATION REPORT
Chemtech Consulting Group
November, 1981

920920070

TIERRA-D-018832

Division of Waste Management
Facility Inspection Form

Time at Facility
Departed 1215 hrs
Arrived 0945 hrs

Facility Name: British Petroleum/N. American Trading
Address: Coastal Street, Port Newark 07102

Date: 9/1/83
Fac. Rep: Charlie Guilfoyle
Position: Plant Manager
Inspector: L. Zannelli

Facility Type: storage, transfer

EPA ID #: NJD980591838
Lot: 15, 5

Block: 78, 6000
Weather Conditions: - Clear -
Wind Direction: NW Temp: 82° Speed: 5-10 MPH: ____

Operating Authorization

Facility is operating under (type of authorization): - Waiting for permit from State to store waste

Summary of Inspection (check appropriate statement)

Facility: is in compliance with operating authorization: ____
is not in compliance with operating authorization: ✓ NA

Facility: is in compliance with NJAC Title 7, Chapter 26: ✓
is not in compliance with the following statute provisions(s): ____

Overall housekeeping: Poor ____ Fair ____ Satisfactory ✓ Very Good ____

Inspection Observations

		Yes	No	N/A
1.	Does the treatment process (including storage tanks) system show any signs of ruptures, leaks, or corrosion? If yes, explain.		✓	
2.	Spills. If yes, explain. - See comment # 1 -	✓		
3.	Odors. If yes, explain. - Petroleum-like odors throughout yard and tank area -	✓		

Container Storage: (7:26-9.4(d)

Drum No. 6 Stack Height 1 High Storage Method On

	Yes	No	N/A
Do the containers appear to be in good condition, not in danger of leaking: If no, explain in detail. - See comment # 3 -	✓		
Are all containers closed except those in use?	✓		
Are incompatible wastes stored separate from each other?	✓		
Adequate aisle space?	✓		
Are containers stored according to waste characterization?	✓		

1070

Charles Guilfoyle

920920071

TIERRA-D-018833

	Yes	No	N/A
Is each container marked or labeled with the words "Hazardous Waste" and in compliance with the DOT labeling requirements:			
- generator name	✓		
- address	✓		
- UN, NA number	✓		
- DOT shipping name	✓		
- EPA ID number	✓		
- manifest number	✓		
- accumulation start date	✓		

<u>Vehicles: (7:26-7.1 and 7.5)</u>

	Yes	No	N/A
Valid registration card			✓
Numbers displayed			✓
Properly placarded			✓

<u>Manifests: (7:26-7.4, 7.5 and 7.6)</u>

Does each manifest have the folliwng information?

	Yes	No	N/A
The generators name, mailing address, telephone number, EPA ID number and signature?	✓		
The transporters name, EPA ID number and signature?	✓		
SWA transporter registration number?	✓		
The name, address, EPA ID number of the designated facility and signature?	✓		
A description of the wastes (DOT)?	✓		
The total quantity of each hazardous waste?	✓		
Has the generator received signed copies (fromthe TSDF) of all the manifests for waste shipped off site more than 35 days ago?	✓		

<u>Record Keeping: (7:26-9.4 (f and i)</u>

Are the following being kept properly?

	Yes	No	N/A
1. Daily inspection log?	✓		
2. Daily operating log?	✓		
3. Waste inventory log?	✓		

Samples taken: yes no number of samples

NJ DEP ID#

Photographs taken: yes no - Seven photos were taken of spill area -

Linda Zanivelli

Signature of Inspector

Signature of Facility Representative

920920072

TIERRA-D-018834

Facility Name BP / N. American Trading Co. Date of Inspection 9/1/83

EPA ID No. NJD 980591839 HW/EF No. 07/108

Comments, observations, summary

1) As noted in 8/4/83 facility inspection report, BP had a spill on 2/2/83 as a result of overfilling Tank #106, which consisted of approximately 1000 barrels of #6 fuel oil. BP was then given approval through ACO dated 7/15/83 by DWM-Engineering, to use dried bacteria culture (DBC) in order to degrade the spilled #6 fuel oil, and a 90 day period was given for clean-up project to be completed. According to Charlie Guilfoyle, facility is pumping approximately 4 times a week, 25-50 gallons of material into Tanks: C+D, and separator is used only during rainfall. A vast improvement was noted overall with the use of DBC in the spill area.

2) The problem BP has had of leeching oil into the ~~[illegible]~~ channel through the bulkhead has been corrected. New lines + piping were placed in area. As a precaution, several test wells will be sunk in the future.

Linda Zaninelli

Signature of Inspector

Charles H. [illegible]

Signature of Facility Representative

920920073

TIERRA-D-018835

Facility Name B.P. / N. American Trading Date of Inspection 9/1/83
EPA ID No. NJD980591838 HW/EF No. 07/108

Comments, observations, summary

(3) As noted in 8/4/83 facility report six drums were on-site containing oil spill clean up material X-725 (oily rags + speedy dry). The two leaking drums noted in 8/4/83 report have been repacked, as well as the other 4 drums, and all drums now have lids. Also hazardous waste labels are now on all drums, and labels are properly filled out as per 8/4/83 facility inspection report

(4) The following persons were on-site during my inspection:

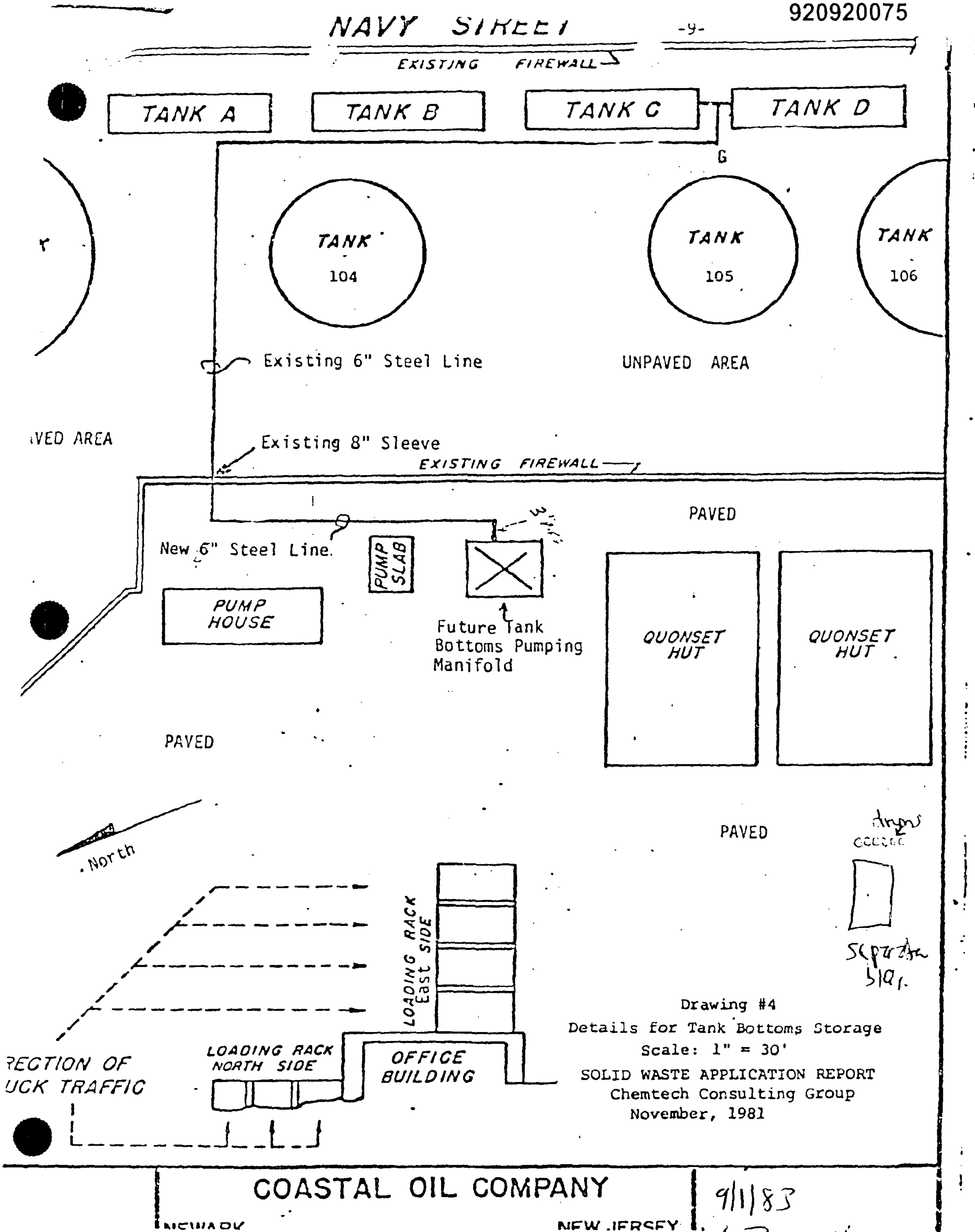
Scott Baker - DWM - Engineering
Frank Gagliano - DWM - BFO - Central Region
John Francis } Loma Industries, Inc.
Ray Stinger }

Progress and time factors of DRC project were discussed

Linda Zannella
Signature of Inspector

[signature]
Signature of Facility Representative

920920074
TIERRA-D-018836



Drawing #4
Details for Tank Bottoms Storage
Scale: 1" = 30'
SOLID WASTE APPLICATION REPORT
Chemtech Consulting Group
November, 1981

Charles [illegible] L Zannelli

Form DWM-005
2/83

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
BUREAU OF FIELD OPERATIONS

ENFORCEMENT REFERRAL

TO: Meg Robinson DATE: 8-22-83

FROM: George Smajda REGION: II

RE: British Petroleum / N. American Trading Corp. NJD 0950591838
Name of Facility ID Number Location Address

Lot 15.5 Blk 78,6000 Newark Essex
Lot and Block Township County

Coastal St. Charles Guilfoyle - Pt. Mgr.
Mailing Address Responsible Party

The attached inspection/investigation report(s) dated 6-16-83 is being referred and it is recommended an NOV be issued for violations of:

NJAC 7:26– 19.4(d)2 leaking drums.

12.3(b)3 storage of drums over 90 days in violation of permit limits.

19.6e Failure to provide aisle space as needed.

9.3(a)3; 7.2(a) Failure to label drums.

NJSA 58:10–

Suggested penalty: none pending compliance w/I 10 days of receipt

ADDITIONAL COMMENTS:

First citation of vios.

NO ACTION / ENFORCEMENT ALREADY REFERRAL FOR BE&C VIOLATIONS TO SIMILAR VIOLATIONS FROM INSPECTION 8/4/84

REVIEWED AND APPROVED BY:

K9

920920076

White – Enforcement and Compliance Copy
Yellow – Region Copy

TIERRA-D-018838

Form DWM-005
2/83

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
BUREAU OF FIELD OPERATIONS

ENFORCEMENT REFERRAL

TO: Meg Robinson DATE: 8-22-83

FROM: George Sangla REGION: II

RE: British Petroleum/N. Amer. Trading Corp. NJD980591838
Name of Facility / ID Number / Location Address

Lot 15.5 Blk 78,6001 Newark Essex
Lot and Block / Township / County

Coastal St. Charles Guildfoyle
Mailing Address / Responsible Party

The attached inspection/investigation report(s) dated 8-4-83 is being referred and it is recommended a NOV AO/PSO be issued for violations of:

NJAC 7:26— 9.3(a)3 Failure to label drums as required

9.4(d)2 leaking drums.

NJSA 58:10—

Suggested penalty: $100.00 – To be Computed by Bureau of C+E

ADDITIONAL COMMENTS:

Report Violation of both statutes

REVIEWED AND APPROVED BY:

[signature] 9/8/

920920077

White — Enforcement and Compliance Copy
Yellow — Region Copy

TIERRA-D-018839

Division of Waste Management
Facility Inspection Form

Time at Facility
Departed 1230 am
Arrived 0930 am

Facility Name: British Petroleum/N. American Trading
Address: Coastal Street, Port Newark 07102

Date: 8/7/83
Fac. Rep: R. Williams
Position: Supervisor
Inspector: Zanelli

Facility Type: storage, transfer

EPA ID #: NJD980591838
Lot: 15, 5

Block: 78, 6000
Weather Conditions: Overcast
Wind Direction: NW Temp: 82° Speed: 5-10 MPH: ____

Operating Authorization

Facility is operating under (type of authorization): Waiting for permit from state to store waste

Summary of Inspection (check appropriate statement)

Facility: is in compliance with operating authorization: ____
is not in compliance with operating authorization: ____

Facility: is in compliance with NJAC Title 7, Chapter 26: ____ N/A
is not in compliance with the following statute provisions(s): ____

Overall housekeeping: Poor ____ Fair ____ Satisfactory ✓ Very Good ____

Inspection Observations

	Yes	No	N/A
1. Does the treatment process (including storage tanks) system show any signs of ruptures, leaks, or corrosion? If yes, explain.		✓	
2. Spills. If yes, explain. see comments # 1, 2, 3	✓		
3. Odors. If yes, explain. Petroleum-like odor throughout yard + tank area	✓		

Container Storage: (7:26-9.4(d)

Drum No. 6 Stack Height 1 High Storage Method On Ground

	Yes	No	N/A
Do the containers appear to be in good condition, not in danger of leaking: If no, explain in detail. - Two drums were leaking - see comment #3 -		✓	
Are all containers closed except those in use? - see comment #3		✓	
Are incompatible wastes stored separate from each other?	✓		
Adequate aisle space?	✓		
Are containers stored according to waste characterization?	✓		

920920078

0471

TIERRA-D-018840

	Yes	No	N/A
Is each container marked or labeled with the words "Hazardous Waste" and in compliance with the DOT labeling requirements:			
- generator name		✓	
- address		✓	
- UN, NA number — SEE Comment #3 —		✓	
- DOT shipping name		✓	
- EPA ID number		✓	
- manifest number		✓	
- accumulation start date		✓	

Vehicles: (7:26-7.1 and 7.5)

	Yes	No	N/A
Valid registration card			✓
Numbers displayed			✓
Properly placarded			✓

Manifests: (7:26-7.4, 7.5 and 7.6)

Does each manifest have the folliwng information?

	Yes	No	N/A
The generators name, mailing address, telephone number, EPA ID number and signature?	✓		
The transporters name, EPA ID number and signature?	✓		
SWA transporter registration number?	✓		
The name, address, EPA ID number of the designated facility and signature?	✓		
A description of the wastes (DOT)?	✓		
The total quantity of each hazardous waste?	✓		
Has the generator received signed copies (fromthe TSDF) of all the manifests for waste shipped off site more than 35 days ago?	✓		

Record Keeping: (7:26-9.4 (f and i)

Are the following being kept properly?

	Yes	No	N/A
1. Daily inspection log?			✓
2. Daily operating log?	✓		
3. Waste inventory log?	✓		

Samples taken: yes no number of samples

NJ DEP ID#

Photographs taken: yes no

Linda Zanniello
Signature of Inspector

[signature]
Signature of Facility Representative

9209200 TIERRA-D-018841

Facility Name BP / N. American Trading Co. Date of Inspection 8/4/83

EPA ID No. NJD 980591839 HW/EF No. 07108

Comments, observations, summary

(1) As noted in 6/16/83 facility inspection report, facility had a spill on 2/2/83 resulting from overfilling Tank # 106. Approximately 1000 barrels of #6 oil spilled. Approximately 3/4 of that has been cleaned up. On 6/8/83 facility applied nutrients to spill and on 6/13/83, dried bacteria culture (DBC) was applied to spill as per C/O from Dum. Engineering Section giving DBC use approval in order to degrade the spilled #6 oil. According to Bo Williams, Supervisor, facility is pumping approximately 25-50 gallons of material into Tanks (+D) two times a week. At time of inspection, soil which covers the ~~[illegible]~~ clay soil inside the diked walls by spill area were visible several feet extending from diked wall and around tanks. Material is skimmed to separator + put back into Tanks (+D).

(2) The problem of leaking oil into the channel through the bulkhead has for the most part been corrected as per 6/16/83 inspection report. The two leaking

Linda Zanarelli

Signature of Inspector

[illegible]

Signature of Facility Representative

920920080

TIERRA-D-018842

Facility Name BP / N. American Trading Co. Date of Inspection 8/4/83

EPA ID No. NJD 980591839 HW/EF No. 07/108

Comments, observations, summary

pipes were found + new piping was added. According to Bo Williams, one test well has been sunk in front of the bulkhead, and prices are being looked into for several more test wells to be installed extending back from the bulkhead. At time of inspection, Moser Contractors, Deans, N.J. were installing + ticing in pipes.

(3) Six drums were observed on-site in front of the separator building on concrete containing oily rags + speedy dry (x-72.5) Two of these drums were leaking + material goes into catch basin and into separator. Inspector instructed facility to add speedy dry. Four of the drums were not covered. According to Bo Williams facility is waiting for new drums which they ordered since drums won't seal + 2 are leaking from the bottom. Out of six drums on-site, five are full + one is ½ filled. Also only two of the six drums have hazardous waste labels on them. Accumulation start date as well as EPA waste type is not filled out as per

Linda Zannelli

Signature of Inspector

Signature of Facility Representative

920920081

TIERRA-D-018843

Facility Name BP | N. American Trading Co. Date of Inspection 8/4/83
EPA ID No. NJD 980591839 HW/EF No. 07/108

Comments, observations, summary

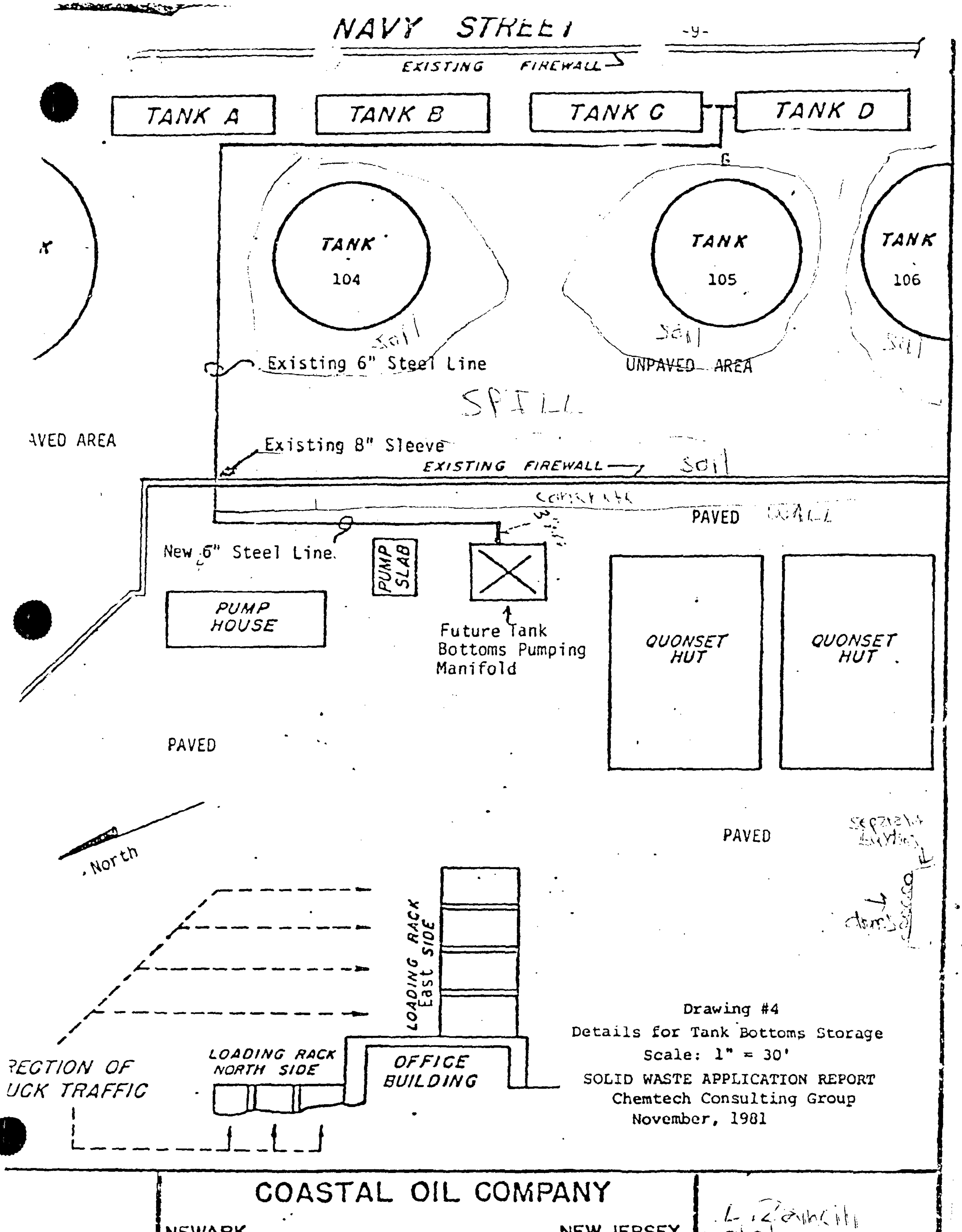
N.J.A.C. 7:26-9.3 (a) 3, on the two labeled drums
Labels were typed up in my presence + put on drums.
(4) Out of the 24 drums noted in 6/16/83 inspection
report, 21 drums were sent off site on
7/13/83 hauled by Moran Crawley and
TSD Facility used was American Recovery.
Manifest # B 22103

Linda Zanivelli
Signature of Inspector

[signature]
Signature of Facility Representative

920920082

TIERRA-D-018844



Drawing #4
Details for Tank Bottoms Storage
Scale: 1" = 30'
SOLID WASTE APPLICATION REPORT
Chemtech Consulting Group
November, 1981

920920083

Form DWM-002
/83

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT

NOTICE OF VIOLATION

ID NO. 07||83 DATE 3|3|83

NAME OF FACILITY BP / North American Trading Co., Inc

LOCATION OF FACILITY Coastal St., Bldg 350 - Port Newark

NAME OF OPERATOR Charlie Gulfogle / Bo Williams

You are hereby NOTIFIED that during my inspection of your facility on the above date, the following violation(s) of the Solid Waste Management Act, (N.J.S.A. 13:1E-1 et seq.) and Regulations (N.J.A.C. 7:26-1 et seq.) promulgated thereunder and/or the Spill Compensation and Control Act, (N.J.S.A. 58:10-23.11 et seq.) and Regulations (N.J.A.C. 7:1E-1 et seq.) promulgated thereunder were observed. These violation(s) have been recorded as part of the permanent enforcement history of your facility.

DESCRIPTION OF VIOLATION NJAC 7:26-9.3(a)3 - Accumulation start date must be clearly marked on each container.

Four out of six drums have no hazardous waste labels on them + the two that do, are not filled out properly

Remedial action to correct these violations must be initiated immediately. The issuance of this document serves as notice to you that a violation has occurred and does not preclude the State of New Jersey, or any of its agencies from initiating further administrative or legal action, or from assessing penalties, with respect to this or other violations. Violations of these regulations are punishable by penalties of $25,000 per violation.

Linda Zanivelli

Investigator, Division of Waste Management
Department of Environmental Protection

[signature]

920920084

TIERRA-D-018846

DWM-002

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT

NOTICE OF VIOLATION

ID NO. 07/107 DATE 8/3/83

NAME OF FACILITY BP/North America Trading Co., Inc.

LOCATION OF FACILITY Coastal St., Bldg 350 - Port Newark NJ

NAME OF OPERATOR Charlie Guilfoyle / Bo Williams

You are hereby NOTIFIED that during my inspection of your facility on the above date, the following violation(s) of the Solid Waste Management Act, (N.J.S.A. 13:1E-1 et seq.) and Regulations (N.J.A.C. 7:26-1 et seq.) promulgated thereunder and/or the Spill Compensation and Control Act, (N.J.S.A. 58:10-23.11 et seq.) and Regulations (N.J.A.C. 7:1E-1 et seq.) promulgated thereunder were observed. These violation(s) have been recorded as part of the permanent enforcement history of your facility.

DESCRIPTION OF VIOLATION N.J.A.C. 7:26-9.4(d)4 - Containers shall be securely closed except during filling or emptying.

N.J.A.C. 7:26-9.4(d)1+2 + N.J.A.C. 7:26-9.3(a)2 - If a container is not in good condition, material shall be transferred to a container in good condition.

Remedial action to correct these violations must be initiated immediately. The issuance of this document serves as notice to you that a violation has occurred and does not preclude the State of New Jersey, or any of its agencies from initiating further administrative or legal action, or from assessing penalties, with respect to this or other violations. Violations of these regulations are punishable by penalties of $25,000 per violation.

Investigator, Division of Waste Management
Department of Environmental Protection

920920085
TIERRA-D-018847

Division of Waste Management
Facility Inspection Form

Time at Facility
Departed 1610 hours
Arrived 1400 hours

Facility Name: British Petroleum/N. American Trading
Address: Coastal Street, Port Newark 07102

Date: 6/16/83
Fac. Rep: Charlie Guilfoyle
Position: Plant Manager
Inspector: L. Zoinelli

Facility Type: storage, transfer

EPA ID #: NJD980591838
Lot: 15, 5
Block: 78, 6000
Weather Conditions: ~~[illegible]~~ Smog
Wind Direction: SE Temp: 90° Speed: 0-5 MPH:

Operating Authorization
Facility is operating under (type of authorization): N/A - waiting for permit from state to store waste.

Summary of Inspection (check appropriate statement)
Facility: is in compliance with operating authorization: ____
is not in compliance with operating authorization: N/A

Facility: is in compliance with NJAC Title 7, Chapter 26: ____
is not in compliance with the following statute provisions(s): ✓
N.J.A.C. 7:26-9.6 (e) Facility is not maintaining adequate aisle space

Overall housekeeping: Poor ____ Fair ____ Satisfactory X Very Good ____

Inspection Observations

		Yes	No	N/A
1.	Does the treatment process (including storage tanks) system show any signs of ruptures, leaks, or corrosion? If yes, explain.		X	
2.	Spills. If yes, explain. - see comment #1 + #2 -	X		
3.	Odors. If yes, explain. - Petroleum-like odors -	X		

Container Storage: (7:26-9.4(d)
Drum No. 24-55 gal Stack Height 1 high Storage Method On Concrete

	Yes	No	N/A
Do the containers appear to be in good condition, not in danger of leaking: If no, explain in detail. - see comment # 2 -		X	
Are all containers closed except those in use?	X		
Are incompatible wastes stored separate from each other?	X		
Adequate aisle space?		X	
Are containers stored according to waste characterization?	X		

7-12-83

1019

CHB

920920086
TIERRA-D-018848

	Yes	No	N/A
Is each contianer marked or labeled with the words "Hazardous Waste" and in compliance with the DOT labeling requirements:			
- generator name -SEE comment #2-		X	
- address		X	
- UN, NA number		X	
- DOT shipping name		X	
- EPA ID number		X	
- manifest number		X	
- accumulation start date		X	
Vehicles: (7:26-7.1 and 7.5)			
Valid registration card			X
Numbers displayed			X
Properly placarded			X
Manifests: (7:26-7.4, 7.5 and 7.6)			
Does each manifest have the folliwng information?			
The generators name, mailing address, telephone number, EPA ID number and signature?	X		
The transporters name, EPA ID number and signature?	X		
SWA transporter registration number?	X		
The name, address, EPA ID number of the designated facility and signature?	X		
A description of the wastes (DOT)?	X		
The total quantity of each hazardous waste?	X		
Has the generator received signed copies (fromthe TSDF) of all the manifests for waste shipped off site more than 35 days ago?	X		
Record Keeping: (7:26-9.4 (f and i)			
Are the following being kept properly?			
1. Daily inspection log?	X		
2. Daily operating log?	X		
3. Waste inventory log?	X		

Samples taken: yes no number of samples
NJ DEP ID#

Photographs taken: yes no

Linda Zaninelli
Signature of Inspector

Charles G. Jany
Signature of Facility Representative

920920087

TIERRA-D-018849

Facility Name BP | N. American Trading Co. Date of Inspection 6/17/83

EPA ID No. NJD980591839 HW/EF No. 07|108

Comments, observations, summary

(1) Facility had a spill on 2/2/83 resulting from overfilling Tank #106 as noted in 4/22/83 inspection report. Approximately 1000 barrels of #6 oil spilled. Approximately 3/4 of that has been cleaned. (20,000 gal)

(2) Facility has received Consent Order from DEP - DWM approving the use of dried bacteria culture (DBC) to degrade the spilled #6 oil. C/O received 5/4/83. Facility applied "bugs" on Monday 6/13/83. (week behind on bug application because applied hot water and steam + nutrients on 6/8/83 and oil rose (approximately 5,000-6000 gallons as a result was pumped into Tanks C + D, heated and pumped into Tanks 8, 1, + 5 - product tanks.

(2) Approximately 6 leaking drums were observed out of the 24 drums stored on site in front of the separator building on concrete. These drums contain oily rags and speedy dry (X-725). Leaking material goes into catch basin which goes into separator. However, 6 drums will be repacked. Arrangements are being made for disposal; drums have been stored for

Linda Zannelli

Signature of Inspector

[signature]

Signature of Facility Representative

920920088
TIERRA-D-018850

Facility Name BP/N. American Trading Co. Date of Inspection 6/17/83

EPA ID No. NJD980591839 HW/EF No. 07/108

Comments, observations, summary

approximately ten months to seventeen months. Drums are not labeled. Labels are now being typed up in my presence with new name. They were also put on drums in my presence.

(3) Problem of leeching oil into the channel through the bulkhead which has been worked on with Frank Gagliano, DEM investigator, has been corrected. According to Mr. Guilfoyle the first leaking pipe was found on 5/16/83 and the second leaking pipe was found on 5/18/83. These pipes were found under the street and have been sealed. Two new pipes will be added in the near future. Also, according to Mr. Guilfoyle, two test wells will be sunk to see how far oil spread.

(4) Approximately eight loads of oil and water sludge from Tanks C + D have been sent 3/11-4/12/83 off-site for disposal. Anderson Waste Oil-Elizabeth was the hauler used in all cases, and TSD Facility used was B+L Oil-Newark.

(5) Aisle space will be corrected today; 2 out of 3 drum aisles must be corrected

Linda Zamanelli

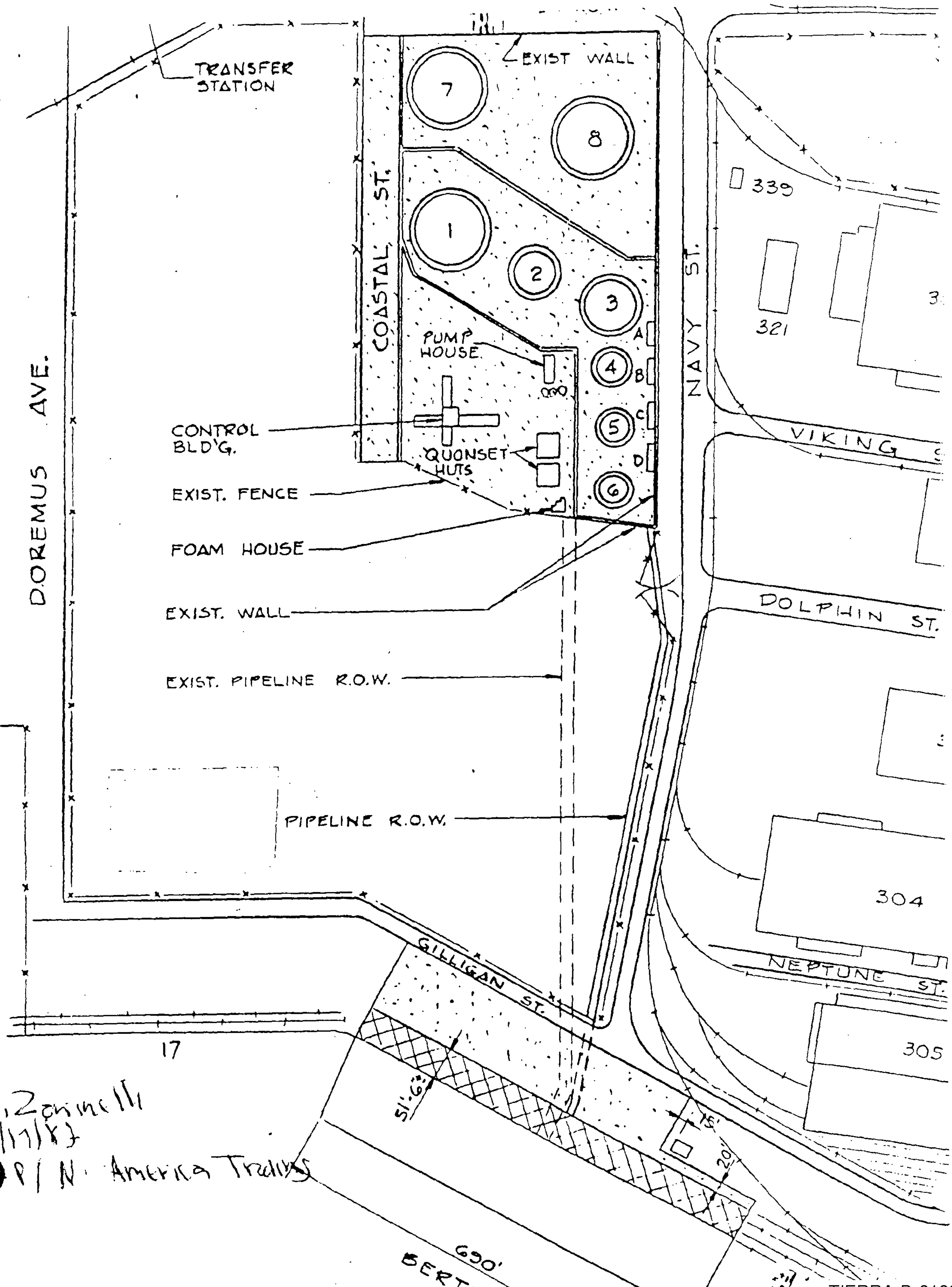
Signature of Inspector

Charles H Guilfoyle

Signature of Facility Representative

920920089
TIERRA-D-018851

920920090



L. Zanelli
6/17/87
P/ N. America Trading

TIERRA-D-018852

Form DWM-002
5/83

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT

NOTICE OF VIOLATION

ID NO. 07/108 DATE 6/16/83

NAME OF FACILITY BP/N. American Trading

LOCATION OF FACILITY Coastal St., Port Newark

NAME OF OPERATOR Charlie Guilfoyle

You are hereby *NOTIFIED* that during my inspection of your facility on the above date, the following violation(s) of the Solid Waste Management Act, (N.J.S.A. 13:1E-1 et seq.) and Regulations (N.J.A.C. 7:26-1 et seq.) promulgated thereunder and/or the Spill Compensation and Control Act, (N.J.S.A. 58:10-23.11 et seq.) and Regulations (N.J.A.C. 7:1E-1 et seq.) promulgated thereunder were observed. These violation(s) have been recorded as part of the permanent enforcement history of your facility.

DESCRIPTION OF VIOLATION N.J.A.C. 7:26-9.6(e)
Facility has not maintained adequate aisle space in two of the three rows of drums containing oil spill clean-up material.

Remedial action to correct these violations must be initiated immediately. The issuance of this document serves as notice to you that a violation has occurred and does not preclude the State of New Jersey, or any of its agencies from initiating further administrative or legal action, or from assessing penalties, with respect to this or other violations. Violations of these regulations are punishable by penalties of $25,000 per violation.

Linda Zanelli
Investigator, Division of Waste Management
Department of Environmental Protection

920920091
TIERRA-D-018853

HWIEF #: 07/108 thru Kevin Goshlin

Date: 6/17/83

C O N F I D E N T I A L

Recommendations

Subject: BP/ North American Trading Co.

6/17/83 Visited Scott Baker, DWM - Engineer to discuss permitted drum storage at the above-noted facility. I was told that permit application only included storage for Tanks C + D and BP did not file for drum storage. According to Charlie Guilfoyle, Plant Manager, drums have been stored well over 90 days. Therefore, BP is technically in violation of N.J.A.C. 7:26-9.3(b). However, I recommend that no enforcement action be taken since disposal arrangements are being made at this time. However, for the future, Scott Baker will contact BP and request that an addendum to permit application be made to include drum storage, should BP plan to store drums containing waste in excess of 90 days.

Division of Waste Management
Facility Inspection Form

Facility Name: BP / North American Trading, Inc ID # Date: 4/22/83 Time: 1145 hrs.
Address: Bldg. 350 Coastal Street Facility Representative: Charles
Facility Type: Transfer/Storage Position: Plant Manager Guilfoyle
HW/EF No.: 07/108 Inspector: L. Zaninelli
Town: Port Newark
Weather Conditions: - Overcast -
Wind Direction: SE Temp: 58° Speed 5-10 MPH

Operating Authorization

Facility is operating under Application pending with BHW Engineering
Facility is in compliance with operating authorization
Yes No N/A

Inspection Observations

	Yes	No	N/A
1. Does the treatment process (including storage tanks) system show any signs of ruptures, leaks, or corrosion? If yes, explain.	✓		
2. Spills. If yes, explain } - See comment #4 -	✓		
3. Odors. If yes, explain. } - Petroleum Odors -	✓		

4. Overall housekeeping: Poor Fair Good

Container Storage: (7:26-9.4(d))

Drum No. 24 Stack height 1 Palletized? - on block top temporarily

	Yes	No	N/A
Do the containers appear to be in good condition, not in danger of leaking? If no, explain in detail.	✓		
Are all containers closed except those in use?	✓		
Are incompatible wastes stored separate from each other?	✓		
Adequate aisle space? - See comment #6 -	✓		
Are containers stored according to waste characterization?	✓		

Chas Guilfoyle

920920093
TIERRA-D-018855

	Yes	No	N/A
Is each contianer marked or labeled with the words "Hazardous Waste" and in compliance with the DOT labeling requirements: -SEE comment #6			
- generator name		✓	
- address		✓	
- UN, NA number		✓	
- DOT shipping name		✓	
EPA ID number		✓	
- manifest number		✓	
- accumulation start date		✓	

Vehicles: (7:26-7.1 and 7.5)

	Yes	No	N/A
Valid registration card			✓
Numbers displayed			✓
Properly placarded			✓

Manifests: (7:26-7.4, 7.5 and 7.6)

Does each manifest have the folliwng information?

	Yes	No	N/A
The generators name, mailing address, telephone number, EPA ID number and signature?			✓
The transporters name, EPA ID number and signature?			✓
SWA transporter registration number?			✓
The name, address, EPA ID number of the designated facility and signature?			✓
A description of the wastes (DOT)?			✓
The total quantity of each hazardous waste?			✓
Has the generator received signed copies (fromthe TSDF) of all the manifests for waste shipped off site more than 35 days ago?			✓

Record Keeping: (7:26-9.4 (f and i)

Are the following being kept properly?

	Yes	No	N/A
1. Daily inspection log? -SEE comment #3 -		✓	
2. Daily operating log?	✓		
3. Waste inventory log?	✓		

Samples taken: yes no number of samples

NJ DEP ID#

Photographs taken: yes no

Linda Zanella
Signature of Inspector

Charles Goodknight
Signature of Facility Representative

920920094

TIERRA-D-018856

Facility Name BP / North American Trading Inc Date of Inspection 4/22/83

EPA ID No. NJD980591838 HW/EF No. 07/108

Comments, observations, summary

(1) Coastal Oil (BP) is still waiting for permit from state to store waste oil (tank bottoms) in Tanks C + D - 2 - 30,000 gallon capacity

(2) A joint inspection was conducted with Scott Baker - DWM - Engineering

(3) Daily inspection log is not being maintained. Charles Guilfoyle agreed to implement log. A copy of all hazardous waste regulations were given to facility. It was discovered that spill logs are maintained + this could be incorporated w/ drum storage.

(4) As mentioned in 3/9/83 inspection report large spill is still being contained inside dike. Spill occured on 2/2/83 which resulted from the overfilling of Tank #106. Approximately 1000 barrels of #6 oil spilled. Approximately 3/4 of that has been cleaned up. Facility is waiting for approval from DWM - Engineering to use dried bacteria cultures (DBC) to degrade the spilled #6 oil. DWM is still writing up Consent Order to use DBC.

(5) According to Charles Guilfoyle, Coastal Oil has been taken over by BP/NAT, Inc.

Linda Zannelli

Signature of Inspector

Charles Guilfoyle

Signature of Facility Representative

920920095

TIERRA-D-018857

Facility Name BP/North American Trading Inc. Date of Inspection 4/22/83

EPA ID No. NJD 980591838 HW/EF No. 07/108

Comments, observations, summary

British Petroleum / North American Trading, Inc.
This was effective the beginning of month.

(6) According to Charles Guilfoyle, aisle space was corrected during 3/9/83 inspection. However, I was told that the drums were moved to clean area last night, and aisle space needs to be corrected, and Mr Guilfoyle wants to move drums back onto concrete, rather than blacktop. Drums will be moved back to original location + adequate aisle space will be maintained. There are 20 drums on-site containing (solid) speedy dry and dirty rags. Prices are being looked into at this time for disposal. Another 4 drums are on-site containing oil and water. Facility plans to decant oil and put back in tank. Most drums have been on-site for six months. Drums are not labeled. Labels ~~are typed up + will be~~ placed on drums today.

(7) Facility has found Part B-generators copy of NJ0055686l from the TSDF dated 3/4/82, which could not be produced during 3/9/83 inspection (see attached copy).

(8) According to Mr. Guilfoyle, facility plans to

Linda Zannelli

Signature of Inspector

Charles Guilfoyle

Signature of Facility Representative

920920096

TIERRA-D-018858

Facility Name BP/North American Trading, Inc. Date of Inspection 4/22/83
NJD980591838
EPA ID NO.
SWEF NO. 07/108

Comments, observations, summary

pull at approximately 5500 gallons of tank bottoms a day by Anderson Waste Oil - Ma. - collector/hauler NJSWASEEOS AD.

(9) Facility also has a problem of oil leeching into the channel through the bulkhead which is being worked on with Frank Gagliano, DWM investigator. Thought oil was coming from valve sump, Pipes are being uncovered and lines dug up, and still oil is being picked-up. Facility now is trying to find source. An area approximately 100'x400' has been excavated. Facility is also pressure testing lines + put in test holes. Nicaretta Construction Co. Bryant were contracted for job. Any contaminated soil will be covered with plastic & held in diked well until disposed

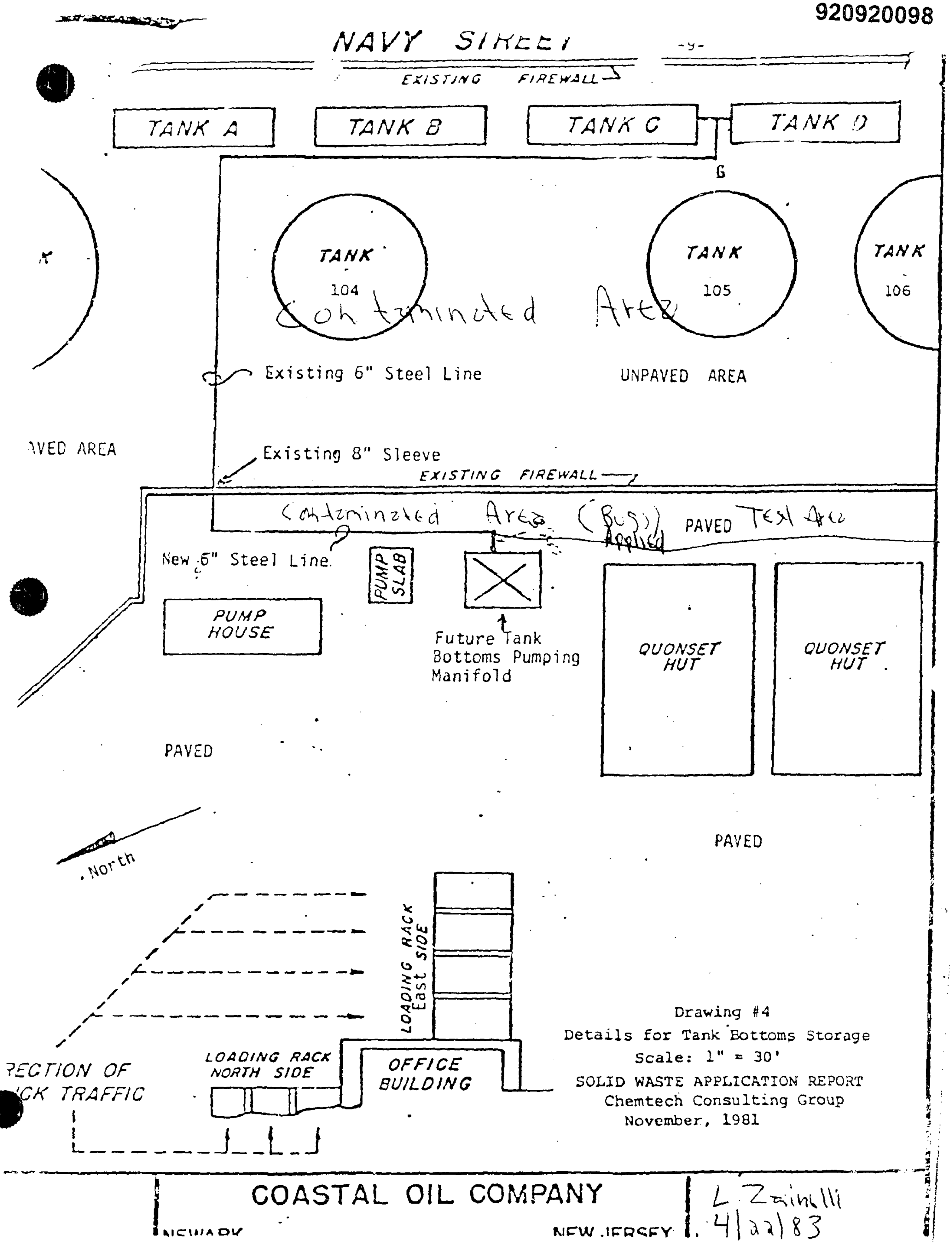
(10) No material has been sent off-site since last inspection.

(11) Tank C contains 27,973 gallons of 2,4,+6 oil
Tank D contains 22,774 gallons of combination of 2,4,+6 oil

Linda Zannelli
Signature of Inspector

Charles [illegible]
Signature of Facility Representative

920920098



TIERRA-D-018860

920920102

REMEDIAL ACTIVITY
INSTALLATION OF FOUR (4) ADDITIONAL RECOVERY WELLS
FAPS PARKING LOT

BRITISH PETROLEUM MARINE TERMINAL
PORT NEWARK, NEW JERSEY

Report Date: March 9, 1995
Recovery Wells Installed: November 14-15, 1994

Prepared for:

BP Marine Americas
Building 350
Coastal Street
Port Newark, New Jersey

Prepared by:

Handex of New Jersey, Inc.
500 Campus Drive
Morganville, New Jersey

BAA000025

Handex®

266

TIERRA-D-018861

Handex®

HANDEX OF NEW JERSEY, INC., 500 Campus Drive, P.O. Box 451, Morganville, New Jersey 07751-0451 Fax (908) 536-7751 (908) 536-8500

March 9, 1995

BP Marine Americas
200 Westlake Park Blvd.
Houston, Texas 77079

Attention: Rob Hubbert

Re: Recovery Well Installations in FAPS Parking Lot
BP Marine Terminal
Port Newark, New Jersey

Dear Mr. Hubbert:

Enclosed please find four (4) copies of the report titled: Remedial Activity, Installation of Four (4) Additional Recovery Wells, FAPS Parking Lot. I have incorporated the changes to the draft report (dated: February 2, 1995) that you faxed me on February 22, 1995. In regards to the date of this final report, please keep in mind that originally this report was to include a discussion of the recovery well pumps. Handex was informed in mid-January that the recovery pumps had been installed by others and asked to proceed with the report preparation without the discussion of the recovery pump installation. At that time, the report was prepared and sent to your review on February 2, 1995.

Handex is pleased we are able to assist you with this project, and look forward to working with you in the future. Handex appreciates being included on the bidders list for the upcoming investigative work. Thank you.

Sincerely,

Andrew R. Drake
Senior Scientist

c: Hal Venables, BP Marine (with enclosure)

1.0 INTRODUCTION

Handex of New Jersey, Inc. (Handex) was contracted by BP Marine Americas (BP Marine) to install four (4) recovery wells at a property referred to as the FAPS parking lot, located adjacent and to the south of BP Marine's Port Newark facility. The purpose of drilling the recovery wells was to enhance the recovery efforts of liquid-phase hydrocarbon (LPH) in the area of a former line leak.

Two (2) recovery wells had been installed in previous efforts. After completion of the four (4) wells associated with this effort, the total recovery well in place as of November 15, 1994 is six (6). The placement of the four (4) new recovery wells was assisted by field investigative efforts performed on April 27 and 28, 1994.

Section 2.0 provides background information. Section 3.0 describes the recovery well installations. The report is summarized in Section 4.0.

2.0 BACKGROUND

2.1 SITE DESCRIPTION

The property investigated is located immediately south/southwest of the BP Marine facility in Port Newark, New Jersey (see Figure 1). The property is owned by The Port Authority of New York and New Jersey (Port Authority) and is leased to Foreign Auto Preparation Service (FAPS). The property is used by FAPS as a parking lot for cars unloaded from marine vessels. Transecting the FAPS property is an abandoned below-grade pipeline that, prior to 1992, was used by BP Marine to convey products from their terminal to a dock at Port Newark (City) Channel, located approximately 1000 feet from the BP facility. In 1992, BP Marine abandoned these below grade pipelines in place and now uses above grade piping to convey products from the terminal to Port Newark (City) Channel.

2.2 INCIDENT BACKGROUND

The following background information was obtained by Handex from BP Marine personnel and records.

BP Marine first reported a possible spill event to the Coast Guard and the NJDEP on October 4, 1992, after an oil sheen was discovered immediately adjacent to BP Marine's dock at Port Newark (City) Channel. The sheen was traced to a storm sewer outfall leading from the BP Marine Terminal and the adjacent FAPS parking lot. On October 6, 1992, oil was discovered in a storm sewer basin (located next to RW-2 on Figure 2) and access pit associated with underground pipelines from BP Marine's Terminal (located at RW-1, see Figure 2). The release of oil had apparently resulted from a leak from one of four of BP Marine's underground pipelines. It was suspected that oil within the storm sewer basin had originated from this underground pipeline leak.

Immediately upon discovery of the oil, BP Marine shut off and drained the oil from all four underground pipelines until the source was determined. In addition, BP Marine evacuated the spilled oil from the access pit and the storm sewer basin and installed absorbent buoys at the storm sewer outfall in the vicinity of the BP Marine dock. Upon conducting a hydrostatic testing of all four underground pipelines on October 6, 1992, it was determined that the oil was the result of only one of the four lines leading from the storage facilities on BP Marine Terminal to the dock adjacent to the access pit. The leak had not been detected in hydrostatic pressure testing performed only a few months prior and was not indicated in daily product monitoring performed by BP Marine. This information suggests that the leak only occurred during times when the line was under elevated pressures while in operation for product transfers and the duration over which the leak occurred was probably short.

To prevent the potential for further incidents, BP Marine has replaced all underground pipelines between the Terminal and dock with above ground piping. The underground pipelines have been cleaned and are inactive.

2.3 REGULATORY INVOLVEMENT

On November 16, 1992, BP Marine submitted a remedial work plan to the NJDEP to investigate the nature and extent of possible contamination caused by the underground pipeline leak. No immediate response to the work plan was provided by the NJDEP. BP Marine chose to continue with its remedial investigation voluntarily, without NJDEP oversight.

On February 5, 1993, the NJDEP offered BP Marine the opportunity to proceed with the remedial activities at the site under a Memorandum of Agreement (MOA). During this period of dialogue with the NJDEP, BP Marine initiated an effort with Ground Water Associates, Inc. on March 8 - 10, 1993, to investigate the area of concern as well as initiate extraction of the subsurface oil. After further dialogue, BP Marine entered into a Memorandum of Agreement (MOA) with the NJDEP on June 7, 1993.

2.4 PRIOR ENVIRONMENTAL INVESTIGATIONS (FAPS PARKING LOT)

The initial investigation of the area was conducted by Ground Water Associates and included drilling nine (9) soil borings, two (2) of which were completed as groundwater monitor wells, and installing one (1) recovery well. A complete description of this initial effort can be found in the April 9, 1993 report prepared by Ground Water Associates titled: Remedial Investigation Report, BP Marine Terminal, Port Newark, New Jersey. A second effort was completed by Handex and included drilling three (3) soil borings, installing one (1) monitor well and one (1) recovery well. This work is detailed in the April 21, 1994 Handex report titled: Remedial Investigation Update Report, BP Marine Terminal, Port Newark, New Jersey. Liquid-phase hydrocarbon (LPH) was detected in the two monitor wells installed by Ground Water Associates (shown as MW-19 and MW-20 on Figure 2), both recovery wells (RW-1 and RW-2) and one soil boring (SB-1) installed by Ground Water Associates. LPH is currently recovered from the two recovery wells via automated pump systems.

To roughly define the area of LPH impact, Handex drilled 22 soil borings on April 27 and 28, 1994. Field observations and measurements were used to estimate an areal extent of LPH. The estimated LPH thickness map constructed from the collected field data has been included as Figure 2. A complete description of this field investigation is detailed in the September 7, 1994 Handex report titled: Remedial Investigation Update Report, Exploratory Boring Program, FAPS Parking Lot, BP Marine Terminal, Port Newark, New Jersey.

3.0 RECOVERY WELL INSTALLATIONS

Handex installed four recovery wells in the FAPS parking lot on November 14 and 15, 1994. The recovery well locations were based on the findings of the exploratory boring program conducted in April 1994. The recovery well locations are shown on Figure 2. It should be noted that RW-3 was intended as a replacement recovery well to RW-1. Prior to and at the time of RW-3 installation, RW-1 was non-operational.

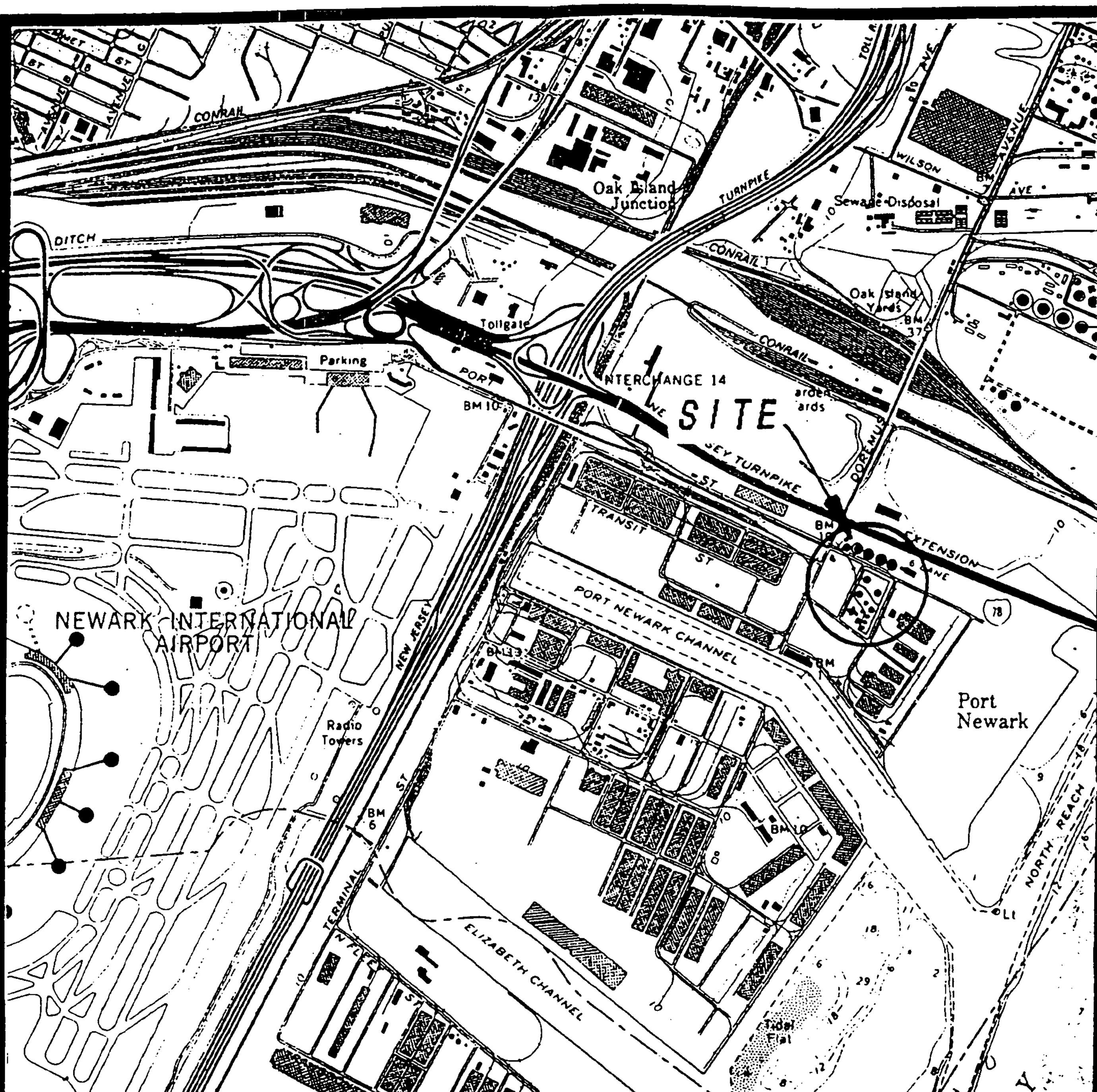
On November 14 and 15, 1994, four, eight-inch diameter recovery wells were installed. The recovery well installation was supervised by Handex of New Jersey, Inc. and conducted by Burlington Environmental Inc. The wells were installed via the auger drilling method using 14-inch outer-diameter augers. The recovery wells were installed to a depth of 18 or 18.5 feet. The eight-inch recovery wells were constructed of continuous-slot PVC. #1 Morie well gravel was used for the sand pack. The wells were developed by over-pumping.

The upper seven feet of sediments were predominately sand, gravel and silt. Below seven feet was predominately silt and clay. LPH was noted on the cuttings and augers during drilling of RW-4. Strong hydrocarbon odors were noted during drilling of the other three recovery wells. A complete description of the sediments found and the well construction of each recovery well is detailed in well logs attached as Appendix A.

BP Marine installed pneumatic submersible, top-loading, total-fluids pumps in the recovery wells along with the associated piping in December 1994 and January 1995. Handex recommends the intakes be set 4 to 5 feet below static water levels. The four recovery wells installed in November 1994 augment the recovery efforts of two previously installed recovery wells.

4.0 SUMMARY

Handex installed four recovery wells in the FAPS parking lot on November 14 and 15, 1994 in a continuing effort to remediate an LPH plume in this area. Placement of the recovery wells were based on the findings of an exploratory boring program conducted on April 27 and 28, 1994. BP Marine has installed pneumatic submersible, top-loading, total-fluids pumps in the recovery wells. The four recovery wells augment the recovery efforts of two previously installed recovery wells.



NORTH

ELIZABETH, NJ
N4037.5-W7407.5/7.5

1967
PHOTOREVISED 1981
DMA 6165 II
NE-SERIES V822

NEW JERSEY

QUAD LOCATION

Handex

FIGURE 1

TOPOGRAPHIC MAP

0 1/2 1 MILE
SCALE IN MILES

SCALE 1 TO 24000

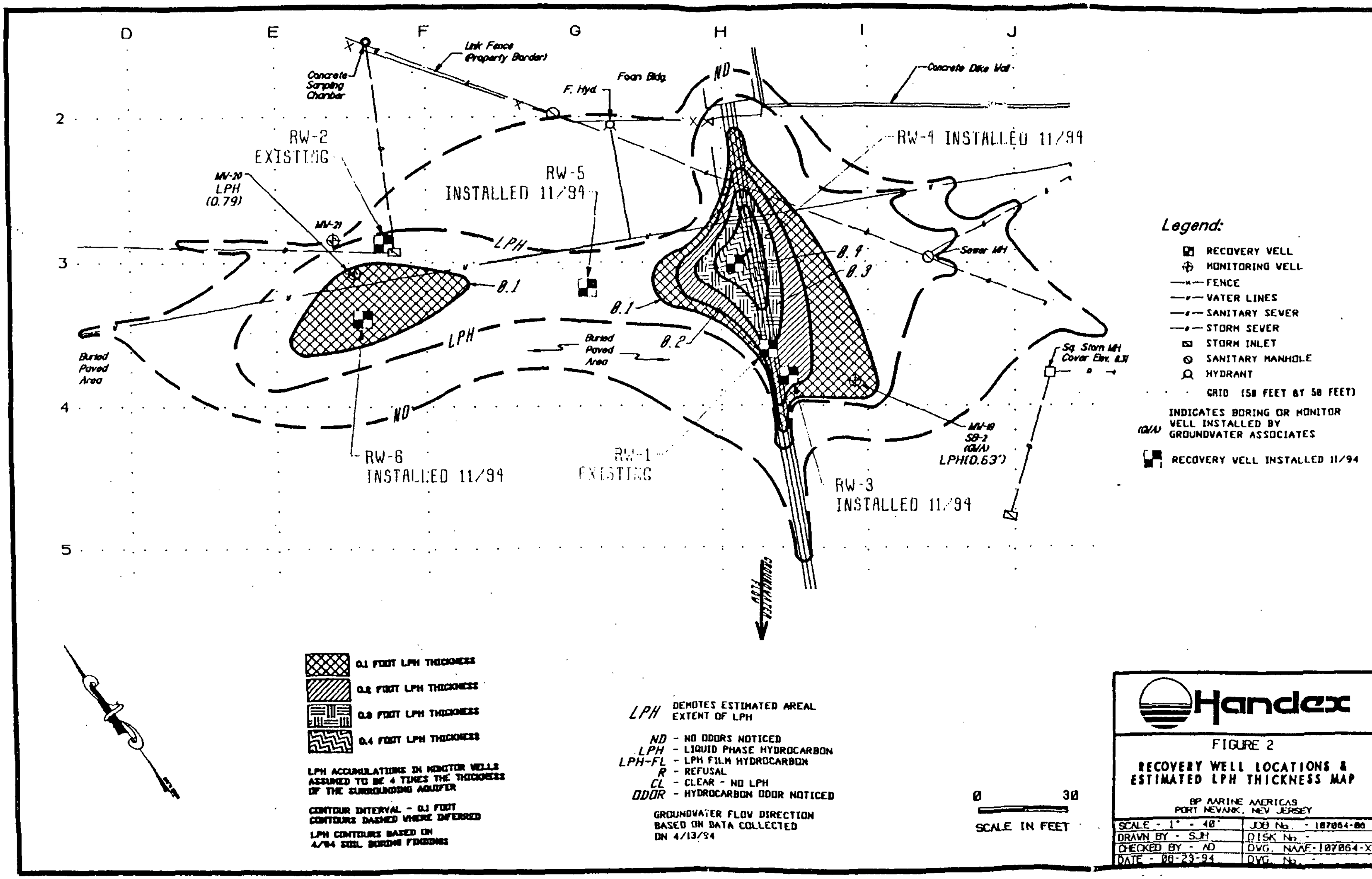
CONTOUR INTERVAL
10 FEET

1000 0 1000 2000 3000
SCALE IN FEET

0 1/2 1 KM
SCALE IN KILOMETERS

BP MARINE AMERICAS
PORT NEWARK, NEW JERSEY

920920108
TIERRA-D-018867



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TIERRA-D-018868

APPENDIX A

BORING LOGS

Handex®

920920110

Handex®
Handex of NJ

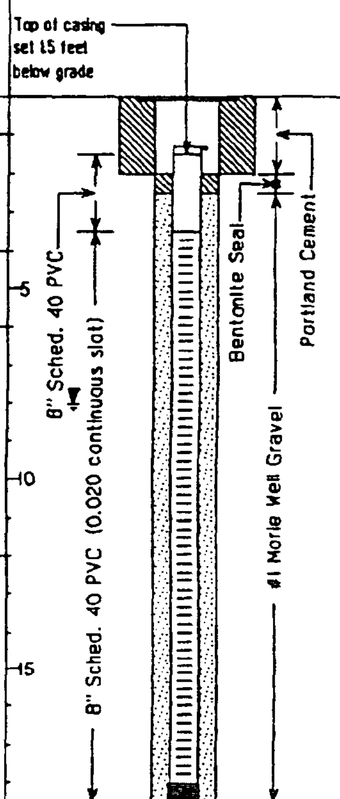
WELL LOG: RW-3

Permit #: *26-38884*	Drill Date: *November 14, 1994*	Use: *Recovery*
Location: *BP Marine, Port Newark Terminal*		Owner Loc #:
Owner: *BP Marine Americas*		Handex Loc #: *107064*
Owner Address: *BLdg 350 Coastal Street, Newark, NJ*	BORING – Depth: *18.5 ft.*	Diameter: *14 in.*
Drilling Method: *Auger*	CASING – Length: *2 ft.*	Diameter: *8 in.*
Sampling Method: *Drill Cuttings*	SCREEN – Length: *15 ft.*	Diameter: *8 in.*
Static Water Level: *6.55 ft.* *(from Grade)*	WELL – Depth: *18.5 ft.*	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	HNU (ppm)	Graphic Log	Geologic Description
0–0.8						ASPHALT
0.8–3.2						Black medium to fine SAND and medium Gravel Fill. Moderate to strong hydrocarbon odor.
3.2–5						Brown medium to fine SAND, little (+) medium to fine Gravel, little (–) wood fragments. Moderate to strong hydrocarbon odor.
5–12						Brown medium to fine SAND, some (–) Silt, little (+) medium to fine gravel, little (–) wood fragments.
12–18.5						Brown SILT. Slight hydrocarbon odor.

Depth scale: 5, 10, 15, 20, 25, 30

Well Diagram



NOTES: * = Sample analyzed at laboratory; ⊠ = Sample interval/recovery; ⊻ = Static Water Level (from Grade)

Geologist: Andrew Drake	Driller: Richard Gurczynski, Burlington

Handex of NJ

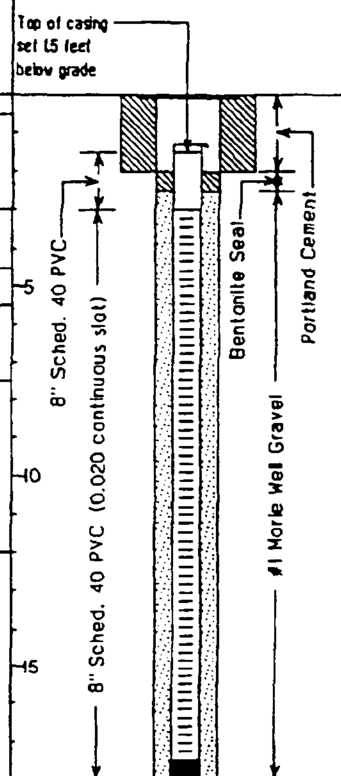
WELL LOG: RW-4

Permit #: 26-38685	Drill Date: November 15, 1994	Use: Recovery
Location: BP Marine, Port Newark Terminal		Owner Loc #:
Owner: BP Marine Americas		Handex Loc #: 107064

Owner Address: BLdg 350 Coastal Street, Newark, NJ	BORING - Depth: 18 ft.	Diameter: 14 in.
Drilling Method: Auger	CASING - Length: 1.5 ft.	Diameter: 8 in.
Sampling Method: Drill Cuttings	SCREEN - Length: 15 ft.	Diameter: 8 in.
Static Water Level: NA (from Grade)	WELL - Depth: 18 ft.	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	HNU (ppm)	Graphic Log	Geologic Description
						ASPHALT
						GRAVEL-Fill.
						Brown coarse to fine SAND, some fine Gravel, little Silt.
5						Brown coarse to fine SAND, little Wood, little fine to medium Gravel, little Silt. (Strong hydrocarbon odors)
						Brown CLAY and SILT and fine SAND. (Free product noted on cuttings on augers from 8-10 feet.)
10						Black CLAY
						Black SILTY CLAY (moderate odors below 12 feet).
15						
20						
25						
30						

Well Diagram



NOTES: * = Sample analyzed at laboratory; ⊠ = Sample interval/recovery; ▼ = Static Water Level (from Grade)

Geologist: Andrew Drake	Driller: Richard Gurczynski, Burlington

920920113

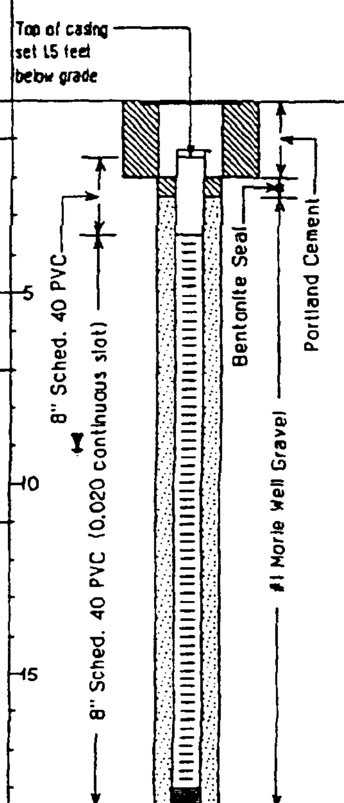
Handex of NJ

WELL LOG: RW-5

Permit #: 26-38888	Drill Date: November 14, 1994	Use: Recovery	
Location: BP Marine, Port Newark Terminal		Owner Loc #:	
Owner: BP Marine Americas		Handex Loc #: 107064	
Owner Address: BLdg 350 Coastal Street, Newark, NJ	BORING - Depth: 18.5 ft.	Diameter: 14 in.	
Drilling Method: Auger	CASING - Length: 2 ft.	Diameter: 8 in.	
Sampling Method: Drill Cuttings	SCREEN - Length: 15 ft.	Diameter: 8 in.	
Static Water Level: 7.82 ft. (from Grade)	WELL - Depth: 18.5 ft.		

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	HNU (ppm)	Graphic Log	Geologic Description
0–1						ASPHALT
1–5						Brown medium to fine SAND, some medium to fine Gravel, trace (+) Wood and Brick fragments. Moderate to strong hydrocarbon odors.
5–7						Brown medium to fine SAND, some medium to fine Gravel. Moderate to strong hydrocarbon odors.
7–11						Brown SILT and CLAY.
11–18.5						Brown CLAY and SILT. Slight to moderate hydrocarbon odors.

Well Diagram



NOTES: * = Sample analyzed at laboratory; ☒ = Sample interval/recovery; ⊻ = Static Water Level (from Grade)

Geologist: Andrew Drake | Driller: Richard Gurczynski, Burlington

TIERRA-D-018872

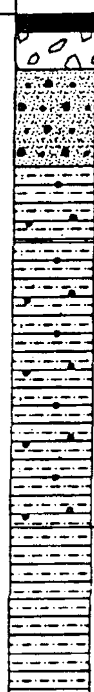
Handex

Handex of NJ

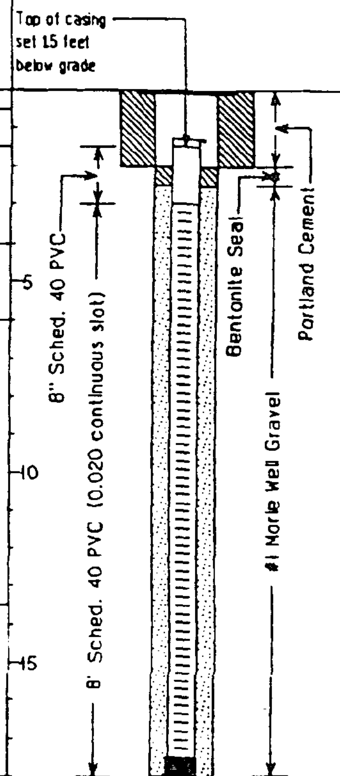
WELL LOG: RW-6

Permit #: 26-38687	Drill Date: November 15, 1994	Use: Recovery
Location: BP Marine, Port Newark Terminal		Owner Loc #:
Owner: BP Marine Americas		Handex Loc #: 107064
Owner Address: BLdg 350 Coastal Street, Newark, NJ	BORING - Depth: 18 ft.	Diameter: 14 in.
Drilling Method: Auger	CASING - Length: 1.5 ft.	Diameter: 8 in.
Sampling Method: Drill Cuttings	SCREEN - Length: 15 ft.	Diameter: 8 in.
Static Water Level: NA (from Grade)	WELL - Depth: 18 ft.	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	HNU (ppm)	Graphic Log	Geologic Description
						ASPHALT
						GRAVEL, Sub-base.
						Brown fine SAND, some medium to fine Gravel fill.
5						Brown/Red SILT and CLAY, trace fine to medium Gravel.
						Red/Brown SILT and CLAY, trace fine Gravel. Strong hydrocarbon odors.
10						
15						Red/Brown Silty CLAY.
20						
25						
30						



Well Diagram



NOTES: * = Sample analyzed at laboratory; ⊠ = Sample interval/recovery; ⊻ = Static Water Level (from Grade)

Geologist: Andrew Drake	Driller: Richard Gurczynski, Burlington

REMEDIAL INVESTIGATION UPDATE REPORT

BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

April 21, 1994

Prepared for:

BP Marine Americas
200 Westlake Park Blvd.
Houston, TX 77079

Prepared by:

Andrew R. Drake
Senior Scientist

Reviewed by:

Thomas J. Marr
Principal Hydrogeologist

Handex of New Jersey, Inc.
500 Campus Drive
Morganville, New Jersey

EXECUTIVE SUMMARY

Handex of New Jersey, Inc. (Handex) was retained by BP Marine Americas (BP Marine) in August 1993 to perform additional remedial investigations and corrective actions in a former leak area of a below-grade pipeline, approximately 100 feet from the BP Marine Terminal facility. Based on a previously conducted remedial investigation (conducted by Ground Water Associates), there was a small leak in a joint of a below-grade pipeline (immediately repaired upon detection). The below-grade pipeline was used by BP Marine to convey products between BP Marine's dock at City Channel and the BP Marine Terminal facility.

The work performed by Handex included completing soil borings and collecting soil samples, installing a recovery well and pump, installing one monitor well, and sealing the walls and pipe connections in a storm water catch basin.

Two soil borings (SB-1 and SB-2) were performed to investigate subsurface conditions near the terminal, next to the below-grade pipeline. One soil boring (SB-A) was performed to assess the impact along a storm sewer line located in the parking lot, southwest of the BP Marine Terminal. Figure 2 is a site plan showing the locations of the borings and the associated total petroleum hydrocarbon (TPHC) results.

TPHC concentrations in the soil samples were: 140 ppm in SB-1, 2,400 ppm in SB-2, and <25 ppm in SB-A. The NJDEPE Soil Cleanup Criteria for TPHC is 10,000 ppm if volatile organics are less than 1,000 ppm (this is the case at this area of concern). SB-2 was also analyzed for volatile organics (VTCL+15) by Method SW846 8240, and base neutrals (B625+15) by Method SW846 8270 (Table 3). All detected volatile organic and base neutral compounds were below the NJDEPE Soil Cleanup Criteria.

The recovery well and monitor well installation and catch basin sealing were performed to address hydrocarbons that have been observed by BP Marine personnel in a catch basin located approximately 75 feet south of the BP Marine Terminal (see Figure 2), and at the outfall of the storm drain line to City Channel. To eliminate hydrocarbons entering the catch basin through cracks (concentrated around two inlet pipes), the walls of the catch basin were sealed and a recovery well (RW-2) was installed to depress the water table in the area of the catch basin and to recover hydrocarbons (note: RW-1 was installed by Ground Water Associates in April/May 1993). After completion of RW-2, a total fluids pump was installed in the well and approximately five feet of drawdown is currently maintained. The water and product is pumped to the BP Marine Terminal oil/water separator. Additionally, a monitor well was installed to gauge the influence of the recovery well. A cross sectional depiction of the water-table drawdown in the vicinity of the recovery well and catch basin is shown in Figure 3. Figure 3 shows the recovery well has effectively lowered the water table near the catch basin, thus preventing migration of the product along the subsurface storm water lines. Based on observations at the discharge point, the BP Marine separator, product is being recovered. Because the pump transfers total fluid (both product and water) to the BP Marine separator, the extracted volume of product recovered is measured after the two phases of liquid are segregated at the separator.

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FIGURES

APPENDICES

1.0 INTRODUCTION

Handex of New Jersey, Inc. (Handex) was retained by BP Marine Americas (BP Marine) in August 1993 to perform additional remedial investigations and corrective actions associated with the BP Marine Port Newark facility operations. This effort was conducted in response to a former leak of a below-grade pipeline. The purpose of this investigation was to further evaluate an area of known contamination defined by Ground Water Associates, Inc. on March 8 - 10, 1993. An area wide map illustrating the site setting is attached as Figure 1.

Based on the previous remedial investigation (see Ground Water Associates, Inc. Remedial Investigation Report dated April 9, 1993), it was concluded that a small leak occurred in a joint of a below-grade pipeline. The pipeline was immediately hydrostatically tested and repaired. The below-grade pipeline was used by BP Marine to convey products between BP Marine's dock at City Channel and the BP Marine Terminal facility. The area of concern is located southwest of the BP Marine Terminal facility. The below-grade pipeline is located in an easement owned by BP Marine. This easement traverses a piece of property owned by the New York/New Jersey Port Authority. The property the easement traverses is leased to FAPS Inc. and is currently used as a parking lot.

The work performed by Handex included completing soil borings and collecting soil samples, installing a recovery well and recovery pump, installing one monitor well, and sealing the walls and pipe connections in a storm water catch basin.

2.0 BACKGROUND

The following background information was obtained by Handex from BP Marine personnel and records.

Contamination of groundwater is known to exist in the area immediately southwest of the BP Marine's Port Newark Terminal. BP Marine first reported a possible spill event to the Coast Guard and the NJDEPE on October 4, 1992, after an oil sheen was discovered immediately adjacent to BP Marine's dock along Newark Bay. The sheen was traced to a storm sewer outfall leading from the BP Marine Terminal and an adjacent parking lot. On October 6, 1992, oil was discovered in a storm sewer basin and access pit associated with underground pipelines from BP Marine's Terminal. The release of oil had apparently resulted from a leak from one of four of BP Marine's underground pipelines. It was suspected that oil within the storm sewer basin had originated from the underground pipeline leak.

Immediately upon discovery of the oil, BP Marine shut off and drained the oil from all four underground pipelines until the source was determined. In addition, BP Marine evacuated the spilled oil from the access pit and the storm sewer basin and installed absorbent buoys at the storm sewer outfall in the vicinity of the BP Marine dock. Upon conducting a hydrostatic test of all four underground pipelines on October 6, 1992, it was determined that the oil was the result of only one of the four lines leading from the storage facilities on BP Marine Terminal to the dock adjacent to the access pit. The leak had not been detected in hydrostatic pressure test performed only a few months prior and was not indicated in daily product monitoring performed by BP Marine. This information suggests that the leak only occurred during times when the line was under elevated pressures while in operation for product transfers and the duration over which the leak occurred was probably short.

To prevent the potential for further incidents, BP Marine has replaced all underground pipelines between the Terminal and dock with above ground piping. The underground pipelines have been cleaned and are inactive.

On November 16, 1992, BP Marine submitted a remedial work plan to the NJDEPE to investigate the nature and extent of possible contamination caused by the underground pipeline leak. No immediate response to the work plan was provided by the NJDEPE. BP Marine chose to continue with its remedial investigation voluntarily, without NJDEPE oversight.

On February 5, 1993, the NJDEPE offered BP Marine the opportunity to proceed with the remedial activities at the site under a Memorandum of Agreement (MOA). During this period of dialogue with the NJDEPE, BP Marine initiated an effort with Ground Water Associates, Inc. on March 8 - 10, 1993, to delineate the area of concern as well as initiate extraction of the subsurface oil. After further dialogue, BP Marine entered into a Memorandum of Agreement (MOA) with the NJDEPE on June 7, 1993.

To further delineate the area of concern, Handex was contracted in October 1993 to perform additional investigative and removal efforts.

3.0 SITE DESCRIPTION

The BP Marine's Terminal stores petroleum products and supplies these products to ships in Newark Bay. A BP Marine fueling dock located approximately 900 feet to the south along Newark Bay provides a means to transfer fuel oil to and from ships and barges. Pipelines transfer the material between the Terminal and dock. Although fuel oil is currently pumped through above ground pipes, it was historically transferred through a series of four underground pipelines beneath an adjacent parking lot within an easement owned by BP Marine. These below grade pipelines have been cleaned and are inactive. There are two access pits associated with the inactive pipelines, the first is on BP Marine's property. The second pit, which is the one in which the leaked oil was detected, is about 200 feet south of BP Marine's property line. This offsite pit is approximately 4 feet by 8 feet by 4 feet deep and is constructed of 12-inch reinforced concrete. A 36-inch manhole provides entry into the pit.

Subsurface utility lines in the vicinity of the spill include a sanitary sewer line and a pressurized water line. Both are located under the parking lot immediately south of BP Marine property. Also, a water discharge line leads from BP Marine's permitted oil/water separator to the impacted storm sewer basin.

4.0 SCOPE OF WORK

The work performed by Handex included performing three soil borings and collecting soil samples from each of the three borings, sealing the walls and pipe connections in a storm water catch basin, installing one recovery well and recovery pump, and installing one monitor well.

4.1 SOIL BORINGS

Three soil borings were performed to further investigate subsurface conditions in the area of the former leak. Two soil borings (SB-1 and SB-2) were performed near the terminal property next to the below-grade pipeline that runs from the BP Marine Terminal to the Berth 19 dock area. One soil boring (SB-A) was performed to assess the impact along a storm sewer line located in the parking lot, approximately 100 feet southwest of the BP Marine Terminal, and west of the pipeline. The locations of these soil borings are illustrated on the site plan attached as Figure 2.

The borings were performed using the auger drilling method. Soil samples were collected from all borings using split spoon samplers and were field screened with an HNU photoionization detector (PID) for volatile organics (see Table 1). Referring to Table 1, PID readings of the soil samples ranged from 2 ppm to 110 ppm. It should be noted that the PID provides a field assessment of ionizable volatiles that may be present in the sample, and the results are neither compound specific or quantitative.

The samples for laboratory analysis were collected above the water table from the zone with the highest PID readings. The water table at time of sampling was found to vary from approximately 4.5 feet below grade to 5.5 feet below grade. The sample depths are shown on the boring logs, attached as Appendix A. Also illustrated on the boring logs is the material encountered during drilling. The surficial material is predominately sand with varying percentages of gravel, silt and clay. Based on the drilling conducted to install the monitor well and recovery well, clay predominates below 5 feet.

Soil samples were laboratory analyzed for total petroleum hydrocarbons (TPHC) by EPA Method 418.1, and the results are summarized in Table 2. Referring to Table 2, TPHC concentrations in the soil samples were: 140 ppm in SB-1, 2,400 ppm in SB-2, and <25 ppm in SB-A. SB-2 was also analyzed for volatile organics (VTCL+15) by Method SW846 8240, and base neutrals (B625+15) by Method SW846 8270; these results are summarized in Table 3. Referring to Table 3, all compounds were below the NJDEPE Soil Cleanup Criteria. As noted in Table 3, NJDEPE Impact to Groundwater Soil Cleanup Criteria was used based on the close proximity of groundwater to the sample locations. The NJDEPE Soil Cleanup Criteria for TPHC is 10,000 ppm if volatile organics are less than 1,000 ppm, which they are in this case.

Although this area is an established area of concern, based on this phase of the investigation in which no compounds exceeded the NJDEPE Soil Cleanup Criteria, no remedial action in connection with the soil should be required by the NJDEPE.

4.2 CATCH BASIN SEALING

BP Marine personnel have observed a hydrocarbon sheen at the outfall of the storm sewer line as well as in the catch basin located next to RW-2 (see Figure 2). BP Marine personnel have also observed liquid entering the catch basin through cracks/holes in the catch basin below the water table. The catch basin is nearly 9 feet deep, and the water table is approximately 4 to 5 feet below grade. BP Marine suspects that hydrocarbons were seeping into the storm drain basin located next to RW-2 and travelling to the outfall via the storm drain. To eliminate this, Handex has sealed the catch basin and depressed the water table near the catch basin below the cracked areas via the new recovery well RW-2.

The cracks in the catch basin were located around two pipes that enter the catch basin 4 to 6 feet below grade. Handex sealed the inside of the catch basin by patching the visible holes and cracks in the storm drain basin with mortar, and epoxy coating the entire basin.

4.3 RECOVERY WELL AND MONITOR WELL INSTALLATION

To depress the water table below the pipe inverts, recovery well RW-2 was installed approximately 4 feet from the catch basin. RW-2 is eight-inch in diameter, is 18 feet deep, and is constructed of 0.020-inch continuous slot PVC. The bore hole diameter, gravel pack and well construction details are illustrated in the boring log, attached as Appendix C.

Monitor well MW-21 was installed 18 feet from RW-2 along the storm sewer line to evaluate the drawdown created by RW-2. MW-21 is a typical 4-inch diameter monitor well constructed of 0.020 slot Schedule 40 PVC, and is 16 feet deep. The boring log for MW-21 is attached as Appendix C.

A downhole pneumatic total fluids pump was installed in RW-2 to depress the water table and recover separate phase product. The pump conveys both ground water and separate-phase product to the BP Marine facility oil/water separator. The pump intake is set approximately 10 feet below grade, which provides approximately 5 feet of drawdown in the recovery well. Figure 3 is a cross sectional depiction of the recovery well, catch basin, storm sewer line, and water levels under pumping and non-pumping conditions. Based on Figure 3, the pump is maintaining drawdown below the pipe inverts in the catch basin (the area of the former cracks). Approximately one foot of drawdown is being achieved in MW-21, located 18 feet from RW-2. Although not depicted in Figure 3, approximately 3 feet of drawdown is being achieved in MW-20, located approximately 15 feet from RW-2. The static level readings were collected on October 26, 1993, prior to turning on the pump. The pumping level readings were collected October 29, 1993, after three days of pumping.

The difference in liquid levels in the two monitor wells suggests a gradient reversal and capture of the LPH plume in the vicinity of RW-2.

TABLE 1

HNU PHOTOIONIZATION FIELD SCREENING READINGS

BORING	DEPTH (ft)	READING (ppm)	BORING	DEPTH (ft)	READING (ppm)
SB-1	1-4	35	SB-A	2-3	2
SB-1	4-6	25	SB-A	3-4	70
SB-2	1-3	110	SB-A	4-5	90
SB-2	3-5	70	SB-A	5-6	40

Note: PID readings in ppm.

TABLE 2

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS (mg/kg or ppm)

	SB-1	SB-2	SB-A
TPHC	140	2,400	<25

Note: The above TPHC concentrations are below the NJDEPE Soil Clean-Up Criteria. The NJDEPE Soil Cleanup Criteria for TPHC is 10,000 ppm if volatile organics are less than 1,000 ppm (which they are in this case - see Table 3).

TABLE 3

DETECTED VOLATILE ORGANIC and BASE NEUTRAL COMPOUNDS in SB-2 (ppb)

DETECTED VOLATILE ORGANIC COMPOUNDS	SB-2	NJDEPE Soil Cleanup Criteria
BENZENE	1.2	1,000
TOLUENE	9.2	500,000
ETHYLBENZENE	ND	100,000
XYLENES	3.3	10,000
2-BUTANONE	ND	50,000
METHYLENE CHLORIDE	10	10,000
DETECTED BASE NEUTRAL COMPOUNDS		
ACENAPHTHENE	ND	100,000
ANTHRACENE	ND	500,000
BENZO(A)ANTHRACENE	ND	500,000
BENZO(A)PYRENE	ND	100,000
BENZO(B)FLUORANTHENE	ND	NA
BENZO(K)FLUORANTHENE	ND	500,000
BIS(2-ETHYLHEXYL)PHTHALATE	1700	100,000
BUTYL BENZYL PHTHALATE	ND	100,000
CHRYSENE	ND	40,000
DI-N-BUTYL PHTHALATE	ND	100,000
FLUORANTHENE	ND	500,000
FLUORENE	ND	100,000
NAPHTHALENE	ND	100,000
PHENANTHRENE	ND	NA
PYRENE	ND	500,000

Note: NJDEPE Soil Cleanup Criteria are Impact to Groundwater Cleanup Criteria. Impact to Groundwater Criteria was used based on the close proximity of groundwater to the sample locations.

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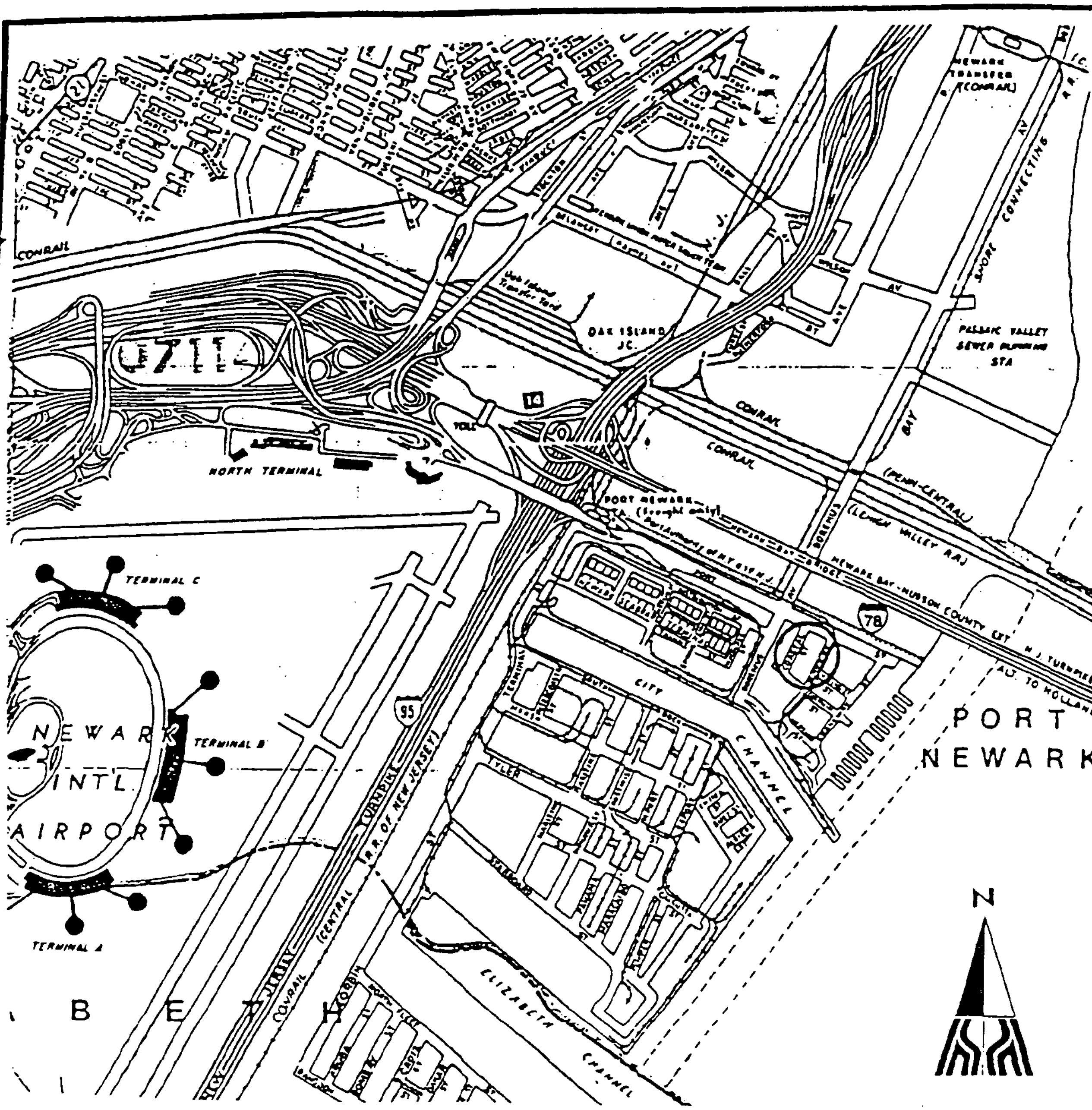


APPROXIMATE SCALES

0 1000 2000 3000 4000 5000 Feet

0 200 400 600 800 1000 Meters

1 Kilometer

FIGURE 1

SITE LOCATION MAP

BP MARINE PORT NEWARK, NJ

920920126

TIERRA-D-018884

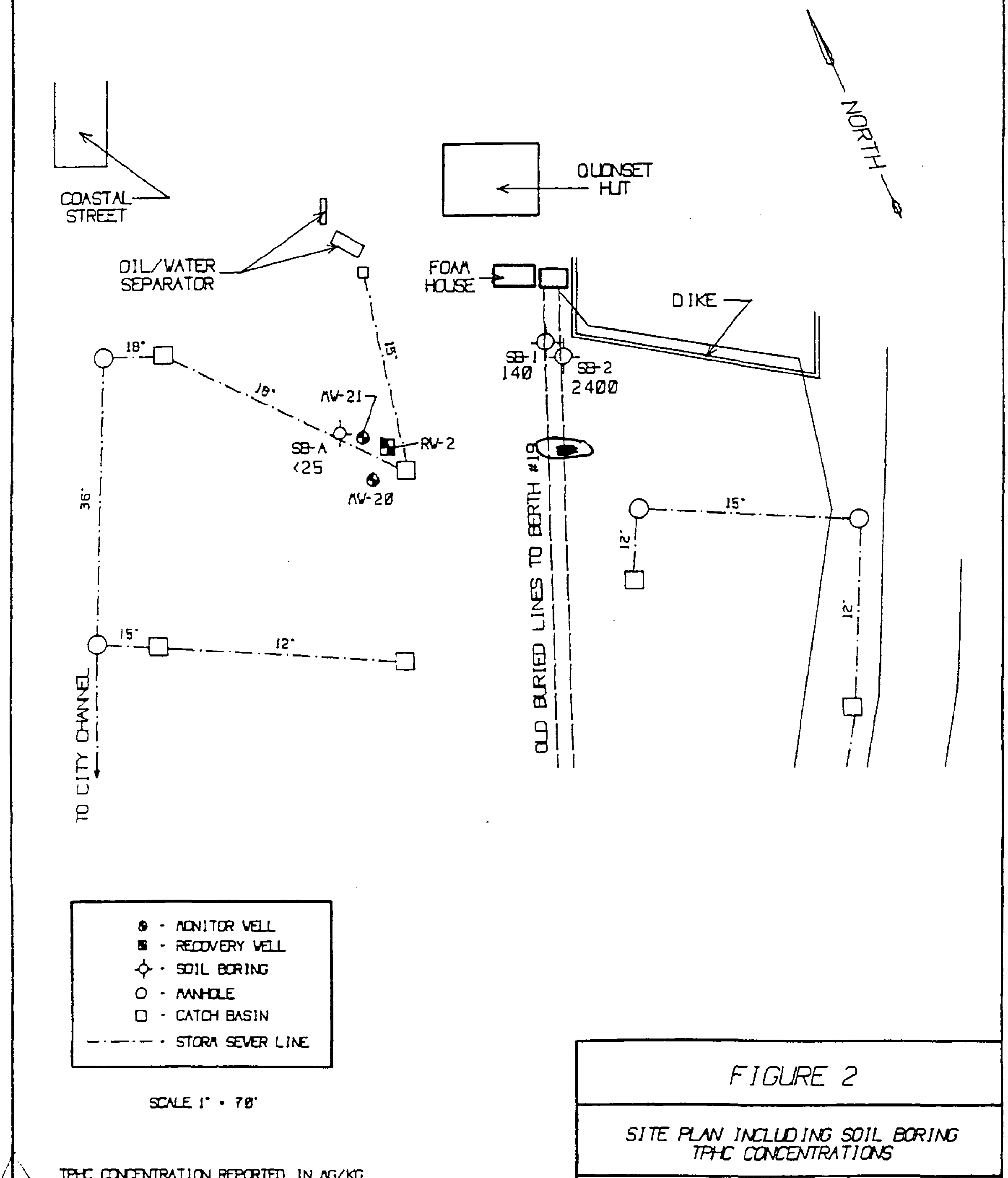


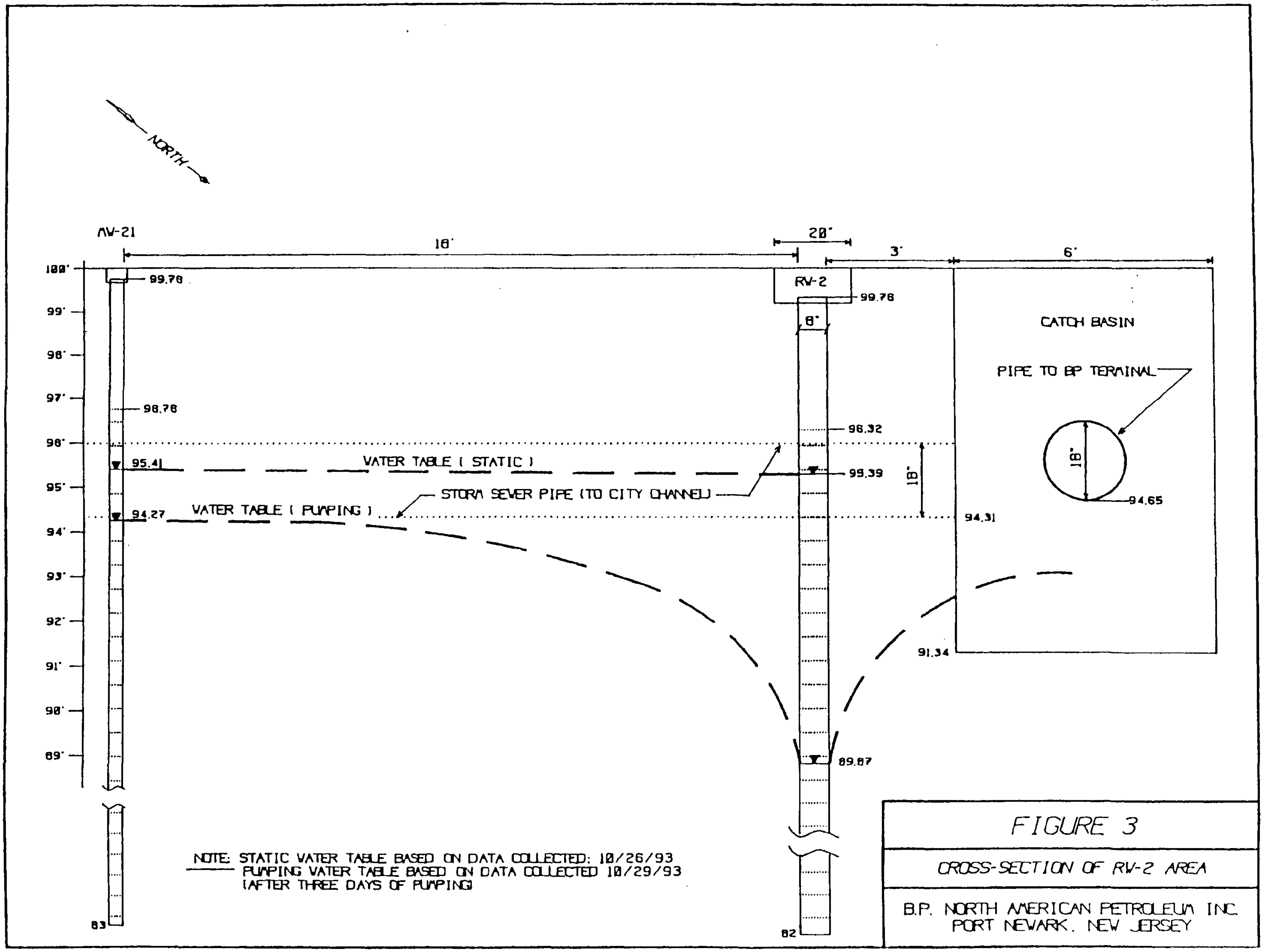
FIGURE 2

SITE PLAN INCLUDING SOIL BORING TPHC CONCENTRATIONS

B.P. NORTH AMERICAN PETROLEUM INC.
PORT NEWARK, NEW JERSEY

Exhibit 1937

920920127
TIERRA-D-018885



920920128

TIERRA-D-018886

APPENDIX A

BORING LOGS
(SOIL BORINGS)

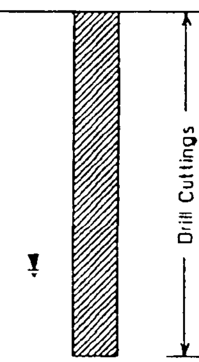
Handex of New Jersey

BORING LOG: SB-1

Permit #: N/A	Drill Date: October 6, 1993	Use: Soil Boring
Location: BP Marine Terminal, Port Newark, NJ		Owner Loc #:
Owner: BP Marine Americas		Handex Loc #: 107064
Owner Address: Bldg 350 Coastal St, Port Newark, NJ	BORING - Depth: 6 ft.	Diameter: 6 in.
Drilling Method: Augers	CASING - Length: N/A	Diameter: N/A
Sampling Method: Drill Cuttings	SCREEN - Length: N/A	Diameter: N/A
Static Water Level: 4.5 ft.	WELL - Depth: N/A	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description
0–1						ASPHALT.
1–4.5				35		Brown SILTY CLAY, some (-) fine to medium Gravel, little (-) Sand.
~4.5	SB-1*	☒				
4.5–6				25		Dark Brown CLAY.
6						Boring complete at 6 feet.

Boring Diagram



NOTES: * = Sample analyzed at laboratory; ☒ = Sample interval; ▼ = Water Table Depth at Time of Sampling

Geologist: Andrew Drake	Driller: Robert Brown

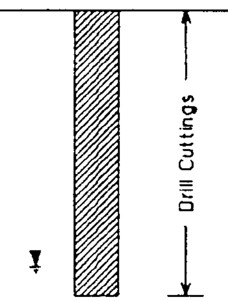
Handex®
Handex of New Jersey

BORING LOG: SB-2

Permit #: N/A	Drill Date: October 6, 1993	Use: Soil Boring
Location: BP Marine Terminal, Port Newark, NJ		Owner Loc #:
Owner: BP Marine Americas		Handex Loc #: 107064
Owner Address: Bldg 350 Coastal St, Port Newark, NJ	BORING – Depth: 5 ft.	Diameter: 6 in.
Drilling Method: Augers	CASING – Length: N/A	Diameter: N/A
Sampling Method: Drill Cuttings	SCREEN – Length: N/A	Diameter: N/A
Static Water Level: 4.5 ft.	WELL – Depth: N/A	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description
						ASPHALT.
	SB-2*	☒		110		Tan medium to fine SAND – Fill.
						Brown medium to fine SAND, some (–) fine Gravel, trace (+) Silt.
				70		GRAVEL, little coarse to fine Sand, trace Silt.
5						Black CLAY.
						Boring complete at 5 feet.
10						
15						
20						

Boring Diagram



NOTES: * = Sample analyzed at laboratory; ☒ = Sample interval; ⊻ = Water Table Depth at Time of Sampling

Geologist: Andrew Drake | Driller: Robert Brown

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Handex of New Jersey

BORING LOG: SB-A

Permit #: N/A	Drill Date: October 5, 1993	Use: Soil Boring
Location: BP Marine Terminal, Port Newark, NJ		Owner Loc #:
Owner: BP Marine Americas		Handex Loc #: 107064
Owner Address: Bldg 350 Coastal St, Port Newark, NJ	BORING - Depth: 7 ft.	Diameter: 8 in.
Drilling Method: Augers	CASING - Length: N/A	Diameter: N/A
Sampling Method: Drill Cuttings	SCREEN - Length: N/A	Diameter: N/A
Static Water Level: 5.50 ft.	WELL - Depth: N/A	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Boring Diagram
						ASPHALT.	Drill Cuttings
				2		Black fine to coarse SAND, some fine to coarse Gravel.	
				70		Brown SILTY CLAY, little (+) fine to coarse Gravel, trace Sand.	
5	S-A*	⊠	4,2,2,2	80		Red/brown CLAYEY SILT, little fine to coarse Gravel, trace Sand.	▼
				40			
						Boring complete at 7 feet.	
10							
15							
20							

NOTES: * = Sample analyzed at laboratory; ⊠ = Sample interval; ▼ = Water Table Depth at Time of Sampling

Geologist: Andrew Drake	Driller: Robert Brown

APPENDIX B

LABORATORY ANALYTICAL REPORT

ACCUTEST
2235 ROUTE 130, DAYTON, NJ 08810 • (908) 329-0200

ANALYSIS REPORT

SAMPLE No	COLLECTED DATE	COLLECTED TIME	COLLECTED BY	POINT OF COLLECTION
E327726	10/06/93	14:00	AD	SOIL - SB-1 BP MARINE AMERICAS, BLDG. 350 COASTAL ST., PORT NEWARK, NJ

TEST DESCRIPTION	RESULT	MDL	UNITS	DATE	INIT
PETROLEUM HYDROCARBONS	140	25	MG/KG	10/08/93	LM
SOLIDS, TOTAL PERCENT	85	2.0	%	10/08/93	LMM

UG/KG = PPB   MG/KG = PPM
MDL = METHOD DETECTION LIMIT
ALL RESULTS REPORTED ON A DRY WEIGHT BASIS

ACCUTEST
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ANALYSIS REPORT

SAMPLE No	COLLECTED DATE	TIME	BY	POINT OF COLLECTION
E327727	10/06/93	14:30	AD	SOIL - SB-2 BP MARINE AMERICAS, BLDG. 350 COASTAL ST., PORT NEWARK, NJ

TEST DESCRIPTION	RESULT	MDL	UNITS	DATE	INIT
PETROLEUM HYDROCARBONS	2400	130	MG/KG	10/08/93	LM
SOLIDS, TOTAL PERCENT	88	2.0	%	10/08/93	LMM

UG/KG = PPB   MG/KG = PPM
MDL = METHOD DETECTION LIMIT
ALL RESULTS REPORTED ON A DRY WEIGHT BASIS

ACCUTEST
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ANALYSIS REPORT

SAMPLE No	COLLECTED DATE	COLLECTED TIME	COLLECTED BY	POINT OF COLLECTION
E327735	10/05/93	12:00	AD	SOIL - SB-A BP MARINE AMERICAS, BLDG. 350 COASTAL ST., PORT NEWARK, NJ

TEST DESCRIPTION	RESULT	MDL	UNITS	DATE	INIT
PETROLEUM HYDROCARBONS	<25	25	MG/KG	10/08/93	LM
SOLIDS, TOTAL PERCENT	83	2.0	%	10/08/93	LMM

UG/KG = PPB   MG/KG = PPM
MDL = METHOD DETECTION LIMIT
ALL RESULTS REPORTED ON A DRY WEIGHT BASIS

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2235 ROUTE 130, DAYTON, NJ 08810 • (908) 329-0200

HANDEX CORPORATION
500 CAMPUS DRIVE
MORGANVILLE, NJ 07751

DATE: 11/03/93
JOB No: 935979R
PROJECT No: 107064-02
SAMPLE RECEIVED: 10/07/93

ATTN: TOM MARR

SAMPLE SUMMARY

SAMPLE No	COLLECTED DATE	TIME	BY	POINT OF COLLECTION
E327727R	10/06/93	14:30	AD	SOIL - SB-2 BP MARINE AMERICAS, BLDG. 350 COASTAL ST., PORT NEWARK, NJ
E327731R	10/06/93	11:30	AD	SOIL - SB-12 BP MARINE AMERICAS, BLDG. 350 COASTAL ST., PORT NEWARK, NJ

VINCENT J. PUGLIESE
PRESIDENT

ACCUTEST
2235 ROUTE 130, DAYTON, NJ 08810 • (908) 329-0200

ANALYSIS REPORT FOR VOLATILE ORGANICS BY GC/MS

		DATA FILES	ANALYSIS DATE
TEST CODE : VTCL+	Initial :	>D0730	10/18/93
LAB SAMPLE #: E327727R	Dilution #1 :		
MATRIX : SOIL	Dilution #2 :		
METHOD : SW846 8240			

	COMPOUND	RESULT (ug/kg)*	MDL (ug/kg)*	Q
1)	CHLOROMETHANE	ND	0.54	
2)	BROMOMETHANE	ND	0.84	
3)	VINYL CHLORIDE	ND	0.75	
4)	CHLOROETHANE	ND	0.95	
5)	METHYLENE CHLORIDE	10	0.75	
6)	ACETONE	ND	1.9	
7)	CARBON DISULFIDE	ND	1.0	
8)	1,1-DICHLOROETHENE	ND	0.86	
9)	1,1-DICHLOROETHANE	ND	1.0	
10)	1,2-DICHLOROETHENE (total)	ND	1.8	
11)	CHLOROFORM	ND	0.87	
12)	1,2-DICHLOROETHANE	ND	0.63	
13)	2-BUTANONE	ND	1.2	
14)	1,1,1-TRICHLOROETHANE	ND	0.77	
15)	CARBON TETRACHLORIDE	ND	0.94	
16)	BROMODICHLOROMETHANE	ND	0.92	
17)	1,2-DICHLOROPROPANE	ND	0.78	
18)	cis-1,3-DICHLOROPROPENE	ND	0.99	
19)	TRICHLOROETHYLENE	ND	0.72	
20)	DIBROMOCHLOROMETHANE	ND	0.37	
21)	1,1,2-TRICHLOROETHANE	ND	0.80	
22)	BENZENE	1.2	0.76	
23)	trans-1,3-DICHLOROPROPENE	ND	0.98	
24)	BROMOFORM	ND	0.86	
25)	4-METHYL-2-PENTANONE	ND	0.88	
26)	2-HEXANONE	ND	0.89	
27)	TETRACHLOROETHYLENE	ND	2.7	
28)	1,1,2,2-TETRACHLOROETHANE	ND	1.6	
29)	TOLUENE	9.2	0.92	
30)	CHLOROBENZENE	ND	1.1	
31)	ETHYLBENZENE	ND	0.84	
32)	STYRENE	ND	0.93	
33)	XYLENES (TOTAL)	3.3	0.81	
34)	VINYL ACETATE	ND	0.34	

ND = NOT DETECTED
MDL= METHOD DETECTION LIMIT
* - REPORTED ON A DRY WEIGHT BASIS

(1) - RESULTS REPORTED FROM DILUTION #1
(2) - RESULTS REPORTED FROM DILUTION #2

QUALIFIERS (Q)
J =INDICATES AN ESTIMATED VALUE BELOW MDL
B =INDICATES COMPOUND FOUND IN THE ASSOCIATED BLANK AS WELL AS IN SAMPLE
E =ESTIMATED VALUE; EXCEEDS INSTRUMENT CALIBRATION RANGE

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Client Name: VTCL+

Lab Sample ID: E327727R

Date Analyzed: 10/18/93 19:43

Lab File ID: >D0730

Matrix: SOIL FOR VOA

Number TICs found: 1 CONCENTRATION UNITS: ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST CONC	Q
1.	Unknown	2.94	15.	4
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				

QUALIFIERS(Q);
- (1)-THIS COMPOUND (OR SIMILAR SPECTRA) FOUND IN LAB BLANK.
- (2)-INTERNAL OR SURROGATE STANDARD ADDED BY LABORATORY.
- (3)-THIS COMPOUND ALREADY IDENTIFIED AND REPORTED AS TARGET COMPOUND.
- (4)-PROBABLE BACKGROUND DUE TO SOLVENT OR CO2.
- (5)-OTHER:

FORM I VOA-TIC

ACCUTEST®
2235 ROUTE 130, DAYTON, NJ 08810 • (908) 329-0200

ANALYSIS REPORT FOR BASE NEUTRAL EXTRACTABLES BY GC/MS

TEST CODE : B625+
LAB SAMPLE #: E327727R
MATRIX : SOIL
METHOD : SW846 8270

	DATA FILES	ANALYSIS DATE
Initial :	>C0942	10/31/93
Dilution #1 :		
Dilution #2 :		

	COMPOUND	RESULT (ug/kg)*	MDL (ug/kg)*	Q
1)	ACENAPHTHENE	ND	90	
2)	ACENAPHTHYLENE	ND	90	
3)	ANTHRACENE	ND	90	
4)	BENZIDENE	ND	3800	
5)	BENZO(A)ANTHRACENE	ND	66	
6)	BENZO(A)PYRENE	ND	83	
7)	BENZO(B)FLUORANTHENE	ND	90	
8)	BENZO(K)FLUORANTHENE	ND	180	
9)	BENZO(G,H,I)PERYLENE	ND	60	
10)	BIS(2-CHLOROETHOXY)METHANE	ND	120	
11)	BIS(2-CHLOROETHYL)ETHER	ND	83	
12)	BIS(2-CHLOROISOPROPYL)ETHER	ND	98	
13)	BIS(2-ETHYLHEXYL)PHTHALATE	1700	74	
14)	4-BROMOPHENYL PHENYL ETHER	ND	75	
15)	BUTYL BENZYL PHTHALATE	ND	31	
16)	2-CHLORONAPHTHALENE	ND	120	
17)	4-CHLOROPHENYL PHENYL ETHER	ND	120	
18)	CHRYSENE	ND	51	
19)	DIBENZO(A,H)ANTHRACENE	ND	83	
20)	1,2-DICHLOROBENZENE	ND	110	
21)	1,3-DICHLOROBENZENE	ND	69	
22)	1,4-DICHLOROBENZENE	ND	90	
23)	3,3'-DICHLOROBENZIDENE	ND	170	
24)	DIETHYL PHTHALATE	ND	75	
25)	DIMETHYL PHTHALATE	ND	75	
26)	DI-N-BUTYL PHTHALATE	ND	51	
27)	2,4-DINITROTOLUENE	ND	200	
28)	2,6-DINITROTOLUENE	ND	130	
29)	DI-N-OCTYL PHTHALATE	ND	63	
30)	1,2-DIPHENYLHYDRAZINE	ND	90	
31)	FLUORANTHENE	ND	60	
32)	FLUORENE	ND	83	
33)	HEXACHLOROBENZENE	ND	130	
34)	HEXACHLOROBUTADIENE	ND	98	
35)	HEXACHLOROCYCLOPENTADIENE	ND	180	
36)	HEXACHLOROETHANE	ND	170	
37)	INDENO(1,2,3-CD)PYRENE	ND	41	
38)	ISOPHORONE	ND	120	
39)	NAPHTHALENE	ND	120	
40)	NITROBENZENE	ND	110	
41)	N-NITROSODIMETHYLAMINE	ND	200	
42)	N-NITROSO-DI-N-PROPYLAMINE	ND	130	
43)	N-NITROSODIPHENYLAMINE	ND	54	
44)	PHENANTHRENE	ND	53	
45)	PYRENE	ND	44	
46)	1,2,4-TRICHLOROBENZENE	ND	98	

ND = NOT DETECTED
MDL= METHOD DETECTION LIMIT
* - REPORTED ON A DRY WEIGHT BASIS

(1) - RESULTS REPORTED FROM DILUTION #1
(2) - RESULTS REPORTED FROM DILUTION #2

QUALIFIERS (Q)
J =INDICATES AN ESTIMATED VALUE BELOW MDL
B =INDICATES COMPOUND FOUND IN THE ASSOCIATED BLANK AS WELL AS IN SAMPLE
E =ESTIMATED VALUE; EXCEEDS INSTRUMENT CALIBRATION RANGE

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Client Name: B625+

Batch Number: MS-S-2806

Lab Sample ID: E327727R

Extraction Date: 10/15/93

Lab File ID: >C0942

Date Analyzed: 10/31/93 0:20

Matrix: SOIL FOR BN

Number TICs found: 15

CONCENTRATION UNITS: ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST CONC	Q
1.	62016346	Octane, 2,3,7-trimethyl- (9CI)	20.08	3000.	
2.	74645980	Dodecane, 2,7,10-trimethyl- (9CI)	22.10	5800.	
3.	630035	Nonacosane (8CI9CI)	22.49	3500.	
4.	54832836	1H-Indene, octahydro-2,2,4,4,7,7-h	22.71	4300.	
5.	54833486	Heptadecane, 2,6,10,15-tetramethyl	23.63	9400.	
6.	54832836	1H-Indene, octahydro-2,2,4,4,7,7-h	23.77	6200.	
7.	62238113	Decane, 2,3,5-trimethyl- (9CI)	24.26	8400.	
8.	54832836	1H-Indene, octahydro-2,2,4,4,7,7-h	24.44	6000.	
9.	544763	Hexadecane (8CI9CI)	25.93	6900.	
10.	55045119	Tridecane, 5-propyl- (9CI)	26.73	8600.	
11.	629787	Heptadecane (8CI9CI)	27.50	4000.	
12.	1921706	Pentadecane, 2,6,10,14-tetramethyl	27.63	11000.	
13.	74764117	Iron, tricarbonyl[N-(phenyl-2-pyri	29.00	2500.	
14.	638368	Hexadecane, 2,6,10,14-tetramethyl-	29.18	5100.	
15.	74764117	Iron, tricarbonyl[N-(phenyl-2-pyri	31.75	2100.	

QUALIFIERS(Q); 86,800 ppm

(1)-THIS COMPOUND (OR SIMILAR SPECTRA) FOUND IN LAB BLANK.
(2)-INTERNAL OR SURROGATE STANDARD ADDED BY LABORATORY.
(3)-THIS COMPOUND ALREADY IDENTIFIED AND REPORTED AS TARGET COMPOUND.
(4)-PROBABLE BACKGROUND DUE TO SOLVENT OR CO2.
(5)-OTHER:

FORM I SV-TIC

w
5

920920141
TIERRA-D-018899

LABORATORY CHRONICLE

ACCUTEST JOB #...............935979R

DATE SAMPLES RECEIVED........10/07/93

ACCUTEST SAMPLE #	SAMPLE DATE	ANALYTE	METHOD	INITIAL PREP.	FINAL PREP.	PREP. INITIALS	INITIAL ANALYSIS	REPORTED ANALYSIS	ANALYST INITIALS
E327727R	10/06/93	VOLATILE ORGANICS + 10, TARG	SW846 8240				10/18/93	10/18/93	AAA
E327731R	10/06/93	VOLATILE ORGANICS + 10, TARG	SW846 8240				10/19/93	10/19/93	WVY
E327727R	10/06/93	BASE NEUTRAL EXTRACTABLES +	SW846 8270	10/15/93	10/15/93	KW	10/26/93	10/31/93	WHS
E327731R	10/06/93	BASE NEUTRAL EXTRACTABLES +	SW846 8270	10/15/93	10/15/93	KW	10/26/93	10/31/93	WHS

SO

Handex®

HANDEX OF NEW JERSEY, INC. 500 Campus Drive P.O. Box 451 Morganville, New Jersey 07751-0451 (908) 536-8500

CHAIN OF CUSTODY

BP Marine Americas
CLIENT
Bldg 350 Coastal Street
ADDRESS
Port Newark NJ
CITY STATE/ZIP
Charlie Guilfoyle
ATTENTION TELEPHONE #

BILL TO:

JOB NO. 935979
PROJECT NO. 107064.02
FACILITY NAME:

REQUESTED TURN AROUND TIME: ☐ DISCHARGE (7 DAYS) SPECIFIC DATE:

☐ 24 HOURS ☐ 2-7 DAYS ☐ 8-13 DAYS ☑ NORMAL (14 DAYS) APPROVED:

ACCUTEST ID	DATE SAMPLED	TIME SAMPLED	SMPL BY	MAT RIX	NO CONT	PRES	pH	FIELD ID/POINT OF COLLECTION	ANALYSIS REQUESTED
E327726	10/6/93	2:00	AD	Soil	~~2~~ 3	4°		BP Marine Terminal Port Newark, NJ SB-1	TPHC 418.1 *
E327727		2:30						" SB-2	
E327728		9:45						" SB-9	
E327729		10:30						" SB-10	
E327730		11:00						" SB-11	
E327731		11:30						" SB-12	
E327732		12:00						" SB-13	
E327733		1:00						" SB-14	
E327734		1:30			3			" SB-16	
E327735	10/5/93	12:00	AD	Soil	1 ~~3~~	4°		" SB-A	No VO's rec'd. MD 10/7/93

1. RELINQUISHED BY:	DATE/TIME: 6:30 10/6/93	1. RECEIVED BY: Jean P Modla	3. RELINQUISHED BY: MB	DATE/TIME: 10-7-93 14:00	3. RECEIVED BY:
2. RELINQUISHED BY: Jean P Modla	DATE/TIME: 13:50 10/7/93	2. RECEIVED BY: MB	4. RELINQUISHED BY:	DATE/TIME:	4. RECEIVED BY:

SAMPLE LOCATION 3A, 14A4

DELIVERABLE PACKAGE (CHECK ONE) COMM A

☑ NORMAL QC/COMMERCIAL A ☐ REDUCED TIER II ☐ OTHER

COMMENTS: * For samples greater than 1000 ppm TPHC, also run for BN + VO GC/MS, TCL +10 8240

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TIERRA-D-018901

REMEDIAL INVESTIGATION REPORT
BP MARINE AMERICAS, PORT NEWARK, NEW JERSEY

BP MARINE AMERICAS
HOUSTON, TEXAS

JULY 1996

PREPARED BY:

MALCOLM PIRNIE, INC.
One International Boulevard
Mahwah, New Jersey

BAA000030

26 V

BP MARINE AMERICAS
CONTENTS

TABLES

FIGURES

APPENDIX

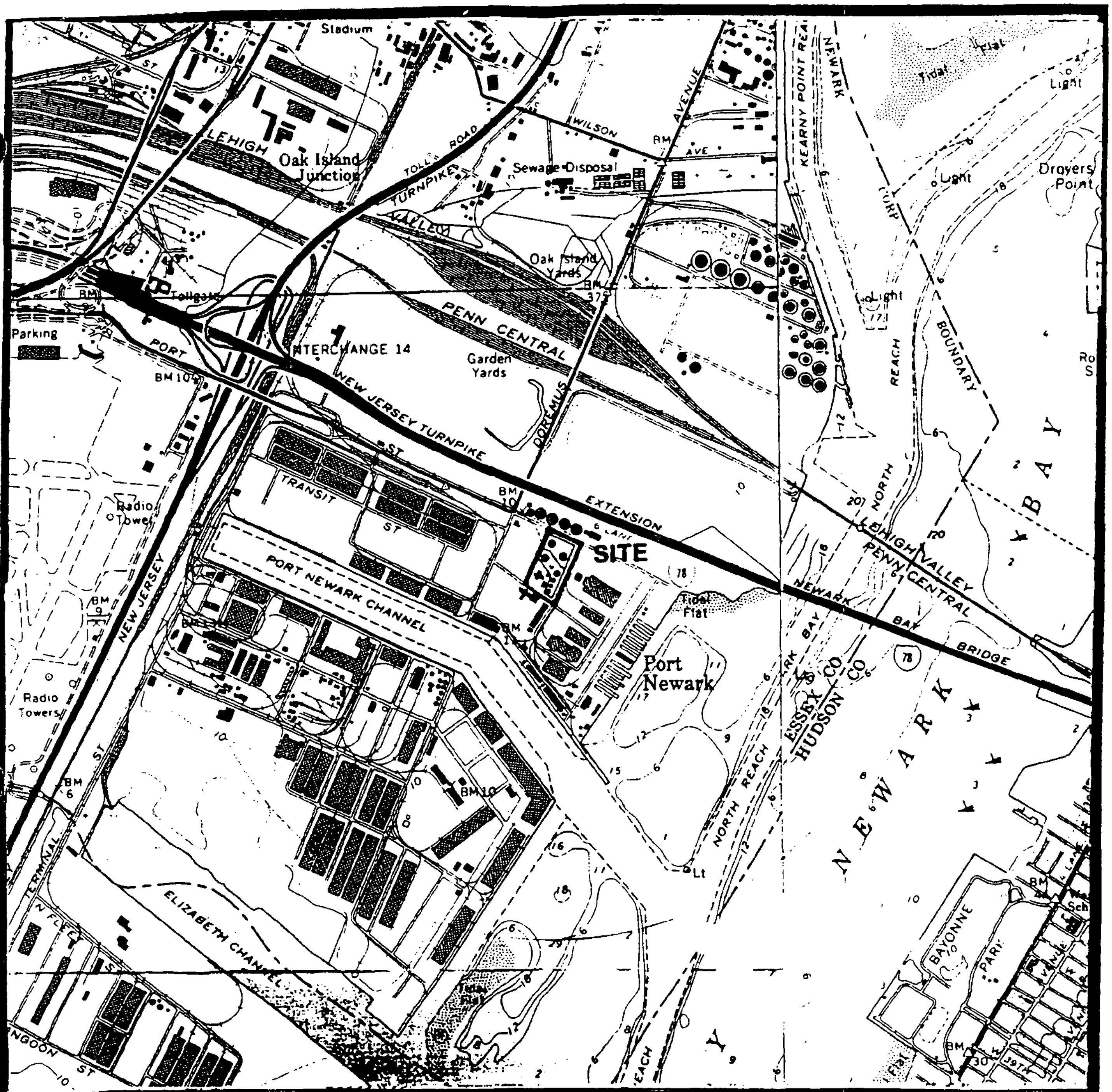
1.0 INTRODUCTION

Malcolm Pirnie was retained by BP Marine Americas (BP Marine) to conduct a Remedial Investigation (RI) at the Foreign Auto Preparation Service (FAPS) parking lot property. This property is located adjacent to, and south of, BP Marine's Port Newark facility. BP Marine has installed six (6) recovery wells in a remedial effort to remove liquid phase petroleum hydrocarbons floating on the water table resulting from a pipe line leak that occurred on the FAPS property in October, 1992.

Previous investigations by others have identified the extent of the hydrocarbon contamination by visual inspection of soil and groundwater samples. Only three samples were collected for laboratory analysis. Because of the lack of analytical data to confirm the visual observations, the New Jersey Department of Environmental Protection (NJDEP) required BP Marine to conduct an RI to confirm the nature and extent of petroleum hydrocarbon contamination in the soil and groundwater based on the results of laboratory analyses of soil and groundwater samples. As required by the NJDEP, this RI was developed in accordance with the NJDEP Technical Requirements for Site Remediation (Tech Req.) (N.J.A.C. 7:26E). It included the drilling of 32 soil borings and the installation of eight monitoring wells.

1.1 BACKGROUND

The FAPS parking lot is located immediately south/southwest of the BP Marine Terminal No. 1 facility in Port Newark, New Jersey (Figure 1). The property is owned by The City of Newark and managed by The Port Authority of New York and New Jersey (Port Authority). The property is leased by FAPS. The property is used by FAPS as a parking lot for cars unloaded from ships. Transecting the FAPS property are four abandoned and grout filled below-grade pipelines that prior to 1992, were used by BP Marine to convey petroleum products from its dock at City Channel to Terminal No. 1. The dock is located approximately 1000 feet from the BP Marine facility. In 1992, after the October incident, BP Marine abandoned the below grade pipelines in place and replaced them with above grade piping. As a result of the leak, BP Marine implemented remedial actions.



NORTH

ELIZABETH, NJ
N4037.5-W7407.5/7.5

1967
PHOTOREVISED 1981
DMA 6165 II
NE-SERIES V822

NEW JERSEY

QUAD LOCATION

MALCOLM PIRNIE

0 1/2 1 MILE
SCALE IN MILES

SCALE 1 TO 24000

CONTOUR INTERVAL 10 FEET

1000 0 1000 2000 3000
SCALE IN FEET

0 1/2 1 KM
SCALE IN KILOMETERS

FIGURE 1

TOPOGRAPHIC MAP

BP MARINE AMERICAS
PORT NEWARK, NEW JERSEY

920920188

TIERRA-D-018907

1.2 DESCRIPTION OF PETROLEUM RELEASE

The following background information is summarized from reports prepared for BP Marine by Ground Water Associates, Inc.

BP Marine first reported a possible spill to the Coast Guard and the NJDEP on October 4, 1992, after an oil sheen was discovered immediately adjacent to BP Marine's dock at City Channel. The sheen was traced to a storm sewer outfall leading from the BP Marine terminal and the adjacent FAPS parking lot. On October 6, 1992, oil was discovered in a storm sewer basin and an access pit for the underground pipelines.

Immediately upon discovering of the oil, BP Marine shut off and drained the oil from all four pipelines. In addition, BP Marine cleaned up the spilled oil from the access pit and the storm sewer basin, and installed absorbent buoys at the storm sewer outfall in the vicinity of the BP Marine dock. After conducting hydrostatic tests of all four underground pipelines on October 6, 1992, it was determined that the oil had leaked from only one of the four lines. The type of oil was identified as No. 2 to No. 4 fuel oil. The leak had not been detected in hydrostatic pressure tests performed only a few months prior and was not indicated in daily product monitoring by BP Marine. This information suggests that the pipeline leaked only when the line was under elevated pressure for product transfer. The time over which the leakage occurred was believed to be short.

To prevent further leaks, BP Marine has replaced all underground pipelines between the terminal and the dock with above ground piping. The underground pipelines have been abandoned in place by filling them with cement grout.

1.3 OBJECTIVES AND SCOPE OF WORK

On November 16, 1992, BP Marine submitted a remedial work plan to the NJDEP to investigate the nature and extent of possible contamination caused by the underground pipeline leak. No immediate response to the work plan was provided by the NJDEP. BP

Marine chose to continue with its remedial investigation voluntarily, without NJDEP oversight.

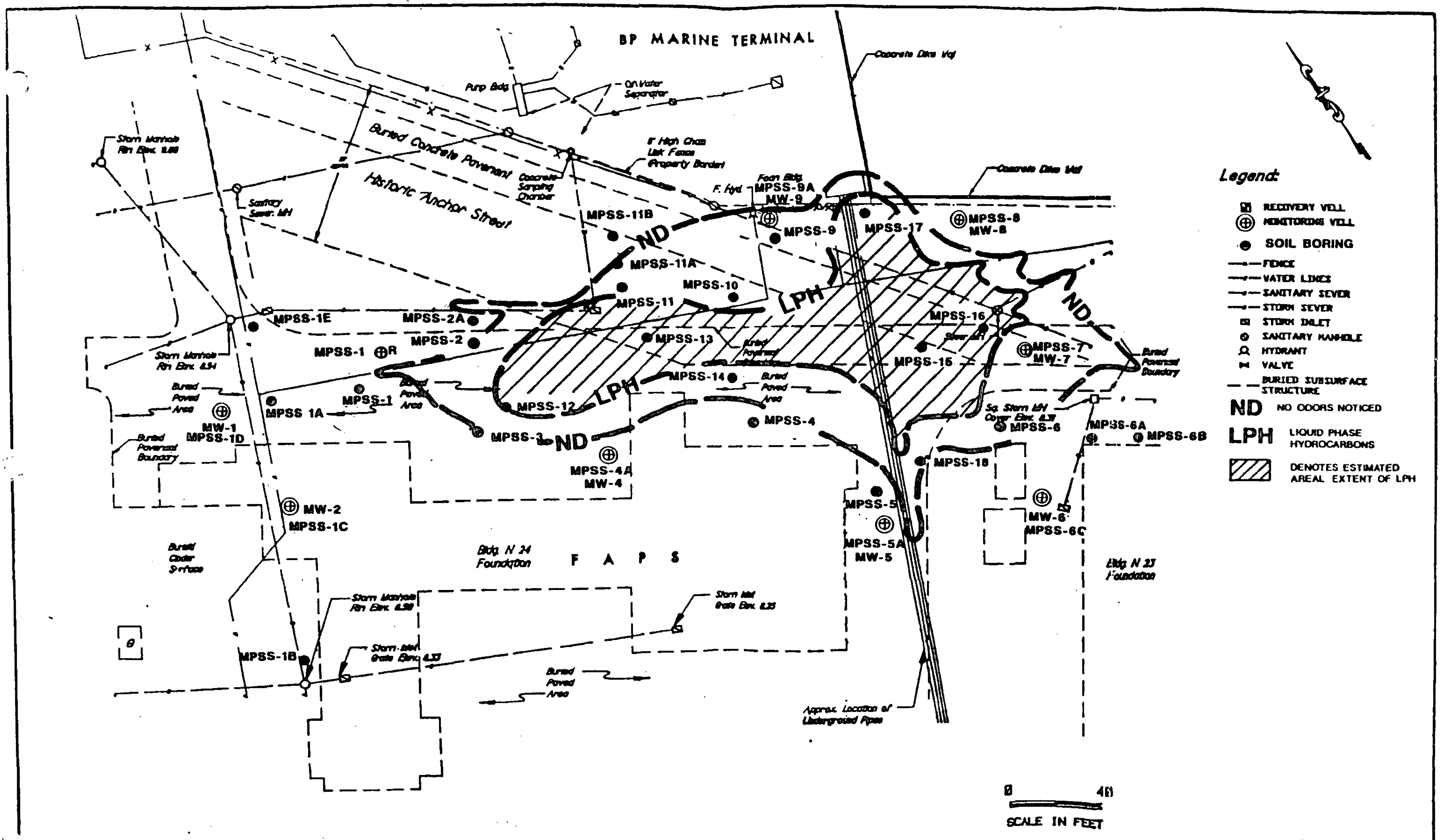
On February 5, 1993, the NJDEP offered BP Marine the opportunity to proceed with remedial activities under a Memorandum of Agreement (MOA). BP Marine retained Groundwater Associates, Inc. on March 8, 1993, to investigate the area of concern as well as to begin cleaning up the subsurface oil. BP Marine entered into an MOA with the NJDEP on June 7, 1993.

1.4 PRIOR ENVIRONMENTAL INVESTIGATIONS AND REMEDIAL ACTIONS

The initial investigation was conducted by Ground Water Associates from March 8 to 11, 1993, and included the drilling of nine soil borings, two of which were completed as groundwater monitoring wells, and one as a recovery well. A description of the investigation is given in the April 9, 1993, report prepared by Ground Water Associates entitled; Remedial Investigation Report, BP Marine Terminal, Port Newark, New Jersey. A second investigation was conducted on October 5 and 6, 1993, by Handex. Three soil borings were drilled, and one monitoring well and one recovery well were installed. This work is described in the April 21, 1994, Handex report entitled; Remedial Investigation Update Report, BP Marine Terminal, Port Newark, New Jersey. Liquid-phase petroleum hydrocarbon was detected in the two monitoring wells, two recovery wells, and one soil boring.

A third phase of investigation was conducted by Handex from April 27 to 28, 1994, which included drilling 22 soil borings. This work is described in the September 7, 1994, Handex Report entitled; Remedial Investigation Update Report, Exploratory Boring Program, FAPS Parking Lot. Odors, but no direct physical evidence of liquid phase petroleum hydrocarbons were detected in five of the 22 borings. Evidence of liquid petroleum hydrocarbons were observed in seven of the 22 borings.

A fourth phase of work was completed by Handex from November 14 to 15, 1994, which included the installation of four recovery wells. A complete description of this work



MALCOLM PIRNIE

BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

SOIL BORING AND MONITROING WELL LOCATIONS /PREVIOUS EXTENT OF LIQUID PHASE PETROLEUM CONTAMINATION

MALCOLM PIRNIE, INC.

FIGURE 2

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is given in the March 9, 1995, report prepared by Handex titled; Remedial Activity, Installation of Four Recovery Wells, FAPS Parking Lot. These recovery wells were installed to collect and remove the liquid phase petroleum hydrocarbons.

These investigations have identified the extent of the liquid phase petroleum hydrocarbon contamination associated with the pipeline leak (as shown on Figure 2) through visual observation of petroleum hydrocarbon contamination in soil samples collected from soil borings, and from the presence of liquid phase petroleum hydrocarbons in three observation wells and six recovery wells.

1.5 REMEDIAL INVESTIGATION

In February, 1995, the NJDEP requested that BP Marine prepare a Remedial Investigation Work plan (RIW) in accordance with N.J.A.C. 7:26E Technical Requirements for Site Remediation describing the scope of work required to confirm the nature and extent of the petroleum hydrocarbon contamination in the soil and groundwater. BP Marine retained Malcolm Pirnie in April, 1995, to prepare the RIW and conduct the work per N.J.A.C. 7:26E. The RIW was submitted to the NJDEP in June, 1995 and approved in December, 1995. The objective of the RI was to satisfy the NJDEP's requirement to confirm the nature and extent of hydrocarbon contamination with laboratory analyses of soil and groundwater. This was done by using hollow stem augers and a split spoon sampler for the collection of soil samples, the installation of monitoring wells for the collection of groundwater samples, and laboratory analyses of soil and groundwater samples. The field investigations were conducted in accordance with NJDEP's Field Sampling Procedures Manual (May 1992).

2.0 FIELD INVESTIGATION PROCEDURES

2.1 SOIL SAMPLING

2.1.1 Soil Sample Locations

Altogether, 32 borings were drilled to determine the extent and nature of petroleum hydrocarbon contamination in the soil. The locations of the soil borings (Figure 2) were selected to confirm the results of visual observations reported by Groundwater Associates and Handex, and were biased to identify possible migration pathways following subsurface utilities. Soil samples collected from the borings were used to assess the thickness of the free phase petroleum hydrocarbon, determine the type of contamination through laboratory analysis, and to determine the horizontal and vertical limits of contamination. The rationale for locating each boring is summarized in Table 1.

A number of the soil borings were located along transects to delineate the limits of petroleum hydrocarbon contamination by establishing contaminant gradients across the previously identified area of petroleum hydrocarbon contamination. The following five transects were established:

T1 - MPSS-1, MPSS-11, and MPSS-2

T2 - MPSS-8, MPSS-9, MPSS-13, and MPSS-3

T3 - MPSS-16, MPSS-14, MPSS-17, and MPSS-4

T4 - MPSS-7, MPSS-15, MPSS-6, and MPSS-5

T5 - MPSS-1, MPSS-12, MPSS-14, MPSS-15, and MPSS-6

Soil borings MPSS-1 through MPSS-9 were drilled to determine the locations for monitoring wells. At each location where free product was found, the boring was abandoned and a new boring was drilled approximately ten feet away. This procedure was continued until no free product was found. These additional borings were labeled with the original boring number followed by the letter A, B, C, etc. Because many subsurface obstructions

TABLE 1
MONITORING WELL AND SOIL BORING RATIONALE
BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

Monitoring Well and Soil Boring Identification No.		Rationale
MW-1	MPSS-1 MPSS-1A MPSS-1B MPSS-1C MPSS-1D MPSS-1E	Perimeter monitoring at the western end of the liquid phase plume, and to assess the nature and extent of petroleum hydrocarbons migrating along the subsurface utilities in the area.
MW-2	MPSS-2 MPSS-2A	Perimeter monitoring at the western end of the liquid phase plume, and to assess the nature and extent of petroleum hydrocarbons migrating along the subsurface utilities in the area.
	MPSS-3	Soil boring to assess the nature and extent of petroleum hydrocarbons on this area. MW-3 was not installed because the locations of MW-4 and MW-2 were moved in such a way that they could effectively monitor this area.
MW-4	MPSS-4 MPSS-4A	Perimeter monitoring at the southern end of the liquid phase plume, and to assess the extent of petroleum hydrocarbons migrating with the hydraulic gradient to the south.
MW-5	MPSS-5 MPSS-5A	Perimeter monitoring at the southern end of the liquid phase plume, and to access the nature and extent of petroleum hydrocarbons migrating with the petroleum pipeline to the south.
MW-6	MPSS-6 MPSS-6A MPSS-6B MPSS-6C	Perimeter monitoring at the southern end of the liquid phase plume, and to assess the nature and extent of petroleum hydrocarbons migrating with the hydraulic gradient to the south.
MW-7	MPSS-7	Perimeter monitoring at the eastern end of the liquid phase plume, and to access the nature and extent of petroleum hydrocarbons migrating in the sewer and water utilities to the south.
MW-8	MPSS-8	Perimeter monitoring at the northern end of the liquid phase plume, and to assess the up gradient condition.
MW-9	MPSS-9 MPSS-9A	Optionally installed if the existing well is damaged; Perimeter monitoring at the northern end of the plume and to assess the up gradient, and nature and extent of petroleum hydrocarbons migrating west of the pipeline.
	MPSS-10	Assess the extent of petroleum hydrocarbons in the soil in the clean zone to the northwest of the pipeline.
	MPSS-11 MPSS-11A MPSS-11B	Assess the extent of petroleum hydrocarbons in the soil in the clean zone to the northwest of the pipeline.
	MPSS-12	Assess the extent of petroleum hydrocarbons in the soil in the clean zone to the southwest of the pipeline.
	MPSS-13	Assess the extent of petroleum hydrocarbons in the soil to the west of the pipeline.
	MPSS-14	Assess the extent of petroleum hydrocarbons in the soil in the clean zone to the southwest of the pipeline.
	MPSS-15	Assess the extent of petroleum hydrocarbons in the soil to the east of the pipeline.
	MPSS-16	Assess the extent of petroleum hydrocarbons in the soil to the east of the pipeline and adjacent to the sewer and water utilities.
	MPSS-17	Assess the extent of petroleum hydrocarbons in the soil to the north and adjacent to the pipeline.
	MPSS-18	Assess the extent of petroleum hydrocarbons in the soil to the south and adjacent to the pipeline.

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exist on the site (i.e., building foundations, paved surfaces, etc.), the augers met refusal at several locations. The borings were moved several feet to avoid the obstruction.

2.1.2 Soil Sampling Procedure

The 32 soil borings were installed using a failing F-15 drill rig equipped with 8.25-inch I.D. hollow stem augers and standard 2-inch diameter split-spoon samplers. The split-spoon samplers were advanced directly from ground surface using a 140-pound hammer with a 30-inch drop. Continuous samples were collected from the surface to the water table at each location, and each sample was logged in the field book by a Malcolm Pirnie hydrogeologist. In most instances, because of the close proximity of the water table to the surface, only two or three split-spoons were collected from each boring. At any soil boring location where a monitoring well was not installed, the bore holes were filled with a cement/bentonite grout. Prior to the collection of soil samples at each location, the downhole drilling equipment was decontaminated by steam cleaning, and the sampling equipment was decontaminated with the six-step decontamination procedure outlined below:

1. Wash and scrub with nonphosphate detergent (Alconox);
2. Rinse with tap water (from potable water supply);
3. Rinse with methanol followed by hexane (pesticide grade or better);
4. Thorough rinse with deionized, demonstrated analyte-free water (volume used during this rinse must be 3 to 5 times the volume of solvent used in Step 3);
5. Air dry; and
6. Wrap in aluminum foil for transport.

2.1.3 Soil Sampling Depths

The soil sampling depths were determined in the field based on the depth to the liquid petroleum hydrocarbon or the depth to ground water. All of the soil samples were collected from the 6-inch interval above the saturated zone. This ranged from 1.0 to 5.0 feet below grade across the site. The above information is summarized on the boring logs in Appendix A.

2.1.4 Soil Sample Handling

Upon retrieval, the split-spoon samplers were opened and screened immediately with an OVA flame ionization detector (FID), Model 128. The readings were recorded in the field logbook in parts per million (ppm) OVA calibration gas equivalents. With the exception of the samples to be analyzed for VOCs, which were collected directly from the split-spoons, the samples were homogenized. This was accomplished by placing the sample in a stainless steel bowl and thoroughly mixing it with a stainless steel trowel or spoon. Once mixed, the soil samples were placed in the appropriate sample containers and stored in an iced cooler until they were relinquished to the analytical laboratory at the end of each sampling day.

To check laboratory accuracy, two blind duplicate samples, MPSS-6D and MPSS-16D, were collected from soil boring locations MPSS-6C and MPSS-16 and sent to the laboratory for analysis. To determine if cross contamination of samples from sampling equipment occurred, field rinsate blank FB-1 was collected.

2.1.5 Soil Analyses

Since fuel oil was released from the pipeline, the Tech. Req. required the soil samples to be analyzed for total petroleum hydrocarbons (TPHC) by Method 418.1. Twenty-five percent of the samples that contained petroleum hydrocarbons at concentrations in excess of 100 mg/Kg were required to be analyzed for the Target Compound List (TCL) of Polynuclear Aromatic Hydrocarbons (PAH). In addition, 25 percent of the samples that had TPHC levels exceeding 1000 ppm had to be analyzed for the EPA TCL of Volatile Organic Compounds (VOCs). Soil sampling results are discussed in Section 3.0.

2.2 HYDROGEOLOGIC INVESTIGATION

2.2.1 Monitoring Well Locations

The distribution of liquid phase petroleum hydrocarbons at the site is controlled by factors such as the slope of the water table, the numerous underground utilities and the intermittent pumping of the recovery wells. Even though the groundwater is flowing to the south, a significant portion of the liquid phase petroleum hydrocarbons has migrated to the west, which is lateral to the hydraulic gradient of the water table. This is believed to result from the liquid phase petroleum hydrocarbons migrating along the sewer utilities which transect the area.

The locations of the eight monitoring wells were chosen at locations where liquid phase petroleum was previously detected. The wells were installed outside the limit of the floating petroleum hydrocarbon body to detect dissolved groundwater contamination associated with the petroleum hydrocarbon spill and to establish a perimeter monitoring well network to detect any movement of the floating oil petroleum hydrocarbon.

The eight monitoring wells, MW-1, MW-2 and MW-4 through MW-9, were installed in the corresponding soil boring locations MPSS-1, MPSS-2 and MPSS-4 through MPSS-9. Monitoring well MW-3, however, was not installed in soil boring MPSS-3. The monitoring well locations, excluding MW-7 and MW-8, were moved from the original locations because petroleum hydrocarbons were found in the first soil boring drilled at each location. The area around proposed monitoring well MW-3 was effectively monitored by wells MW-2 and MW-4 eliminating the need for a well at the soil boring MPSS-3 location. In some instances, up to three or four additional soil borings had to be drilled before a clean boring with no evidence of petroleum hydrocarbons was found. Once a clean boring was encountered, a monitoring well was installed. The revised well locations were agreed to by the NJDEP as summarized in Malcolm Pirnie's December 22, 1995 letter (Appendix B). The soil boring and monitoring well locations are shown on Figure 2.

2.2.2 Monitoring Well Construction

The eight monitoring wells, MW-1, MW-2, and MW-4 through MW-9, were installed in December 1995. The wells were installed by Advanced Drilling Inc., a New Jersey licensed well driller, using a Strata Star-15 auger rig.

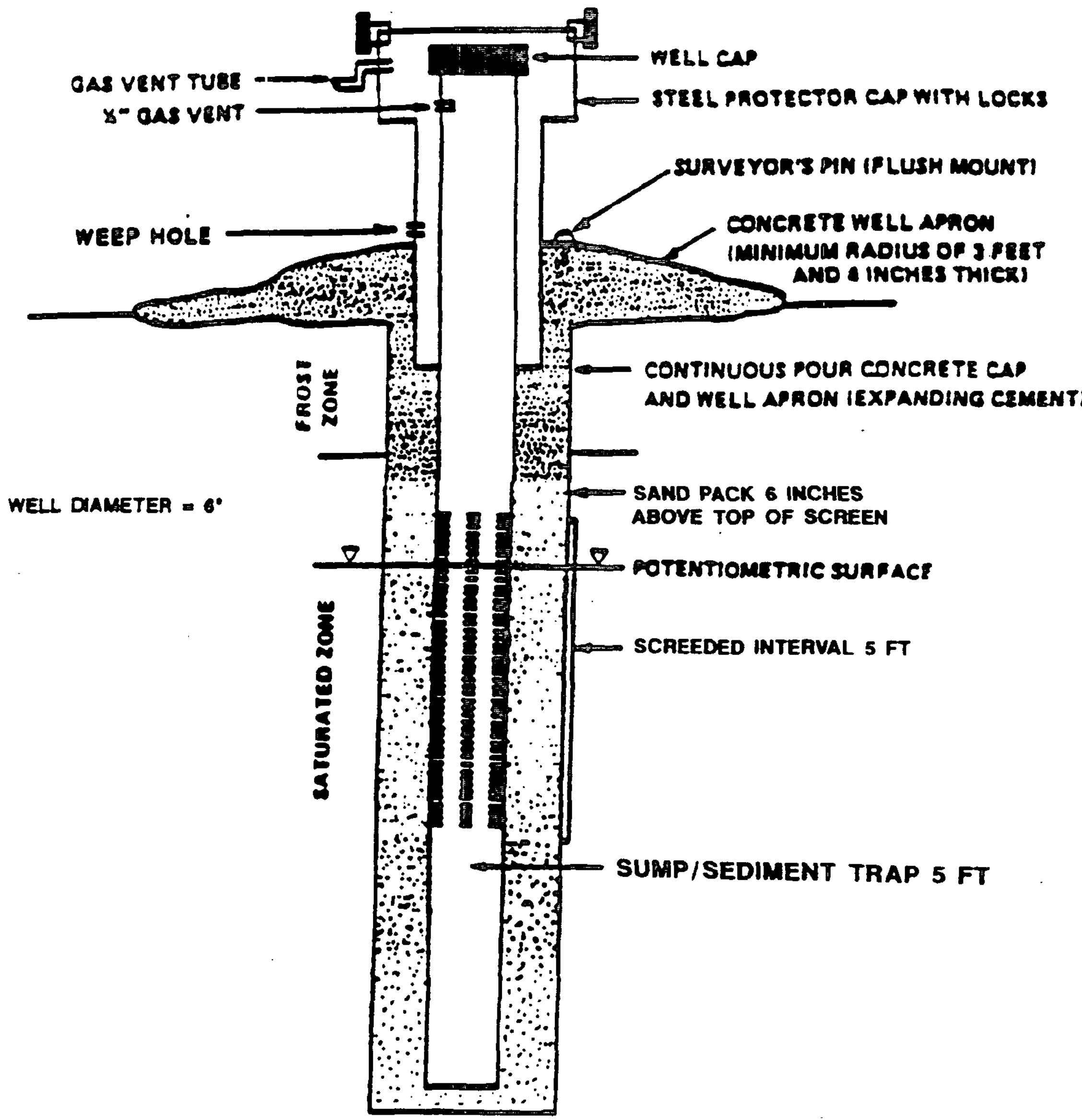
Twelve-inch augers were used to ream out the soil borings to a depth sufficient to install a monitoring well. The depths of the monitoring wells ranged from 12 to 14 feet below grade. The wells are constructed of 6-inch diameter - schedule 40 PVC so that if free product migrate into the wells, they can be used as recovery wells. They are constructed with a five-foot sump, a five-foot length of 10 slot well screen and enough riser to extend to approximately six inches below grade. The sump was installed below the screen to provide room to install a submersible pump should the well be used to recover oil.

Prior to installing each well, approximately one foot of clear silica sand filter pack was placed in the bottom of the borehole. The casing and screen assembly was inserted into the borehole inside the hollow stem augers. The sand filter pack was then emplaced six to twelve inches above the screen. A bentonite slurry seal was then tremied on top of the sand pack, and any remaining annular space was tremied grouted with a cement/bentonite slurry. Due to the close proximity of the water table to the ground surface, the sand pack, bentonite seal, and grout thicknesses had to be compressed. A minimum of at least six inches of sand pack was placed above the screen, and at least six inches of bentonite was installed to seal the well. The remaining annular space was sealed with bentonite/cement grout.

Each well was completed with a two foot square concrete pad installed around a flush mount locking curb box. The riser pipe was completed with a compression seal well cap with a one-quarter inch vent hole and a lock. Typical well construction details are shown on Figure 3. Monitoring well construction forms and Form A's are in Appendix C.

2.2.3 Well Development

Each well was developed by surging and pumping with a centrifugal pump to insure a proper hydraulic connection with the shallow groundwater. None of the eight wells yielded



MALCOLM PIRNIE

BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

OVERBURDEN WELL CONSTRUCTION

MALCOLM PIRNIE, INC.

FIGURE 3

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enough water to be pumped continuously for three to five casing volumes. Each time a well was pumped dry it was allowed to recover, and development was continued.

The wells were developed until samples of the discharge water had a concentration of 50 Nephelometric Turbidity Units (NT) or less. If a turbidity level of 50 NOUS was not achieved after one hour, development continued for two additional hours. If, at that time, the water quality parameters (specific conductivity, pH and temperature) did not vary more than 10 percent, the well was considered developed. Three to five well volumes of water were removed from each well, and all wells were developed to below 50 NTUs, except MW-1 which had a final NTU reading of 186.

2.2.4 Petroleum Hydrocarbon Product and Ground Water Measurements

After the wells were installed and developed, two rounds of petroleum hydrocarbon product and groundwater level measurements were made in the eight newly installed wells, three existing monitoring wells and six recovery wells. Petroleum hydrocarbon product and groundwater measurements were collected on April 9, 1996, and May 9, 1996. These measurements were collected long after the wells were installed because the wells were unaccessible. The wells were covered by large amounts of snow and/or snow banks from plowing the parking lot, or by cars staged in the investigation area.) Product and groundwater level measurements from both rounds of measurements are summarized in Table 2 and Table 3. Free phase petroleum hydrocarbons were only measured in two wells, MW-19 and MW-10.

2.2.5 Groundwater Sampling

One round of groundwater samples was collected from the eight newly installed monitoring wells on April 9, 1996. The samples were analyzed for diesel fuel (Modified Method 8015), TCL V.C. (plus 10), and TCL List of base neutral organic compounds plus 15 (BN + 15).

Prior to the start of sampling, product level measurements, water level measurements and organic vapor readings of the monitoring well head spaces were made. The head space

Table 2

Groundwater Elevations as recorded on April 9, 1996
BP Marine Terminal
Port Newark, New Jersey

Well ID	Headspace Readings (FID ppm)	Elevation (MSL)	Depth to Water (DTW)	Depth to Product (DTP)	Groundwater Elevation (MSL)
MW-1	400	8.66	5.28	ND	3.38
MW-2	>1,000	9.04	6.03	ND	3.01
MW-4	30	9.01	4.40	ND	4.61
MW-5	>1,000	8.63	4.37	ND	4.26
MW-6	70	7.29	3.32	ND	3.97
MW-7	>1,000	7.80	3.81	ND	3.99
MW-8	30	8.70	3.05	ND	5.65
MW-9	>1,000	8.73	3.97	ND	4.76
MW-19[1]	600	7.61	4.05	3.55	3.06
MW-20[1]	900	7.66	8.07	5.24	-3.24
MW-21	>1,000	8.26	4.91	ND	3.02
RW-1[2] / RW-1[3]	>1,000	4.43	8.00	ND	-3.57
RW-2[2] / RW-2[3]	>1,000	7.79	8.78	ND	-0.99
RW-5[2] / RW-3[3]	>1,000	7.95	14.10	ND	-6.15
RW-6[2] / RW-4[3]	>1,000	8.30	14.66	ND	-6.36
RW-4[2] / RW-5[3]	>1,000	8.15	14.08	ND	-5.93
RW-3[2] / RW-6[3]	600	8.02	13.65	sludge	-5.63

MW-3 was not installed.
ND = Not Detected.
[1] = corrected for presence of LNAPL
[2] = This is the correct numbering sequenced used by BP Marine for the recovery wells.
[3] = Previous number sequence used and the numbering sequence used in this report.

Table 3

Groundwater Elevations as recorded on May 9, 1996
BP Marine Terminal
Port Newark, New Jersey

Well ID	Headspace Readings (FID ppm)	Elevation (MSL)	Depth to Water (DTW)	Depth to Product (DTP)	Groundwater Elevation (MSL)
MW-1	420	8.66	5.36	ND	3.30
MW-2	>1,000	9.04	6.21	ND	2.83
MW-4	39	9.01	4.49	ND	4.52
MW-5	>1,000	8.63	4.45	ND	4.18
MW-6	90	7.29	3.41	ND	3.88
MW-7	>1,000	7.80	3.90	ND	3.90
MW-8	45	8.70	3.13	ND	5.57
MW-9	>1,000	8.73	4.05	ND	4.68
MW-19[1]	750	7.61	4.13	3.62	3.06
MW-20[1]	>1,000	7.66	8.18	5.32	-2.86
MW-21	980	8.26	5.02	ND	2.94
RW-1[2] / RW-1[3]	>1,000	4.43	7.96	ND	-3.53
RW-2[2] / RW-2[3]	>1,000	7.79	8.91	ND	-1.12
RW-5[2] / RW-3[3]	>1,000	7.95	13.92	ND	-5.97
RW-6[2] / RW-4[3]	>1,000	8.30	14.21	ND	-5.91
RW-4[2] / RW-5[3]	>1,000	8.15	14.18	ND	-6.66
RW-3[2] / RW-6[3]	890	8.02	14.14	sludge	-6.12

MW-3 was not installed.
ND = Not Detected.
[1] = Corrected for presence of LNAPL
[2] = This is the correct numbering sequence used by BP Marine for the recovery wells.
[3] = Previous number sequence used and the numbering sequence used in this report.

readings were measured using an OVA FID. The OVA readings ranged from 30 to >1,000 ppm above background. However, the OVA readings measured in the breathing zone were equal to background and respiratory protection was not required. The depth to water was measured with an electronic water product interface level indicator from a measuring point on the top of each well. This information is summarized in Tables 2 and 3. Three well volumes of water were purged from wells MW-1, MW-6 and MW-8 prior to sampling. However, wells MW-1, MW-2, MW-4, MW-5 and MW-9 yielded only two volumes before being pumped dry. The pH, specific conductivity and temperature of the purged water were measured after each well volume was removed and again after sampling. This information is included on the sample collection logs in Appendix D.

Groundwater samples were collected using dedicated laboratory-decontaminated stainless steel bailers with teflon leaders and dedicated nylon cord. The water samples were transferred directly from the bailers to the sample containers. The vials provided for volatile organics were filled first, without leaving any headspace or air bubbles. Then the other sample bottles were filled to the shoulder. The samples were collected in the following order:

- Volatile organics
- Base neutrals
- Diesel fuel

All pertinent information was entered on the sample labels and the sample containers were placed in coolers and maintained at 4°C. The bailers and any sampling equipment that entered the wells, or came in contact with the samples, were handled with surgical gloves to prevent contamination. New surgical gloves were worn by the sampling personnel at each sampling location.

Quality Assurance/Quality Control (QA/QC) procedures in the field included field blanks, trip blanks, duplicates and strict chain of custody protocols. To check decontamination procedures, a field rinsate blank was collected using laboratory supplied blank water which was poured over the sampling equipment and into the parameter-specific sample containers. A trip blank accompanied the bottles from the laboratory to the site and back to the laboratory. To check the laboratory for accuracy, a blind duplicate sample called MW-DUP was collected from MW-8 and sent in for analysis. The sample containers were transported by Malcolm Pirnie personnel to the laboratory at the end of the sampling day. Chain of custody forms accompanied the samples and file copies were kept. All analyses were done by Laboratory Resources, Inc. in Teterboro, New Jersey. Groundwater sampling results are discussed in Section 3.0. See Appendix D for sample collection logs and chain of custody forms.

2.2.6 Disposal of Drill Cuttings and Purge Water

All decontamination fluids, drill cuttings, and well development/purge water generated from the installation, development and sampling of monitoring wells were stored in DOT-approved 55-gallon drums. Drill cuttings and well waters were staged in separate drums. All drums containing cuttings or water were permanently numbered and labeled with the project site name, date, and content. The drums were staged on site for future disposal by BP Marine once the analytical results of groundwater and soil samples were obtained.

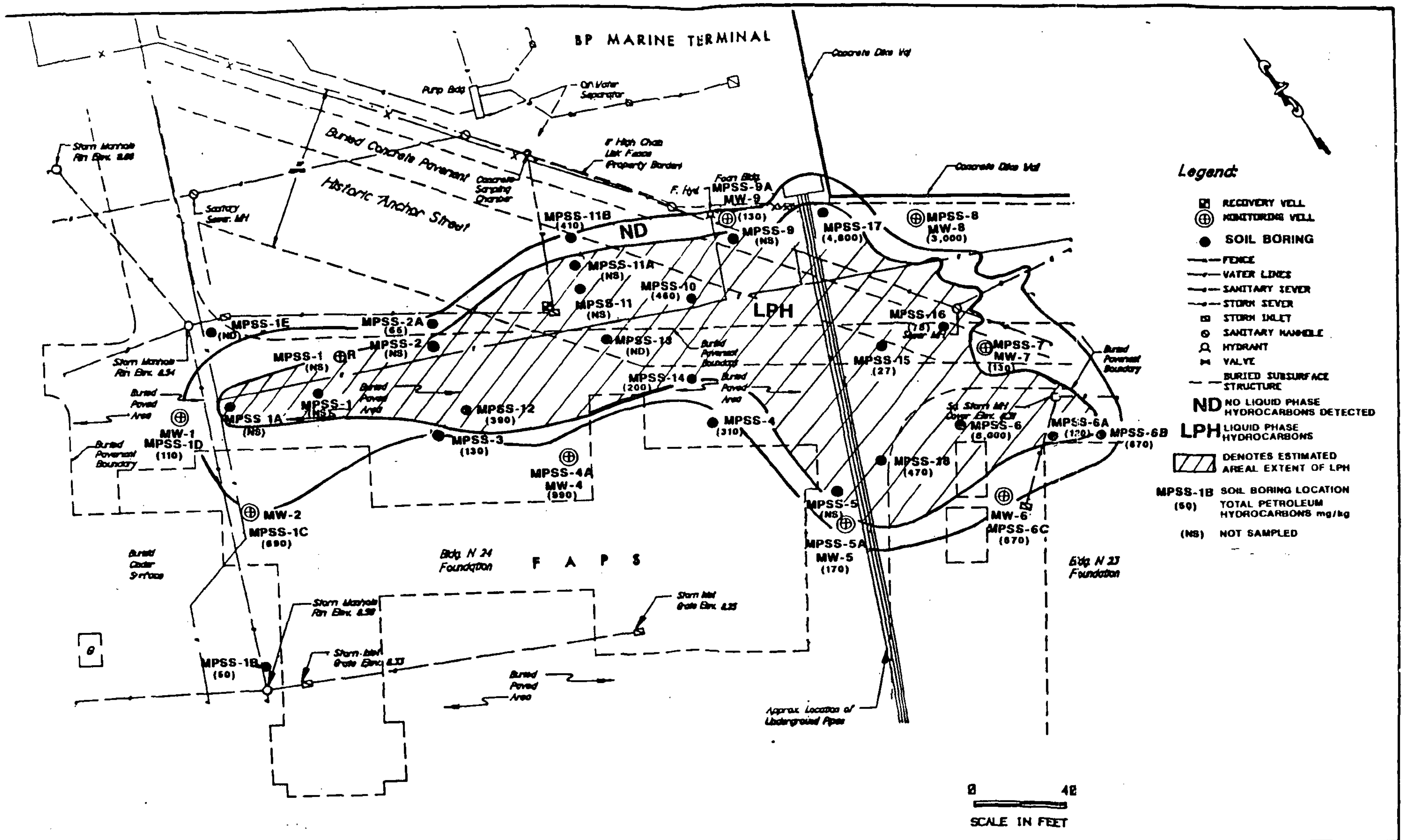
3.0 REMEDIAL INVESTIGATION RESULTS

Soil and groundwater samples were sent to Laboratory Resources, Inc., located in Teterboro, New Jersey, for analysis. Table 4 provides a summary of the samples collected for soil and groundwater analyses. All soil and groundwater samples were analyzed within the required holding times. Soil samples were analyzed within 12 hours of an acceptable instrument tune and an acceptable instrument daily calibration, and groundwater samples were analyzed within 24 hours of an acceptable instrument tune and calibration. Method blanks were extracted and analyzed at the proper frequency, and all method blanks met QA/QC criteria for maximum allowable blank contamination concentrations. Laboratory data is provided in Appendix E.

3.1 SOIL SAMPLE ANALYTICAL RESULTS AND DISCUSSION

Thirty two soil borings were drilled to define the nature and extent of petroleum hydrocarbon contamination. Five borings, MPSS-13, 15, 16, 17 and 18, were drilled throughout the area where liquid phase petroleum hydrocarbons was determined to be present from previous investigations (Figure 2). Those samples were sent to the laboratory for TPHC analysis to define the nature of petroleum contamination. The remaining twenty seven borings were drilled on the edge of what was defined as the limit of the liquid phase petroleum hydrocarbons in previous investigations (Figure 2). Initially, thirteen borings (MPSS-1 though MPSS-14) were proposed to accomplish this task. However, due to the presence of product in eight of these borings, an additional fourteen borings were drilled to define the limit where no liquid phase petroleum hydrocarbons were usually noted in the soil samples. Therefore, 27 borings were drilled to define the liquid phase limit on the clean zone. Of these 27 samples, 20 were sent for TPHC analyses. In addition, two duplicate samples were sent for QA/QC purposes.

The TPHC analyses are summarized in Table 5. TPHCs were not detected above the proposed NJDEP remediation standard of 10,000 mg/kg (per 24NJR386) in any of the 27 samples analyzed for TPHC. The TPHC distribution is shown on Figure 4. The limit of the liquid phase petroleum hydrocarbons is also shown on Figure 4. This limit was based on



MALCOLM PIRNIE

BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

EXTENT OF LIQUID PHASE PETROLEUM HYDROCARBON PLUME AND PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL

MALCOLM PIRNIE, INC.

FIGURE 4

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TABLE 4
SUMMARY OF FIELD SAMPLING PROGRAM
BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

MEDIA	TYPE OF INVESTIGATION	NUMBER OF SAMPLES COLLECTED	NUMBER OF QA/QC SAMPLES TO BE COLLECTED	PARAMETERS	METHOD
SOIL	Subsurface Soil Sampling	25	2 Duplicate 1 Field Blank	Total Petroleum Hydrocarbons (TPHC) Priority Pollutant-VOC (+10) on 25% of samples > 1000 ppm TPHC Polynuclear Aromatic Hydrocarbons on 25% of samples > 100 ppm TPHC	418.1 624 625
GROUNDWATER	Groundwater Sampling	8	1 Duplicate 1 Field Blank 1 Trip Blank	Diesel Fuel Priority Pollutant-VOC (+10) on 25% samples > 1000 ppm TPHC Priority Pollutant-Semi VOC (+15) 25% of samples > 100 ppm TPHC	Modified 8015 624 624

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Table 5
Soil Sampling Results
Total Petroleum Hydrocarbons
BP Marine Terminal
Port Newark, New Jersey
(mg/Kg)

Sample ID	Total Petroleum Hydrocarbons mg/kg	Comments
MPSS-1	NS	Petroleum Product Observed
MPSS-1A	NS	Petroleum Product Observed
MPSS-1B	50	
MPSS-1C	690	
MPSS-1D	110	
MPSS-1E	27 U	
MPSS-2	NS	Petroleum Product Observed
MPSS-2A	65	
MPSS-3	130	
MPSS-4	310	
MPSS-4A	990	
MPSS-5	NS	Petroleum Product Observed
MPSS-5A	170	
MPSS-6	8000	Petroleum Product Sheen Observed
MPSS-6A	120	
MPSS-6B	870	
MPSS-6C	670	
MPSS-6D	1500	
MPSS-7	130	
MPSS-8	3100	
MPSS-9	NS	Petroleum Product Observed
MPSS-9A	130	Petroleum Product Sheen Observed
MPSS-10	460	
MPSS-11	NS	Petroleum Odor Observed
MPSS-11A	NS	Petroleum Odor Observed
MPSS-11B	410	
MPSS-12	390	Petroleum Odor Observed
MPSS-13	29 U	Petroleum Odor Observed
MPSS-14	200	
MPSS-15	27	Petroleum Product Observed
MPSS-16	78	Petroleum Odor and Sheen Observed
MPSS-16D	510	Petroleum Odor and Sheen Observed
MPSS-17	4800	
MPSS-18	470	
FB-1	0.42	mg/L

visual observations and the TPHC analytical results. These results indicate that the liquid phase limit extends further to the north, west and south then reported in the previous investigations (Figure 2).

The TPHC analytical results show that twenty one samples had TPHC concentrations greater than 100 mg/kg. As required by the RIW, 25 percent of the samples exceeding the 100 mg/kg TPHC concentration were analyzed for PAHs. Additional samples were also analyzed for PAHs to establish background concentrations. The PAH analytical results are summarized on Table 6. Benzo[a]pyrene was the only PAH detected at a concentration above NJDEP's Non-Residential Direct Soil Cleanup Criteria of 660 ug/kg. This exceedance occurred in only one sample, MPSS-17, which had a concentration of 870 JD ug/kg. This is an estimated concentration because it was below the reported detection limit for this sample. This is an isolated exceedance and does not appear to be representative of the other results. In addition, because the soil is below a paved surface there is little potential for direct contact. Therefore, no further action is recommended.

The RIW also required that 25 percent of the samples with TPHC concentrations exceeding 1,000 mg/kg be analyzed for VOCs +10. Five samples were analyzed for VOCs (Table 7). There were no VOCs detected above NJDEP's Non-Residential Direct Contact Soil Cleanup criteria.

3.2 GROUNDWATER ANALYSES

A total of nine groundwater samples were collected, of which one sample was a duplicate collected for laboratory QA/QC. These samples were analyzed for diesel fuel (modified method 8015), TCL VOCs +10, and semi-volatile organic components (SVOCs). Sample dilutions were required for sample MW-7 because of matrix effects and/or high contaminant concentrations.

Methylene chloride was detected at concentrations above the groundwater standards (N.J.A.C. 7:9 - Table 8) in the samples collected from wells MW-2, MW-4 and MW-7;

Table 6
Soil Sampling Results
Target Compound List of Polynuclear Aromatic Hydrocarbons
BP Marine Terminal
Port Newark, New Jersey

PARAMETER ppm	NJDEP ppb	MPSS-1C	MPSS-4	MPSS-4A	MPSS-6	MPSS-6B	MPSS-8	MPSS-9A	MPSS-11B	MWSS-16	MWSS-16D	MPSS-17	MPSS-18	FB-1
Naphthalene 230	4,200,000	370 U	350 U	350 U	1600 D	370 U	39 J	45 J	350 U	170 J	410 U	3700 U	68 J	10 U
Acenaphthylene		370 U	51 J	350 U	86 JD	130 J	63 J	49 J	350 U	120 J	410 U	3700 U	220 J	10 U
Acenaphthene 3400	10,000,000	370 U	37 J	48 J	95 JD	370 U	350 U	390 U	350 U	50 J	410 U	3700 U	400 U	10 U
Fluorene 2300	10,000,000	370 U	350 U	68 J	780 U	82 J	350 U	390 U	350 U	60 J	410 U	3700 U	400 U	10 U
Phenanthrene		280 J	320 J	430	280 JD	1000	230 J	140 J	82 J	290 J	50 J	730 JD	320 J	10 U
Anthracene 10,000	10,000,000	59 J	130 J	160 J	110 JD	260 J	93 J	40 J	39 J	130 J	410 U	3700 U	120 J	10 U
Fluoranthene 2300	10,000,000	490	660	830	330 JD	1300	460	220 J	160 J	530	100 J	860 JD	490	10 U
Pyrene 1700	10,000,000	480	610	590	420 JD	1000	480	250 J	160 J	660	130 J	1900 JD	470	10 U
Benzo(a)anthracene .9	4,000	260 J	350	330 J	180 JD	560	260 J	170 J	77 J	330 J	68 J	3700 U	320 J	10 U
Chrysene 9	40,000	390	340 J	350 J	360 JD	570	360	250 J	81 J	450	85 J	1100 JD	430	10 U
Benzo(b)fluoranthene .9	4,000	580	380	330 J	320 JD	600	340 J	240 J	72 J	410	72 J	3700 U	410	10 U
Benzo(k)fluoranthene .9	4,000	180 J	290 J	310 J	320 JD	410	340 J	160 J	56 J	390 J	80 J	3700 U	320 J	10 U
Benzo(a)pyrene .66	660	270 J	380	320 J	200 JD	560	260 J	170 J	68 J	370 J	82 J	870 JD	400	10 U
Indeno(1,2,3-cd)pyrene .9	4,000	120 J	350 U	78 J	110 JD	340 J	110 J	140 J	38 J	190 J	53 J	520 JD	310 J	10 U
Dibenzo(a,h)anthracene .66	660	63 J	350 U	46 J	780 U	370 U	350 U	390 U	350 U	100 J	410 U	3700 U	400 U	10 U
Benzo(g,h,i)perylene		130 J	230 J	140 J	130 JD	370 J	120 J	180 J	41 J	210 J	67 J	650 JD	350 J	10 U

Note: All units are given in ug/kg
U - Compound was undetected at specified detection limit
J - Compound was detected below specified detection limit, the amount is an estimate
B - Compound was detected in the blank
D - Compound was identified in an analysis at a secondary dilution factor

— MDL exceed res criteria
— results exceed res criteria

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Table 7
Soil Sampling Results
Target Compound List of Volatile Organic Compounds
BP Marine Terminal
Port Newark, New Jersey

Okay

PARAMETER	NJDEP Cleanup Criteria	MPSS-4A	MPSS-6	MPSS-6D	MPSS-8	MPSS-17
Chloromethane		11 U	58 U	11 U	11 U	56 U
Vinyl Chloride	7,000	11 U	58 U	11 U	11 U	56 U
Bromomethane	1,000,000	11 U	58 U	11 U	11 U	56 U
Chloroethane	1,000,000	11 U	58 U	11 U	11 U	56 U
1,1-Dichloroethene	150,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Carbon Disulfide		5.3 U	29 U	5.7 U	5.3 U	28 U
Acetone	1,000,000	11 U	87 D	11 U	11 U	56 U
Methylene Chloride	210,000	10 B	67 BD	16 B	8.9 B	64 BD
trans-1,2-Dichloroethene		5.3 U	29 U	5.7 U	5.3 U	28 U
1,1-Dichloroethane	1,000,000	5.3 U	29 U	5.7 U	5.3 U	28 U
cis-1,2-Dichloroethene		5.3 U	29 U	5.7 U	5.3 U	28 U
Chloroform	28,000	5.3 U	29 U	5.7 U	5.3 U	28 U
1,2-Dichloroethane	24,000	5.3 U	29 U	5.7 U	5.3 U	28 U
2-Butanone	1,000,000	11 U	58 U	11 U	11 U	56 U
1,1,1-Trichloroethane	1,000,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Carbon Tetrachloride	4,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Benzene	13,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Trichloroethene	54,000	5.3 U	29 U	5.7 U	5.3 U	28 U
1,2-Dichloropropane	43,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Bromodichloromethane	46,000	5.3 U	29 U	5.7 U	5.3 U	28 U
trans-1,3-Dichloropropene	5,000	5.3 U	29 U	5.7 U	5.3 U	28 U
cis-1,3-Dichloropropene	5,000	5.3 U	29 U	5.7 U	5.3 U	28 U
1,1,2-Trichloroethane	420,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Dibromochloromethane	1,000,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Bromoform	370,000	5.3 U	29 U	5.7 U	5.3 U	28 U
4-Methyl-2-Pentanone	1,000,000	11 U	58 U	11 U	11 U	56 U
Toluene	1,000,000	5.3 U	53 D	5.7 U	5.3 U	28 U
Tetrachloroethene	6,000	5.3 U	29 U	21	5.3 U	28 U
2-Hexanone		11 U	58 U	11 U	11 U	56 U
Chlorobenzene	680,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Ethylbenzene	1,000,000	5.3 U	88 D	5.7 U	5.3 U	28 U
meta+para-Xylene	1,000,000	5.3 U	130 D	5.7 U	5.3 U	28 U
ortho-Xylene	1,000,000	5.3 U	95 D	5.7 U	5.3 U	28 U
Styrene	97,000	5.3 U	29 U	5.7 U	5.3 U	28 U
1,1,2,2-Tetrachloroethane	70,000	5.3 U	29 U	5.7 U	5.3 U	28 U
Ether		10 J	82 JB	14 J	10 JB	
1-Propanol		17 J				
Ethane, 1,1,2-trichloro-1,2			160 JB		15 JB	

Note: All units are given in ug/kg
U - Compound was undetected at specified detection limit
J - Compound was detected below specified detection limit, the amount is an estimate
B - Compound was detected in the blank
D - Compound was identified in an analysis at a secondary dilution factor

however, methylene chloride was also detected in the blank and is a common lab contaminant. The concentrations of ortho-xylene (65 ug/l) and meta+para-xylene (54 ug/l) in the sample from well MW-7 were also detected above the groundwater standards of 40 ug/L for total xylenes. These compounds were identified during a secondary sample analysis with a greater dilution factor which caused the minimum detection limit to rise. The reported concentrations of these two compounds are less than the higher minimum detection limit, therefore, the concentrations were estimated. Xylenes were not detected in any other groundwater sample and therefore, its presence is not believed to be related to the pipeline leak. The source of those xylenes are unknown. However, it should be noted that a slight oil sheen was observed in the water sample collected from Well MW-7.

No other volatile or semi-volatile (Table 8) compounds (Table 9) were detected above the groundwater standards in any of the other samples. Diesel range organics (Table 10) were detected in the samples from wells MW-1 (0.016 J mg/l - amount estimated), MW-5 (0.32 mg/l), MW-7 (12 mg/l), MW-8 (0.04 mg/l) and its duplicate sample (0.03 mg/l), and MW-9 (0.4 mg/l).

These results indicate that the liquid phase petroleum has not broken down to the individual hydrocarbons reported in a VOC or SVOC scan. Diesel range organics were detected in upgradient wells MW-9 and MW-8, and in three down gradient wells. These results indicate that the presence of diesel range organics is indicative of background conditions. No further action is recommended for the groundwater.

3.3 SITE GEOLOGY

The site is located in the Northern Piedmont Lowlands and is bounded by the Coastal Plain to the south and east, the New England Uplands to the north, and the Piedmont Uplands to the west. It is located within the Newark Group and is underlain by the Brunswick Formation, which consists of thin-bedded shales, dust stones and sandstones. The bedrock at the site is mantled by a Wisconsin-age glacial ground moraine and post-glacial tidal marsh deposits. The moraine consists of various combinations of gravel, sand, silt and clay, while

Table 8

Groundwater Sampling Results
Target Compound List of Volatile Organic Compounds
BP Marine Terminal
Port Newark, New Jersey

PARAMETER	NJDEP Cleanup Criteria	MW -1	MW-2	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
Chloromethane		10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Vinyl Chloride	5	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Bromomethane		10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Chloroethane		10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
1,1-Dichloroethene	2	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Carbon Disulfide		5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Acetone	700	17	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Methylene Chloride	2	1.4 JB	2.6 JB	2.3 JB	1.1 JB	5 U	57 JD	5 U	5 U
trans-1,2-Dichloroethene		5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
1,1-Dichloroethane	70	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
cis-1,2-Dichloroethene		5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Chloroform	6	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
1,2-Dichloroethane	70	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
2-Butanone		10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
1,1,1-Trichloroethane	30	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Carbon Tetrachloride	2	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Benzene	1	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Trichloroethene	1	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
1,2-Dichloropropane	1	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Bromodichloromethane	1	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
trans-1,3-Dichloropropene	NA	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
cis-1,3-Dichloropropene	NA	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
1,1,2-Trichloroethane	3	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Dibromochloromethane	1	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Bromoform	4	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
4-Methyl-2-Pentanone	400	10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Toluene	1,000	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Tetrachloroethene	1	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
2-Hexanone		10 U	10 U	10 U	10 U	10 U	250 U	10 U	10 U
Chlorobenzene	4	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
Ethylbenzene	700	5 U	5 U	5 U	5 U	5 U	30 JD	5 U	5 U
meta+para-Xylene	40	5 U	5 U	5 U	5 U	5 U	54 JD	5 U	5 U
ortho-Xylene	40	5 U	5 U	5 U	5 U	5 U	65 JD	5 U	5 U
Styrene	100	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U
1,1,2,2-Tetrachloroethane	2	5 U	5 U	5 U	5 U	5 U	130 U	5 U	5 U

Note: All units are given in ug/l
U - Compound was undetected at specified detection limit
J - Compound was detected below specified detection limit, the amount is an estimate
B - Compound was detected in the blank
D - Compound was identified in an analysis at a secondary dilution factor
Remediation standards are taken from NJAC 7:9 - Table 1
NA - No standard is applicable

Table 8

Groundwater Sampling Results
Target Compound List of Volatile Organic Compounds
BP Marine Terminal
Port Newark, New Jersey

PARAMETER	NJDEP Cleanup Criteria	FB-1	MW-DUP	REMEDIATION STANDARD
Chloromethane		10 U	10 U	NA
Vinyl Chloride	5	10 U	10 U	5
Bromomethane		10 U	10 U	NA
Chloroethane		10 U	10 U	NA
1,1-Dichloroethene	2	5 U	5 U	2
Carbon Disulfide		5 U	5 U	NA
Acetone	700	10 U	10 U	700
Methylene Chloride	2	2.2 JB	5 U	2
trans-1,2-Dichloroethene		5 U	5 U	100
1,1-Dichloroethane	70	5 U	5 U	70
cis-1,2-Dichloroethene		5 U	5 U	10
Chloroform	6	5 U	5 U	6
1,2-Dichloroethane	70	5 U	5 U	2
2-Butanone		10 U	10 U	NA
1,1,1-Trichloroethane	30	5 U	5 U	30
Carbon Tetrachloride	2	5 U	5 U	2
Benzene	1	5 U	5 U	1
Trichloroethene	1	5 U	5 U	1
1,2-Dichloropropane	1	5 U	5 U	1
Bromodichloromethane	1	5 U	5 U	1
trans-1,3-Dichloropropene	NA	5 U	5 U	0.2
cis-1,3-Dichloropropene	NA	5 U	5 U	0.2
1,1,2-Trichloroethane	3	5 U	5 U	3
Dibromochloromethane	1	5 U	5 U	10
Bromoform	4	5 U	5 U	4
4-Methyl-2-Pentanone	400	10 U	10 U	400
Toluene	1,000	5 U	5 U	1000
Tetrachloroethene	1	5 U	5 U	1
2-Hexanone		10 U	10 U	NA
Chlorobenzene	4	5 U	5 U	4
Ethylbenzene	700	5 U	5 U	700
meta+para-Xylene	40	5 U	5 U	40
ortho-Xylene	40	5 U	5 U	1
Styrene	100	5 U	5 U	100
1,1,2,2-Tetrachloroethane	2	5 U	5 U	2

Note: All units are given in ug/l

U - Compound was undetected at specified detection limit.

J - Compound was detected below specified detection limit, the amount is an estimate

3 - Compound was detected in the blank

D - Compound was identified in an analysis at a secondary dilution factor

Remediation standards are taken from NJAC 7:9 - Table 1

NA - No standard is applicable

Table 9
Groundwater Sampling Results
Target Compound List of Base Neutral Organic Compounds
BP Marine Terminal
Port Newark, New Jersey

PARAMETER	NJDEP Cleanup Criteria	MW -1	MW-2	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	FB-1	MW-DUP
bis(2-chloroethyl) ether	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-dichlorobenzene	600	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-dichlorobenzene	75	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-dichlorobenzene	600	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,2'-oxybis(1-chloropropane)		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
hexachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-nitriso-di-n-propylamine	20	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
nitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
isophorone	100	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-chloroethoxy) methane		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-trichlorobenzene	9	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
naphthalene		1.4 J	10 U	10 U	12	10 U	79	10 U	10 U	10 U	10 U
4-chloroaniline		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
hexachlorobutadiene	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-methylnaphthalene		10 U	10 U	10 U	24	10 U	120	10 U	10 U	10 U	10 U
hexachlorocyclopentadiene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-chloronaphthalene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-nitroaniline		25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
acenaphthylene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
dimethylphthalate		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,6-dinitrotoluene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
acenaphthene	400	2.6 J	1.3 J	10 U	3 J	1.2 J	18	10 U	3.3 J	10 U	10 U
3-nitroaniline		25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
dibenzofuran		10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.2 J	10 U	10 U

Note: All units are given in ug/l
U - Compound was undetected at specified detection limit
J - Compound was detected below specified detection limit, the amount is an estimate
B - compound was detected in the blank

92092015

Table 9 (Cont'd)
Groundwater Sampling Results
Target Compound List of Base Neutral Organic Compounds
BP Marine Terminal
Port Newark, New Jersey

PARAMETER	NJDEP Cleanup Criteria	MW -1	MW-2	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	FB-1	MW-DUP
2,4-dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
fluorene	300	1.1 J	10 U	10 U	2.5 J	10 U	22	10 U	4.5 J	10 U	10 U
4-chlorophenyl-phenylether		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
diethylphthalate	5,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-nitrolaniline		25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
n-nitrosodiphenylamine	20	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-bromophenyl-phenylether		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
hexachlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
phenanthrene		1.9 J	10 U	10 U	2.9 J	10 U	58	10 U	10 U	10 U	10 U
anthracene	2,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
carbazol		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
di-n-butylphthalate	900	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
fluoranthene	300	10 U	10 U	10 U	10 U	10 U	3.4 J	10 U	10 U	10 U	10 U
pyrene	200	10 U	10 U	10 U	10 U	10 U	9.2 J	10 U	10 U	10 U	10 U
butylbenzylphthalate	100	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-dichlorobenzidine	60	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo[a]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
chrysene		10 U	10 U	10 U	10 U	10 U	2.2 J	10 U	10 U	10 U	10 U
bis(2-ethylhexyl)phthalate	30	7.9 J	10 U	8.4 J	3.7 J	4.2 J	5.6 J	4.9 J	4.3 J	4.3 J	4.6 J
di-n-octylphthalate		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo[b]fluoranthene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo[k]fluoranthene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo[a]pyrene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
indeno[1,2,3-cd]pyrene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
dibenz[a,h]anthracene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo[g,h,i]perylene		10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Note: All units are given in ug/l
U - Compound was undetected at specified detection limit
J - Compound was detected below specified detection limit, the amount is an estimate
B - Compound was detected in the blank
BPVOC.XLS

92092016

Table 10
Groundwater Sampling Results
Diesel Fuel
BP Marine Terminal
Port Newark, New Jersey

PARAMETER	MW -1	MW-2	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	FB-1	MW-DUP
Diesel Range Organics	0.016 J	0.020 U	0.020 U	0.32	0.020 U	12	0.04	0.4	0.020 U	0.03
Petroleum Hydrocarbons	0.20 U	0.20 U	0.20 U	0.25 U	0.20 U	49	0.20 U	0.20 U	0.20 U	0.20 U

Note: all units are given in mg/l
U - compound was undetected at the specified detection limit
J - compound was detected below the detection limit, amount estimated

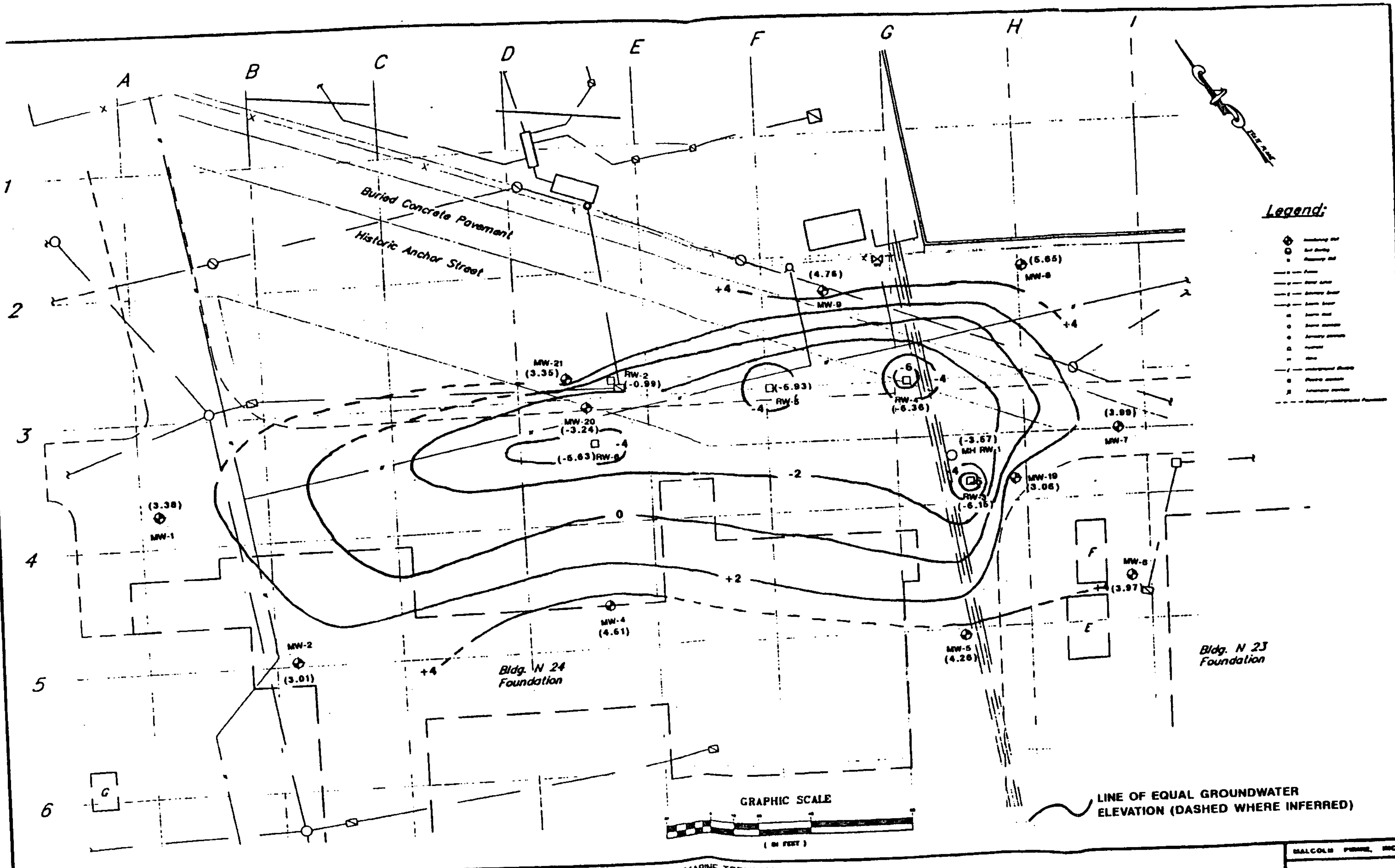
920920217

the tidal marsh deposits consist of organic silt, clay and fine sand. Blanketing the natural deposits is approximately three feet of fill containing brick and concrete rubble, as well as sand and gravel. The fill material was encountered, in each boring drilled during this investigation, from the bottom of the asphalt to a depth of approximately four feet below grade. The material was characterized by poorly sorted and moderately compacted coarse-grained sand, gravel, and rubble. Numerous concrete slabs associated with the historic building foundations on site were also encountered.

3.4 SITE HYDROGEOLOGY

Groundwater in the area of the site is present in both the consolidated and unconsolidated sediments. The deepest zone is in the bedrock (the Brunswick Formation) where water is typically present in joints and fractures. Above the bedrock is the glacial ground moraine water bearing zone, which may be confined or semi-confined by the low permeability of the overlying organic silt and clay marsh deposits. The investigation at the site was limited to the upper most water bearing zone in the fill which lies on the bed of organic silt and clay.

Static water level measurements taken on April 9, 1996 in the fill indicate that the potentiometric surface of the water table ranged from 2.42 feet above mean sea level (MSL) in the central portion of the site (MW-20) to 5.65 feet above MSL in the eastern portion of the site (MW-8) as shown on Figure 5. Figure 6 shows the groundwater contours which were collected from the second round of measurements taken on May 9, 1996. A review of these figures shows that at the time the measurements were collected, groundwater flow is controlled by the six recovery wells installed on site. These wells have apparently created a limited capture zone in the water table whereby groundwater flow in the vicinity of the limits of the liquid phase petroleum hydrocarbons plume is radial towards the recovery wells. The groundwater contours indicate that the liquid phase petroleum hydrocarbons is within the zone of hydraulic control created by the pumping of the recovery wells. Based on these groundwater contours, no additional recovery wells are recommended. It is recommended that water levels in the monitoring wells be monitored on a monthly basis the first year. If



MALCOLM PIRNIE

BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

GROUND WATER CONTOURS FOR MEASUREMENTS COLLECTED ON APRIL 9, 1996

FIGURE 5

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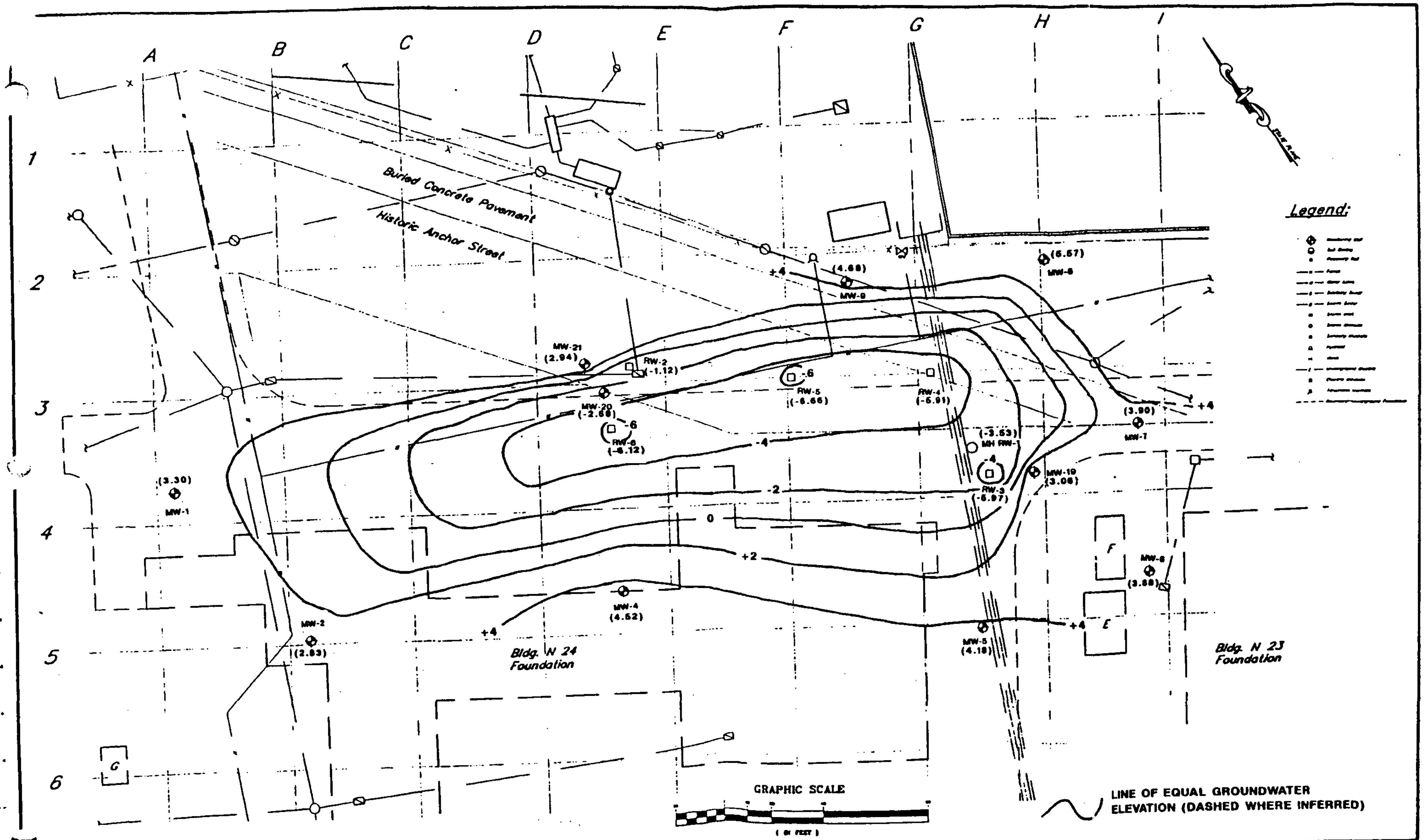

MALCOLM PIRNIE

BP MARINE TERMINAL
PORT NEWARK, NEW JERSEY

GROUND WATER CONTOURS FOR MEASUREMENTS COLLECTED ON MAY 9, 1996

FIGURE 6

920920220

hydraulic control is maintained, and there is no evidence of petroleum in the sentinel wells, then the water level and free product monitoring may be decreased to quarterly. If BP Marine wishes to enhance the recovery of petroleum, then an additional recovery well is recommended. This optional recovery well could be installed in the vicinity of soil boring MPSS-18. BP Marine may also want to consider pumping well MW-7 because of the slight sheen noted in the water samples collected from this well.

4.0 SUMMARY AND CONCLUSIONS

Malcolm Pirnie was retained by BP Marine to conduct a RI at the property referred to as the FAPS parking lot. The property is located adjacent to and to the south of BP Marine's Port Newark facility. This RI consisted of the advancement of 32 exploratory soil borings and the installation of eight groundwater monitoring wells. Remedial action is ongoing in an effort to cleanup liquid phase petroleum hydrocarbons from a pipeline leak that occurred on the FAPS property in October, 1992.

Previous investigations have identified the extent of the liquid phase petroleum contamination associated with the pipeline leak (Figure 2). This contamination was determined through on-site visual observations of petroleum contamination in three observation wells, six recovery wells and soil samples collected from borings. The NJDEP required BP Marine to confirm both the nature and extent of the petroleum contamination in the soil and groundwater associated with the pipeline leak in accordance with N.J.A.C. 7:26E (Technical Requirements for Site Remediation). Therefore, the objective of this RI was to characterize and locate the area of contamination as required by the NJDEP.

Results from this RI confirmed the presence of petroleum hydrocarbons in the soil and groundwater apparently from the pipeline spill in 1992. Soil analytical results and visual observations indicate that the extent of the liquid phase petroleum hydrocarbon extends further to the north, west and south than reported in the previous investigations. The analytical results indicate that there is no exceedances of the proposed soil TPHC remediation standard of 10,000 mg/kg, nor were there any VOC exceedances of the Non-Residential Direct Soil Contact Cleanup Criteria. Benzo[a]pyrene exceeded this criteria in only one sample. Due to the single detection and isolation location, there is little potential for direct contact; therefore, no further action is recommended.

Groundwater analytical results from the eight wells installed around the perimeter of the liquid phase plume indicate that only the groundwater sample collected from monitoring well MW-7 had concentrations of petroleum hydrocarbon related constituents (xylenes) above the standards. However, xylenes were not detected in any other sample and their source is unknown. Based upon these analytical findings, no further action is recommended for the groundwater.

The recovery well system has apparently established hydraulic control around the liquid phase plume. The groundwater contours indicate that groundwater movement around the liquid phase plume is radially towards the recovery wells. At this time, no additional recovery wells or other remedial actions are recommended. However, due to the intermittent pumping of the recovery wells and the numerous underground utilities, it is possible that the liquid phase may migrate away from influence of the recovery wells. Therefore, it is recommended that groundwater levels and free product thickness measurements be obtained from the monitoring wells on a monthly basis to ensure that hydraulic control is maintained, and that the liquid phase petroleum hydrocarbon plume is not migrating.

MEMO

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

TO KARL DELANEY

FROM FRANK GAGLIANO DATE MARCH 18, 1983

SUBJECT COASTAL OIL, PORT NEWARK
DWM #83-02-02-01

The subject facility experienced a #6 fuel oil spill which resulted in 40,000 gallons of product escaping into its dike area. Approximately 20,000 gallons was returned to storage.

FEBRUARY 4, 1983

1510 hrs. - Contacted Paul Ferguson, Terminal Manager of Coastal Oil. He reported that he now has a more accurate figure for the amount of #6 fuel oil lost during the overfill. They have determined that 40,000 gallons of product was spilled. They were able to collect and return to storage about 15 to 20 thousand gallons. This also included some rainwater which was present from the storm that night. He reported that the pressure generated within the tank during the overfill resulted in the roof seam splitting.

MARCH 9, 1983

1316 hrs. - Arrived at Coastal Oil in Port Newark.

1322 hrs. - Met with Paul Ferguson, Vice President of Operations and Charlie Guilfoyle, Plant Manager. Also present were:

Tom Downey	- DWM, Region II
Scott Baker	- DWM, Engineering
Ben Esterman	- DWM, Engineering

We discussed Coastal Oil's proposal to use dried bacteria cultures (DBC) to degrade the spilled #6 fuel oil. Scott Baker will be making a detailed review of the proposal and will contact this writer for further discussion and/or recommendations.

1400 hrs. - We inspected the tank farm impacted by the spill. Approximately 80 to 90 percent of the dike field was contaminated by the oil. Drainage trenches within the field are filled with rainwater with oil floating on it. The terminal placed a steam line in the trench to facilitate oil removal. The rest of the earthen field was covered with accumulations of 1/2 inch to 2 inches of oil. Penetration into the soil was minimal as demonstrated through the use of a shovel in various random locations (about 1/8 inches). Most of the oil (and water) was recovered and put back into the ruptured tank. The dike walls are made of concrete and are about 10 feet high. Heavy equipment has limited accessibility into the tank farm. The maze of piping inside the dikes makes conventional modes of spill cleanup difficult. These are the premises on which Coastal

MARCH 9, 1983 (continued)

decided to try the DBC approach. Mr. Ferguson will submit a formal request for the proposal's review and approval to Scott Baker.

0400 hrs. - Called Yardville to report in.

0410 hrs. - Departed for Lakewood.

FG:lmc

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COASTAL OIL COMPANY

GATEWAY ONE • SUITE 300
NEWARK, N. J. 07102
(201) 643-7800

TELEX 642-972

March 18, 1983

83-02-02-01
EC0217
SP07

Office of Hazardous Substances Control
Division of Water Resources
120 Route 56
Yardville, New Jersey 08620
Attention: Discharge Confirmation

Re: Confirmation of Spill
Port Newark Terminal, Coastal Oil Company
February 2, 1983

Gentlemen:

We attached herewith written confirmation of a spill which occured at our Port Newark Terminal on February 2, 1983.

The cause of this spill incident was the failure of a terminal operator to properly secure a tank valve before another operation commenced.

Discussions and meetings with representatives of The Department of Environmental Protection are underway regarding the incident, clean up and follow up action.

Very truly yours,

Paul F. Ferguson

Paul F. Ferguson
Vice President Operations
Coastal Oil Company

PFF:ms

BAA000042

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920920228
TIERRA-D-018945

3/18/83

Re: Tank #106 Overfill
Port Newark Terminal 2/2/83

At approximately 0015 hours 2/2/83 Tank #106 ran over during the time a barge was being loaded from another tank.

When the barge loading commenced, product flowed to both the barge and to a full tank through an incorrectly positioned valve.

The overfill distorted the tank roof and caused a rupture at the roof to shell seam. Approximately 88,000 gallons of No. 6 Fuel Oil were released from the tank through the tank vents and ruptured seam.

All product spilled was contained within the diked area or drainage catchment systems. The spilled product spread throughout the diked storage area. Clean-up is underway, however, it has been slowed by heavy rains, a severe snow storm, cold and resultant solidification of the spilled oil.

Tank #106 will be unusable for normal service until it can be cleaned, inspected and repaired. It is being used temporarily for storage of the spilled product and the water being pumped from the dike enclosure.

Clean-up of the adjacent piping, tanks, dike walls and the entire diked area will take a significant amount of time and effort due to the nature of the product and the adverse weather conditions.

There is no significant fire, safety or pollution hazard in the area from the presence of the spilled oil other than the housekeeping problems and the oil coated slippery surfaces which exist.

All appropriate agencies which have jurisdiction were notified. The lead agency, The N. J. Department of Environmental Protection, will be the most active in overseeing the clean-up operation and have ultimate approval authority over clean-up. A preliminary approval has been received from this agency to use dried bacteria cultures to assist in removing all traces of oil from the ground surfaces once all the standing liquids are pumped back to storage. Their final approval of this approach will allow treatment to commence as soon as weather and field conditions permit.

Paul F. Ferguson
Coastal Oil Company

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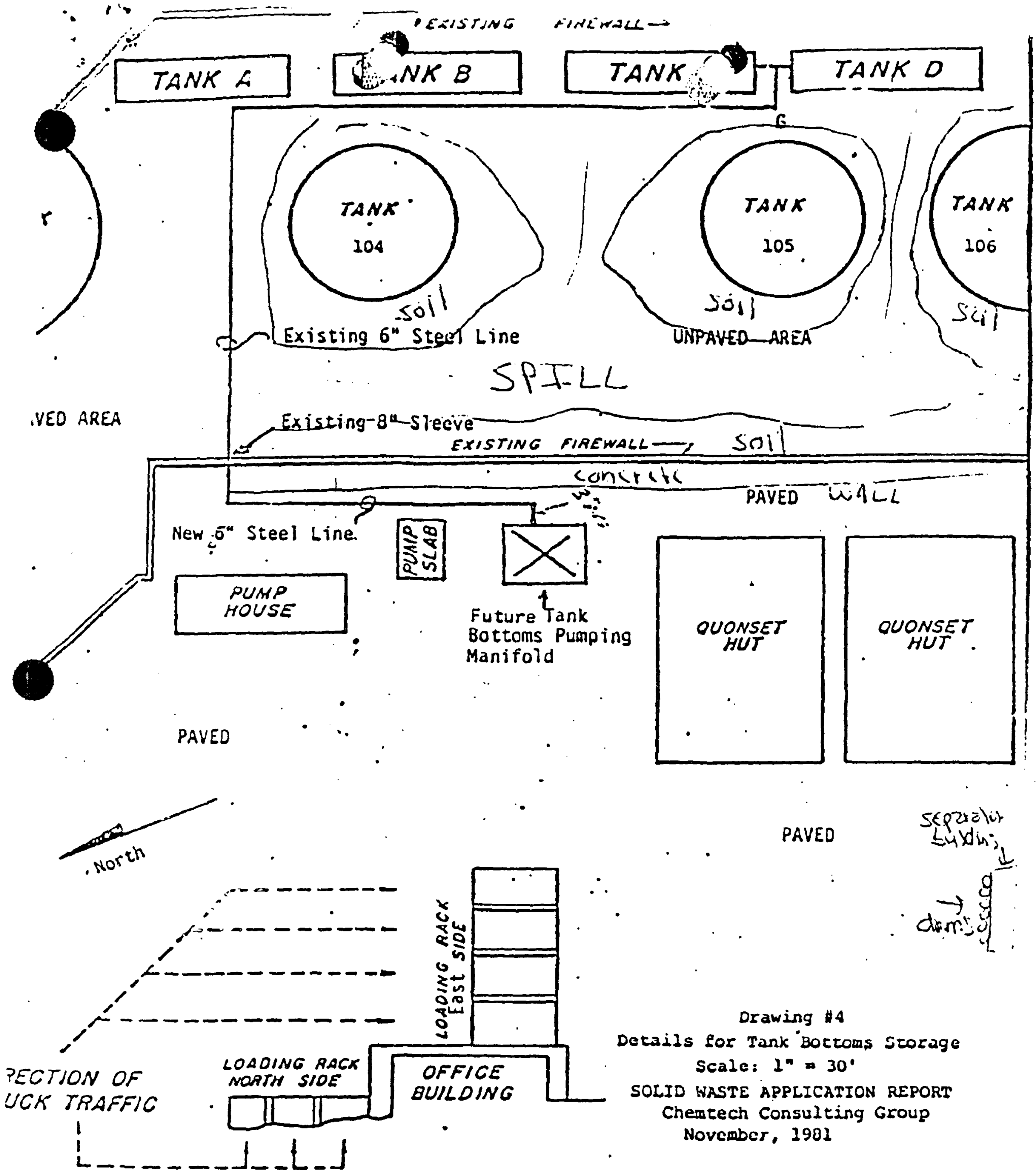

Drawing #4
Details for Tank Bottoms Storage
Scale: 1" = 30'
SOLID WASTE APPLICATION REPORT
Chemtech Consulting Group
November, 1981

COASTAL OIL COMPANY

NEWARK NEW JERSEY

L. Zanchelli
8/3/83

BP/North America
Trading Co. Inc.

A

920920230

TIERRA-D-018947

83-02-02-019
07-14-00

FRANK G

FYI

Ron

BP North America Trading Inc.

Gateway One - Suite 300
Newark, NJ 07102
Tel: 201 643-7600

December 16, 1983

Mr. David J. Shotwell
Chief, Bureau of Compliance and
Enforcement
Division of Waste Management
120 Rt. 156
Yardville, New Jersey 08620

Re: Administrative Consent Order
BP North America Trading Inc.

Dear Mr. Shotwell: 5159

We have reached the termination of the subject Administrative Consent Order transmitted to us on June 20, 1983.

We have thoroughly inspected the area subjected to the spill. We have also thoroughly reviewed the results of soil samples taken and analyzed as a part of the subject order.

At this time we are not satisfied that the visual appearance of the affected area meets our expectations. We are reasonably well satisfied that the results of extrapolating data for the latest soil samples taken October 26, 1983 indicate a quantitative recovery or reduction of spill related hydrocarbons in the soil during the test of 89.9%. We did not take a final set of samples as we were awaiting further visual improvement of the remaining thin skin of "tarry" substance on portions of the affected surface area. We will, however, take a 5th set of samples shortly to track the progress and verify the continued presence of beneficial bacteria in the soil.

From visual inspection it appears that virtually all of the remaining spilled product is in the above mentioned "tarry" material which is quite hard in some areas and almost like road oil. The very heavy rains recently have frequently left the area inundated, however, very little, if any, oil is seen floating on the water. This would seem to indicate that any further release of oil through surface waters from this incident is unlikely. There has been no visual evidence of oil permeating the clay layers underlying the surface.

BAA000046

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920920232

TIERRA-D-018948

We feel it may be necessary to scrape and remove this thin surface of very heavy material to restore the appearance we seek. Since the cold weather and solidification of the remnants of the spill make this task virtually impossible at this time, we feel it can be most effectively done beginning in mid April. We estimate it will require approximately 30 working days to complete. Providing for rain and wet ground, this will likely span 8 calendar weeks. Our consultants feel that significant additional degredation through bacterial digestion will continue even through cold weather will slow the action considerably, however, we have based our estimates on the present visual appearance.

In summary, we feel the test program outlined in the Administrative Consent Order was marginally successful. It is probable that, given an earlier start in order to take advantage of a longer period of favorable weather, we could give a totally enthusiastic endorsement but our appearance standards are not there yet. Additional soil samples will be taken to monitor continuing degredation. Scraping and removing of any remaining spill material will be done when the weather breaks in 1984 and should be completed by June 30, 1984.

We are most grateful to the Department and in particular, the Bureau of Compliance and Enforcement for the substantial amount of time and effort expended in our behalf in working with us in this program. We will look forward to continued support as we finalize this incident.

Very truly yours,

Paul F. Ferguson

Paul F. Ferguson

PFF:ms

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920920233

TIERRA-D-018949

ZCZC
NC
NC DE N9
ISN-N9/14
R 162209Z MAR 83
FM COGARD COTP NEW YORK NY
TO CCGDTHREE NEW YORK NY
INFO ZEN2/EPA REGION TWO EDISON NJ
COGARD NATIONAL RESPONSE CENTER WASHINGTON DC
ZEN2/NEW JERSEY STATE DEP YARDVILLE NJ
BT

83-03-06-01C
SP07
SC0217

UNCLAS //N16465//
SUBJ: POLREP SEVEN NR 6 OIL MINOR DISCHARGE COASTAL OIL CO. NEWARK NEW JERSEY NEWARK CHANNEL PIN 83-03-06/4/0126 (PIC 1-3-0033)

1. SITUATION:
   A. 161300 MAR 83 FEDERALLY FUNDED CLEANUP CONTINUES.
   B. TOTAL AMOUNT RECOVERED TO DATE: APPROX 6 CUBIC YARDS OF OIL CONTAMINATED SORBENTS.
   C. TOTAL COST OF CLEANUP TO DATE: APPROX. 5000 DOLLARS.
   D. WX: TEMP 50 DEGREES F SKY CLEAR SEAS CALM.
2. ACTION TAKEN:
   A. 161300 MAR 83 INVESTIGATORS ALHEIM AND JOHNSON ARRIVE ON SCENE. CLEAN VENTURE PERSONNEL ON SCENE.
   B. 1315 REMOVAL OF OIL CONTAMINATED SWEEP COMMENCED.
   C. 1330 INVESTIGATORS OBSERVED SMALL AMOUNTS OF OIL SEEPING THROUGH BULKHEAD.
   D. 1400 COMMENCED REPLACEMENT OF 6 USED SWEEPS.
   E. 1430 OLD SWEEPS BAGGED AND PLACED IN BARRELS.
   F. 1500 INVESTIGATORS AND CLEAN VENTURE PERSONNEL DEPART SCENE.
3. FUTURE PLANS AND RECOMMENDATIONS:
   A. CG PERSONNEL TO CONTINUE CLEANUP.
4. CASE PENDS, MESSAGE TO FOLLOW AS DEVELOPMENTS OCCUR

BT
NNNN

N9 DE NC R AR TOR-03:17:06:23:16
NNNN

EPA
NY STATE
ZFD 5
170624Z
WXB

GROUP NEW YORK COMMUNICATIONS					
GROUP		COTP		SLOT	
CDR/DEP		CO/XO	I	VTS NY	
OPS		PSO		STA NY	
PERS		WPO		ANT NY	
SUPP		HMO		SAUK	
ELEC		SMO		RARITAN	
ENG		WPPO		MANNING	
A = ACTION OFFICE				LINE	
I = INFO OFFICE				WIRE	
				HAWSER	
000-					

B 1

920920234

TIERRA-D-018950

Check

84-1-20-01C . 7-14-NFA

BP North America Trading Inc.

Gateway One-Suite 300
Newark, NJ 07102
Tel: 201 643-7600

February 17, 1984

N. J. Department of Environmental Protection
Division of Hazard Management
120 Route #156
Yardville, New Jersey 08620

Re: Spill Incident
January 20, 1984
Port Newark, New Jersey

Gentlemen:

Enclosed for your files is our written report pursuant to the subject spill incident and verbal report.

At 00:50 January 20, 1984 approximately 1-2 barrels of No. 6 Fuel escaped from a frozen bleeder valve at our Port Newark Terminal at start up of loading of the barge E-24.

On discovery of the spill, loading was immediately stopped, the spill reported, the cause investigated, and containment and clean up initiated. Clean Venture was called in to assist in clean up work.

A U.S. Coast Guard team directed clean up activity and declared the area, all structures and pilings free from residual clingage on February 6, 1984.

Procedures have been revised to prevent a similar recurrence by requiring that plugs and caps on all dock bleeder valves remain in place except when being operated for venting to drain hoses, lines, etc.

Very truly yours,

Paul F. Ferguson
Manager of Operations

PFF:ms

BAA000051

B2

920920236

TIERRA-D-018951

Summary Report
DPCC/DCR Plans
BP North America Petroleum, Inc.
Port Newark Terminal

The DPCC/DCR Plans for BP North America Petroleum, Inc. - Port Newark Terminal, located in Port Newark, new Jersey, where initially submitted to the Office of Hazardous Substance Control (OHSC) of the DEP on August 4, 1981. The most recent plans were submitted on September 28, 1984. This facility was purchased from Coastal Oil Company in October of 1980. The facility was visited on November 8, 1985 and a Deficiency letter was mailed on April 15, 1986. They responded on May 27, 1986.

The facility serves as an onshore storage and transfer terminal for No. 2 Fuel Oil and Bunker Oil. Oil is received by barge and from the Colonial Pipeline transmission line. Oil leaves the terminal via trucks and the Coastal Oil Company pipeline. 16.1 million gallons of No. 2 Fuel Oil, 15.7 million gallons of bunker oil 1.26 million gallons of kerosene and 711,000 gallons of diesel can be stored on site. Small underground tanks are used to store gasoline and waste oils.

A tank rupture in January of 1984 spilled 44,000 gallons of bunker oil. The incident was reported as required and cleanup was certified complete by the U.S. Coast Guard. In 1979, under different ownership, there was a 4 million gallon fuel oil spill.

All dikes have earthen floors. Permeability of the soil and depth to groundwater have not been determined. The facility presently uses the waterflood technique to prevent ground water contamination during large spills. The facility must submit a certified report on impermeability of diked areas within 60 days.

Housekeeping in the steel-diked area was good, but it could use improvement elsewhere.

BP Oil Indicates that it has appropriate inspection and maintenance programs to ensure prompt discovery of and response to a spill incident. However, inspection records for underground tanks were not provided during site inspection. Underground tanks must be inspected regularly and records should be kept for minimum three years. In light of the tank rupture which occurred in January of 1984, the facility must develop and implement a strong maintenance program.

Aboveground piping in the southern tank farm was not adequately supported during site inspection. Suitable supports have been installed, according to the facility's response letter of may 27, 1986.

A list of current cleanup contractors must be submitted within 30 days.

The facility is located on Port Newark Channel, where it operates a barge berth. It presently has a NJPDES permit (NJ0034231 DSW) for discharge into surface waters. It also has a TWA and a letter of Adequacy from the U.S. Coast Guard.

Spill containment materials are kept on site. BP will contract the services of Clean Venture, Inc. to supplement any cleanup efforts.

The facility is manned 24 hours. It appears to be adequately illuminated.

Surya Shah

Surya Shah
Senior Environmental Engineer
Bureau of Industrial Waste Management

Form DWR 177
7/84

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

DATA CHECK LIST FOR DPCC/DCR PLANS

FACILITY'S NAME B.P. NORTH AMERICA PETROLEUM INC. TERMINAL	OWNER/OPERATOR'S NAME B.P. NORTH AMERICA PETROLEUM INC. TERMINAL
ADDRESS Building #350, Coastal Street Port Newark, N.J. 07114	ADDRESS Building #350, Coastal Street Port Newark, N.J. 07114
NAME OF COMPANY REPRESENTATIVE Mr. Charles Guilfoyle, Terminal Manager	DATE DPCC PLAN SUBMITTED 9/28/84 — DATE DCR PLAN SUBMITTED 9/28/84
TELEPHONE NO. 201-465-2426 — DATE OF INSPECTION 11/8/85	INSPECTED BY L.K. Jain, Carol Berkower, & S. Shah-(DEP)
WATER BODY EFFECTED Newark Bay — NJPDES NO. 0034231 (DSW) Expiring January 1986 but being renewed by DEP.	PLANS REVIEWED BY L.K. Jain and Surya Shah

POLLUTION PREVENTION REGULATIONS (N.J.A.C. 7:1E-4)

PART 4.5 – DPCC PLANS

(A) Types of Substances Stored and Capacity of Above Ground and Buried Storage

			aboveground	underground
Residual Oil	15,722,000 gal.	all above ground		
No. 2 Fuel Oil	16,132,000 gal.	all above ground		
Kerosene	1,263,000 gal.	all above ground		
Oil Settling	60,000 gal.	all above ground		
Diesel			709,000 gal.	2,000 gal.
Gasoline			none	1,000 gal.
Oil from o/w sep.			none	1,100 gal.
Other waste oil			none	2,000 gal.

(B) General Site Plan adequate

Drainage Plans adequate

Comments Site plan & drainage plans revised.

PART 4.7 – FACILITY DRAINAGE AND SECONDARY CONTAINMENT

ITEM	COMPLIANCE Yes	No	Other	REMARKS
(A) Largest probable spill prevented from entering waters	x			44,000 gal. spill history (19
(B) Appropriate secondary containment	x			Steel dikes
(B) Appropriate secondary diversionary	x			
(C)1 All probable routes blocked	x			Part of dike wall missing
(C)2 Sufficient capacity to contain or divert	x			Capacity (actual %) 97.5% to 166%
(C)3 System made of or lined with impervious material	x			Material - Earthen dike floor
(C)4 No drainage into watercourse or sewer system	x			
(C)5 Lagoon's not subject to flooding	x			
(C)6 Incompatible material not stored in same containment areas	x			
(C)7 Estimated time to clean-up largest spill	x			Time - 112 hours
(D)1 Permeability of liner material	x			Not known-must furnish
(D)2 Depth to ground water	x			Not known-must furnish
(E)1 Drainage system appurtenances indicated on drainage plan	x			
Drainage system adequate	x			
(E)3 All impoundments indicated on plans	x			
(F) Discharges to ground or surface water noted	x			
(G)1 All discharges regulated by NJPDES permit	x			
(G)2 Discharges accurately described in NJPDES permit	x			

920920250
TIERRA-D-018954

PART 4.8 – HOUSEKEEPING, MAINTENANCE, INSPECTIONS AND RECORDS

ITEM	*COMPLIANCE*			*REMARKS*
	Yes	*No*	*Other*	
(A) Suitable containers being used for storage	x			
All leaking tank, valves drums promptly repaired or out of service	x			3 valves leaking
(C) All spills promptly cleaned up	x			Minor spillage to be cleaned u
(D) Loose quantities of chemicals not present	x			
(E) Sorbents available	x			
(F) Safety equipment for spills available	x			
(G) Secondary containment systems in good repair	x			Part of dike wall missing; so: stained
(H) Damaged transfer hoses removed from work areas	x			
(I) Inspection records maintained for 3 years	x			Except for underground tanks

PART 4.9 – DETECTION OF DISCHARGES TO GOUND WATER

(A) Are observation wells necessary	x			Awaiting locations from DEP
(B) Sufficient number of wells for area	x			Number -
(C) Locations of wells mapped on site plan	x			
(D) Wells sampled once quarterly	x			Last Report -
(E)1 Report of ground water problem to Department	x			
(E)2 Analytical results reported to DEP	x			
(F) Baseline sample analysis established	x			
(G) Access to wells available	x			
(H) Wells meet State requirements	x			

PART 4.10 – FLOOD HAZARD AREAS n/a, but must be addressed in plans

Hazardous materials stored in flood hazard areas protected	x			

PART 4.11 – SECURITY 24 hours manned

(A) Areas adequately fenced	x			Part of dike wall missing
(B) Valves security locked	x			
(C) Starter controls locked	x			Controlled from control room
(D) Manifolds capped or blanked off	x			
(E) Adequate illumination	x			
(F) If not fenced, all other security items in force	x			

PART 4.12 – TRAINING

(A) Personnel training program implemented	x			
(B) Person for discharge prevention designated	x			Mr. Charles Guilfoyle
(C) Instruction given to employees	x			Date last inst. - 10/21/85 , Minimum 3 months

PART 4.13 – CONTAINMENT EQUIPMENT

(A)1 Containment equipment available	x			
(A)2 Containment equipment maintained	x			

PART 4.14 – BULK STORAGE TANKS Part of dike wall missing

Adequate secondary containment around above-ground tanks	x			Steel dikes not adequate
(A)3 Area below storage tank impervious	x			Liner Mtl Concrete Perm.
(A)4 Valves to tanks close to tanks	x			

PART 4.14 – BULK STORAGE TANKS (Continued)

ITEM	COMPLIANCE Yes	No	Other	REMARKS
(A)5 Above-ground tanks tested periodically	x			Ultrasonic, gauzing
New buried tanks made of corrosion-resistant material	x			Fiberglass or coated
(B)3 New buried tanks have product sensitive detection devices	x			
(B)4 Existing buried tanks have leak detection	x			
(B)5 Buried tanks tested periodically	x			
(C) No new partially buried tanks	x			
(D) Internal heating coils properly designed/operating	x			Not in use
(E) Overfill detection devices present (high level alarms)	x			

PART 4.15 – TANK CAR/TANK TRUCK AREAS

(A) Proper containment/diversion system around transfer areas	x			
(B) Secondary containment system sufficient	x			
(C) Areas paved with impermeable material	x			
(D) No leaking connections	x			
(E) Warning light or barrier provided	x			
(F) PIC present during transfer	x			

PART 4.16 – DRUM STORAGE AREAS

Adequate secondary containment	x			

PART 4.17 – PROCESS AREAS

(A) All catch basins, sumps and drainage systems located on site plan	x			
(B) All seepage pits, impoundments and lagoons shown on site plan	x			
(C) All discharges to surface or ground waters noted	x			
(D) All discharges covered by valid NJPDES permit	x			
(E) NJPDES permit accurate	x			
(F) All treatment works covered by TWA	x			
(G) Process/Cooling water segregated from chemicals				

PART 4.18 – PIPELINES

(A) Pipelines marked	x			Color code
(B) Pipes above-ground	x			
(C) Buried pipes protected	x			
(D) Buried pipes have product sensitive detection devices	x			
(E) Inspection of pipes	x			
(F) Out-of-service pipes capped or blanked	x			
(G) Pipe supports properly designed	x			
(H) Elevated pipes protected	x			

PART 4.19 – TRANSMISSION PIPELINES

(A) Conforms to U.S.D.O.T. 49 CFR Part 195	x			1) Owned by Coastal Oil 2) Owned by Colonial Pipe line
(B) Automatic shut-off devices or shut-off initiation procedures	x			

PART 4.19 – TRANSMISSION PIPELINES (Continued)

ITEM	COMPLIANCE Yes	No	Other	REMARKS
(C) Pipeline wrapped and coated and/or cathodically protected	x			
(D) Appropriated shut-off valves	x			
(E) Pipelines shown on site plan	x			

PART 4.20 – MARINE TRANSFER FACILITIES

ITEM	Yes	No	Other	REMARKS
(A) Conforms to Coast Guard regulations (33 CFR 154 and 156)	x			Letter of adequacy
(B) Site plan of facilities	x			

PART 4.21 – DISCHARGE CLEAN-UP AND REMOVAL PLAN

ITEM	Yes	No	Other	REMARKS
(A) List of containment and removal equipment	x			
(B) List of trained personnel	X			
(C) Discharge clean-up organization	x			Clean Venture
(D) 24-hour telephone numbers	X			201-465-2426
(E) Training program	x			
(F) Proposed site for material waste storage	x			On site storage tanks

SPECIAL COMMENTS OR PROVISOS

Surya Shah
Sr. Env. Engr.

PLAN ☒ RECOMMENDED WITH CONDITIONS ☐ NOT RECOMMENDED FOR ISSUANCE OF AN APPROVAL.

L. K. Jain
Signature of Reviewer

Lalit K. Jain, Chemical Engineer
Name and Title

November 15, 1985
Date

920920253

TIERRA-D-018957

ADM-012

MEMO

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

TO Bureau of Permits Administration

FROM Bureau of Industrial Waste Management DATE MAR 04 1987

SUBJECT NJPDES Draft Permit No. NJ0034231 Type DRCC/DCR approval

___ Major ___ Minor

___ New ___ Renewal

___ Existing without permit

✓ BMP Modification

Attached is the Draft NJPDES Permit ~~PCS Coding Sheet~~ for:

BP North America Petroleum, Inc.

Central Street

Port Newark

New Jersey 07114

This Bureau will arrange to issue the public notice and distribute the draft permit package.

Surya Shah

Environmental Engineer or Specialist

W. S. Beggs 3-1-87

Section Chief

Bureau Chief

Attachment

920920254

TIERRA-D-018958

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CN 402
Trenton, N.J. 08625

PERMIT

ew Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments ccompanying same application, and applicable laws and regulations. This permit is also subject to the further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No.	Issuance Date	Effective Date	Expiration Date
NJ0034231	March 9, 1987	May 1, 1987	April 30, 1992

Name and Address of Applicant	Location of Activity/Facility	Name and Address of Owner
BP North America Petroleum Inc. Building # 350, Coastal St. Port Newark, NJ 07114	Coastal Street Port Newark, Essex County, NJ 07114	Same as Applicant

Issuing Division	Type of Permit	Statute(s)	Application No.
Water Resources	NJPDES-DSW	N.J.S.A. 58:10A-1 et seq.	NJ0034231

This permit grants permission to:

Discharge to Newark Bay, classified as SE3 waters, in accordance with the effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, III and IV hereof.

Approved by the Department of Environmental Protection
the Authority of:
rge G. McCann, P.E.
Acting Director, Division of Water Resources

Arnold Schiffman, Administrator
Water Quality Management

3/9/87
DATE

* *The word permit means "approval, certification, registration, etc."*

(GENERAL CONDITIONS ARE ON THE REVERSE SIDE.)

Form DEP-007 (8/83)

NEW JERSEY POLLUTANT DISCHARGE ELIMINATION SYSTEM

The New Jersey Department of Environmental Protection hereby grants you a NJPDES permit for the facility/activity named in this document. This permit is the regulatory mechanism used by the Department to help ensure your discharge will not harm the environment. By complying with the terms and conditions specified, you are assuming an important role in protecting New Jersey's valuable water resources. Your acceptance of this permit is an agreement to conform with all of its provisions when constructing, installing, modifying, or operating any facility for the collection, treatment, or discharge of pollutants to waters of the state. If you have any questions about this document, please feel free to contact the Department representative listed in the permit cover letter. Your cooperation in helping us protect and safeguard our state's environment is appreciated.

Permit Number: NJ0034231

Final: Stormwater Discharge Renewal Permit Action

Permittee:
BP PRODUCTS NORTH AMERCIA INC
200 WESTLAKE BLVD
HOUSTON, TX 77079

Co-Permittee:

Property Owner:
PORT AUTH NY/NJ
2 GATEWAY CTR 14TH FL SW
Newark, NJ 07102

Location Of Activity:
BP MARINE AMERICAS INC
350 COASTAL ST
Newark, NJ 07114

Authorization(s) Covered Under This Approval	Issuance Date	Effective Date	Expiration Date
RF -Stormwater	02/25/2004	04/01/2004	03/31/2009

By Authority of:
Commissioner's Office

DEP AUTHORIZATION
Barry Chalofsky, P.P.
Bureau of Nonpoint Pollution Control
Division of Water Quality

(Terms, conditions and provisions attached hereto)

Fran Marrazzo

State of New Jersey

Department of Environmental Protection

s E. McGreevey
Governor

Bradley M. Campbell
Commissioner

Division of Water Quality
P.O. Box 029 Trenton, NJ 08625-0029
Phone: (609) 633-7021/Fax: (609) 984-2147
www.state.nj.dep.dwq.nonpoint.htm

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Date: 10/02/2003

Bueford Williams
BP Marine Americas Inc.
350 Coastal Street
Newark, NJ 07114

Re: Stormwater Discharge Renewal Permit Action
Cat: RF -Stormwater
NJPDES NJ0034231
BP MARINE AMERICAS INC
Newark, Essex County

Dear Mr. Williams :

Enclosed is a **draft** New Jersey Pollutant Discharge Elimination System (NJPDES) permit action identified above which has been issued in accordance with N.J.A.C. 7:14A.

Notice of this draft permit action will appear in the October 29, 2003 *DEP Bulletin*. The*DEP Bulletin* is available on the internet at http://www.state.nj.us/dep/bulletin or by contacting the DEP Document Distribution Center at (609) 777-4398. Thus, the public comment period will close on November 29, 2003 in accordance with N.J.A.C. 7:14A-15.10(c)1i.

The procedures for submitting comments on this draft action are detailed in the enclosed *DEP Bulletin notice*.

If you have questions or comments regarding the draft action, please contact John Ashton at (609) 633-7021

Sincerely,

Brian McLendon

Brian McLendon, Supervisor
Bureau of Nonpoint Pollution Control

Enclosures
c: Permit Distribution List

Draftcov.doc

Table of Contents

This Permit Package Contains the Items Listed Below

Public Notice

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Nonpoint Pollution Control

PUBLIC NOTICE

Notice is hereby given that the New Jersey Department of Environmental Protection (Department/NJDEP) intends to reissue an individual stormwter permit to BP Marine Americas, Inc. Requirements for this permit include maintaining drainage control, maintaining a Stormwater Pollution Prevention Plan, and implementing Best Management Practices to meet numeric limits and discharge benchmarks.

BP Marine Americas, Inc. is a marine petroleum distillate terminal that receives petroleum products by barges, ships and the Colonial Pipeline. BP Marine also loads petroleum products onto barges, ships and tanker trucks.

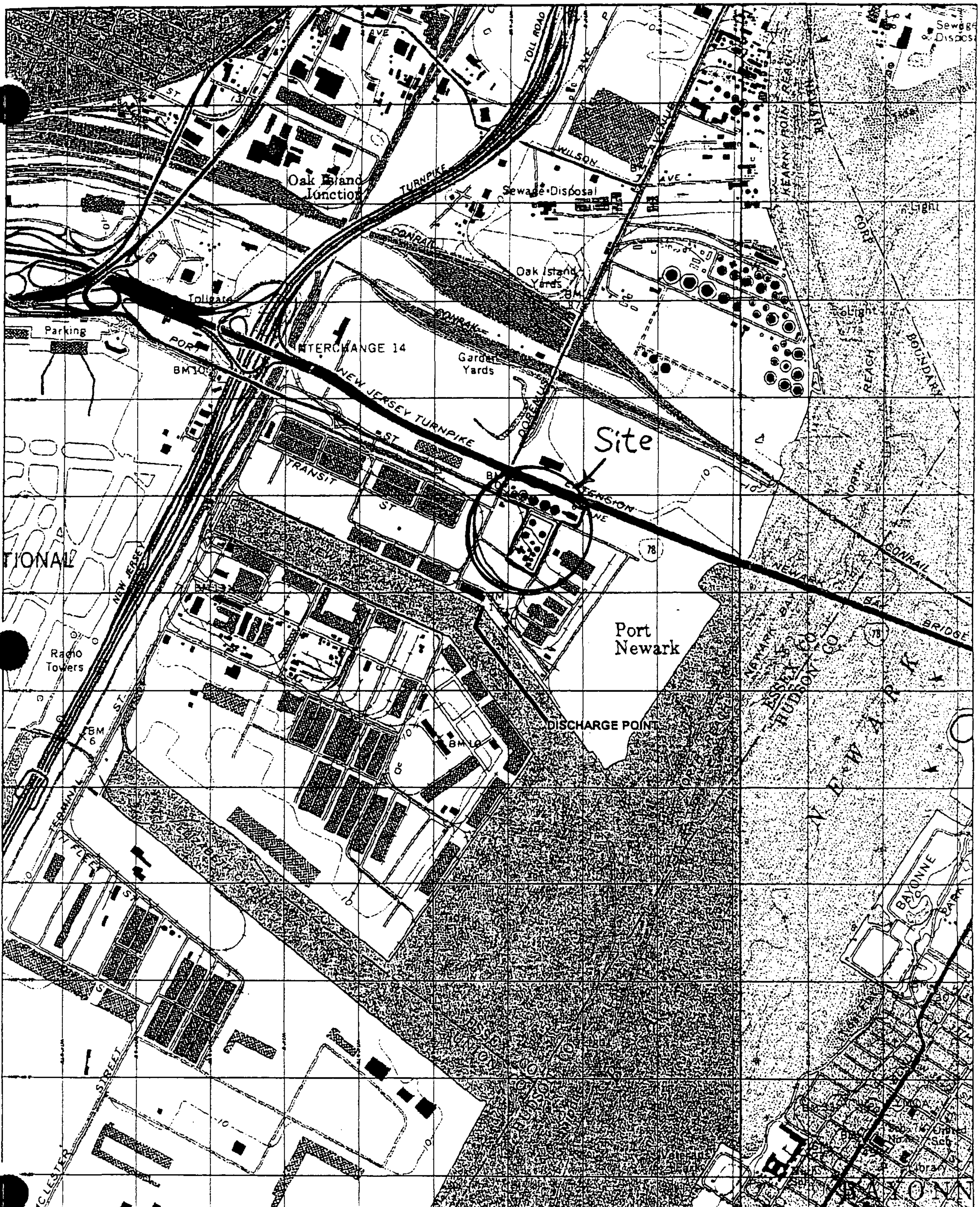
There are three (3) areas of operations: 1) the main site, 2) a tank farm on Port Street and 3) the loading dock on Newark Bay. BP Marine is routinely inspected by the U.S. Coast Guard and the New Jersey Port Authority to ensure compliance with applicable rules and regulations. BP Marine contracts Miller Marine to provide security, booming and spill response 24/7 as a backup to its own staffing.

All site stormwater from the main site and tankfarm is either collected and managed as wastewater or discharges through two (2) oil-water separators prior to discharge to Newark Bay. Stormwater from the dock area discharges to Newark Bay. Each loading station on the dock has separate containment. Water collected in containment is loaded into the site vacuum tanker for reuse or disposal.

If you are interested in scheduling an appointment or requesting specific information regarding the draft document, please contact John Ashton of the Bureau of Nonpoint Pollution Control at (609) 633-7021.

Written comments, or a request that the Department hold a non-adversarial public hearing on the draft document, must be submitted in writing by certified mail (return receipt requested), or by other means which provides verification of the date of delivery to the Department, to Barry Chalofsky, P.P., Chief, or Attention: Comments on Public Notice NJ0132721, Bureau of Nonpoint Pollution Control, P.O. Box 029, Trenton, NJ 08625 by the close of the public comment period. The public comment period closes thirty (30) calendar days after publication of this notice in the *DEP Bulletin* on October 29, 2003. All persons who believe that any condition of this draft document is inappropriate or that the Department's decision to issue this draft document is inappropriate, must raise all reasonable arguments and factual grounds supporting their position, including all supporting materials, during the public comment period.

The Department will respond to all significant and timely comments upon issuance of the final permit decision, and each person who has submitted written comments or requested notice will receive notice of the Department's permit decision.



 950 ft Scale: 1 : 24,000 Detail: 14-0 Datum: WGS84

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Nonpoint Pollution Control (Stormwater)

FACT SHEET

This fact sheet sets forth the principal facts and the significant factual, legal, and policy considerations examined during preparation of the draft permit.

PERMIT ACTION: Stormwater Discharge Renewal Permit Action

1 Name and Address of the Applicant:

BP Products Na Inc
200 Westlake Blvd
Houston, TX , 77079

2 Name and Address of the Applicant:

BP Marine Americas Inc
350 Coastal St
Newark, NJ , 07114

3 Name and Classification of the Receiving Water:

Newark Bay
SE3(C2)

4 Description of the Facility/Site:

BP Marine Americas, Inc. is a Marine Petroleum Distillate Terminal. Petroleum products are received from barges, ships or Colonial Pipeline. Petroleum products are loaded onto barges, ships and tank trucks. BP Marine is also routinely inspected by the Coast Guard and the Port Authority for compliance with applicable environmental rules and regulations. BP Marine keeps a supply of spill cleanup equipment and materials at the main facility and on the dock. In addition to the *SPPP*, the facility also has a *DPCC* and *DCR Plan*, *Coast Guard Operations Manual* and a COTP approved *OPA 90 Spill Response Plan.* There are three (3) areas of operation:

Area 1
The main site has several loading bays with containment, fueling station, diesel tank, two (2) Quonset huts housing a boiler and maintenance shop, testing lab, lockerrooms and spill equipment storage, an air compressor room, an in-line heating furnace for the No.6 fuel oil tank and a tank farm with containment. The site has two (2) stormwater drainage systems. All the site unloading bays except for the Low Sulfur 6 Oil Bay drain to an impervious concrete basin. The rest of the site including the Low Sulfur 6 Oil Bay discharges through two (2) inline oil-water separators (rated for 15 ppm) prior to discharge into the Port

Authority stormdrain system that discharges to Newark Bay. The bays are routinely pressure washed with a water-detergent mix. Vehicle and equipment wash activities are also frequently done at the bays.

Tank Farm containment is clay, covered by a liner, and finished with crushed stone. Permeability test results for this area are also kept with the DPCC. Tanks are routinely hydrostatically tested using water from the Newark Bay in accordance with the terms of the existing permit NJ0034231. Tanks are cleaned and water is disposed of as wastewater prior to hydrostatic testing. The hydrostatic test water is filtered prior to discharge through the inline oil-water separators.

Tank sludges are solidified with kiln ash and shipped offsite for incineration. Boiler ash is disposed of with other waste solids as needed.

Area 2
The dock on Newark Bay has several pumping stations. Each pumping station is curbed and has a containment basin. The basins are routinely pumped using the site vacuum tanker then transferred to the No.6 fuel oil tank. Sludges are drummed and manifested for offsite incineration. BP Marine Americas, Inc. contracts Miller Marine for security, booming and spill emergencies. Miller Marine is stationed at the dock 24/7 and has two (2) trailers on the dock containing spill prevention and spill emergency equipment. BP Marine also maintains an operator station on the dock and its own spill equipment.

Area 3
The Tank Farm located on Port Street is loaded/unloaded through pipelines that are routed under Port Street in concrete-encased piping. Each tank has its own containment with a capacity of 1-1/2 times the volume of the tank. The tank farm base is clay, covered by a liner, and finished with crushed stone. Permeability test results for this area are also kept with the DPCC. The tank farm is bordered on two (2) sides by marshes

The above named applicant has applied for a New Jersey Pollutant Discharge Elimination System (NJPDES) permit Renewal Permit to the New Jersey Department of Environmental Protection (NJDEP), Bureau Nonpoint Pollution Control. A location map of the facility is included. The applicant is involved with the receiving and transporting of petroleum products from barges, pipelines and tankers under the Standard Industrial Classification (SIC) 5171. The existing permit regulates stormwater discharges to the Newark Bay, classified as SE3(C2)

After discussions with representatives of BP MARINE AMERICAS INC a decision was reached to renew. The NJDEP intends to renew and modify the existing NJPDES permit NJ0034231 to include certain numeric effluent limitations, benchmarks and to include ongoing monitoring requirements. In addition, the permit renewal requires the facility to maintain an upated Stormwater Pollution Prevention Plan (SPPP) to control the quality of its stormwater discharges, which is consistent with the Individual Permit requirements.

5 Description of the Receiving Water and Discharge Locations or Local Agency:

Saltwater Tidal
SE3(C2)

6 Type and Quantity of the Wastes, Fluids, or Pollutants (as applicable):

Tank No.	Volume (gallons)	Product	Tank No.	Volume (gallons)	Product
101	3,378,690	Residual Fuel Oil	A	29,988	Diesel
102	839,832	MCB or Residual Fuel Oil	B	29,988	Diesel
103	1,693,272	Residual or #2 Fuel Oil or Diesel or Kerosene	C	29,988	#2 Fuel Oil or Diesel or Kerosene
104	412,230	Residual Fuel Oil	D	29,988	#2 Fuel Oil or Diesel or Kerosene
105	423,906	Residual Fuel Oil	E	17,934	Recoverable Oil or Stormwater
106	843,318	Residual Fuel Oil	F	2,000	Diesel Additive
107	4,063,458	Residual Fuel Oil	G	1,000	Own Use Gasoline
108	4,056,444	Residual Fuel Oil	H	3,000	Hydogen Sulfide Removal Additive
109	4,028,136	#2 Fuel Oil or Diesel or Kerosene	Q	2,000	#2 Fuel Oil for Fired Heater
110	4,027,758	#2 Fuel Oil or Diesel or Kerosene	T	2,000	#2 Fuel Oil for Boiler
111	4,030,110	#2 Fuel Oil or Diesel or Kerosene	Misc.		Lubricating/cutting oils, paints, misc. maintenance chemicals
112	4,061,232	#2 Fuel Oil or Diesel or Kerosene			
113	1,263,612	#2 Fuel Oil or Diesel or Kerosene			
114	648,732	#2 Fuel Oil or Diesel or Kerosene			

The NJDEP's review of all Discharge Monitoring Reports (DMR), submitted by BP Marine Americas, Inc., shows no significant excursions from the existing individual permit numeric limitations. The permittee samples for the following parameters under the existing NJPDES/DSW permit: Total Suspended Solids (TSS), Total Organic Carbon (TOC) and Total Petroleum Hydrocarbons (TPH)

7 Summary of Permit Conditions:

The objective of this regulatory action is to renew an existing NJPDES permit under the procedures established in N.J.A.C. 7:14A-15, 16, and 17.

In accordance with the Federal Clean Water Act and its implementing regulations, specifically, discharges permitted prior to February 4, 1987, and discharges associated with industrial activity (40 CFR 122.26), this facility is required to have a permit for its stormwater discharges to surface water.

Permit effluent limitations, non-numeric effluent limitations, monitoring requirements, Best Management Practices (BMPs) and other conditions are authorized by the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), and the Water Pollution Control Act (State Act; N.J.S.A. 58:10A-1 et seq). These statutes are implemented by the National Pollutant Discharge Elimination System (NPDES) (40 CFR Part 122) and the New Jersey Pollutant Discharge Elimination System (NJPDES) (N.J.A.C. 7:14A) permit programs.

Under the permit renewal, the permittee will be required to:

1. Maintain drainage control of the facility
2. Implement and maintain BMPs to meet numeric limits in Part III of this permit and specific benchmarks
3. Implement a site recycling program
4. Maintain a Spill Prevention Plan
5. Maintain an updated SPPP

Drainage control is the use of grading, diversionary structures, containment, dedicated storage areas and other methods used to divert stormwater from areas of industrial activity to a permitted outfall. Benchmarks establish targets to help the permittee determine if the selected BMPs are effective. Continued exceedance of the benchmarks indicates that the BMPs are not effective and may require modifications or replacement. Additional BMPs may also be required based on monitoring results.

BP Marine is a heavily regulated facility and must comply with the standards listed in Appendix A of the permit. One of the numerous requirements is for twenty-four (24) hour security and spill response capabilities. BP Marine accomplishes this through staffing and contracts with Miller Marine as noted in Section 4 of this Fact Sheet.

BP Marine will continue to monitor for TSS, and TOC. BP Marine will monitor for Oil & Grease (O&G) in place of TPH. O&G is a State effluent limit in N.J.A.C. 7:14A-12.8. There will be a numeric limit of 15 mg/L maximum for O&G as shown in Part III of the permit.

The existing and proposed effluent limitations, non-numeric effluent limitations, and other pertinent information concerning the draft permit renewal are described in the Fact Sheet Summary Table.

Concerning the proposed permit (Renewal), the NJDEP is authorized under the federal regulations (40 CFR 122.44) and under NJPDES rules (N.J.A.C. 7:14A-6.2(b) to impose Best Management Practices (BMPs) to control or abate the discharge of pollutants in lieu of numeric effluent limitations in NJPDES permits. BMPs may be imposed when the NJDEP finds numeric effluent limitations to be infeasible or when BMPs are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the State and Federal Acts. Additionally, the NJDEP believes that it is not feasible at this time to establish water quality based effluent limits (WQBEL) for this stormwater discharge. The proposed limitations incorporated in the SPPP are consistent with the NJDEP's and EPA's stormwater permitting philosophy of reducing the amount of pollution created and to prevent pollution from occurring in the first place (See 24 N.J.R. 2352). The SPPP requirements and monitoring requirements operate as limitations and controls on stormwater effluent discharges to prevent stormwater contamination and are intended to achieve Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT). The SPPP proposed will consist of requirements for preparing the SPPP, certifying the preparation and submitting the plan, implementation of the SPPP by a compliance date, certification of implementation of the SPPP, and annual recertification and reporting of the effectiveness of the SPPP. The objective of the SPPP is to prevent stormwater contamination through the elimination and/or minimization of exposure, during and after storm events, of industrial materials, machinery, waste products, and other source materials associated with industrial activity located at the facility, to stormwater that is discharged through separate storm sewers to surface waters.

For permits that include a notification plan under N.J.A.C. 7:14A-20.7(a)3, a brief description of the conditions of the permit that address approval of residual land application sites not identified at the time of permit issuance.)

8 Description of Procedures for Reaching a Final Decision on the Draft Action:

These procedures are set forth in N.J.A.C. 7:14A-15, 16, and 17. Included in the public notice are requirements for the submission of comments by a specified date, procedures for requesting a hearing, and other procedures for participation in the final agency decision.

For Minor Permits where no significant public comment is expected, please refer to the procedures described in the cover letter.

9 Name, Bureau, and Phone Number of Contact Person:

Additional information concerning the Draft Permit renewal may be obtained between the hours of 8:30 A.M. and 4:00 P.M., Monday through Friday from John Ashton, Bureau of Nonpoint Pollution Control, at (609) 633-7021.

10 Limitation Derivation Worksheets N/a:

11 Permit Summary Table: (Add/Delete Parameters as appropriate)

Facility Name: BP Americas, Inc.
Discharge # : DSN001A
LAT: 40°41′54″
LONG: 74°09′23″

Permit # : NJ0034231
Discharge Type: Stormwater

PARAMETER all values are mg/L unless otherwise stated	**DMR FILE DATA MTLY/DAILY AVG/MAX**	**EXISTING PERMIT CONDITIONS MTLY/DAILY AVG/MAX**	**PROMULGATED EFFLUENT LIMITATION GUIDELINES**	**DRAFT PERMIT REQUIREMENTS**
Total Suspended Solids	≤ 26	Monitor Only	None	Monitor Only
Total Organic Carbon	≤ 45	Monitor Only	None	Monitor Only
Petroleum Hydrocarbons	≤ 1	Monitor Only	None	None
Oil & Grease	None	None	N.J.A.C. 7:14A-12.8	15 maximum
Industrial Activity				Maintain an updated SPPP[1]

S.U. is the abbreviation for standard units.

<u>NOTES</u>

1 - Stormwater Pollution Prevention Plan (SPPP) is derived from Federal (40 CFR 122.44) and State (N.J.A.C. 7:14A-11.2(a)3 rules and will be developed as a non-numeric effluent limit to replace the numeric limits of the prior permit, and to control parameters not listed above. The following outside areas must be addressed in the SPPP, if applicable: (1) vehicle fueling and maintenance areas; (2) waste

management/handling areas; (3) ISRA clean-up areas; (4) loading docks; (5) storage areas; and (6) any other areas with "stormwater discharges associated with industrial activity" as defined by N.J.A.C. 7:14A-1.2.

Appendix

CONTENTS OF THE ADMINISTRATIVE RECORD

The following items are used to establish the basis of the draft permit renewal:

(1) The public notice of the NJDEP's intent to renew NJPDES permit NJ (i.e. "Draft Permit")
(2) The fact sheet for that "Draft Permit"
(3) NJPDES/DSW Permit NJ0003778
(4) NJPDES NJ0088315 (N.J.A.C. 7:14A-3 Appendix A) (NPI)*
(5) N.J.A.C. 7:14A (NPI)*
(6) 40 CFR 122.28 (NPI)*
(7) N.J.S.A. 58:10A-1 et seq (NPI)*
(8) Discharge Monitoring Reports submitted from 2000 to 2003 under NJPDES Permit NJ 0034231.
(9) Site visit conducted August 12, 2003

*NPI: The document is part of the administrative record, but is not physically included with the record.

NEW JERSEY POLLUTANT DISCHARGE ELIMINATION SYSTEM

The New Jersey Department of Environmental Protection hereby grants you a NJPDES permit for the facility/activity named in this document. This permit is the regulatory mechanism used by the Department to help ensure your discharge will not harm the environment. By complying with the terms and conditions specified, you are assuming an important role in protecting New Jersey's valuable water resources. Your acceptance of this permit is an agreement to conform with all of its provisions when constructing, installing, modifying, or operating any facility for the collection, treatment, or discharge of pollutants to waters of the state. If you have any questions about this document, please feel free to contact the Department representative listed in the permit cover letter. Your cooperation in helping us protect and safeguard our state's environment is appreciated.

Permit Number: NJ0034231

DRAFT: Stormwater Discharge Renewal Permit Action

Permittee:
BP PRODUCTS NA INC
200 WESTLAKE BLVD
HOUSTON,TX 77079

Co-Permittee:

Property Owner:
PORT AUTHORITY OF NY & NJ
2 GATEWAY CTR 14TH FL SW
Newark,NJ 07102

Location Of Activity:
BP MARINE AMERICAS INC
350 COASTAL ST
Newark,NJ 07114

Authorization(s) Covered Under This Approval	Issuance Date	Effective Date	Expiration Date
RF -Stormwater			

By Authority of:
Commissioner's Office

DEP AUTHORIZATION
Barry Chalofsky, P.P.
Bureau of [Insert Bureau Name]
Division of Water Quality

(Terms, conditions and provisions attached hereto)

BP MARINE

BP Marine Americas
Building 350
Coastal Street
Port Newark, New Jersey 07114

Direct Line: (973) 465-2425

February 11, 1999

New Jersey Department of
Environmental Protection
Bureau of Discharge Prevention

Re : Spill Incident on
January 14, 1999
at Port Newark NJ.
Ref. Case # 99-01-14-1643-35

Gentleman :

This letter is to confirm our reported spill incident that occurred on January 14, 1999.

Owner/Operator :	BP Marine Americas Inc. Division of BP Exploration and Oil Inc. 200 Westlake Blvd. Houston, Texas 77079
Lease Holder :	Port Authority of NY. & NJ.
Discharge Location :	BP Marine Americas Port Newark Terminal, Berth 21 Bldg. 350 Coastal Street, Port Newark New Jersey 07114
Telephone :	973-465-2425
EPA ID # :	NJD98059138
Reported By :	Terminal Supervisor - Mr. Joseph Jeannetti BP Marine Port Newark Terminal Bldg. 350 Coastal Street Port Newark, New Jersey 07114
Telephone :	973-465-2425
Berth 21 Location :	North Channel, Newark Bay
Name of Street :	Gillgan Street
Latitude :	40 deg. 41 min. 40 sec. North
Longitude :	74 deg. 08 min. 15 sec. West
Source of Discharge :	BP Marines 2,500 Gallon Vacuum Tank Truck
Substance :	No. 6 Fuel Oil Cas No.68476-31-3
Amount Released :	Approximately 300 US Gallons
Discovered at :	16:25 hours on January 14, 1999
Release stopped at :	16:26 hours on January 14, 1999
NJDEP Notified at :	16:43 hours on January 14, 1999

On the evening of January 14, 1999, BP Marine terminal supervisor, Joseph Jeannetti and operator, Carlos Cajeira were in the process of loading 7,740 barrels of IF-380 onto the Eklof barge Newark Bay. The mooring location of the barge, Berth 21, Port Newark Channel, riser connection #3.

At approximately 16:25 hours, Eklof Marine employee (making a delivery to the barge) Tom Sullivan arrived at the loading berth and discovered #6 fuel oil leaking form BP Marines 2,500 gallon Vacuum truck that was parked on Gillagan Street, adjacent Berth 21.

He immediately reported the leak to BP Marine operator Carlos Cajeira. Carlos responded to the area and noticed the lower site glass on the tank truck was missing and leaking product. Temporary action taken to stop the flow of product, Carlos quickly inserted a sorbent pad into the missing site glass opening.

Estimate 300 gallons had leaked onto the paved surface of Gillagan Street and Berth 21. Containment and cleanup operations were initiated by deploying several types of sorbent material (spill pads, speedy dry, sausage boom) and two (2) vacuum trucks.

BP Marine's Oil Spill Response Plan was activated at 16:29 hours by terminal supervisor Joseph Jeannetti.

New Jersey Department of Environmental Protection was notified of the incident at 16:43 hours, Case No. 99-01-14-1643. S&D Environmental was notified and activated at 16:45 hours. Port Authority Police was notified at 17:15 hours (officer Hammer). Port Authority operations representative, Ray Hennessey notified at 17:30 hours. US Coast Guard notified at 18:10 hours, Case No. 470-624 - PO Gauthier. New Jersey Marine Police notified at 18:30 hours, Officer Badge # 5437.

Cleanup contractor S&D Environmental arrived on location at 18:05 hours to assist in cleanup operation. Sever weather conditions (snow, rain and ice), delayed the cleanup process for several days. Precautionary containment boom was deployed in the area of Berth 21 and the spill. No spilled product entered the Newark Channel. Cleanup operations complete by releasing S&D Environmental on January 19, 1999.

Clean contractor S&D Environmental furnished two (2) roll off containers to dispose cleanup material and debris.
New Jersey Non Hazardous Manifest Number : SD-3289 SD-3288

S&D Environmental Inc.	Disposal Site : Ellesor, Inc.
11 Elkins Road	(Incineration) 864 Julia Street
East Brunswick, NJ. 08816	Elizabeth, NJ. 07201
EPA : NJD982744260	Facility ID 2004D2
Phone : 732-432-5566	Phone : 908-289-3222
Fax : 732-432-5757	

Investigation conducted by BP Marine to determine why the site glass had failed and the necessary remedial actions to prevent recurrence . The truck was built and purchased in 1980. During this period BP has never experienced a site glass failure. The missing site glass or fragments of the glass could not be found.
Remedial actions : The three (3) site glasses were removed and covered over with ¾ inch (thick) steel plate. The steel plates were welded in place. The entire 2,500 gallon tank was pressure tested to 100 p.s.i. In the future, tank level indication will be determined by internal float device.

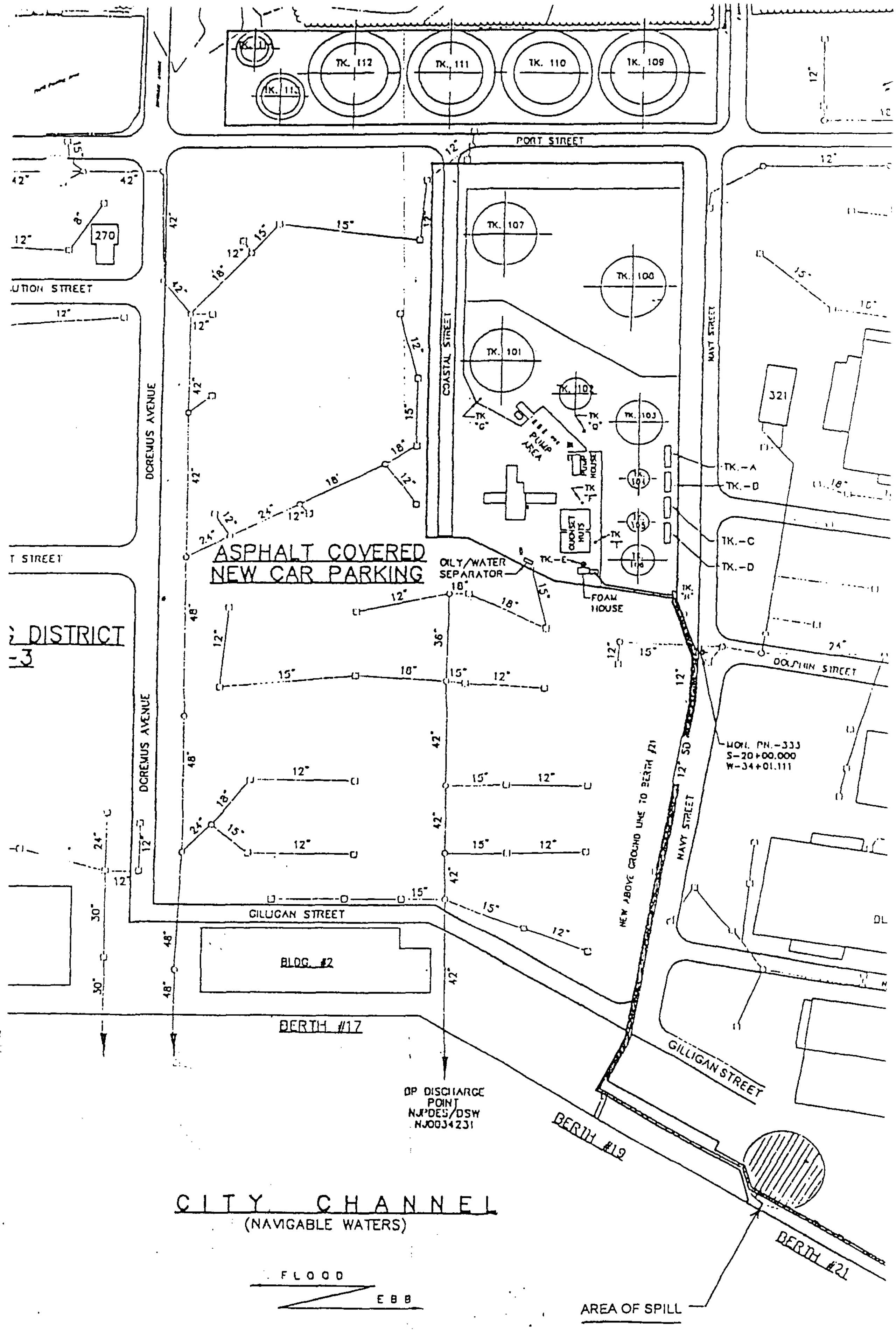
Should you have any questions regarding this matter, please contact me at 973-465-2427.

Sincerely,

Bueford Williams
Terminal Manager

cc : New Jersey DEP Site Remediation Program

Attachments

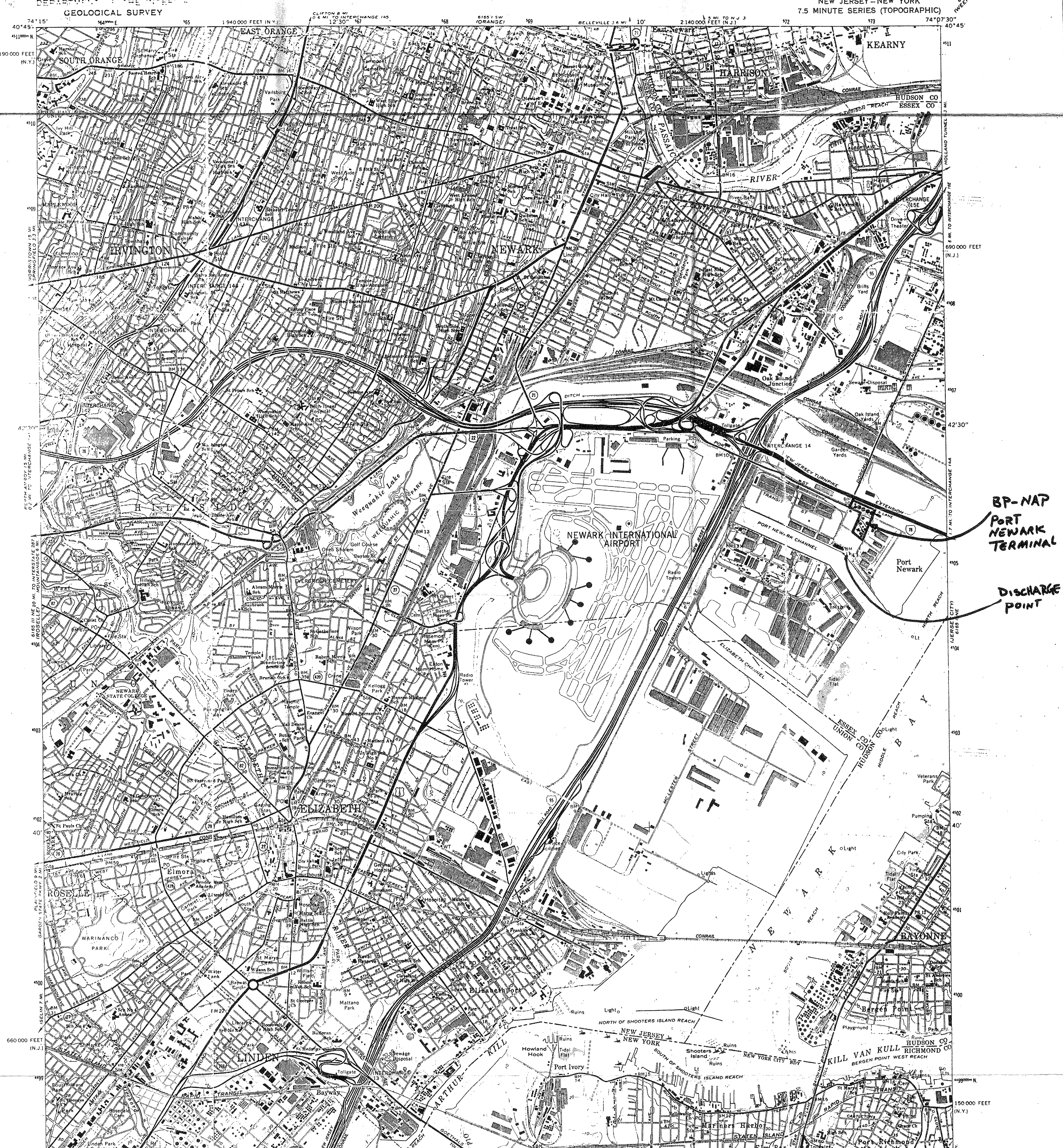


920920271

TIERRA-D-018975

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ELIZABETH QUADRANGLE
NEW JERSEY–NEW YORK
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4.8 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Mapped, edited, and published by the Geological Survey
Revised in cooperation with New York Department of Transportation

Control by USGS, NOS/NOAA, USCE, and New Jersey Geodetic Survey

Planimetry by photogrammetric methods and from NOS charts T-5106, T-5110, T-5111, T-5332, T-5467, T-5468, and T-5469
Topography by photogrammetric methods from aerial photographs taken 1953 and planetable surveys 1955
Revised from aerial photographs taken 1966. Field checked 1967

Selected hydrographic data compiled from NOS charts 285 (1966), 287 (1966), and 369 (1967). This information is not intended for navigational purposes

Polyconic projection. 10,000-foot grid ticks based on New Jersey coordinate system, and New York coordinate system, Long Island zone. 1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue 1927 North American Datum. To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 34 meters west as shown by dashed corner ticks

Red tint indicates areas in which only landmark buildings are shown

UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

Revisions shown in purple and woodland compiled from aerial photographs taken 1976 and other sources
This information not field checked. Map edited 1981

ROAD CLASSIFICATION

Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route — U.S. Route — State Route

ELIZABETH, N.J.—N.Y.
N4037.5—W7407.5/7.5

1967
PHOTOREVISED 1981
DMA 6165 II NW–SERIES V822

OCT 31 1991

TIERRA-D-018976

B.P. North American Trading Company
Building #350 Coastal Street
Newark, Essex County New Jersey 07114

B.P. North American Trading Company is the current owner of Coastal Oil in Newark, New Jersey. They are a petroleum product distributor handling No. 2 Fuel Oil, Kerosene, No. 4 Fuel Oil, and No. 6 Fuel Oil. In the past they have emptied and cleaned their storage tanks resulting in the generation of hazardous waste oil and sludge. These materials were transported, stored, and recycled by the facility. B.P./Coastal Oil no longer stores hazardous waste at their facility (as of December 29, 1983).

On February 2, 1983 the roof seam of tank #106 split due to overfill pressures generated by #6 Fuel Oil. Approximately 40,000 gallons of oil spilled into the drainage trenches and earthen dike area. Half of the oil was recovered. The rest of the contaminated oil and soil was treated by Dried Bacteria Cultures (DBC). These cultures were used in an attempt to reduce the oil to a more manageable state, but due to poor weather conditions and improper maintenance the treatment was only moderately successful. Tar residues and remaining contaminated soil were expected to be removed by Spring, 1984.

In addition to this spill, other minor discharges of oil into the Port Newark Channel near Coastal's bulkhead have been reported. The oils were traced to leaking underground pipes belonging to B.P./Coastal. Repairs of the pipes and clean up of the sheens have been performed.

The site is assigned a low priority based on observed minor discharges of oil to ground and surface waters and the fact that written confirmation of final clean up of the contaminated soil was never made available A site inspection is recommended on a time available basis.

Submitted by:
Michael Surowiec
NJDEP/DWM/HSMA
MSCA Project

HS152:jlc

BAB000013

Preliminary Assessment

B.P. NORTH AMERICAN TRADING COMPANY BUILDING #350

COASTAL STREET, NEWARK, ESSEX COUNTY, NEW JERSEY 07114

Submitted by:
Michael Surowiec
NJDEP/DWM/HSMA
MSCA Project

EPA

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

I. IDENTIFICATION

01 STATE	02 SITE NUMBER

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
B.P.North American Trading Inc./Oil Coastal	Building #350 Coastal St.

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Newark	NJ	07114	Essex		

09 COORDINATES LATITUDE	LONGITUDE	
40° 41' 40"	74° 08' 15"	Lots 15, 5

10 DIRECTIONS TO SITE (Starting from nearest public road)

Take N.J. Turnpike north to Exit 14 (just past Newark Int'l. Airport). Follow ramp around to Port St., follow until Coastal St., B.P. is on both sides.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
B.P. North American Trading Inc.	Gateway One, Suite 300

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Newark	NJ	07102	(201) 643-7600

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)

XX A. PRIVATE ☐ B. FEDERAL: ______ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL

☐ F. OTHER: ______ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: __/__/__ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: __/__/__ (MONTH DAY YEAR) XX C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

XX YES DATE __/__/__ (MONTH DAY YEAR)
☐ NO

BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: ______ (Specify)

CONTRACTOR NAME(S): ______

02 SITE STATUS (Check one)	03 YEARS OF OPERATION	
XX A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN	5/11/81 (BEGINNING YEAR) - (ENDING YEAR)	☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

No. 2 Fuel Oil, Kerosene, No. 4 Fuel Oil, No. 6 Fuel Oil, Waste Oil from tank bottoms.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Soil, groundwater, and surface water contamination due to leaking and spilled Fuel Oil and waste oil.

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) XX C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Frank Gagliano	NJDEP/DWM/BFO Central	(609) 426-0223

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Michael Surowiec	NJDEP	DWM-SE4	(609) 633-2215	11/05/85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

920920276

TIERRA-D-018979

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	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 ______ (Specify)
- ☐ E. SLURRY
- ☒ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)
- TONS ______
- 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			Approximately 40,000 gallons of
OLW	OILY WASTE			#6 waste oil spilled from a
SOL	SOLVENTS			ruptured tank. Oil that was not
PSD	PESTICIDES			contained by dikes soaked into
OCC	OTHER ORGANIC CHEMICALS			soil. Dried Bacteria Cultures
IOC	INORGANIC CHEMICALS			(DBC) were used to reduce the
ACD	ACIDS			oil.
BAS	BASES			
MES	HEAVY METALS			

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

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OLW	#6 Fuel Oil	999	DBC's were used to		
			reduce/down grade oil.		
			Residue was packed		
			into drums.		
OLW	Unknown Fuel Oil	999	Absorbent pads used		
			to soak up oil.		
			Waste packed in drums		

V. FEEDSTOCKS (See Appendix for CAS Numbers)

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

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

Attachment A- Various memos from DEP/DWM/BFO, letters from Coastal Oil.

Attachment B- Memos from DEP/DWM/BFO, Coast Guard printout.

Attachment C- Letters from Coastal Oil/B.P., memos from SWA Engineering, memos DWR.

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

EPA

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 XX A. GROUNDWATER CONTAMINATION — 02 XX OBSERVED (DATE: 4/12/83) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Soil around Coastal's bulkhead was excavated, an oil sheen was observed in the groundwater. The oil was supposedly leaking from a sump valve. (Attachment B1).

01 XX B. SURFACE WATER CONTAMINATION — 02 XX OBSERVED (DATE: 4/4/83) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

An oil sheen was observed in Port Newark waters in the vicinity of Coastal's/ B.P. bulkhead. It was later determined to be originating from same sump valve leak noted above. (Attachment B1).

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

Direct contact/population exposure is unlikely, as the oil leaks were minor, and quickly contained by U.S.C.G. and Clean Venture. (Attachment B1).

01 XX F. CONTAMINATION OF SOIL — 02 XX OBSERVED (DATE: 2/2/83) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres) 04 NARRATIVE DESCRIPTION

Spill oil was contained by earthen trenches and dikes resulting in contamination of upper layers of soil. (See Attachment A).

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

See Part E.

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

EPA

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

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

Potential long term damage to vegetation near holding tanks. (Attachment A).

01 XX K DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) — XX POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Oil leak into Port Newark Channel could potentially harm aquatic life.

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

01 XX M UNSTABLE CONTAINMENT OF WASTES — 02 XX OBSERVED (DATE: 2/2/83) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

Wastes were contained in earthen dikes, after the spill contaminated soil (from the dikes) had to be removed. (Attachment A).

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

Minor infraction of improper maintenance to leaking drum. (Attachment B2).

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

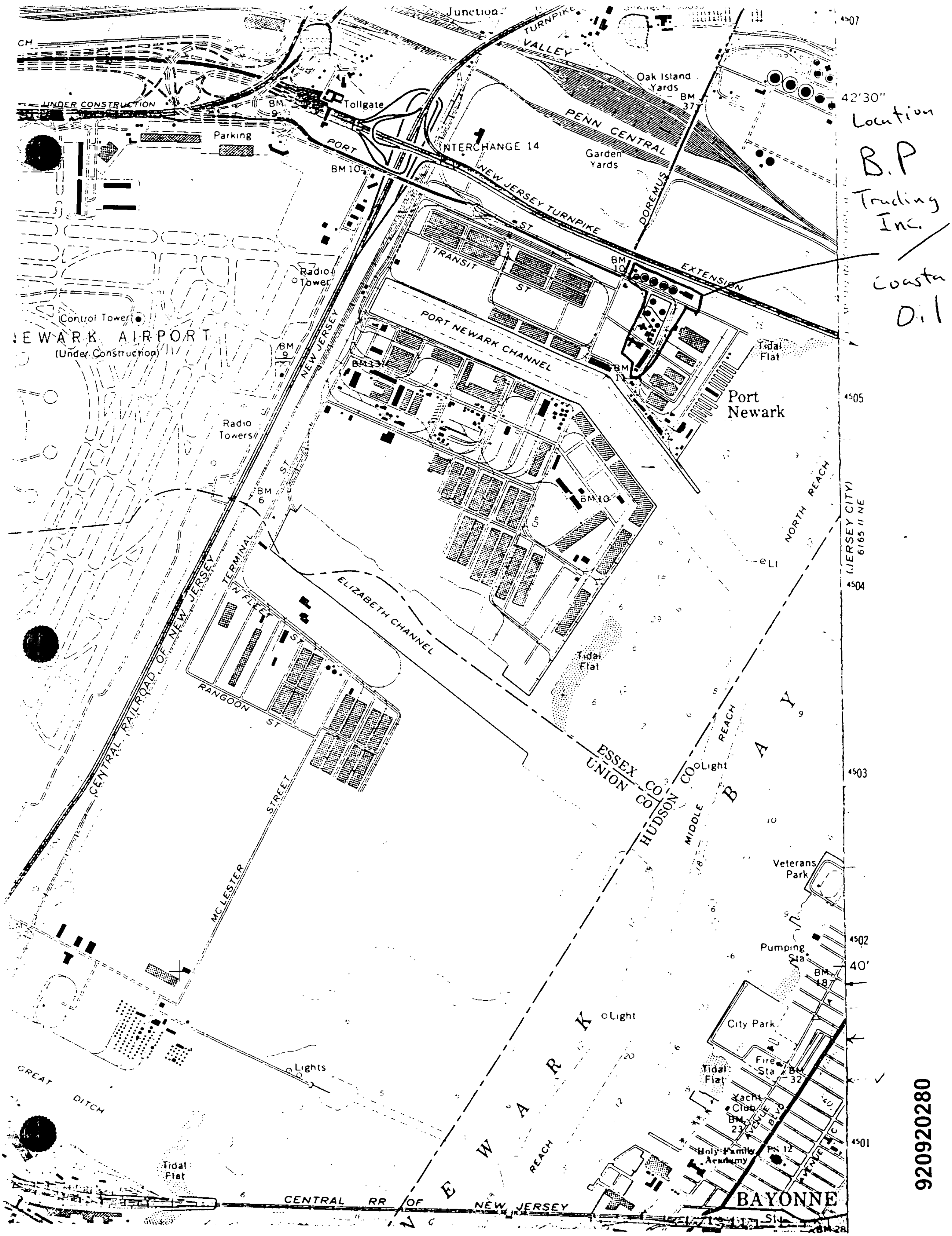
Improper labeling of hazardous waste drums. (Attachment B2).

III. TOTAL POPULATION POTENTIALLY AFFECTED: ______

IV. COMMENTS

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

Attachment A- Various memos DEP/DWM/BFO, letters from Coastal Oil.
Attachment B- Memos from DEP/DWM/BFO, Coast Guard printout.
Attachment C- Letters from Coastal/B.P., memos from SWA Engineering and DWR.



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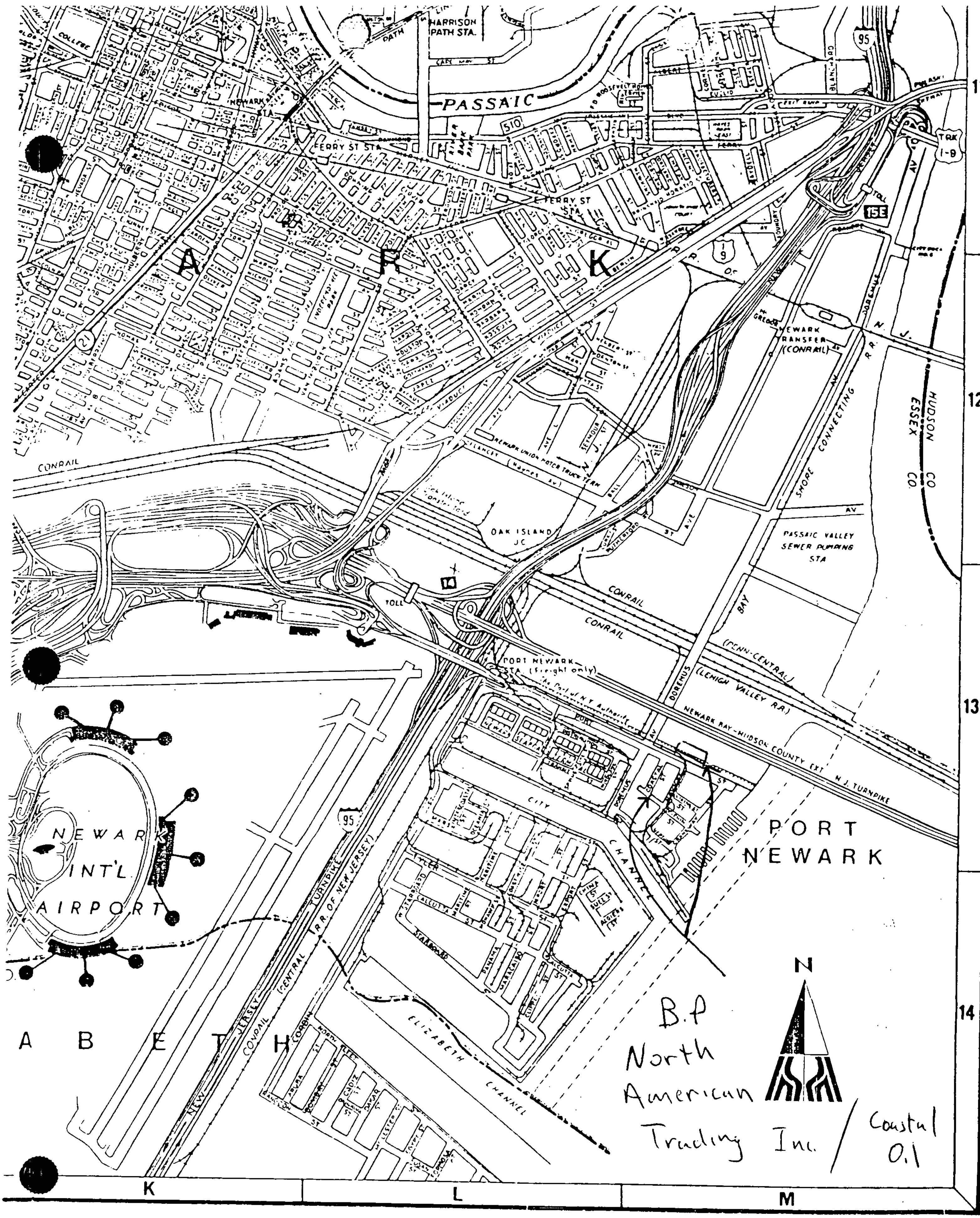

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TIERRA-D-018984

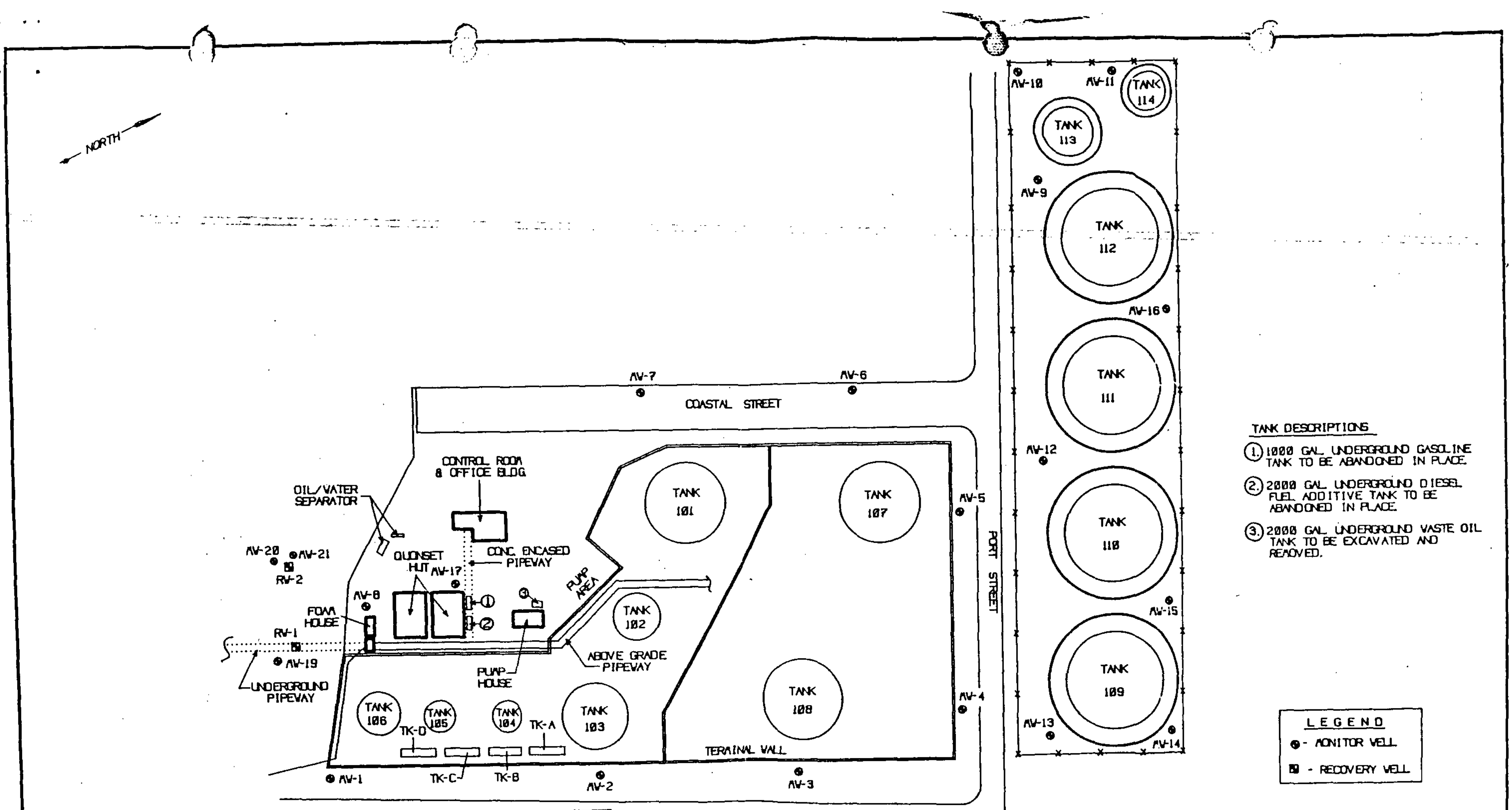

FIGURE 2

SITE PLAN

B.P. NORTH AMERICAN PETROLEUM INC.
PORT NEWARK, NEW JERSEY

920920282

MEMO

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

TO Spill File

FROM Thomas J. Allen DATE July 20, 1978

SUBJECT Coastal Oil Company, Doremous Avenue, Newark - OHMP Case # 78-1-31-6

On January 31, 1978, I investigated a spill report at the above noted facility. My investigation disclosed that an estimated 30,000 BBL's of #4 oil was spilled into a diked area due to a rupture in a storage tank. Oil was seeping through a fire wall into a concrete vault but Coastal Oil personnel were pumping this oil back into the diked area. There was minor seepage through an expansion joint but this was readily contained by use of sand.

I met with Mr. Charles Boggs, Vice President and discussed clean up strategy with him. Since 38,000 BBL's were still in the tank and leaking, efforts were concentrated on the removal of the remaining oil in the tank by use of barge. Once the oil was brought to a level below the leak transfer of the oil in the dike could start.

On February 1, 1978, I spoke with Mr. Boggs by telephone. He informed me that the oil in the tank and dike area had reached equal levels. The oil in the tank is still being pumped into barges and removal of the oil in the dike would start by days end. Mr. Boggs estimated that the oil in the dike would be removed by late evening on February 2, 1978. At 1530 Lt. Commander Dougherty U.S.C.G. informed me pumping of the dike area had started and the level of oil has noticably lowered.

February 2, 1978

On scene and met with Mr. Charles McGiuse, operations manager. They are currently pumping from both the tank and dike at the rate of 500 BBL's per hour. An additional pump should be working shortly that will increase the total pumping rate to approximately 1,000 BBL's per hour. There is approximately 2,000 BBL's remaining in the tank and an estimated 8,000 BBL's in the dike. At the time of the initial discharge the oil was heated to 68^{o} F.

I met with P.O. Sattler and Ens. Del Bueno, U.S.C.G. and viewed clean up operations with them. The oil level in the dike has lowered approximately 8 inches since my last visit. All appears to be going well with an estimated 48 hours of pumping time left.

February 15, 1978

Spoke with Mr. McGuire. He informed me that everything was working out well until the recent snow storms. The oil in the dike area had been lowered to a point where ground surface was becomming visible in some areas. An inspection of the tank revealed a hole in the floor plate.

BAB000014

40

February 22, 1978

Spoke with Mr. McGuire. The solidifing oil in the tank bottom will be removed by vacuum truck tomorrow. Contractor has been hired for the remaining clean up work. Andax Environmental Corporation, 416 Edgewood Place, Rutherford, NJ 07070, (201-939-1358).

March 1, 1978

Spoke with Mr. McGuire. Oil is still floating to ground surface and being removed by vacuum truck. A sump system has been installed in one corner of the dike and continually pumps an oil/water mixture. In all, an estimated 2,000 BBL's of liquid (oil and water) have been removed from the dike area since February 23, 1978. Operations will continue in this manner until the thaw begins, at which time additional sumps will be installed.

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April 17, 1978

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qbznc d8agvyuh hbcnbkh xeza

2.5

3.0

4.3

qb

hq

pouye hgdsa

exsza akshd

cv a ghkpo

qbznc d8agv

HORIZONTAL MAG.				
	Mag.	Min.	Nom.	Max.
1	101.2%	3.63	3.66	3.70
2	85.0%	3.04	3.08	3.11
3	77.0%	2.75	2.79	2.82
4	65.0%	2.32	2.35	2.39
5	61.5%	2.19	2.23	2.26

dseqo sFuhbd8

zsxed op1qpao

qpo6yheq kbeoqndoxy

xycuvbgh hopebdgxcq

e43ygdhb pxzqaudgho

VERTICAL MAG.				
	Mag.	Min.	Nom.	Max.
1	101.2%	5.53	5.56	5.59
2	85.0%	4.65	4.67	4.69
3	77.0%	4.21	4.23	4.25
4	65.0%	3.55	3.57	3.60
5	61.5%	3.36	3.38	3.39

pynkd

cgvyhbu p3po

p8eygds ouyh

ndhsopq gdy6

hbcnbkh xeza

920920287

Spill File

Thomas J. Allen

July 20, 1978

Coastal Oil Company, Doremous Avenue, Newark - OHMP Case # 78-1-31-6

On January 31, 1978, I investigated a spill report at the above noted facility. My investigation disclosed that an estimated 30,000 BBL's of #4 oil was spilled into a diked area due to a rupture in a storage tank. Oil was seeping through a fire wall into a concrete vault but Coastal Oil personnel were pumping this oil back into the diked area. There was minor seepage through an expansion joint but this was readily contained by use of sand.

I met with Mr. Charles Boggs, Vice President and discussed clean up strategy with him. Since 38,000 BBL's were still in the tank and leaking, efforts were concentrated on the removal of the remaining oil in the tank by use of barge. Once the oil was brought to a level below the leak transfer of the oil in the dike could start.

On February 1, 1978, I spoke with Mr. Boggs by telephone. He informed me that the oil in the tank and dike area had reached equal levels. The oil in the tank is still being pumped into barges and removal of the oil in the dike would start by days end. Mr. Boggs estimated that the oil in the dike would be removed by late evening on February 2, 1978. At 1530 Lt. Commander Dougherty U.S.C.G. informed me pumping of the dike area had started and the level of oil has noticably lowered.

February 2, 1978

On scene and met with Mr. Charles McGiuse, operations manager. They are currently pumping from both the tank and dike at the rate of 500 BBL's per hour. An additional pump should be working shortly that will increase the total pumping rate to approximately 1,000 BBL's per hour. There is approximately 2,000 BBL's remaining in the tank and an estimated 8,000 BBL's in the dike. At the time of the initial discharge the oil was heated to 68° F.

I met with P.O. Sattler and Ens. Del Bueno, U.S.C.G. and viewed clean up operations with them. The oil level in the dike has lowered approximately 8 inches since my last visit. All appears to be going well with an estimated 48 hours of pumping time left.

February 15, 1978

Spoke with Mr. McGuire. He informed me that everything was working out well until the recent snow storms. The oil in the dike area had been lowered to a point where ground surface was becomming visible in some areas. An inspection of the tank revealed a hole in the floor plate.

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Spill File

Thomas J. Allen July 20, 1978

Coastal Oil Company, Doremous Avenue, Newark - OHMP Case # 78-1-31-6

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On scene and met with Mr. Charles McGiuse, operations manager. They are currently pumping from both the tank and dike at the rate of 500 BBL's per hour. An additional pump should be working shortly that will increase the total pumping rate to approximately 1,000 BBL's per hour. There is approximately 2,000 BBL's remaining in the tank and an estimated 8,000 BBL's in the dike. At the time of the initial discharge the oil was heated to 68° F.

I met with P.O. Sattler and Ens. Del Bueno, U.S.C.G. and viewed clean up operations with them. The oil level in the dike has lowered approximately 8 inches since my last visit. All appears to be going well with an estimated 48 hours of pumping time left.

February 15, 1978

Spoke with Mr. McGuire. He informed me that everything was working out well until the recent snow storms. The oil in the dike area had been lowered to a point where ground surface was becomming visible in some areas. An inspection of the tank revealed a hole in the floor plate.

920920291

TIERRA-D-018993

February 22, 1978

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O + ~~#~~ 2

Spill File, ~~[illegible]~~
Thomas J. Allen
Coastal Oil Co., Doremus Ave., Newark
OHM# 78-1-31-6

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At 1530 Lt. Comm. Dougherty USCG informed me pumping of the dike area had started and the level of oil has noticeably lowered.

B

920920294
TIERRA-D-018996

Feb. 2, 1978

On scene and met with Mr. Charles McGuire, operations manager. They are currently pumping from both the tank and dike at the rate of 500 BBL's per hour. An additional pump should be working shortly that will increase the total pumping rate to approx. 1,000 BBL's per hour. There is approx. 2,000 BBL's remaining in the tank and an estimated 8,000 BBL's in the dike. At the time of the initial leaking the oil was heated to 68°F.

I met with P.O. Sattler and Enr. Del Bueno, U.S.C.G. and viewed clean up operations with them. The oil level in the dike has lowered approx. 8 inches since my last visit. All appears to be going well, with an estimated 48 hours of pumping time left.

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high was put in its place. Both tanks are empty of all product. The dike is expected to be out of service for approx. 4 to 6 weeks.

Leave open

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF WATER RESOURCES

TRENTON, NEW JERSEY 08625

THIS IS FOR STATE AGENCIES USE ONLY - NO FEE NECESSARY

Please limit your requests to no more than 10 names per day.

Coastal Oil Co
Newark
(Corporate Name)

Corporate Officers [ ]
(Request only when necessary. Your representative must obtain from last Annual Report).

Requested by Thomas T. Allen

Sr. Envir. Engr. Water Resources
(Title)

(TO BE COMPLETED BY SECRETARY OF STATE'S OFFICE ONLY)

Coastal Oil Company
(Exact Name of Corporation)

X40221
(File Number)

Good
(Status)

Corporation Trust Company
(Registered Agent)

28 West State St, Trenton N.J. 08608
(Registered Office)

6/76
(Last Annual Report)

920920299

TIERRA-D-019001

Let's protect our earth

2/1

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
OFFICE OF SPECIAL SERVICES
OIL AND HAZARDOUS MATERIALS SPILL REPORT

INITIAL REPORT

OHMP CASE NUMBER: 78-1-31-6

Date of spill: 1-31-78
Municipality: [illegible]
Receiving waters: [illegible]
Tributary to:
Reported by: [illegible], V.P.
Telephone: 201-643-7800
Address:
Affiliation: [illegible]
[illegible] Co.
589-7770 aft. 4pm

Time of spill: [illegible] Am
Type of material: # 4
Quantity: 3,000 BBL [illegible]
Source: [illegible] Oil Co.
Location of spill: [illegible] St [illegible]
(street, road, etc.)
Cause: [illegible] BBL ~~[illegible]~~ floor plate hole
Date of report: 1-31-78
Time of report: 9:10 A M.

Initial Action

	Yes	No
Fish & Game Notified	☐	☒
Affected Water Supplies		
1. ________ , Time ______	☐	☒
2. ________ , Time ______	☐	☒

	Yes	No
Shellfish Notified	☐	☒
Coast Guard/~~EPA Notified~~	☒	☐
Basin Manager Notified	☐	☒

Report taken by: J. Vernam

Hot Line ____________

Case Indexed ☐

Investigation (on scene) (telephone)

Name of investigator: J. Allen
Date of investigation: 1/31/78
Station:
Time:

Persons contacted:

Name	Affiliation	Telephone
1 [illegible]	EPA	201-321-6670
2 C. McGuire	[illegible] Oil Co	201-
3		

Samples: Yes___ No___ Photos: Yes___ No___

Report of investigation and recommended containment and cleanup:

Memo in Spill File ☐

Dike is made of concrete and dirt floor. Tank is 2,000 feet from Newark Bay.

FIELD COPY

920920300

TIERRA-D-019002

BAK000003

THE PORT AUTHORITY OF NY & NJ
Engineering Department
One World Trade Center - 72 East
New York, New York 10048

SITE INVESTIGATION REPORT FOR PORT STREET AND NAVY STREET INTERSECTION NEW JERSEY MARINE TERMINAL PORT NEWARK FACILITY NEWARK, NEW JERSEY

VOLUME 1 OF 3

NJDEPE SPILL CASE NO.: 92-10-15-1235-22

APRIL 1994

Prepared by:

ROY F. WESTON, INC.
Raritan Plaza I - 4th Floor
Edison, New Jersey 08837

sk(ak)/PORTAUTH/PORTNAVY.RPT

WESTON

SITE INVESTIGATION REPORT
PORT AND NAVY STREET INTERSECTION
NJMT, NEWARK, NJ

NJDEPE Spill Case No.: 92-10-15-1235-22

APRIL 1994

Prepared for:

THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY
Engineering Department
One World Trade Center - 72 East
New York, New York 10048

Prepared by:

ROY F. WESTON, INC.
Raritan Plaza I, 4th Floor
Edison, New Jersey 08837

W.O. No. 02527-043-001-0012

sk(nk)/PORTAUTH/PORTNAVY.RPT

WESTON

EXECUTIVE SUMMARY

Background

On October 15, 1992 the Port Authority of New York and New Jersey (Port Authority) notified the New Jersey Department of Environmental Protection and Energy (NJDEPE) that it had discovered evidence of a petroleum release while excavating for a shallow signpost foundation in Port Newark, New Jersey. An oily sheen was observed on the groundwater approximately 5 feet below the ground surface. The suspected release was reported to the NJDEPE; Spill Case No. 92-10-15-1235-22 was assigned. As part of a preliminary investigation to define the source and extent of the free product, the Port Authority implemented a qualitative subsurface investigation. Subsequent to the Port Authority's preliminary investigation, Roy F. Weston, Inc. (WESTON®) was requested to perform a Site Investigation (SI) to determine the nature and extent of the contamination, and identify potential sources.

The release was discovered on property southeast of the intersection of Port and Navy Streets that is leased to Foreign Auto Preparation Service (FAPS) by the Port Authority. The northeastern corner of the intersection is currently vacant and the western side of the intersection is leased to British Petroleum Corp. (BP), who operates a fuel terminal (i.e., bulk petroleum fuel storage and transfer) on the property. The terminal has been in operation since approximately 1930, when it was reportedly operated by the U.S. Navy. Before 1983 the NJPDES-registered terminal owner and operator was the Coastal Oil Company (Coastal), which was a division of BP North America Trading, Inc. Since then, the ownership and responsibility for the Port Newark Terminal was transferred to BP North America Trading, Inc. when the Coastal division was sold to COC Corp.

The SI consisted of three principal activities:

- Site Visit and NJDEPE Records Review.
- Soil Sampling and Analysis.
- Groundwater Sampling and Analysis.

Site Visit and NJDEPE Records Review

As part of the SI, representatives of the Port Authority and WESTON visited the site and the adjacent BP terminal and met with the manager of the terminal, Mr. Charles H. Guilfoyle, who indicated that the large aboveground storage tank (Tank No. 108) located in close proximity to the suspected release had ruptured in 1979 and released its contents into the possibly unlined containment basin.

On behalf of the Port Authority, WESTON requested a review of available files from the NJDEPE, and was able to arrange reviews at the Division of Water Resources and Department of Groundwater Well Permits. These reviews confirmed that the facility had experienced a release of 4,000,000 gallons of fuel oil in 1979, presumably No. 4 oil from tank No. 108.

<u>Soil Sampling and Analysis</u>

The SI included the installation of 41 soil borings and soil sampling and analysis.

Soil boring locations were selected on the basis of:

- Results identified in the Port Authority's preliminary site investigation.
- Potential sources identified in the review of Port Authority records.
- Results from screening soil samples for total petroleum hydrocarbons (TPHC) during the investigation.

Screening for total petroleum hydrocarbons (TPHC) was performed on soil samples obtained from directly above the water table using the Port Authority Materials Division's portable total petroleum hydrocarbon (TPHC) analyzer, which is manufactured by the General Analytics Corporation. The TPHC analyzer allowed for short-term processing of soil samples to determine petroleum hydrocarbon content on a quick turn-around basis. WESTON reviewed the results from the TPHC screening with the Materials Division daily and identified individual samples for laboratory analysis by the Port Authority's contracted laboratory, NYTEST. Final determination of the selected samples was made by the Materials Department on the basis of sample (split spoon) recovery. Soil samples submitted to NYTEST were analyzed for total petroleum hydrocarbons (TPHC), base/neutral/acid extractable compounds (BNA), lead, volatile organic compounds (VOC), and methyl-tertiary-butyl-ether (MTBE) and tertiary-butyl alcohol (TBA).

Although not required by NJDEPE, four (4) samples were split with WESTON's Lionville Laboratory for a "fingerprint" fuel analysis. This analysis was conducted in order to determine if the compounds detected in the soil samples were characteristic of diesel fuel, oil, or other fuel (e.g., gasoline).

The analytical results of the soil samples indicated:

- The presence of total petroleum hydrocarbons (TPHC) at concentrations exceeding the NJDEPE action level of 10,000 mg/kg for total organic contaminants in four samples located nearest to the containment basin wall in proximity to Tank No. 108. Two of these samples contained TPHC at concentrations approaching saturation.

- The presence of TPHC at concentrations below 10,000 mg/kg but greater than 1,000 mg/kg in seven samples located further away from the containment basin walls.

- The presence of TPHC in the site soils at concentrations below 1,000 mg/kg at locations furthest away from the containment basin wall.

Although many of the BNA results were reported at detection levels above the proposed NJDEPE cleanup criteria and thus could not be quantified for remediation purposes, the presence of Tentatively Identified Compounds (TICs) in the samples suggests that regulated BNA compounds may be present in the site soils at levels that may require remediation. Since the proposed NJDEPE soil cleanup criteria are compound specific (i.e., for BNA) additional confirmatory sampling for these compounds as part of a Remedial Investigation (RI) will be required to supplement the TPHC results and define clear cleanup boundaries for the subsurface soil.

The "fingerprint" analysis of the four soil samples indicated the presence of "diesel oil", with components of No. 2, No. 4, and No. 6 fuel oil confirmed in the samples. The presence of these compounds is consistent with the petroleum fuels that were listed in the Coastal DPCC/DCR Plan as having been stored and blended at the BP facility. Although the petroleum "comparison standards" used by WESTON for the fingerprinting are of contemporary origin and cannot be indisputably tied to fuels that were released 15 years ago, no other organic compounds were identified in the soil samples which would have indicated that the source of the analytes was other than the BP/Coastal storage facility.

Groundwater Sampling and Analysis

Five shallow groundwater monitoring wells and one deep groundwater monitoring well were also installed to:

- Determine groundwater flow direction.
- Detect possible presence of free product on the water table.
- Test for the possible presence of dissolved petroleum product.

The deep well was installed to assess the conditions of the lower water-bearing zone at the site, since this zone is more likely to represent regional groundwater conditions.

Two water bearing zones were identified during the subsurface investigation. Comparing the information from the shallow and deep wells suggests that the deeper water-bearing zone is connected to Newark Bay and that the upper, unconfined water-bearing zone is most likely perched freshwater resulting from percolating precipitation.

Preliminary results indicated a 2 foot layer of floating free product in the shallow monitoring

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well MW-4A, and trace concentrations of organic contaminants in MW-4A and the deep monitoring well MW-4B. These two wells were installed as a pair close to the containment basin wall at the intersections of Port Street and Navy Street. Additional checks by the Port Authority indicated a two inch layer of floating free product in monitoring well MW-5A. All three wells are located close to the containment basin wall near Tank No. 108.

The presence of elevated levels of benzene in the deep monitoring well MW-4B may indicate contamination of the lower water bearing zone in the area. This may be due to a potential pathway between the upper and lower water bearing zones created by foundation piles. Both the containment basin walls and the aboveground storage tanks are probably constructed on load-bearing pile foundations, as indicated by Mr. Guilfoyle of the BP Facility.

To confirm these findings, a second round of groundwater sampling should be performed.

<u>Conclusions and Recommendations</u>

The findings of the SI suggest that the source of contamination in the vicinity of Port Street and Navy Street probably originated within the Tank No. 108 contaminant basin. It is anticipated that an interim groundwater remedial measure (IRM) consisting of the removal of floating free product should be considered after confirmatory analyses. The soil analytical data for TPHC, coupled with field observations, indicate that a soil remedial action will be required in the vicinity of the containment basin wall.

Because of the discovery of regulated compounds on the site in concentrations exceeding NJDEPE cleanup criteria and indications that these compounds probably originated in the BP facility, a Remedial Investigation (RI) will need to be performed pursuant to N.J.A.C. 7:26E-4 et. seq. Planning for the RI would be based on the need to determine the sources and horizontal and vertical extent of contamination.

In addition, WESTON recommends that the Port Authority request from BP copies of all historical and record correspondence with the NJDEPE regarding the 1979 release and any subsequent cleanup and site monitoring actions.

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SECTION 1.0

BACKGROUND

1.1 INTRODUCTION

On October 15, 1992 the Port Authority of New York and New Jersey (Port Authority) notified the New Jersey Department of Environmental Protection and Energy (NJDEPE) that it had discovered evidence of a petroleum release while excavating for a shallow signpost foundation in Port Newark, New Jersey. An oily sheen was observed on the groundwater approximately 5 feet below the ground surface. The suspected release was reported to the NJDEPE; Spill Case No. 92-10-15-1235-22 was assigned.

The release was discovered on property southeast of the intersection of Port and Navy Streets that is leased to Foreign Auto Preparation Service (FAPS) by the Port Authority. The northeastern corner of the intersection is currently vacant and the western side of the intersection is leased to British Petroleum Corp. (BP), who operates a fuel terminal (i.e., bulk petroleum fuel storage and transfer) on the property. The terminal has been in operation since approximately 1930, when it was reportedly operated by the U.S. Navy. Before 13 April 1983 the NJPDES-registered terminal owner and operator was the Coastal Oil Company (Coastal), which was a division of BP North America Trading, Inc. After that date, the ownership and responsibility for the Port Newark Terminal was transferred to BP North America Trading, Inc. when the Coastal division was sold to COC Corp.

As part of a preliminary investigation to define the source and extent of the free product, the Port Authority implemented a qualitative subsurface investigation using a small diameter auger. Starting at the sign location where the sheen was first discovered, borings were performed along the southwestern side of Port Street and the southwestern side of Navy Street. Borings along the two perpendicular lines were spaced at intervals of either 25 feet or 50 feet. Subsequent investigations extended the survey to the southeastern side of the BP facility, into the FAPS lot, and to the northeastern side of the intersection. A visual observation was made of the soil cores removed from each boring as the auger was lifted. This was continued until no visual observations of petroleum were encountered. Neither chemical analyses nor vapor screening of the soil cores were performed. The findings of the preliminary investigation are provided in Appendix A.

Subsequent to the Port Authority's preliminary investigation, Roy F. Weston, Inc. (WESTON®) was requested to perform a Site Investigation (SI) to determine the nature and extent of the contamination, and identify potential sources. The investigation was designed to meet the criteria established in N.J.A.C. 7:26E, Technical Requirements for Site Remediation. The investigation involved a historical review and a field sampling and laboratory analysis program.

1.2 ORGANIZATION OF THIS REPORT

As a result of this network of environmental regulations, the Port Authority undertook the Site Investigation study, as described in this Report; in order to determine the nature and extent of the release observed in the sign post excavation:

- Ascertain if free product is present.
- Sample the soil to determine if an impact due to a release had occurred.
- Sample the groundwater to determine if an impact due to a release had occurred.

Once the scope of the contamination has been determined, a plan to remediate the site would be developed. This remedial plan would incorporate the technical and environmental standards promulgated in the environmental regulation described above.

The remainder of this Report discusses the results of the Site Investigation program as follows:

- SECTION 2 - Summarizes the history of Port Newark and the site and provides a site description that includes the physical setting, an overview of the geology and hydrogeology, and a summary of the findings from a review of available NJDEPE file records.

- SECTION 3 - Discusses the Site Investigation program performed by WESTON, including soil sampling and analysis and reliability of the analysis through quality assurance/quality control processes.

- SECTION 4 - Summarizes the findings of the Site Investigation field and laboratory program and presents the analytical results.

- SECTION 5 - Discusses the conclusions made based on the results of the Site Investigation and gives recommendations for further action.

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SECTION 2.0

HISTORICAL INFORMATION AND PHYSICAL SETTING

2.1 LOCATION AND HISTORY OF PORT NEWARK

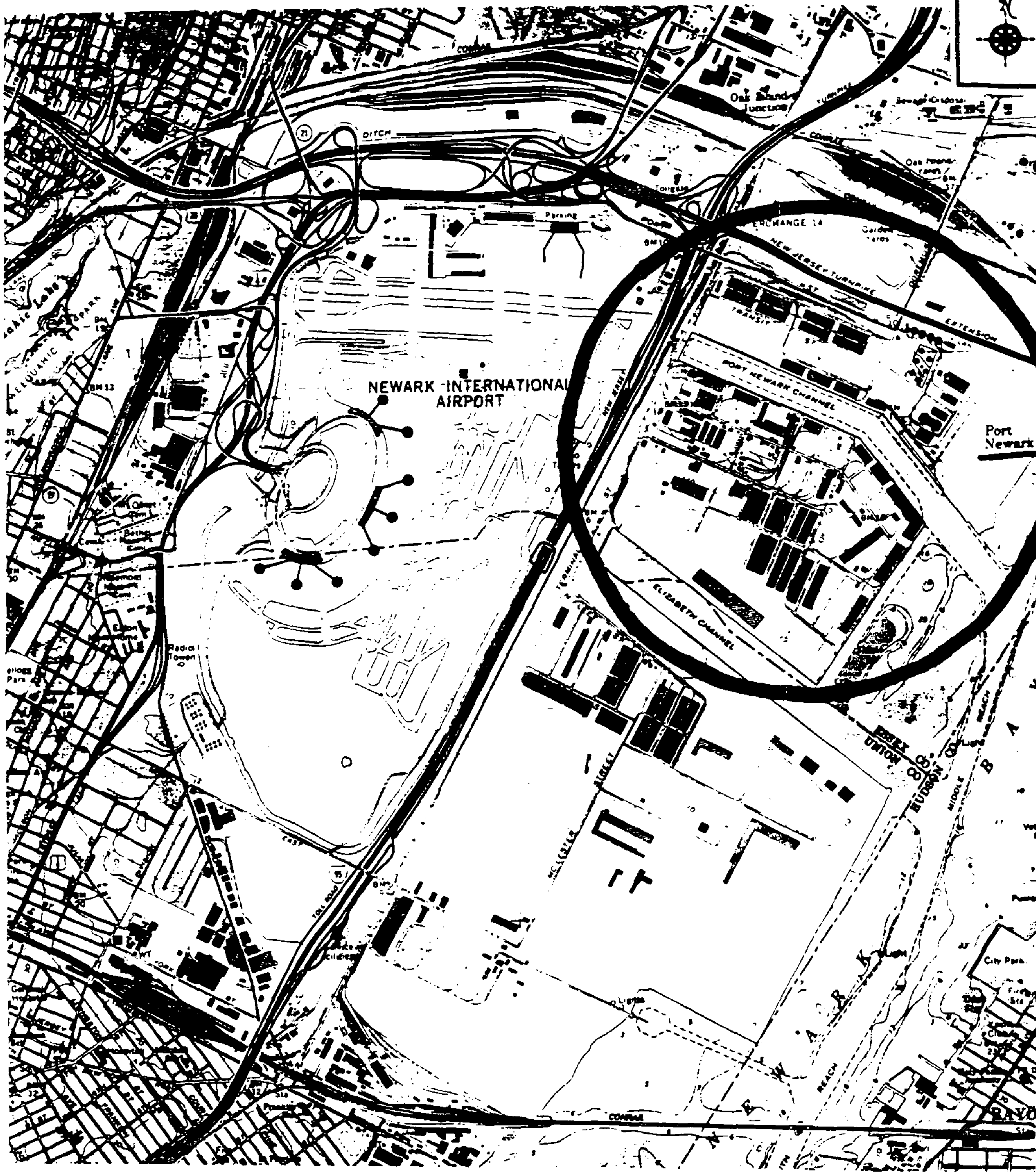
The Port Authority's New Jersey Marine Terminal - Port Newark facility (Port Newark) is a waterfront terminal development located on the western shore of Newark Bay in the City of Newark, Essex County, New Jersey. The facility contains approximately 930 acres of property that includes wharves, deepwater ship berths, transit sheds, open storage areas, distribution buildings, specialized facilities, and railroad trackage.

Port Newark is situated in an extensively developed area of New Jersey, one dominated by domestic and international trade, transportation, and manufacturing. Port Newark is bounded by New Jersey Marine Terminal - Port Elizabeth (Port Elizabeth) to the South, Newark International Airport to the west, the New Jersey Turnpike and Conrail's Garden Yards to the north, and Newark Bay to the east. Figure 2-1 shows the location of Port Newark. Figure 2-2 shows the location of the Port and Navy Street site.

Port Newark was opened by the City of Newark in 1915. The City of Newark leased Port Newark property to the Port Authority on March 27, 1948. The adjacent United States Naval Industrial Shipyard was acquired by the Port Authority in 1963 and is included in the leasehold. Construction of additional berths and related paving in the Naval Shipyard area began in 1971 and was completed in 1978. The Port Authority also developed the southern portion of the Port Newark facility along a channel that adjoins the Port Elizabeth facility. In 1986, the Port Authority and the U.S. Army Corps of Engineers (ACE) signed an Agreement of Local Cooperation for developing Newark Bay to a depth of 40 feet by the ACE. This depth of channel provided the necessary depth for the container ships that call at Port Newark-Port Elizabeth's container ship facilities.

2.2 SITE DESCRIPTION

The Port and Navy Street site is located in the northeastern corner of Port Newark at the intersection of Port Street and Navy Street. Port Newark channel lies approximately 0.4 miles south of the site. Newark Bay is located approximately 0.5 miles east of the site. Properties northwest and southwest of the intersection are occupied by British Petroleum (BP) fuel storage and distribution terminals. The area northeast of the roadway crossing is used as a parking lot for "car carrier" trucks. The lot was formerly occupied by a police and fire station. Southeast of the intersection is the FAPS parking lot and Buildings No. 301 and 321. Building 301 is a storage warehouse owned by the Federation Company. Site details are provided on Figure 2-3.



1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

ELIZABETH, N. J. – N. Y.
N4037.5—W7407.5/7.5
1967
PHOTOREVISED 1981
DMA 6165 II NW—SERIES V822

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MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME:
SUBSURFACE ENVIRONMENTAL INVESTIGATION
PORT STREET AND NAVY STREET
PORT NEWARK, NEW JERSEY
NEWARK, NEW JERSEY

CLIENT NAME:
PORT AUTHORITY OF NY & NJ

REGIONAL LOCATION MAP

DATE: 10-29-93

FIGURE #: 2-1

REVISION #: FILE NAME: FIG 2-1.DWG DATE: DRAWN BY: A. MAKSUT PLOT NAME:

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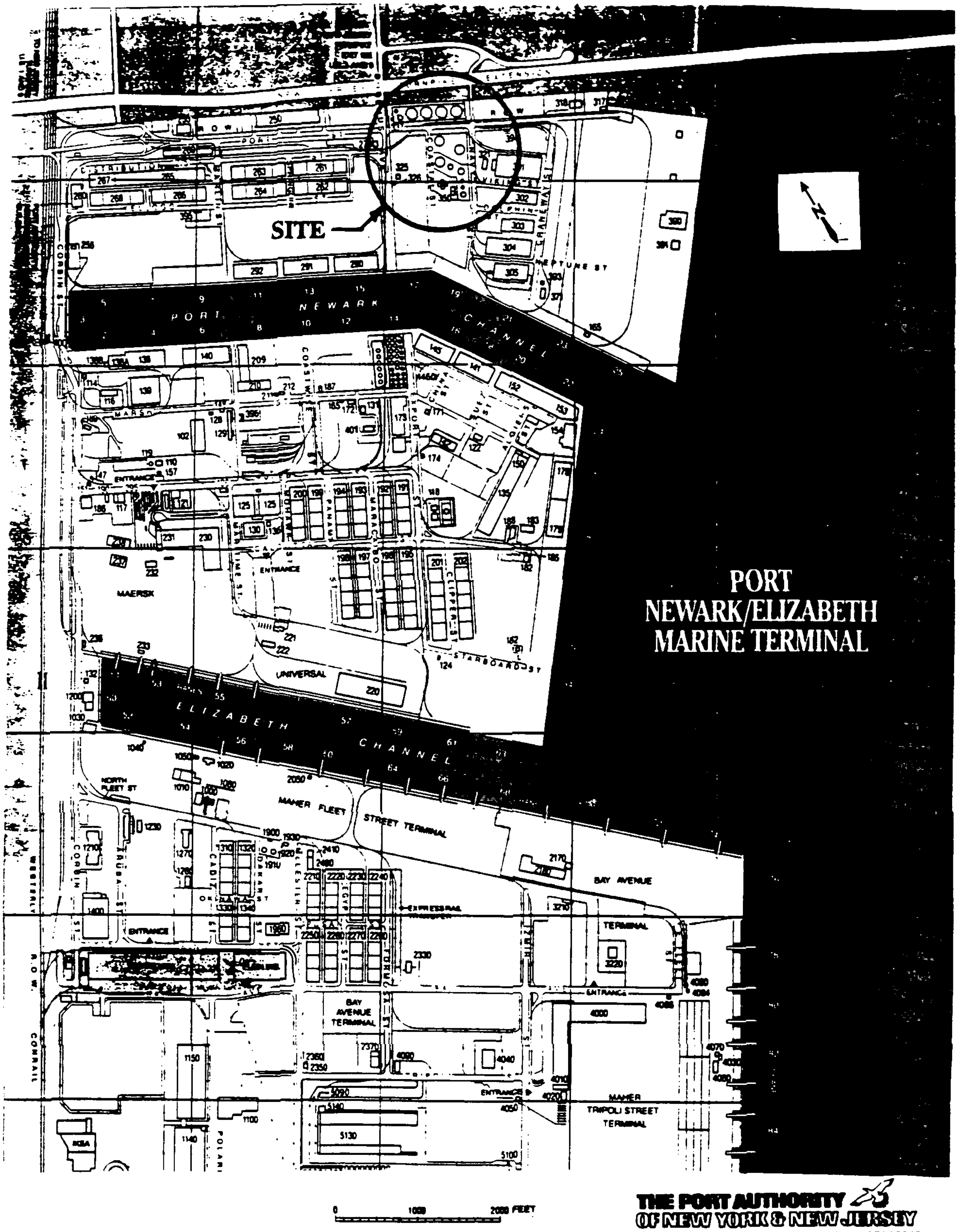

THE PORT AUTHORITY OF NEW YORK & NEW JERSEY
One World Trade Center, 34E, New York, NY 10048

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: SUBSURFACE ENVIRONMENTAL INVESTIGATION PORT STREET AND NAVY STREET PORT NEWARK, NEW JERSEY NEWARK, NEW JERSEY	SITE LOCATION MAP	
	CLIENT NAME: PORT AUTHORITY OF NY & NJ	DATE: 10-29-93	FIGURE #: 2-2

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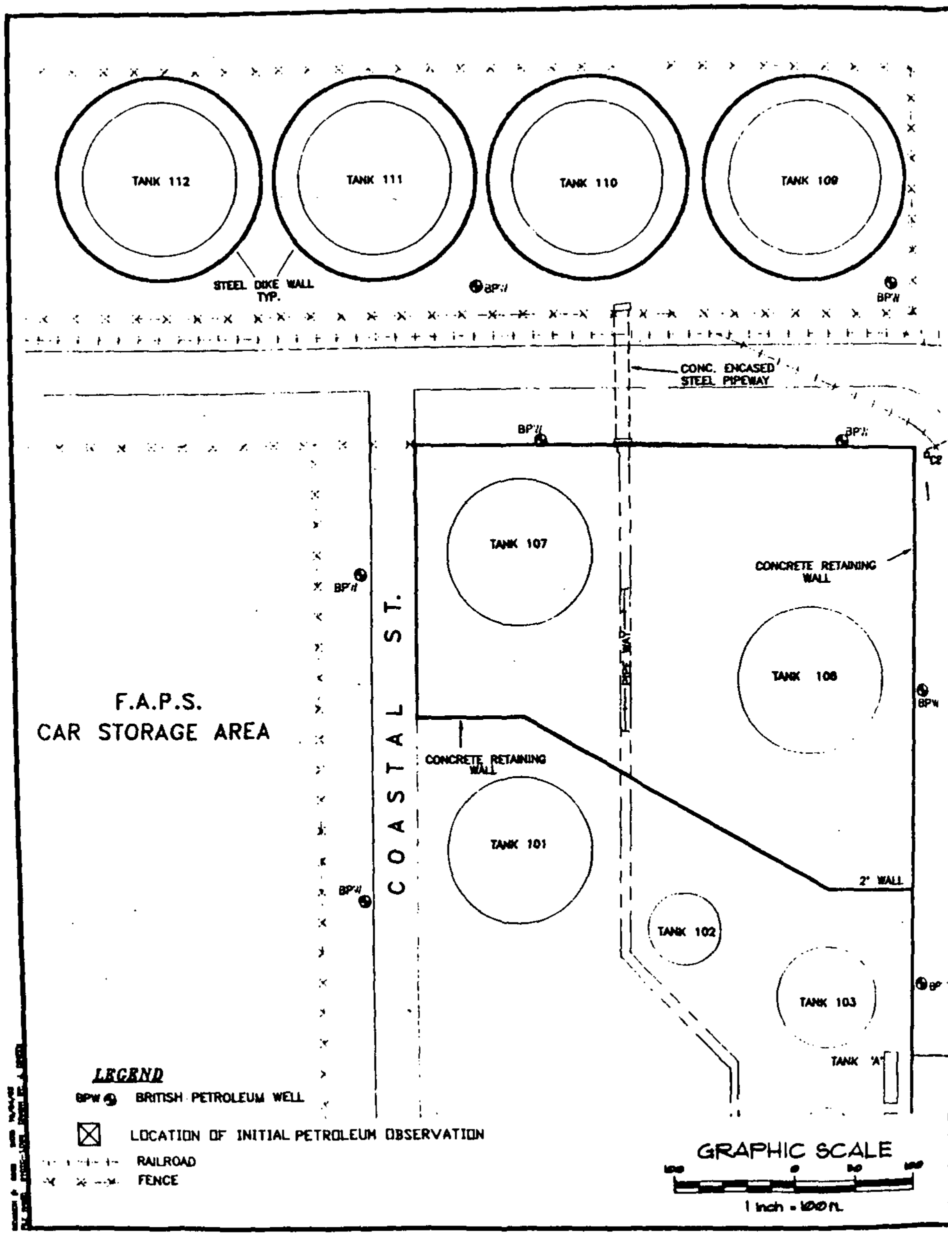

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PROJECT NAME: SUBSURFACE ENVIRONMENTAL INVESTIGATION
PORT STREET AND NAVY STREET
PORT NEWARK, NEW JERSEY
NEWARK, NEW JERSEY

CLIENT NAME: PORT AUTHORITY OF NY & NJ

SITE PLAN

DATE: 10/04/93

FIGURE #: 2-3

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2.3 SITE HISTORICAL INFORMATION

Historical information on the site was gathered from three sources: a walkthrough with BP facility and Port Authority personnel, a review of the Port Authority's Engineering Department Contract Files, and a review of available NJDEPE record files. Each of these is discussed below.

2.3.1 Site Walkthrough

As part of the Site Investigation, representatives of the Port Authority and WESTON visited the site and the adjacent BP terminal and met with the manager of the terminal, Mr. Charles H. Guilfoyle. Mr. Guilfoyle, who reported that he has worked at the terminal for over 30 years, provided some historical information and site details. Mr. Guilfoyle did not provide references for this information. The information provided by Mr. Guilfoyle consisted of the following:

- The large aboveground storage tank (Tank No. 108), located in close proximity to the suspected release, had ruptured in 1979 and released its contents into the containment basin. The tank had reportedly stored No. 2 oil during and after the Second World War. According to Mr. Guilfoyle, its contents at the time of the release was reportedly No. 6 oil. The concrete containment basin's walls (approximately 10 ft. high) are constructed on piles whose top (butt) elevations are approximately 3 to 4 feet below the street elevation. Coastal reported the release to the NJDEPE. In order to collect and dispose of the oil, the basin was flooded with water to float and skim the oil. The oil was then recovered and the water trucked off site. The basin floor was excavated to the water table and refilled with a clayey soil to reduce permeability. The type and condition of the original basin floor's soil is not known. During the walkthrough a "post hole" in the northeastern corner of the basin, which was dug into the basin's earth floor down to the water table, was observed beneath a piece of plywood by WESTON and the Port Authority. Mr. Guilfoyle pointed out that the groundwater could be seen to be free of any sheen through this hole. He did not comment on the potential impact of the hole on the basin's containment integrity.

- No. 2 oil is stored in tanks on the northern side of the terminal. This oil is transferred across Port Street through buried underground pipes to the southern side of the terminal.

2.3.2 Review of Available Port Authority Engineering Department Files

WESTON also performed a limited records search of the Port Authority's Engineering Files to gain information about other physical structures in the area. Since the Port Authority did not build the facility but acquired it approximately 18 years after initial construction, the available information was limited. The information that was obtained consisted of the following:

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- A fuel "bunker," consisting of several tanks (550-gallon and 2,000-gallon) or a vault is located to the south of the railroad track on the eastern side of Navy Street. This structure is reportedly registered for fuel storage by the U.S. Army and provides fuel service to Building 301. Neither its present nor historical contents are known.

2.3.3 Review of Available NJDEPE Record Files

On behalf of the Port Authority, WESTON requested a review of available files from the following Departments within the NJDEPE:

- Division of Water Resources.
- Division of Responsible Party Site Remediation.
- Division of Hazardous Waste Management.
- Office of Legal Affairs.
- Metropolitan Bureau of Water and Hazardous Waste Enforcement.
- Department of Groundwater Well Permits.

WESTON reviewed files at the Division of Water Resources and Department of Groundwater Well Permits. Requests for reviews are still pending at the Division of Responsible Party Site Remediation, Office of Legal Affairs, and the Metropolitan Bureau of Water and Hazardous Waste Enforcement.

At the Division of Water Resources, WESTON reviewed the BP/Coastal file (NJPDES NJ0034231) and the General File for Newark/Essex County. At the Department of Groundwater Well Permits, WESTON reviewed the well installation records. There was no file on record for BP/Coastal at the Division of Hazardous Waste. Information copied from the files is provided in this Report as Attachment 1, located in front of Appendix A in this Volume. The following is a summary of the information obtained from the reviews.

- Division of Water Resources

    - Coastal had submitted three revised DPCC/DCR Plans to the NJDEPE between 1979 and 1981. The newest revision in the file, dated August 4, 1981, included the following statement, "Facility has experienced one reportable discharge in last year. Incident reported as required..."

    - A Summary Report on the facility DPCC/DCR Plans, prepared by Surya Shah of the Bureau of Industrial Waste Management, stating "This facility was purchased from Coastal Oil Company in October 1980...In 1979, under different ownership, there was a 4 million gallon fuel oil spill." The file did not contain information to determine the source of information used by Mr. Shah for his Summary Report.

- Information in the DPCC/DCR Plans indicated that Tank No. 108 has a volume of approximately 4,000,000 gallons, and that it stored No. 4 fuel oil around the time of the release.

- Letter from W.C. Myers (BP North America Trading) to the NJDEP, dated 13 April 1983, advising NJDEP that the Coastal Oil Company, which was a division of BP North America Trading, Inc. has been sold to COC Corp...ownership and responsibility for the Port Newark Terminal, which has been known as the Coastal Oil Company, Port Newark Terminal will remain with BP North America Trading, Inc."

- Letter from Paul C. Kurisko (NJDEP) to Mr. C. Guilfoyle (BP) dated 8 June 1987 regarding the facility's Final NJPDES-BMP Modification DPCC/DCR Plan NJ0034321. This letter granted permission to BP to implement DPCC/DCR Plans submitted September 1984 (not in file) along with a Best Management Practices (BMP) submitted in letter format 27 May 1986. With this Modification, 12 additional Special Conditions were stipulated, two of which require:

  1) A study of the permeability of the soils within the diked areas within 3 months...to also determine the depth of the groundwater...and shall state whether or not the liner is impermeable as defined under N.J.A.C. 7:1E-4.2. Waterflooding may not be used in place of an impermeable lining.

  2) A plan and schedule to bring all diked areas into compliance with the N.J.A.C. 7:1E regulations.

- The file did not appear to contain information answering these requirements.

- Department of Groundwater Wells

  - Well construction logs for 17 shallow (each 11 feet deep) groundwater monitoring wells installed for British Petroleum Co. by Handex Corp. in November 1986. Exact coordinate locations were not given with the logs.

2.4 PORT NEWARK GEOLOGY AND HYDROGEOLOGY

The Port Newark Geology described in the following section is based on information provided by the Port Authority Engineering Department and work previously performed at the site. Port Newark was built over a tidal marsh deposit consisting of very weak and compressible organic silts and peats extending from about mean high water to a depth of 10 to 30 feet. The organic deposits are generally underlain by a medium dense, fine grained sand or silty sand with a thickness of five feet or more. Below the sand are glacial lake deposits and bedrock. The glacial lake deposits consist of reddish-brown silts and clays, frequently varved. Bedrock is soft, red shale, and occurs at depths ranging from 40 to 100 feet.

The site location and surrounding area are essentially flat, with elevations between 307.8 feet to 303.7 feet. Mean high water elevation in Newark Channel is 300 feet (elevation is referenced to Port Authority datum system). The Port Authority datum is 2.653 feet above mean sea level (0.0 ft.) at the Sandy Hook, New Jersey reference station. The Sandy Hook reference datum is established by the National Oceanic and Atmospheric Administration, National Ocean Service.

Beginning in 1913, the area was systematically filled with dry hydraulic fill. The fill first placed on the tidal marsh was generally dredge soil excavated during the construction of Port Newark channel. In certain areas, miscellaneous fill was placed by dumping and spreading on the virgin marsh.

Subsequent to the initial filling, fine to medium sand was used to fill areas to present grade. Current average elevations at Port Newark range between 303 and 308 feet.

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SECTION 4.0

FINDINGS OF THE FIELD PROGRAM

4.1 OVERVIEW

Forty one borings and six monitoring wells were installed across the Port and Navy Street site. During the subsurface investigation soils were screened visually for stains or saturation by petroleum products and screened with instruments using an HNu photoionization detector (PID). Petroleum or petroleum residues and odors were observed in twenty-one of the forty-one borings. For borings where visual observations of suspected petroleum was observed, the Hnu PID field screening data, Materials Laboratory TPHC screening results, and NYTEST analytical laboratory TPHC results are summarized in Table 4-1. The complete list of HNu PID readings, which are provided in Appendix B, showed readings that ranged from 0 units to 150 units above background with the majority of the readings between 0 units and 10 units above background.

Summary Tables for the soil and groundwater analytical data are provided at the end of Section 4.0.

4.2 SOIL ANALYTICAL RESULTS

A total of 27 samples were selected and delivered to NYTEST for confirmatory laboratory analysis based on visual observations of samples in the field, HNu PID readings, and screening results of soils using the Port Authority Materials Department TPHC analyzer, as discussed in Section 3.3. The samples were analyzed for TPHC, volatile organic compounds (VO+10), base/neutral/acid extractable compounds (BNA), and total lead. The following sections summarize the finding of the laboratory analyses and compare these findings to NJDEPE soil cleanup criteria. Analytical data packages are provided in Appendix D.

4.2.1 Total Petroleum Hydrocarbon (TPHC)

Analytical results indicate that elevated levels of TPHC in soils were observed closest to the containment basin wall and decrease with distance away from the containment basin wall. Confirmatory laboratory analysis for TPHC indicated four samples contained TPHC at concentrations greater than 10,000 mg/kg, with the highest detected concentration being 29,600 mg/kg (soils containing TPHC at a concentration of 30,000 mg/kg or more are considered to be "saturated" and would be classified as a New Jersey "X series" hazardous waste if disposed of). All four samples were from soil borings located closest to the containment basin wall, as depicted in Figure 4-1. Since TPHC is one component of "total organic compounds", TPHC results can be used to make a preliminary delineation of the potential area impacted, as depicted in Figure 4-1.

TABLE 4-1
FIELD DATA AND LAB TPHC ANALYSIS FOR BORING LOCATIONS IN WHICH PETROLEUM OR PETROLEUM RESIDUE WAS SUSPECTED

BORING NUMBER	HNu READINGS	TPHC ANALYZER RESULTS mg/kg	LAB TPHC RESULTS mg/kg
B-3	1 unit	97	SNR
B-4	10 units	22	261
B-5	35 units	510	SNR
B-6	50/40 units	>1000	6410
B-7	150/50 units	>1000	29600
B-8	4 units	29	SNR
B-12	0 units	405	186
B-17	50 units	59	SNR
B-18	35 units	72	267
B-19	150 units	48	8530
B-20	35 units	21	284
B-21	25 units	484	SNR
B-22	0 units	68	324
B-23	70/5 units	>1000	28300
B-27	25 units	>1000	2630
B-31	35 units	>1000	4740
MB-4	50 units	54	19400
MB-5	15 units	>1000	18000
MB-6	25 units	>1000	2020
MB-7	15 units	48	SNR
MB-10	6 units	>1000	477

SNR = Sample Not Run
BGS = Below Ground Surface
50/40 indicates readings in the upper/lower portion of the sample.

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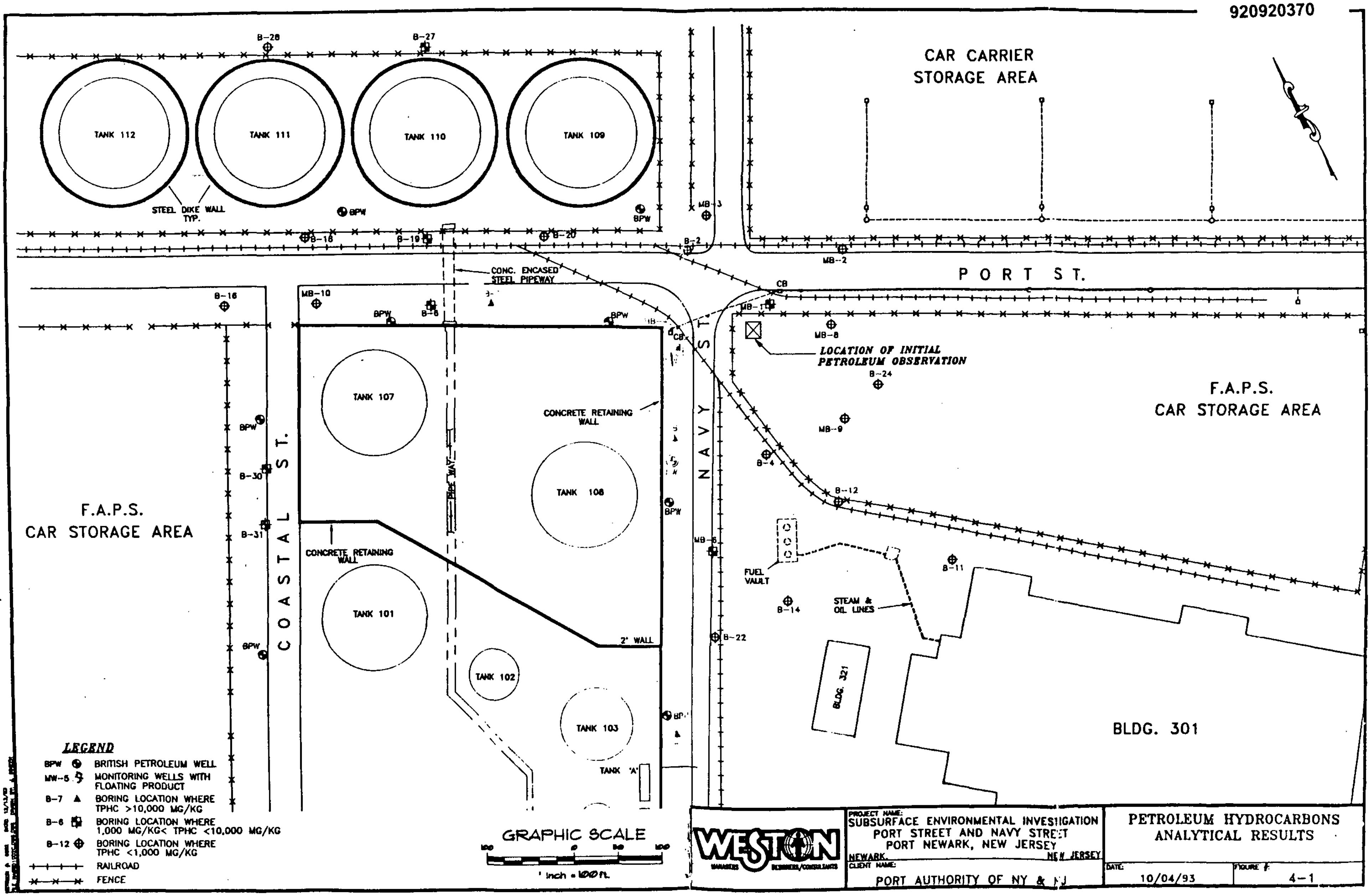

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An additional seven (7) soil samples exhibited TPHC concentrations between 1,000 mg/kg and 10,000 mg/kg. Six (6) of these samples were collected from soil borings located either in close proximity to the containment basin wall or the BP transfer pipelines which extend beneath Port Street. The seventh was located next to Tank No. 110, one of the tanks located to the north of Port Street. Locations of these samples are depicted on Figure 4-1.

The remaining 16 soil samples did not indicate TPHC concentrations above 1,000 mg/kg.

4.2.2 Volatile Organic (VO+10) Compounds

VO+10 were found to be below the NJDEPE's impact to groundwater soil cleanup criteria.

4.2.3 Base/Neutral/Acid Extractable (BNA) Compounds

During preparation for analysis at NYTEST, 11 of the 27 samples analyzed for BNA compounds were diluted before analysis such that it was not possible to determine if chemical specific (BNA) soil cleanup criteria were exceeded. While seven of these samples also indicated TPHC concentrations greater than 1,000 mg/kg, four did not, preventing their use in determining whether the soils associated with those four samples exceed NJDEPE soil cleanup criteria.

The presence of elevated concentrations of Tentatively Identified Compounds (TICs) in most of the soil samples correlates with the elevated TPHC results.

4.2.4 Total Lead

Analysis for total lead indicated concentrations in soil samples ranged from 13.1 to 796 mg/kg. NJDEPE's proposed impact to groundwater soil cleanup criteria does not currently have a value for lead.

These soil analytical results are summarized in Tables 4-2 to 4-4 at the end of Section 4.0.

4.3 SOIL ANALYTICAL RESULTS FOR DIESEL FUEL FINGERPRINT PARAMETERS

Fingerprint analysis indicated that the petroleum hydrocarbons found in the soil samples were generally indicative of weathered diesel fuel, or a combination of diesel fuel and fuel oils No. 4, No .5, and No. 6. These findings are consistent with the types of fuel and oil that were listed in Coastal DPCC/DCR Plans as having been stored at the facility and suggest that the contaminants in the area probably originated at the terminal. Analytical results for the fingerprint samples are presented in Appendix E.

4.4 GROUNDWATER ANALYTICAL RESULTS

A total of six (6) groundwater samples were delivered to NYTEST for analysis. The samples were analyzed for total petroleum hydrocarbons (TPHC), volatile organic compounds (VO+10), base/neutral/acid extractable compounds (BNA), and total lead. A summary of analytical results is presented in Table 4-5 at the end of Section 4.0. Laboratory analytical data results for the groundwater samples are provided in Appendix F.

4.4.1 Free Product Determination

A layer (estimated 2 feet thick) of floating free product was observed in the shallow monitoring well MW-4A, which is located just outside the containment basin wall in proximity to Tank No. 108. Evidence of a few inches of free product was independently observed in the shallow monitoring well MW-5A by the Port Authority, which is also just outside the containment basin wall near Tank No. 108. The presence of free product in these two shallow monitoring wells correlates with the apparent subsurface soil depression and contour discussed in Subsection 3.2.1, and the apparent direction of flow of the shallow groundwater illustrated on Figure 3-5.

4.4.2 Volatile Organic and Base/Neutral/Acid Extractable Compounds

The analytical results indicated the presence of benzene in the deep monitoring well MW-4B and bis(2-ethylhexyl)phthalate in the shallow monitoring well MW-4A at concentrations exceeding promulgated NJDEPE Class II-A groundwater cleanup standards for the respective compounds.

The analyses also indicated the presence of methylene chloride in all shallow well groundwater samples at estimated concentrations greater than the groundwater cleanup standards for that compound. Also detected in the laboratory (method blank) QA/QC sample, methylene chloride in the method blank indicates that this compound appears to be present as a laboratory artifact in the samples. In addition, the presence of 2-propanone (acetone) in the method blank indicates this compound appears to be present as a laboratory artifact in the samples collected from the shallow groundwater monitoring wells MW-1, MW-2, MW-3, MW-4A, and MW-5. Table 4-6, at the end of Section 4.0, summarizes the abbreviations and data qualifiers used in Tables 4-2 through 4-5.

No other regulated volatile organic compounds or BNA compounds or floating free product were detected.

4.4.3 Tentatively Identified Compounds

In both VOA and BNA analyses, TICs were reported at various concentrations.

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4.5 ANALYTICAL DATA VALIDATION

The analytical data obtained from NYTEST was reviewed using data validation procedures published in CLP Organics Data Review and Preliminary Review - SOP No. HW-6, Revision No. 8, USEPA Region II, 1992. The findings of the review, which could potentially impact direct use of the data are as follows:

4.5.1 Soil Samples

- The elevation of practical quantitation levels (PQLs) reported for samples B31 S2, B7 S1A, and MB5 S1 were due to a 1:5 dilution of the samples before analysis.

- Although methylene chloride and acetone were detected in some soil samples, their concentrations were less than 10 times those corresponding concentrations detected in the method blanks and/or the associated field blanks. As a result, the sample results were qualified as not detected (flag = u) at the reported concentrations. For the same reason, toluene was qualified as not detected at the appropriate PQLs, being corrected for the percent moisture.

- Target compound 2-chloroethyl vinyl ether was not analyzed for in the soil samples.

- NYTEST had difficulty concentrating the extract from two soil samples, MB-6 S1 and MB-1 S1. These were analyzed at a final volume of 10.0 ml. The samples were subsequently analyzed at a 1:4 dilution resulting in a final dilution of 1:40 and elevated quantitation levels of 15,000 ug/kg and 20,000 ug/kg, with a correction for the percent moisture, respectively.

- With the exception of samples MB-6 S1 and MB-1 S2, all samples show BNA contaminants at various concentrations.

- Samples for which estimated "J" values were reported may have contained analytes of concern in concentrations exceeding regulatory criteria but may not have been quantified because most of the soil samples were analyzed at 1:2 dilution. If the quantitation levels had not been corrected for the dilution factor, many of the BNA compound concentrations may have exceeded the uncorrected quantitation levels and would not have been reported as estimated "J" concentrations.

4.5.2 Groundwater Samples

- Although methylene chloride and acetone were detected in some samples, their concentrations were less than ten times those in the method blank. As a result, all the methylene chloride results were qualified as not detected at 5 ug/L (5u). With the exception of sample MW-4B, the acetone results were qualified as not detected at 10 ug/L (10u) for MW-5 and not detected at the concentration reported for MW-1, MW-2, MW-3 and MW-4A.

- NYTEST did not analyze for 2-chloroethyl vinyl ether, a target compound in Method 8240.

- NYTEST noted that crystals were formed during the extraction of sample MW-2 but did not provide an explanation as to their cause. This finding might have caused the low surrogate recoveries (<5%) in the sample analysis. Due to the low recoveries, the reported non-detects should be considered unusable (R).

TABLE 4-5 (CONTINUED)

SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES COLLECTED ON JULY 21 AND 22, 1993 PORT AND NAVY STREET SITE, PORT NEWARK, NEWARK, NEW JERSEY

Sample ID Number		MW-1	MW-2	MW-3	MW-4A	MW-4B	MW-5	NJDEPE Groundwater Cleanup Standards Class IIA - Groundwater
Lab ID Number		1755801	1755802	1755803	1755804	1759501	1755805	
Matrix		Water	Water	Water	Water	Water	Water	
Depth (Feet BGS)		NA	NA	NA	NA	NA	NA	
Analytical Parameters	Units							
Base/Neutral Compounds								
bis(2-chloroethyl)ether	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0
Hexachloroethane	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0
Nitrobenzene	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0
1,2,4-Trichlorobenzene	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	9.0
Hexachlorobutadiene	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	1.0
2-Methylnaphthalene	ug/l	10.0 u	10.0 u	10.0 u	13.0 T	8.0 J	10.0 u	NLE
Dibenzofuran	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	2.0 J	10.0 u	NLE
2,4-Dinitrotoluene	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0
2,6-Dinitrotoluene	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0
Hexachlorobenzene	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0 u	10.0
bis(2-Ethylhexyl)phthalate	ug/l	3.0 J	2.0 J	10.0 u	75.0 T	10.0 u	4.0 J	30.0
Naphthalene	ug/l	10.0 u	10.0 u	10.0 u	10.0 u	64.0 T	10.0 u	NLE

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TABLE 4-4 (CONTINUED)
BASE NEUTRAL ACID EXTRACTABLE ANALYTICAL RESULTS
FOR SOIL SAMPLES COLLECTED MAY 10 THRU 21, 1993

SAMPLE I.D. NO.	B2-S1	MB4-S1	MB5-S1	B16-S2	B18-S1	B19-S2	B20-S1	MB2-S2	MB3-S3	B12-S1	NJDEPE Draft Impact to Groundwater Soil Cleanup Criteria (ug/kg)
Lab I.D. No.	1673801	1673802	1673803	1680301	1680302	1680303	1680304	1680305	1680306	1680307	
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	
Depth (ft bgs)	0-2	0-2	0-2	2-4	0-2	2-4	0-2	2-4	4-6	0-2	
Parameter (ug/kg)											
4-Chlorophenyl phenylether	400 U	2000 U	2100 U	410 U	970 U	1700 U	1600 U	410 U	900 U	730 U	NS
4-Nitroaniline	1900 U	11000U	10400U	2000 U	4900 U	8700 U	8100 U	2000 U	4500 U	3700 U	NS
di-n-Octyl phthalate	400 U	2000 U	2100 U	410 U	970 U	1700 U	1600 U	410 U	900 U	730 U	100000
Naphthalene	400 U	1400 J	2100 U	410 U	970 U	1700 U	270 U	97 J	170 J	190 J	100000
Acenapthylene	30 J	2000 U	2100 U	30 J	75 J	1700 U	1600 U	410 U	93 J	96 J	NS
Acenapthene	400 U	7500 T	2100 U	410 U	970 U	2500 T	1600 U	410 U	900 U	350 J	100000
Fluorene	400 U	81000T	2500 T	410 U	970 U	1800 T	1600 U	410 U	900 U	440 J	100000
Phenanthrene	68 J	20000T	1800 J	46 J	67 J	3200 T	290 J	110 J	230 J	3500 T	NS
Anthracene	400 U	3600 T	2100 J	25 J	220 J	670 J	1600 U	410 U	87 J	580 J	500000
Fluoranthene	130 J	6900 T	450 J	110 J	120 J	2900 T	450 J	300 J	470 J	3700 T	500000
Pyrene	120 J	3000 T	420 J	60 J	130 J	810 J	210 J	130 J	170 J	2500 T	500000
Benzo(a)anthracene	65 J	2000 T	2100 U	65 J	190 J	880 J	200 J	140 J	210 J	1300 T	500000
Chrysene	130 J	2700 T	1200 J	94 J	180 J	1400 J	310 J	250 J	330 J	1700 T	500000
Benzo(b)fluoranthene	400 U	2000 U	2100 U	61 J	95 J	920 J	270 J	260 J	220 J	1400 T	500000
Benzo(k)fluoranthene	400 U	2000 U	2100 U	58 J	970 U	740 J	180 J	140 J	170 J	780 T	500000
Benzo(a)pyrene	400 U	980 J	2100 U	62 J	970 U	780 J	210 J	120 J	210 J	970 T	100000

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FINAL
TECHNICAL SUPPORT DOCUMENT
FOR THE CLASS II-B
GROUNDWATER RECLASSIFICATION PETITION
ELIZABETH PORT AUTHORITY MARINE TERMINAL

FEBRUARY 1998

Prepared for:

ENGINEERING DEPARTMENT
PORT AUTHORITY OF NEW YORK AND NEW JERSEY
One World Trade Center - 72nd Floor
New York, New York 10047

BBA000004

Prepared by:

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W.O. No. 02527-050-002-0001

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EXECUTIVE SUMMARY

The Port Authority of New York and New Jersey (Port Authority) is filing a petition to reclassify shallow groundwater beneath the area occupied by Newark International Airport (EWR) and the Elizabeth Port Authority Marine Terminal (EPAMT). This petition has been prepared in accordance with the provisions of the New Jersey Administrative Code (N.J.A.C. 7:9-6). The petition seeks to amend N.J.A.C. 7:9-6.5 and designate the shallow groundwater beneath the proposed reclassification area as a Class II-B Classification Area. This will change the shallow groundwater in the reclassification area from a Class II-A to a Class II-B designation.

The proposed reclassification area occupies the former Newark Meadows. The area is bounded on the east by Newark Bay, on the north by the New Jersey Turnpike Extension and Interstate 78, and on the west by State Highway Routes 1 and 9. To the south the area extends just beyond the southern extent of EPAMT. Intense industrial development has occurred in the reclassification area since the 1920s. Industrial development of the area has included, and for the most part required, the placement of fill materials over the natural marsh deposits of the Newark Meadows. The nature of historical fill material placement in this area has varied widely from controlled structural soil fill placed for foundation support, to municipal waste landfilling activities, to miscellaneous construction and demolition debris disposal.

Placement of fill over the natural marsh deposits has caused the formation of the shallow groundwater-bearing zone for which this petition is being filed. The shallow groundwater occurs as a thin low-yielding saturated zone within the man-placed historic fill. The shallow groundwater saturated zone is less than 10 feet thick. Because the unit was created by the filling of the former Newark Meadows, the underlying marsh deposits, or meadow mat, provide a fine-grained low-permeability bottom for the shallow groundwater throughout the reclassification area. This low-permeability bottom serves to hydraulically isolate the historic fill from surrounding and underlying water-bearing units.

The shallow groundwater-bearing zone is a thin saturated zone that is not capable of producing significant or economically viable quantities of water by pumping from wells. The accumulation of the groundwater in the miscellaneous fill has also had an impact on the quality of the shallow groundwater, particularly in comparison to the groundwater that occurs in the surrounding natural geologic formations. The inherent impact of the historic fill materials, combined with impacts from other industrial activities conducted in the area such as bulk fuels storage and handling, has caused the shallow groundwater to not meet the New Jersey Department of Environmental Protection (NJDEP) Class II-A Groundwater Quality Standards (GWQSs) on an areawide basis. These conditions create a hydrogeologically unique regime, which meets the requirements for reclassification to a Class II-B area.

Class II-B groundwater is defined as groundwater that has little or no current use or potential use in the foreseeable future, has widespread exceedance of the NJDEP Class II-A GWQSs such that current remedial technologies are insufficient, and has a minimal potential to impact downgradient receptors. Existing hydrogeologic data demonstrate that the shallow groundwater-bearing zone beneath the area occupied by EWR and EPAMT and contiguous lands, meets the requirements for reclassification. NJDEP-published guidance for Class II-B groundwater reclassification identifies five areawide characteristics that must be demonstrated. Each of the five characteristics required for reclassification are stated below along with a summary of the existing conditions that demonstrate each characteristic.

1. Groundwater Quality Exhibits Extensive Exceedances of One or More of the Groundwater Quality Criteria as a Result of Past Discharges

   - Existing shallow groundwater quality data from 218 wells in the reclassification area were compiled from available reports. These data have indicated numerous exceedances of the Class II-A GWQSs throughout the reclassification area. Geostatistical analysis of the existing data demonstrated that within 80% of the reclassification area there is a greater than 80% probability of encountering groundwater contaminated above NJDEP Class II-A GWQSs.

   - Furthermore, in the course of filling the Newark Meadows, municipal wastes, construction and demolition debris, industrial wastes, and dredge spoils have been disposed of in the area of reclassification, creating a source of areawide shallow groundwater contamination. These fill deposits have been recognized as having impacted the shallow groundwater in the reclassification area.

2. Groundwater Restoration Cannot Be Achieved Using Technologically Practicable Means

   - Due to the large area that has been affected (approximately 10 square miles), remediation is not technically or financially feasible. The low hydraulic conductivity and thin saturated zone cause the shallow groundwater to have poor yield characteristics. The poor yield characteristics greatly inhibit and limit the effectiveness of conventional groundwater recovery and treatment systems, hydraulic control stations, bio-augmentation technologies, or other active remediation methods. Therefore, the application of currently available remedial approaches is technically impracticable and economically infeasible. For example, a remediation system based on groundwater collection from well points may require 550,000 well points and may cost $275 million.

   - The reclassification area is underlain by historic fill, which includes construction and demolition debris, trash from former municipal landfills, industrial wastes, and dredge spoils. Both of these are sources of contamination, especially inorganic compounds.

Although an exact estimate of the volumes of the demolition debris and trash does not exist, the debris and trash underlie most of the 10 square miles of the reclassification area. Consequently, a remedial approach such as excavation and treatment or disposal, or containment and stabilization are technically and financially impracticable, because they would require excavation or some form of in-situ or ex-situ treatment of almost the entire 10 square miles of reclassification area.

3. <u>There Are or Will Not Be Any Potable Uses of the Groundwater for Reclassification</u>

- No public community supply wells or zones of contribution for such wells exist within the proposed reclassification area. All potable water used in the proposed reclassification area and surrounding region is imported from off-site. There are no registered production wells within the limits of the proposed reclassification area.

- The potential use of the historic fill as a future potable water supply is not anticipated. Saltwater intrusion into the bedrock aquifer from historic overpumping has rendered the bedrock aquifer unusable beneath and around the proposed reclassification area.

- The Port Authority, which operates in most of the reclassification area, does not have any plans to develop the shallow groundwater resources or to require the future use of groundwater in the area. Both the City of Newark and the City of Elizabeth are supplied by surface water, originating outside the region. Neither city plans to develop groundwater resources. Both cities indicated that they have adequate capacity from existing surface water sources for the next 25 years.

4. <u>No Significant Risk of Pollution Migration into Class I, II-A, or III-A Areas</u>

- There is no risk of pollution migration to an aquifer of higher water quality. The underlying middle sand and bedrock groundwater are isolated from the historic fill groundwater by the meadow mat and silt and clay layers. In addition, because the reclassification area is situated along Newark Bay in a regional discharge zone, the groundwater flow gradients will be upward from the deeper aquifers to the shallow groundwater. The upward flow gradients further preclude migration into the underlying middle sand and bedrock. There are no Class I, II-A, or III-A areas between the reclassification area and where the shallow groundwater discharges into Newark Bay.

5. <u>Natural Attenuation Can Be Relied on to Restore Groundwater Quality for Criteria Identified Pursuant to Characteristic No. 1</u>

- The organic contamination consists of low levels of petroleum hydrocarbon compounds, which have been demonstrated to be readily biodegradable and amenable to natural attenuation. Whereas inorganic contaminants do not biodegrade, they will be adsorbed onto the soil matrix. Soil/water partitioning coefficients and solubility data for the inorganic contaminants of concern indicate that these analytes are generally moderately mobile to immobile and have a moderate to high affinity for soils. Because groundwater flow gradients are exceedingly low, most of the dissolved-phase contaminants are expected to be adsorbed or biodegraded before reaching the discharge zone.

- **The contaminants of concern are arsenic, cadmium, chromium, lead, and benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds.** The analysis of the migration potential of the contaminants of concern indicates that the dissolved organic compounds will degrade and the inorganic compounds will be immobilized before the groundwater discharges to Newark Bay. It is estimated that the dissolved contaminant concentrations will attenuate to undetectable levels within a 20-year time frame. Within 20 years the groundwater will have traveled a total distance of only 20 feet. Furthermore, a 50,000-times dilution is estimated for groundwater discharging into Newark Bay surface water. At this rate of dilution, any contaminants that reach the surface water will have no effect on surface water quality.

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SECTION 1.0

INTRODUCTION

1.1 BACKGROUND

On behalf of the Port Authority of New York and New Jersey (Port Authority), Roy F. Weston, Inc. (WESTON®) has prepared this report to provide the technical background in support of the reclassification petition for the shallow groundwater beneath the Newark International Airport (EWR) and the Elizabeth Port Authority Marine Terminal (EPAMT) from Class II-A to Class II-B. This reclassification area occupies the former Newark Meadows and has undergone intense industrial development since the 1920s.

As a result of industrial activities, shallow groundwater beneath EWR and EPAMT does not meet the New Jersey Department of Environmental Protection (NJDEP) Groundwater Quality Standards (GWQSs) for Class II-A Groundwaters (February 1993) on an areawide basis. In accordance with the provisions of the New Jersey Administrative Code (N.J.A.C. 7:9-6), the Port Authority is petitioning NJDEP to reclassify the shallow groundwater in this area from Class II-A to Class II-B. Class II-B groundwater is defined as groundwater that has little or no current use or potential use in the foreseeable future, has widespread exceedances of the NJDEP Class II-A GWQSs such that current remedial technologies are insufficient, and has a minimal potential to harm downgradient receptors. The Port Authority believes that the area occupied by EWR and EPAMT meets the requirements for reclassification. This report discusses, in detail, the justification for meeting these requirements.

1.2 SITE SETTING AND HISTORY

The proposed reclassification area is located in a heavily industrialized area of Newark, Essex County and Elizabeth, Union County, New Jersey. The area is occupied mostly by EWR and EPAMT. Other features that overlie the area include portions of U.S. Routes 1 and 9 and the New Jersey Turnpike. The area is bordered by Newark Bay to the east, the New Jersey Turnpike Extension and Interstate 78 to the north, and State Highway Routes 1 and 9 to the west, and extends just beyond the southern extent of EPAMT to the south. Industrial, commercial, and residential areas of the cities of Newark and Elizabeth lie beyond the western and southern boundary, respectively. The proposed reclassification area occupies approximately 10 square miles. Figure 1-1 presents an area location map.

EPAMT, which includes Port Newark and Port Elizabeth, is a waterfront terminal development located on the western shore of Newark Bay. The facility consists of approximately 930 acres of property that includes wharves, deep-water ship berths, transit sheds, open storage areas, distribution buildings, specialized facilities, and railroad tracks. Port Newark was opened by the City of Newark in 1915. The City of Newark leased Port Newark property to the Port Authority beginning on 27 March 1948. The adjacent United States Naval Industrial Shipyard was acquired by the Port Authority in 1963 and is included in the leasehold. Construction of additional berths and related paving in the Naval Shipyard area began in 1971 and was completed in 1978. The Port Authority also developed the southern portion of the Port Newark facility along a channel that adjoins the Port Elizabeth facility. This developed area is also included in the reclassification area.

The EWR complex is comprised of paved surfaces (roads, runways, and parking lots), buildings, and support structures covering approximately 2,200 acres. The portion of EWR that falls within the County of Essex is under a lease with the City of Newark; the remaining portion (in Union County) is owned by the Port Authority. Current functions of the structures at the airport include passenger terminals, maintenance garages, storage areas, aircraft hangars, vehicle and aircraft maintenance facilities, aircraft fuel storage facilities, air cargo areas, and ancillary facilities.

The City of Newark built EWR in 1928. Construction began on the initial 68-acre unit in 1927, which included a 1,600-foot asphalt-topped runway and a hangar. In 1935 a new administration building was built, and after modifications for passenger use, the airlines transferred their operations to it. During the 1940s and World War II, the runway and other facilities were further expanded by the military. In 1967, an ambitious expansion program was initiated, which included the construction of new runways, passenger terminals, and parking and support facilities.

Prior to the construction of the EPAMT and EWR facilities (and features such as the New Jersey Turnpike and Route 1), the area was occupied by a salt marsh. The "bleak marshland" was progressively "reclaimed" by filling with debris and refuse. The Mosquito Control Commission was instrumental in the filling of the salt marshes in Essex and Bergen Counties. Land management practices of the time encouraged the draining of the marsh, application of oil to stagnant water pools to kill mosquito larvae, and the ultimate filling of the marsh with demolition debris, industrial wastes, and trash to create land for industrial development. Large portions of both EPAMT and EWR tracts were utilized for municipal and industrial waste disposal. Dredging spoils from the adjacent harbor were also utilized as fill. These activities began in the latter part of the 19th century and were continued up until the 1970s.

1.3 HYDROGEOLOGIC SETTING

Five hydrostratigraphic units have been identified beneath the reclassification area. These units include historic fill, meadow mat, middle sand, silt and clay, and bedrock. Figure 1-2 presents a generalized stratigraphic column of the geology in the petition area.

Historic fill varies from absent to 53 feet in thickness across the area, with an average thickness of approximately 10 feet. The fill can be divided into an upper and lower unit. The upper unit is sandy and the lower unit clayey. The upper fili is a mixture of hydraulic fill from dredging operations in Newark Bay, "sanitary" landfill materials, historic fill from construction of the Verrazano Bridge, and demolition debris from local construction projects. The lower fill is a mixture of hydraulic fill from dredging operations in Newark Bay, historic fill from construction of the Verrazano Bridge, and demolition debris from local construction projects. The upper fill contains a saturated zone under phreatic (water table) conditions. The lower fill is usually saturated and is a semiconfining bed, thereby impeding the vertical migration of groundwater and contaminants.

The meadow mat is grayish brown, dark brown to dark gray, laminated organic silt with an admixture of peat and lenses of peat and sandy organic silt. This unit is composed of tidal marsh and tidal c.eek deposits. The meadow mat is usually saturated, and because of its clayey consistency, acts as a confining bed. It is sandy in the northeastern section of Port Newark, where sand from the Passaic River has mixed with the tidal marsh deposits. On average, the meadow mat occurs approximately 10 feet below ground surface (bgs). This unit varies from absent to 33 feet thick, with the average thickness between 5 and 10 feet. The thickest section of meadow mat is in an elongated zone north-northwest of the EWR terminal complex, under the western end of Runway 11-29. Generally, the meadow mat thickens towards the east and south. This unit is locally absent in an area southeast of the EWR passenger terminal complex, under the southern end of Runway 4R-22L.

The middle sand is composed of gray to brown silty sand to gravelly sand, and locally contains beds or lenses of organic silt or grades into sandy silt. This unit is saturated and is a confined or semiconfined water-bearing unit. It represents post-glacial fluvial sedimentation, and it generally occurs at approximately 20 feet bgs. The middle sand varies from absent to 57 feet thick. Its average thickness ranges between 7 and 15 feet. The middle sand tends to thicken towards the east. It is absent under the terminal complex at EWR, in a zone in the central portion of Runway 4R-22L, and in small areas to the east of the New Jersey Turnpike.

The glaciolacustrine silt and clay is composed of thin laminae (varves) of silt and clay, with local sandy or gravelly zones. The silt and clay unit was deposited in glacial lake Hackensack, and according to the New Jersey Geological Survey, it is the main sedimentary mappable unit in the petition area (Standford et al., 1990). The silt and clay unit acts as a confining layer. This unit varies from absent to 95 feet thick, with the ave.age thickness of the varved silt and clay being 20 to 30 feet. The unit thins to the west, and is draped against the glacial moraine that underlies Elizabeth, Hillside, and Newark. The silt and clay unit is absent along the western edge of the tidal marsh, southwest of the EWR terminal co.nplex. . It is frequently underlain by 3 to 15 feet of gravelly, sandy, silty clay till. This glacial till is a relatively impermeable unit but is discontinuous.

The bedrock underlying EWR and EPAMT is red shale of the Brunswick Formation. The depth to bedrock varies from 34 to 113 feet under EWR and EPAMT. The bedrock is the major aquifer in the area of EWR and EPAMT (Nichols, 1968; Nemickas, 1976). The bedrock is separated from the shallow aquifer by the thick sequence of the silt and clay (glaciolacustrine) sediments. The Brunswick Formation has been dewatered in the Newark area because of past overpumping. The pumping has resulted in high chlorides due to saltwater intrusion from the Passaic River and Newark Bay in the Newark area (approximately 1 mile upstream from EPAMT) (Herpers and Barksdale, 1951). Dredging of ship channels for navigation has probably removed impermeable Recent and Pleistocene deposits along the shipping channels, allowing saltwater intrusion into the bedrock from the river and bay (Nichols, 1968). The nearest commercial public water supply well is in the City of Roselle, 2.5 miles to the west-southwest of EWR (Nemickas, 1976). The public water supply in Roselle is located outside the hydraulic region that is the subject of this study.

Several industrial wells were identified within 1 mile of EWR and EPAMT (Nichols, 1968 and Nemickas, 1976). These wells also pump from the bedrock, and are isolated from the EWR and EPAMT shallow groundwater. These wells are no longer in use because of the saltwater intrusion.

1.4 HORIZONTAL AND VERTICAL LIMITS OF THE PETITION AREA

Figure 1-1 illustrates the horizontal extent of the proposed reclassification area. In general, the proposed area of reclassification encompasses all of the property designated as EWR and EPAMT. The area is essentially semispherical in shape and includes a total of approximately 3,130 acres. The proposed area is bounded by latitudes 40° 39' 35" N and 40° 42' 00" N and longitudes 74° 07' 30" W and 74° 11' 35" W. The eastern border of the area is Newark Bay. The northern border of the area is delineated by Interchange 14 of the New Jersey Turnpike, the New Jersey Turnpike Extension, and Interstate 78, while the western border is delineated by State Highway Routes 1 and 9. The southern border extends just beyond the southern property boundary of EPAMT.

The groundwater to be reclassified is limited to the shallow groundwater contained in the historic fill material underlying the proposed area. The vertical limit of this groundwater is defined by the meadow mat layer, which is consistent throughout the proposed area. Based on available boring logs, the top of the meadow mat ranges from approximately 280 feet to approximately 310 feet local elevation datum. Local elevation datum 300 feet corresponds to 2.653 feet above mean sea level (msl) at Sandy Hook.

1.5 POTENTIAL RECEPTORS

There are no potable, commercial, or industrial wells located within the reclassification area, or in an area that is hydraulically connected to the proposed reclassification area. The lack of current and planned use of shallow groundwater makes the surface water and sediment in Newark Bay the two most important potential receptors of shallow groundwater from the proposed reclassification area. Surface waters considered to be potentially affected by the groundwater reclassification include the Peripheral Ditch and Newark Bay. In addition, a few wetland areas remain along the Peripheral Ditch, and limited tidal flat areas still remain in the northern portion of EPAMT.

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SECTION 2.0

INDUSTRY-SPECIFIC INFORMATION

Most of the proposed reclassification area is operated by the Port Authority. Roads such as the New Jersey Turnpike and Routes 1 and 9 are owned by the New Jersey Department of Transportation (NJDOT). Other private owners of land within the proposed reclassification area include IKEA, Inc. A portion of the area is owned by the City of Newark and leased by the Port Authority. In order to determine the current uses of the property above the proposed reclassification area, WESTON obtained tenant lists from the Port Authority for the areas that encompass the petition area. The Port Authority also provided historical reports and data from all environmental investigations that have taken place within the proposed reclassification area. In addition, WESTON obtained an environmental database search from Environmental Data Resources, Inc. (EDR) for the entire petition area. The following section presents the environmental regulatory status of the proposed petition area, including detailed information concerning facilities that occupy the petition area.

2.1 PARTIES INCLUDED IN THE PETITION

The reclassification petition is being filed by the Port Authority. Other parties within the proposed reclassification area that are not responsible for filing the petition include NJDOT, the New Jersey Turnpike Authority, and IKEA, Inc. Tables 2-1 and 2-2 present a listing of current tenants that occupy Port Authority-owned facilities at EWR and EPAMT, respectively. The listing of tenants is subject to change. Plates 1 and 2 present detailed maps of EWR and EPAMT, respectively.

2.2 SOURCES OF POLLUTION

To determine the potential sources of groundwater contamination in the petition area, WESTON reviewed available Port Authority files for EWR and EPAMT. In addition, WESTON conducted an environmental database search for the petition area through EDR. WESTON also consulted the most recent (January 1997) list of Known Contaminated Sites in New Jersey. The purpose of these activities was to identify active discharges to groundwater, source removal or aquifer restoration projects completed or under way, areas of known groundwater contamination, or remedial activity occurring in response to regulatory programs. The results of each activity are presented below.

2.2.1 Environmental Database Search

All of the facilities identified in the EDR database search as lying within the reclassification area are located on EPAMT and EWR. Table 2-3 lists the facilities located on EPAMT and EWR that were found in at least one of the environmental databases searched by EDR. Numerous other facilities were identified immediately adjacent to and surrounding the reclassification area. A summary of the results is presented below. Only those databases where sites were listed are presented. Appendix A presents the EDR database map depicting the approximate location of each of the sites.

EPA National Priorities List Database

The National Priorities List (NPL) is the United States Environmental Protection Agency (EPA) listing of uncontrolled or abandoned hazardous waste sites identified for remedial action under the Superfund program. A search of this database identified no NPL sites located on EWR or EPAMT.

EPA RCRIS Database

The EPA Resource Conservation and Recovery Act Information System (RCRIS) database is a compilation of reporting facilities that generate, transport, store, or dispose of hazardous waste. A total of 34 facilities on EPAMT and 26 on EWR were listed in the RCRIS database.

EPA CERCLIS Database

The EPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list is a compilation of sites that EPA has investigated or is currently investigating regarding releases or threatened releases of hazardous substances pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. A search of this database identified three CERCLIS sites within the limits of EPAMT and none on EWR.

RCRA Corrective Action Activity (CORRACTS) Database

The RCRA Corrective Action Activity Database (CORRACTS) is a database listing handlers that have had corrective action activities. A search of this database identified one RCRA CORRACTS site on EPAMT property and none on EWR.

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Leaking Underground Storage Tanks Site Database

NJDEP maintains a database for leaking underground storage tanks (LUSTs) in the state. The LUST database identified 11 sites on EPAMT and 15 on EWR.

Solid Waste Facilities/Landfill Sites Database

NJDEP maintains a list of landfill and solid waste disposal sites. One solid waste or transfer station site was identified within the property boundaries of EPAMT, and none were identified on EWR.

Registered Underground Storage Tanks Site Database

NJDEP maintains a database of all registered underground storage tanks (USTs). A search of this database identified a total of 25 USTs on EPAMT and 10 on EWR.

Facility Index System Database

The Facility Index System (FINDS) database contains both facility information and indicators leading to other sources of information. A total of 39 sites on EPAMT and 13 on EWR were listed in the FINDS database.

Hazardous Materials Information Reporting System Database

The U.S. Department of Transportation maintains the Hazardous Materials Information Reporting System (HMIRS) Database, which contain all reported hazardous materials spill incidents. The HMIRS database listed three reported spills on EPAMT and none on EWR.

State Hazardous Waste Site Database

NJDEP maintains the State Hazardous Waste Site (SHWS) Database, which lists the known contaminated sites in New Jersey. A total of four sites were identified by EDR on EPAMT property. The date of the EDR version of the database is February 1996. WESTON reviewed a current version (January 1997) of the Known Contaminated Sites in New Jersey. Based on this review, a total of 25 known contaminated sites were identified on EPAMT and EWR. Table 2-4 presents a summary of these results.

CERCLA No Further Remedial Action Planned Database

In February 1995, CERCLIS sites designated as No Further Remedial Action Planned (NFRAP) were removed from the CERCLIS database. The CERC-NFRAP database identified three sites on EPAMT and none on EWR.

Major Facilities Database

NJDEP maintains a list of sites designated as major facilities in the State of New Jersey. One major facility was identified on EPAMT property.

Toxic Chemical Release Inventory System Database

EPA maintains the Toxic Chemical Release Inventory System (TRIS) Database, which lists facilities that release toxic chemicals to the air, water, and land in reportable quantities. The TRIS database listed one facility on EPAMT and none on EWR.

Toxic Substances Control Act Database

The Toxic Substances Control Act (TSCA) Database identifies manufacturers and importers of certain chemical substances. The TSCA database listed two facilities located on EPAMT and none on EWR.

Nearby Facilities

The EDR database report also identified a number of facilities within 0.25 mile of the proposed reclassification area boundary. Table 2-5 presents a list of these facilities, which summarizes current facility information. The EDR database search identified 15 facilities that operated USTs; 5 of these facilities were listed on the LUST database. All of the USTs for which contents were reported contained petroleum products. A total of 15 RCRA generators were located within 0.25 mile of the proposed reclassification area. One RCRA treatment, storage, and disposal facility (TSDF) was identified. Also identified within the search area were three state hazardous waste sites, two major facilities, and two sites that were assigned NFRAP recommendations under CERCLA. Based on the proximity of the above sites to the proposed reclassification area, there is a potential that these sites may have impacted the groundwater quality in the proposed reclassification area.

2.2.2 Port Authority File Review

WESTON obtained from Port Authority historical file information concerning groundwater contamination, remedial activity, NJDEP oversight, and enforcement activities. A summary of the information obtained is presented below.

2.2.2.1 EWR

Terminals A and B

In early 1980, jet fuel product was detected in the sumps that collect water from under-drain systems at Terminals A and B. To determine the source of the free product, 45 groundwater monitoring wells were installed in the area. The study concluded that leakage from the hydrant pits for the fuel supply lines was responsible for the release of the jet fuel. All hydrant pits were repaired by the mid-1980s. Monitoring of groundwater levels and free product thickness has continued on a regular basis. A March 1993 Summary Report for the area indicates that product thickness and rate of product removal had decreased over the 10-year period. In addition, groundwater levels had risen slightly.

In April 1996, 20 additional monitoring wells were installed in the area and were sampled to determine the extent of liquid- and dissolved-phase jet fuel and benzene, toluene, ethylbenzene, and xylenes (BTEX) in groundwater. The results of this effort delineated the extent of the liquid-phase jet fuel and indicated that the free product plumes in some locations may have shifted, possibly as the result of groundwater elevation changes. Figure 2-1 presents an illustration of the plumes identified. The horizontal extent of dissolved BTEX in groundwater was determined, and concentrations outside of the contaminant plumes were generally found to be below detection limits. Based on the data collected during this study, a remedial alternative evaluation is planned.

To coordinate management of subsurface remediation issues at EWR, the Port Authority has entered into a memorandum of agreement (MOA) with NJDEP. This MOA outlines NJDEP's oversight role regarding the conduct of subsurface remediation activities at EWR by the Port Authority.

Newark 2000

As part of the redevelopment program at EWR (Newark 2000), 11 soil borings and 3 monitoring wells were installed at various locations throughout the EWR property to evaluate necessary methods for handling excavated soil and groundwater during the development process. In each of the borings, one soil sample was collected from near the ground surface, one from just above the water table, one from just above the organic silt layer (meadow mat), and one from within the meadow mat, for a total of four samples per boring. Each soil sample was analyzed for total petroleum hydrocarbons (TPH), Extraction Procedure (EP) Toxicity, explosivity, reactivity, and polychlorinated biphenyls (PCBs). Analytical results of the soil samples indicate elevated levels of TPH and EP Toxicity lead in the area of Parking Lot E, in the parking lot in front of Terminal C, and near Parking Lot D.

Groundwater samples from each of the monitoring wells were collected and analyzed for TPH, reactivity, explosivity, PCBs, and Priority Pollutant List (PPL) organics and metals. TPH was detected in all three groundwater samples collected; however, the highest detection was 6.6 parts per million (ppm). No other contaminants were detected in any of the groundwater samples collected.

Building 79 Vehicle Fueling Station

In September 1991, Port Authority representatives reported a leak of approximately 1 gallon of leaded gasoline from Tank No. 22, one of three gasoline USTs located in the northeast corner of EWR between Buildings 11 and 79. The NJDEP Spill Case No. assigned to the tank is 91-9-16-1018-22. A discharge investigation was conducted, and a Discharge Investigation and Corrective Action Report (DICAR) was prepared in August 1992. During the investigation, four soil borings and four monitoring wells were installed in the vicinity of the USTs. Two soil samples were collected from each boring, and one groundwater sample was collected from each well. All soil and groundwater samples were analyzed for volatile organic compounds (VOCs), methyl-tertiary-butyl-ether (MTBE), tertiary butyl alcohol (TBA), semivolatile organic compounds (SVOCs), and Priority Pollutant metals. Analytical results of the soil samples indicated the presence of VOCs (not detected to 8.185 milligrams per kilogram [mg/kg]), SVOCs (0.360 mg/kg to 97.75 mg/kg), TPH (170 mg/kg to 588 mg/kg), and lead (353 mg/kg). Analytical results of the groundwater samples indicated the presence of total VOCs (102 micrograms per liter [μg/L] to 5,587 μg/L), total SVOCs (1 μg/L to 45 μg/L), and TPH (1 milligrams per liter [mg/L]).

Building 10 USTs

Four USTs were located adjacent to Building 10 in the north-central portion of the EWR property. The USTs consisted of one 6,000-gallon gasoline tank (No. 19), one 6,000-gallon diesel tank (No. 20), one 10,000-gallon gasoline tank (No. 18), and one 10,000-gallon diesel tank (No. 17). In 1986, Tank No. 19 failed a tightness test and a discharge was reported to NJDEP; Case No. 86-04-20-09M was assigned. In July 1993, all four tanks were removed. During removal, gasoline odors were reportedly noticeable, and groundwater was observed entering the tank through a large hole in the tank wall. A total of 10 post-excavation soil samples were collected from the base of the excavation and analyzed for VOCs and lead. Analytical results of the soil samples indicated the presence of total xylenes (not detected to 1,060 mg/kg), ethylbenzene (not detected to 55 mg/kg), toluene (not detected to 44 mg/kg), and lead (3.1 mg/kg to 33 mg/kg). No groundwater samples were collected during the investigation.

Building 51 USTs

In October 1992, two 4,000-gallon No. 4 fuel oil USTs were removed from an area adjacent to Building 51 in the northeast corner of the EWR property. Free product and stained soil were observed in the excavation. Due to the presence of the free product, no samples were collected. The excavation was backfilled with the contaminated soil generated during removal activities, and the area was secured.

South Fuel Farm

The South Fuel Farm is located in the southwestern portion of the EWR property. The fuel tanks were constructed in 1968. Prior to construction of the tanks, the meadow mat in this area was removed, and the area was regraded with sand fill. In 1993, a study was conducted to determine the amount of free product fuel in the subsurface underneath the fuel farm. Up to that time, a total of 90,000 gallons of fuel had been recovered over a 10-year period at the site. It was determined that approximately 250,000 to 500,000 additional gallons of fuel could be recovered through conventional pumping techniques. This value represented approximately half of the estimated free product in the subsurface. The time necessary to complete the fuel recovery process is now being determined.

Runway 4L-22R Extension

In November and December 1994, a geotechnical and environmental investigation was conducted south of Runway 4L-22R as part of an expansion project. The objective of the study was to determine subsurface soil conditions in the unsaturated zone beneath the project area. During the investigation, no visible indications of USTs, stressed vegetation, or previous spills were identified. The investigation involved the installation of 19 borings and 5 test pits. An additional four borings were also installed in stockpiled soil located near the project area to determine appropriate disposal requirements. Soil sample analytical results indicated TPH levels that ranged from 23 ppm to 2,900 ppm. BTEX was not detected in any of the soil samples collected. None of the waste characterization samples exceeded Toxic Characteristic Leaching Procedure (TCLP) criteria. Based on these results, the subsurface and stockpiled soils were characterized as Below Regulatory Concern Category.

2.2.2.2 EPAMT

Port Street and Navy Street Intersection

In October 1992, the Port Authority notified NJDEP that it had discovered evidence of a petroleum release on a property southeast of the intersection of Port and Navy Streets. An oily sheen was observed on the groundwater in a shallow excavation at a depth of approximately 5 feet below grade. The suspected release was assigned Spill Case No. 92-10-15-1235-22. A site investigation was initiated to determine the nature and extent of contamination and to identify potential sources. Based on the location and nature of the contamination, the adjacent BP North America Trading, Inc. fuel terminal aboveground storage tanks (ASTs) were determined to be the source of the contamination. A fingerprint analysis of four soil samples collected in the area indicated the presence of diesel oil, with components of No. 2, No. 4, and No. 6 fuel oil confirmed in the samples. Preliminary results indicated a 2-foot-thick layer of free product in the shallow monitoring well nearest the AST containment basin. Groundwater samples collected from shallow (surficial fill) and deep (middle sand) monitoring wells indicated the presence of benzene in the deep well at a concentration above the NJDEP Class II-A GWQS. Low levels of TPH and trace levels of VOCs were detected in the shallow monitoring well samples. A remedial investigation was recommended as a follow-up to the site investigation.

182 Calcutta Street

Operations conducted at 182 Calcutta Street prior to 1992 consisted of tire storage and shredding and rock salt storage. In addition, three 2,000-gallon USTs were reported to be located on the property. A preliminary assessment of the property was conducted in 1992 to establish background soil and groundwater conditions. Twelve soil borings and four monitoring wells were installed at the property during assessment activities. Soil samples were collected from 0 to 12 inches bgs and 1 foot above the water table in each boring. Soil samples were analyzed for TPH, BTEX, TCLP metals, PCBs, and SVOCs. Analytical results of the soil samples indicated the presence of TPH (not detected to 4,120 mg/kg), toluene (not detected to 2,040 micrograms per kilogram [μg/kg]), total xylenes (not detected to 2,270 μg/kg), naphthalene (not detected to 936 μg/kg), 2-methylnaphthalene (not detected to 3,911 μg/kg), and TCLP barium (not detected to 1.14 mg/L). One groundwater sample was collected from each of the four wells on-site. Analytical results of the groundwater samples indicated the presence of TPH (not detected to 0.45 mg/L), benzene (not detected to 105 μg/L), ethylbenzene (not detected to 1.9 μg/L), toluene (not detected to 6.5 μg/L), and xylene (not detected to 10.3 μg/L).

UST Closures

A number of USTs were removed from various areas across EPAMT. Analytical results of subsurface soil and groundwater samples collected during a majority of the removals indicated the presence of VOCs, SVOCs, TPH, and metals in the soil and groundwater underlying EPAMT.

SECTION 3.0

LAND AND WATER USE

3.1 AREA HISTORY

Historically, the proposed reclassification area had been occupied by an extensive salt marsh. Near the turn of the century, the industrial development in the greater Newark area generated a need for land on which to erect factories and access to means of bulk shipping. At the same time, public health concerns put a pressure on the authorities to manage the mosquito population of the area. To address these issues, an effort was initiated to reclaim the marshlands along Newark Bay. This program included the oiling of stagnant pools, the draining of the marsh, and the filling of the drained areas. Of particular significance to this petition is the filling of the marsh. These activities continued up until the 1970s.

To generate land suitable for industrial development, the marsh was filled with municipal and industrial waste, demolition debris, and (later) dredging spoils. In the early part of the century, these activities were sporadic and unfocused. A 1930 map of the "Newark Meadows" prepared by the New Jersey Department of Conservation and Development shows a single large tidal wetland area covering all of the proposed reclassification area, extending south to Port Elizabeth and east to Newark Bay. Starting in approximately 1935, three distinct areas of EWR were used for the dumping of mixed refuse, including liquid wastes, from the adjacent cities of Newark and Elizabeth. During the same time period, dredge spoils were also deposited. Dumping continued in some locations until the early 1950s. In addition, at least one section of EPAMT near Kapkowski Road was reportedly used as a landfill that also accepted liquid wastes.

The photos from 1961 and the 1970s show filling activities more representative of landfilling occurring near the southern boundary of the proposed reclassification area, in the area near the present-day IKEA building. This correlates with reports that the City of Elizabeth operated a landfill in this area. In addition, the Port Authority has indicated that certain areas on the current EWR property were used for landfilling purposes in the past. Many of these areas were reported to have accepted liquid waste. The constituents of any of the waste deposited in the proposed reclassification area are unknown. Figure 3-1 presents the areas of the EWR property that are known to have been used for landfilling activities. Figure 3-2 is a schematic representation of landfill, known contaminated site locations, and free-phase product plumes.

3.2 AREA LAND USE

The proposed reclassification area and surrounding areas are heavily developed and industrialized, with few of the original natural features remaining. Land use classifications for the area include industrial, commercial, and transportation. This land use extends beyond the limits of the reclassification area. Figure 3-3 presents a summary of the land use classifications for the petition area and the areas immediately surrounding the petition area.

3.3 GROUNDWATER USE

Based on a well search conducted at the NJDEP Bureau of Water Allocation, NJDEP Geographic Information System (GIS) data, and conversations with local water departments, no public community supply wells or zones of contribution for such wells were identified within the proposed reclassification area. All potable water used in the proposed reclassification area is imported from off-site, from sources outside the petition area. All potable and industrial groundwater wells in the region draw from the bedrock aquifer, which is not hydraulically connected to the reclassification area. Because of the very low groundwater yields from this historic fill, which is evidenced by a small saturated thickness, long recovery times in monitoring wells, and the presence of dry wells at Building 220 (EPAMT), the saturated zone of the historic fill has no potential as a future potable water supply.

According to the New Jersey State Water Quality Inventory Report (NJDEP 1988), the reclassification area is not identified as one or part of any of the State's Drainage Basins or Watersheds.

3.4 SURFACE WATER USE

The proposed reclassification area is bounded to the east by Newark Bay, which is used extensively for commercial shipping activities. Newark Bay receives freshwater flow from the Hackensack and Passaic Rivers, and is hydrologically contiguous with the Arthur Kill and Kill Van Kull to the south. Estuarine intertidal flats are located along the shores of Newark Bay both north and south of the Port Newark and Elizabeth terminals, while the Great Ditch (south and west of the proposed reclassification area) is mapped by the U. S. Fish and Wildlife Service (USFWS) as estuarine intertidal open water, indicating that it is tidally influenced and supports minimal wetland vegetation.

The Peripheral Ditch surrounds the property occupied by EWR. This manmade drainage ditch is approximately 8 feet deep and 80 feet wide, and was constructed to drain the EWR property and some upland areas during the airport expansion in the 1970s. The Peripheral Ditch provides the principal means of surface water conveyance for an area of approximately 10 square miles, including EWR and industrial/commercial facilities in and adjacent to the petition area (Killam 1995). The ditch flows south and eastward through a tidal gate at the Elizabeth Channel, and into Newark Bay. Killam Associates identified several industrial point source discharges to the Peripheral Ditch, as well as the potential for five combined sewer overflows (CSOs) from the City of Newark and one from the City of Elizabeth to discharge to the Ditch.

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The Peripheral Ditch is not used for recreational purposes. Access to the Peripheral Ditch is controlled and limited. Neither Newark Bay nor the Peripheral Ditch is used as a potable water source, nor is it likely that they will ever be used for such a purpose, due to their salinity and degraded characteristics.

SECTION 5.0

GROUNDWATER QUALITY/NATURAL ATTENUATION

5.1 GROUNDWATER QUALITY

WESTON reviewed available information on shallow groundwater quality within the vicinity of the proposed reclassification area. The following summary of groundwater quality is based upon data obtained from a variety of sources related to UST investigations, site remedial studies, and other environmental investigations where groundwater sampling was conducted within the surficial fill water-bearing zone. All of the data evaluated were developed by New Jersey certified laboratories. Most of the sampling events included the collection and analysis of appropriate Quality Assurance/Quality Control (QA/QC) samples, including field blanks and trip blanks. Based on this, the analytical data used for groundwater quality evaluations are believed to be of known and defensible quality for comparison purposes.

Groundwater quality within the historic fill is impacted by the fill material used to develop what was formerly an extensive tidal marsh area. NJDEP has acknowledged the pervasive metals contamination of the shallow groundwater as a result of historic filling throughout the area (Appendix B). Shallow groundwater quality data from within the proposed reclassification area were compared with NJDEP GWQSs for Class II-A groundwater. This comparison shows that several petroleum-derived compounds and metals in the shallow groundwater exceed the standards. These compounds are listed in Table 5-1.

Benzene was the most common petroleum-related compound detected in groundwater within the shallow zone, with an average concentration of 1,141.36 μg/L. This average concentration exceeds the benzene GWQS of 1 μg/L by more than 10 orders of magnitude. Lead was the most common metal detected in the surficial groundwater, at an average concentration of 799.79 μg/L. This average concentration of lead is more than 70 times greater than its GWQS. However, these are arithmetic means, which are conservative. Geometric means, which are more appropriate for log-normally distributed data, were calculated for the compounds with more than 10 GWQS exceedances. As shown in Table 5-1, the geometric means are significantly lower than the arithmetic means, indicating that although there are extensive exceedances of GWQSs, the magnitude of these exceedances is moderate. As Table 5-1 indicates, methylene chloride was the most frequently detected compound. However, methylene chloride is a common laboratory contaminant. As most of the detections were low-level, it is reasonable to assume that they are laboratory artifacts. Therefore, methylene chloride is not considered a significant contaminant in the shallow zone.

Both benzene and lead can be directly related to releases of gasoline. However, lead can also be related to the historic fill. The Port Authority has been advised by NJDEP that lead concentrations detected in the shallow groundwater may be related to the historic fill rather than to facility operations. The other more widely distributed compounds occurring at average concentrations exceeding the NJDEP GWQSs include arsenic, cadmium, chromium, and BTEX compounds. It is likely that many of the metals detected at exceedance levels in groundwater originated in contaminated historic fill material.

5.2 GEOSTATISTICAL ANALYSIS OF THE PROBABILITY OF GROUNDWATER CONTAMINATION

5.2.1 Overview

Assessing the spatial distribution of contamination and mapping areas where the concentrations of contaminants in groundwater exceed standards require an unbiased quantification approach to be defensible. Geostatistical contouring (a form of geostatical analysis) is generally considered to be the best approach to contouring environmental data.

Geostatistical contouring is much more involved than is contouring by simpler interpolation methods. First, a structural analysis is conducted to evaluate the spatial correlation structure of the data. This process involves the construction of a variety of semivariograms – plots of the spatial variance versus the distance between the samples. From these diagrams, models describing the spatial correlation structure are derived including:

- Nugget – the sum of natural variations in the magnitude of the spatial data (microvariance) and errors in the measurement of the variable (error variance).
- Sill – depending on the model used, the sill is approximately equal to the spatial variance of the data.
- Range – depending on the model used, the range is the minimum distance between samples at which the samples are statistically uncorrelated.

The range is also used to evaluate the spatial symmetry of the correlation structure (termed the anisotropy) of each model.

Grid values are estimated from the raw data using a statistical interpolation process called kriging. Kriging is an unbiased linear estimator that uses the spatial correlation structure as a basis for an inverse-distance-weighted interpolation. Because geostatistical interpolation is based on the raw data values as well as the correlation structure of the raw data, it generally produces surfaces that are closer approximations of reality than does any other type of interpolation algorithm.

5.2.2 Data

Existing shallow groundwater quality data from 218 wells in the area were compiled from available reports. All wells were screened in the same water-bearing zone. Logs of the wells used for this analysis are included in Appendix C. Duplicate well locations were eliminated for the analysis. Data from each well were assessed to determine whether GWQSs were exceeded. Wells that had any exceedance were assigned a code of 1; wells that had no exceedances were assigned a code of 0. These codes can be interpreted as the probability of exceeding GWQSs. Geostatistical techniques were then used to analyze the spatial correlation structure of the assigned codes. The geostatistical analysis was conducted "blind" (without a base map) to reduce the possibility of analyst bias.

5.2.3 Structural Analysis

The structural analysis, which is the evaluation of the spatial correlation structure of the data, consists of several steps. First, variograms (plots of the spatial variance [the semivariance] versus the distance between samples) are developed for all data to identify characteristic lags. These lags are distances between sampling points that display some distinctive pattern in variograms. Using the characteristic lags, variograms are developed for a variety of directions. These variograms are then modeled to identify the parameters of the spatial correlation (i.e., range, sill, nugget, anisotropy). The results of these analyses are described in the following sections.

5.2.3.1 Variogramming

Omnidirectional variograms were developed for a variety of lags from 10 feet to 8,000 feet. Characteristic lags were identified at 70 feet and 5,085 feet. Directional variograms were then developed at 10-degree intervals for each lag. In these diagrams, the vertical axis is the semivariance and the horizontal axis is the distance between sample pairs. The numbers beside the points represent the number of data pairs used to calculate the semivariance at that distance. The smooth curve represents the theoretical model fit to the data.

Figure 5-1 is an example of a directional variogram for the 70-foot lag at an orientation of 20° north of east. This figure shows the semivariance gradually increasing to a fairly stable level (characteristic of a gaussian model) at a distance of approximately 374 feet (the range). The sill of the diagram is 0.18, and there is no nugget.

Figure 5-2 is an example of a directional variogram for the 5,085-foot lag also at an orientation of 20° north of east. This figure shows the semivariance increasing steeply to a fairly stable level (characteristic of a spherical model) at a distance of approximately 4,940 feet (the range). The sill of the diagram is 0.102, and the nugget is 0.122.

5.2.3.2 Anisotropy

Using the ranges derived from the directional variograms for each correlation structure, rose diagrams were developed to assess anisotropy. Figure 5-3 illustrates the rose diagram for the first correlation structure at a lag of 70 feet. This figure displays a major axis at 70 degrees with an anisotropy ratio (ratio of major axis length to minor axis length) of 1.4. Figure 5-4 illustrates the rose diagram for the second correlation structure at a lag of 5,085 feet. This figure also displays a major axis at 70 degrees with an anisotropy ratio of 2.

5.2.3.3 Composite Spatial Correlation

Using the variogram parameters described in the preceding sections, a composite spatial correlation was developed. This pattern is illustrated in Figure 5-5.

5.2.4 Probability of Groundwater Contamination

Based on the correlation structure interpreted from the semivariogram, a contour map was generated using *kriging* estimators. Figure 5-6 illustrates the spatial probabilities of exceeding groundwater standards.

Figure 5-7 illustrates the differences between the original data codings and the geostatistical surface shown in Figure 5-6. The lack of contours on the right side of the map indicates that there is good agreement between the data and the geostatistical surface. The left side of the map, however, indicates that the probability of contamination is less uniform and more subject to error.

5.2.5 Area of Groundwater Contamination

The area covered by the geostatistical map was assessed to determine approximately how much of the area had a high probability of being contaminated. Figure 5-8 is a plot of the percentage of the mapped area that exceeds groundwater standards at several probability levels. This graph indicates that in 80% of the reclassification area, there is an 80% probability that groundwater is contaminated above the NJDEP Class IIA GWQSs. Figure 5-9 shows that virtually all of the area east of the New Jersey Turnpike and most of the area west of it have a better than 80% probability of being underlain by groundwater contaminated above the NJDEP Class IIA GWQSs.

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5.3 NATURAL ATTENUATION PROCESSES

Natural attenuation as a remedial approach relies upon natural processes (e.g., dilution, dispersion, sorption to aquifer materials, volatilization, chemical transformation, and intrinsic biodegradation) to contain contaminant plumes, to reduce groundwater contaminant levels, and to remediate groundwater. The contribution of the various attenuation mechanisms depends on the type of contaminants present and the geochemical conditions of the groundwater.

5.3.1 Biodegradation

Natural attenuation has been extensively demonstrated for petroleum hydrocarbons, which are known to be biodegradable groundwater contaminants. NJDEP's guidance on the subject of natural attenuation focuses on petroleum hydrocarbons, and suggests that "Due to the widespread occurrence of aerobic aquifers in New Jersey and the large number of sites contaminated with petroleum products, natural remediation is a viable alternative for many sites under investigation in the state." By having granted the Port Authority classification exception areas (CEAs) at several UST release sites, NJDEP has shown that natural attenuation is acceptable within the reclassification area.

The shallow groundwater quality data from the proposed reclassification area indicate that biodegradable organics are the main contaminants. Since the only groundwater receptor is the adjoining surface water body, where the impact of these compounds is negligible (see Section 6.0), natural attenuation presents a technically sound and regulatorily acceptable remedial approach. The majority of organic contaminants at the EWR and EPAMT sites are petroleum-derived hydrocarbons, which have been demonstrated to readily degrade in groundwater. The shallow groundwater to be reclassified is at a relatively shallow depth and is recharged by oxygenated surface water. The formation surrounding the shallow groundwater consists of a loose, heterogeneous mixture of fill. For these reasons biodegradation provides a viable remedial solution for the mitigation of impacts to the shallow groundwater. There is also evidence in the literature that suggests that anaerobic biodegradation will also significantly reduce contaminant mass in contamination plumes where oxygen has been depleted (Wilson, *et al.*; Eganhouse, *et al.*). Additional data also indicate that over an 8-year period, biodegradation of petroleum released to groundwater has effectively limited the transport of contaminants to a distance of 200 meters from the source (Eganhouse, *et al.*).

Information that further bolsters these statements can be inferred from several ongoing projects at EPAMT. For example, known old petroleum plumes (e.g., Buildings 183 and 220, and the BP-Coastal facility at the intersection of Port Street and Navy Street) have been shown to exhibit diffuse, rather than drawn-out, expansion patterns. Furthermore, these diffuse patterns have migrated limited distances, although they are many years old (e.g., BP-Coastal release occurred in 1978). This suggests that in the amount of time that the groundwater will take to reach the discharge point, natural attenuation will degrade the contaminants to levels below concern. This could result in plume(s) being remediated before the groundwater reaches a preferential pathway and a receptor.

Based on the existing published information regarding the documented effectiveness of biodegradation and the general conditions observed within the reclassification area, it can generally be accepted that biodegradation processes are naturally occurring in the subsurface. The concentrations of TPH throughout the area are below the 20,000-ppm to 25,000-ppm range that is considered to be toxic to microorganisms. EPA has also stated that although it is not likely for all environmental conditions to be within optimal ranges under natural field conditions, natural attenuation processes will still be occurring. In addition, many of the sources contributing to the groundwater contamination have been removed, with the exception of the jet fuel currently being remediated in the area of the EWR terminal complex and fuel storage tanks.

Natural attenuation for inorganics, such as metals that will not be chemically or biologically destroyed, would depend primarily upon their immobilization in the aquifer by processes such as their precipitation on and sorption to the solid (soil) matrix. However, under the shallow groundwater geochemical conditions, which are not very aggressive (i.e., moderate pH and eH values), the literature indicates that inorganic compounds will be moderately mobile to immobile.

5.3.2 Rates of Attenuation

5.3.2.1 Petroleum Hydrocarbons

A large number of field and laboratory studies have been conducted to determine biodegradation rates for petroleum hydrocarbons. Generally, BTEX compounds have been shown to biodegrade at fairly rapid rates. A representative sampling of these estimates is presented below:

COMPOUND	DECAY RATE (d^{-1})	
	(Daniel, R.A. and Borden, R.C)	(Brown, K. *et al.*)
Benzene	0.0014	0.0035
Toluene	0.0063	0.0042
Ethylbenzene	0.0058	0.0025
m-, p- xylene	0.0035	NP
o-xylene	0.0017	NP
Total xylene	NP	0.0026
BTEX	0.0029	0.0029

d^{-1} = per day
NP = not provided

For first-order decay, the change in contaminant concentration through time is given by:

$$C(t) = C_0 e^{-\lambda t}$$

where:

$C(t)$: Contaminant concentration as a function of time
C_0: Initial contaminant concentration
λ: First-order decay constant

As presented in Section 4.0, the shallow groundwater Darcy velocities are very low (9 cm/y). The corresponding particle velocity would be 30 cm/y (assuming 30% porosity), or 1 foot per year (ft/y). Therefore, the time *t* over which the contaminants can degrade is large.

Substituting into the above equation:

$t=10$ years
$C_0=1,141$ppb (arithmetic mean of detected benzene concentration)
$\lambda=0.0014$

The concentration in 10 years will be $C(10)=6.8$ ppb. Over the same period of time the plume, will migrate only 10 feet. In 20 years the concentration will be $C(20)=0.04$ ppb, and the plume will migrate 20 feet.

Although these are simplified degradation calculations, it is evident that because groundwater flow velocities are low, the residence time of the contaminant solutions is high, providing ample opportunity for the contaminants to degrade. The implication of this condition is that unless the contaminant source is adjacent to a receptor, in this case the surface water body, the contaminants will be degraded before the groundwater reaches the receptor.

5.3.2.2 Inorganics

Groundwater analytical results for inorganics from EWR and EPAMT are based on "total metals" analyses. These analyses are conducted on samples that have not been filtered to remove suspended solids. Because of the fine-grained nature of the fill materials, the groundwater samples collected from the monitoring wells are usually very turbid. When these samples are acidified and analyzed, the results reflect the metal content of both the groundwater and the suspended solids. Consequently, the results of the analyses are an artifact of the testing protocol, rather than a true representation of the groundwater conditions. However, as a worst-case, conservative approach, the analytical results were treated as if they were representing dissolved-phase concentrations.

Although there are no generally accepted rates of attenuation for inorganic compounds, an estimate of these rates was calculated based on generally accepted principles. Inorganic compounds are removed from solution when the environment favors the formation of insoluble compounds or when they are adsorbed onto the soil matrix. For the purposes of this estimate, it is assumed that adsorption is the main mechanism acting to remove inorganics from solution.

The potential for a compound to be adsorbed onto the soil matrix is expressed by the *sorption co-efficient* defined as :

$$\log Kd = \log(C_s / C_w)$$

where: C_s is the concentration of the chemical in the solid (soil) phase (mg/kg) and C_w is the concentration of the chemical in the aqueous (groundwater) phase (mg/L).

The partitioning between the soil and aqueous phase is governed by the nature of the soil (e.g., a clayey soil will have a different *Kd* than will a gravelly soil). *Kd* values have been estimated for various inorganic compounds and different soil types. EPA has published selected values in the "Soil Transport and Fate Database 2.0", which were utilized in calculating these estimates. For the compounds of interest, *Kd* values range from 0.01 to 7.70. However, the majority of values tend to concentrate in the 2.0- to 4.0-range.

The effect of the adsorption onto the migration of a particular compound is expressed as the *Retardation Factor.* A linear retardation isotherm was utilized for this calculation. This type of isotherm is independent of solute concentration and assumes infinite adsorption capacity. Although nonlinear isotherms compensate for adsorption capacity, they cannot be estimated by forward calculation. Instead, they must be back-estimated from a transport model. For this reason, the linear isotherm was utilized.

$$R = 1 + \frac{\rho_b}{\theta} K_d$$

Where: R is the retardation factor

ρ_b is the bulk density of the porous medium (soil)

θ is the porosity

Kd is the distribution (adsorption) coefficient

Therefore, the retardation factor is estimated to be:

$$R = 1 + \frac{\rho_b}{\theta} Kd = 1 + \frac{1.3 gr\ cm^3}{0.3} 2.0 cm^3/gr \Rightarrow R \approx 10$$

By utilizing a conservative (low) Kd value, this calculation compensates for the infinite adsorption capacity of the linear model.

To estimate the rate at which the inorganics are removed from solution, and the distance over which the removal occurs, a simple analytical solution of the transport equation was utilized. The one-dimensional advection-dispersion transport of a nonconservative contaminant through a semi-infinite porous medium is given by the following equation:

$$D\frac{\partial^2 C}{\partial x^2} - \bar{v}\frac{\partial C}{\partial x} = R\frac{\partial C}{\partial t}$$

The analytical solution of this equation is:

$$C(x,t) = C_i + (C_0 - C_i)\left\{\frac{1}{2} erfc\left[\frac{R_x - \bar{v}t}{2\sqrt{(DRt)}}\right] + \frac{1}{2}\exp\left(\frac{\bar{v}x}{D}\right) erfc\left[\frac{R_x + \bar{v}t}{2\sqrt{(DRt)}}\right]\right\}$$

where: $C(x,t)$ is the concentration at distance x from the source at time t
- C_0 is the concentration at the source
- C_i is the concentration at distance x from the source at time t=0
- R is the retardation factor
- D is the dispersion coefficient
- $\bar{v}$ is the average pore water velocity

Assuming a constant concentration source with a concentration of 22,500 μg/L (the maximum observed concentration of lead), all solute will be removed over a distance of 60 meters (180 feet).

Although the above estimate is based on many assumptions and simplifications (including the assumption that the dissolved concentration is equal to the total concentration), it demonstrates that because the shallow groundwater flow velocities within the reclassification area are very low, the residence time of the contaminant solutions is high. This provides ample opportunity for the inorganic solutes to be adsorbed onto the soils. Therefore, unless the contaminant source is adjacent to the bay, the contaminants will be immobilized before the groundwater reaches the bay.

SECTION 6.0

IMPACT OF GROUNDWATER ON RECEPTORS

WESTON reviewed several prior studies conducted within the proposed reclassification area and immediate vicinity to identify potential human and ecological receptors that could be influenced by groundwater quality within EWR and EPAMT. This review revealed that there is no direct human health exposure route from contaminated groundwater within the reclassification area. Groundwater from beneath the reclassification area is not used nor are there plans for its use. The absence of a human exposure route is due to the following factors:

- Neither the groundwater within the proposed reclassification area nor potential receiving water bodies (the Peripheral Ditch at EWR, Newark Bay) are used as a potable source. Moreover, the recreational potential of these receiving waters is very limited within the area potentially affected by groundwater flows from the proposed reclassification area.

- Access to the Peripheral Ditch is limited by an existing chain-link fence, and by the fact that the ditch is on EWR property, making human contact highly unlikely. Future residential or other uses of the property allowing human contact with the ditch are also unlikely.

- Access to Newark Bay is limited by the industrial nature of the area, which includes fenced and guarded properties.

- Contaminants of potential concern in the groundwater (i.e., those compounds exceeding NJDEP GWQSs within the reclassification area) are expected to either attenuate or to become adsorbed onto the soil matrix and immobilized before reaching Newark Bay.

- In the event that any contaminants reach Newark Bay, the groundwater from the reclassification area is diluted by a factor of approximately 50,000 by the surface waters of the bay, before it potentially reaches any human receptors.

Exposure to ecological receptors is also expected to be insignificant, because of the attenuation of groundwater contaminants or the lack of mobility of groundwater contaminants, and the high dilution rate once groundwater enters the bay. In addition:

- Most of the proposed reclassification area has been developed, and offers little wildlife habitat that would potentially be affected by groundwater.

- Most of the wetlands previously mapped by the National Wetland Inventory (NWI) program within the proposed reclassification area have been filled.

- Habitat provided by the Peripheral Ditch is very limited and consists primarily of aquatic habitat within the channel itself. Water quality within the ditch is known to be degraded, and the ditch offers poor-quality fish habitat (Section 6.1.1, and Appendix D).

- The shoreline of Newark Bay adjacent to the proposed reclassification area is nearly entirely bulkheaded, and shoreline habitat is limited.

Hence, the discussion below is presented primarily to meet the requirements of the NJDEP guidance for reclassification petitions, which specifies that the petition must identify receptors potentially influenced by the groundwater reclassification.

6.1 POTENTIAL GROUNDWATER RECEPTORS

Only the surrounding surface water bodies, which receive discharge of groundwater, are considered potential receptors. The surface waters considered to be potential receptors of the groundwater from the reclassification area are the Peripheral Ditch and Newark Bay. Whereas several wetland areas appear on the USFWS NWI program maps, a field reconnaissance conducted by WESTON revealed that only two of these wetland areas remain undeveloped within the proposed reclassification area. None of the groundwater data collected to date, in conjunction with information on flow rates and travel times reviewed in Section 5.0, suggest that groundwater contamination has reached any of these receptors. Appendix D describes the ecological receptors associated with each of the habitats identified below.

6.1.1 Waterways

6.1.1.1 Peripheral Ditch

The Peripheral Ditch surrounds the property occupied by EWR, and is the principal means of surface water drainage for the EWR property. The approximately 8-foot-deep, 80-foot-wide ditch was constructed to drain the EWR property during the EWR expansion in the 1970s. However, the ditch actually drains an area of approximately 10 square miles, since it originates within the cities of Newark and Elizabeth (Killam, February 1995). From EWR the ditch flows south and eastward through a tidal gate at the Elizabeth Channel, and into Newark Bay. Killam Associates identified several industrial point source discharges to the Peripheral Ditch, as well as the potential for five CSOs from Newark and one from Elizabeth to discharge to the ditch. Surface water quality within the Peripheral Ditch is classified by the State of New Jersey as FW-2 Non-Trout, while the lower, tidal portion is classified as SE-3.

Human access to the ditch is limited by a 6-foot-high chain-link fence, and any recreational or other use of the ditch is prohibited by the Port Authority. The ditch is not used as a potable water source, nor is it connected to any water body that is used for potable purposes.

The Peripheral Ditch is fed primarily by surface water runoff from EWR, and the upstream flows referred to above. Portions of the ditch are piped as it runs through EWR. Because of the presence of tide gates, water is allowed to flow out into the bay, but is not allowed to enter the ditch from the bay. Water is regularly pumped from the ditch by the City of Newark as a stormwater management tool in anticipation of heavy precipitation events.

The banks of the Peripheral Ditch are lined with riprap, such as concrete and asphalt blocks, for its entire length. Since the surrounding grassy areas are regularly mowed up to the top of the bank for most of the length of the ditch, available habitat is limited to the banks of the ditch itself, which support *Phragmites* vegetation, and in some areas young Tree-of-Heaven (*Ailanthus altissima*) trees. Available habitat that is potentially affected by shallow groundwater flow is limited to open water areas within the channel. Thus, while the ditch may support limited populations of benthic invertebrates and killifish, it supports little aquatic vegetation required by many species of aquatic or wetland wildlife for cover or breeding habitat.

6.1.1.2 Newark Bay

The proposed reclassification area is bounded to the east by Newark Bay, as well as the shoreline of Newark Bay itself. Groundwater from the proposed reclassification area flows south and eastward, eventually reaching Newark Bay, but accounts for a relatively small proportion of the total water entering the bay. Most of the freshwater flows received by Newark Bay come from the Hackensack and Passaic Rivers, which enter the bay just north of the proposed reclassification area. Since Newark Bay is hydrologically contiguous with the Arthur Kill and Kill Van Kull to the south, the primary source of the surface water present is ultimately the Atlantic Ocean. As a result, water quality in the bay is affected by many sources other than shallow groundwater flows from the proposed reclassification area. Specifically, the surface water quality of Newark Bay is influenced by the following factors:

- Regional water and sediment quality within the Hudson-Raritan estuary.
- Pollution loadings from the Hackensack and Passaic Rivers, as well as smaller tidal streams such as the Peripheral Ditch.
- New Jersey Pollutant Discharge Elimination System (NJPDES) and State Pollutant Discharge Elimination System (SPDES) permitted, as well as unpermitted industrial discharges.
- Oil and chemical spills.

- Combined sewer outfalls and municipal wastewater discharges.
- Urban/industrial/residential stormwater runoff.
- Contaminated groundwater flow into the bay, especially from landfills and other historically filled areas.
- Atmospheric deposition of contaminants from surrounding industries.

The degraded water quality of tne bay is reflected by its New Jersey surface water quality classification of SE-3. The "SE-3" classification means that the bay consists of estuarine surface waters that have the designated uses of secondary contact recreation, maintenance and migration of fish populations, migration of diadromous fish, maintenance of wildlife populations, and any other "reasonable" uses. Secondary contact recreation is defined by the State of New Jersey as consisting of activities "where water ingestion is minimal and includes but is not limited to boating and fishing."

The bay itself does not represent a potable water source due to its salinity and degraded characteristics. Moreover, given its classification of SE-3, primary contact recreation (e.g., swimming) in the bay is not encouraged, and is unlikely. Therefore, human exposure routes to the diluted groundwater should be limited to secondary contact recreation.

Secondary contact recreation in the immediate vicinity of Ports Newark and Elizabeth is limited by the shoreline access restrictions present at Ports Newark and Elizabeth; most of the land is privately owned and fenced, while the shoreline is bulkheaded. The area is also used regularly by large commercial vessels, which should preclude the use of the port area by small craft. While fishing from a boat in the vicinity of Ports Newark and Elizabeth is possible, published fish advisories exist for striped bass, bluefish, eels, and blue crabs within the area. If recreational boating or fishing occurs in the area, it is highly unlikely that people would receive significant exposure to shallow groundwater from the proposed reclassification area, given the amount of dilution groundwater would undergo upon entering the bay.

Thus, even if groundwater from the proposed reclassification area flowed directly into the bay without any attenuation or adsorption to soil particles, the potential effects would be limited to ecological receptors within the available habitat provided (Appendix D). Moreover, the greatest potential for ecological effects would be at the point of entry of groundwater into the bay, namely within the bay sediments (see Section 6.2 and Appendices D and E). This assumes that significant mixing does not occur in the tidally influenced groundwater present near the edge of the bay.

6.1.2 Wetland Areas

While several wetland areas were mapped in the vicinity of the proposed reclassification area by the USFWS NWI program in the 1970s, wetland habitats influenced by groundwater within the reclassification area are limited to two small areas that have not been filled. The wetlands identified by the NWI program were mapped on the basis of aerial photography from 1976. Since that time many of the areas mapped as freshwater wetlands have been filled or altered. The areas originally mapped by the NWI program are shown in Figure 6-1, and fall into several categories, including:

- Palustrine open water (small freshwater ponds).
- Palustrine emergent wetlands (freshwater marsh).
- Estuarine intertidal emergent.
- Estuarine subtidal open water.
- Estuarine intertidal flats.
- Riverine lower perennial open water.

During a field reconnaissance conducted on 26 August 1997, only one of the 13 palustrine emergent (freshwater) wetland areas mapped by the NWI program within the proposed reclassification area could be located. The remainder have been apparently filled in since 1976 as the area was developed. The only presently remaining palustrine emergent wetland is a narrow strip located along the Peripheral Ditch in the southeastern corner of EWR. The Peripheral Ditch itself is mapped by NWI as riverine lower perennial open water habitat.

Estuarine intertidal flats are located along the shores of Newark Bay both north and south of the Port Newark and Elizabeth terminals. The Great Ditch (located south and west of the proposed reclassification area) is mapped by USFWS as estuarine intertidal open water, meaning that it is tidally influenced and supports little wetland vegetation. However, within the proposed reclassification area, only one small (<1 acre) estuarine intertidal emergent wetland remains. This area is located in Port Newark in the northeastern corner of the proposed reclassification area. The area consists of approximately 0.5 acre of *Spartina* marsh, with approximately 0.25 acre of *Phragmites* marsh along its upland margin. A small (approximately 0.25-acre) mudflat area is located adjacent to this wetland, along the bay side. The remainder of the coastline within the proposed reclassification area consists either of bulkhead or riprap-lined areas. Riprap is present primarily in the northeastern corner of the area, near the aforementioned estuarine intertidal emergent wetland.

6.2 POTENTIAL FOR BIOACCUMULATION

The potential for bioaccumulation of a contaminant is based upon the presence of at least one exposure pathway. Potential exposure pathways require four basic elements:

(1) A source and the release of a contaminant of potential concern (COPC) from that source.

(2) Subsequent migration through an environmental medium.

(3) Potential contact between a receptor and the medium.

(4) An uptake mechanism associated with a potential receptor.

Thus, in order for a groundwater contaminant to bioaccumulate, it must first reach an aquatic habitat (e.g., surface water body) where ecological receptors are present. Since groundwater contaminants are expected to attenuate or (in the case of metals) become adsorbed to soil particles before they reach Newark Bay, the potential for bioaccumulation of these contaminants is considered insignificant.

Appendix E provides a discussion of the bioaccumulation potential of groundwater contaminants based upon the overly conservative assumption that contaminated groundwater reaches Newark Bay in an undiluted, unattenuated form. A conclusion that may be drawn from this conservative assessment is that even if groundwater were to reach Newark Bay at the concentrations measured in the groundwater wells, significant bioaccumulation effects would largely be limited to metals in the sediment. Since metals in bay sediments are already highly impacted by other contaminant sources (see Section 6.4 below), it is unlikely that the volume of groundwater entering the bay could cause a significant impact.

6.3 POTENTIAL FOR METALS UPTAKE INTO PLANTS

The potential for uptake of the metals of potential concern in groundwater (arsenic, cadmium, copper, lead, mercury, nickel, and zinc) is considered insignificant because of the following factors:

- The low probability that metals in groundwater from the proposed reclassification area ever reach Newark Bay.

- The limited wetland habitat provided within the proposed reclassification area, should metals in groundwater reach it.

- The fact that vegetation within the Peripheral Ditch is largely limited to its banks, and hence would not be expected to come into contact with groundwater.

A review of reports (Keystone Environmental Resources, Inc. 1990) and other information available for the proposed reclassification area, in conjunction with the site reconnaissance conducted in August 1997, indicates that existing wildlife habitat is very limited, as much of the area is developed and unvegetated. Since most of the proposed reclassification area is filled upland that is developed with buildings, impervious cover, and lawns, the opportunity for uptake of groundwater by plants is limited to wetland areas. Within the Peripheral Ditch, there is little opportunity for contaminant uptake by plants, since little submerged aquatic vegetation exists within the channel, and the banks of the ditch are rip-rapped throughout much of its extent. Thus, the plants should not come into contact with groundwater to any appreciable extent.

Natural attenuation and adsorption of contaminants to soil particles are expected to prevent groundwater contaminants from reaching the bay. Even if these contaminants did reach the bay, the only potential opportunity for metals uptake by groundwater exists within the estuarine emergent wetland noted at Port Newark in the northeastern corner of the proposed reclassification area. This area provides limited habitat, as it is less than 1 acre in extent. The opportunity for metals uptake into plants and subsequent ingestion by primary consumers, therefore, is considered insignificant.

6.4 DISCUSSION OF EXISTING SEDIMENT AND WATER QUALITY AT EACH RECEPTOR

6.4.1 Peripheral Ditch

Surface water quality data in the Peripheral Ditch is limited to studies conducted by WESTON (October 1991) for the Port Authority from 1989 through 1991. Parameters measured were pH, TPH, chemical oxygen demand (COD), total suspended solids (TSS), and total organic carbon (TOC). Of these, only TPH results are directly applicable to the Class II-B reclassification petition. TPH concentrations at 10 locations sampled within the ditch ranged from 0.1 mg/L to 2.6 mg/L. While no surface water quality standards exist for TPH, these results suggest that the ditch has somewhat degraded water quality as a consequence of petroleum contamination and high COD values.

Sediment data collected by WESTON within the Peripheral Ditch suggest that the ditch is impacted by petroleum-related compounds. The presence of these compounds is apparently associated with runoff from EWR, the southern fuel farm, and upstream areas, as opposed to shallow groundwater flow, since there are no known plumes that occur within the immediate vicinity of the ditch.

Of the petroleum-related compounds detected, TPH ranged from 4,610 mg/kg to 31,300 mg/kg at the 10 locations sampled within the ditch. Total SVOCs ranged from 18.2 to 52.7 mg/kg, and

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individual SVOCs, such as anthracene, phenanthrene, pyrene, fluorene, benzo(a)anthracene, naphthalene, benzo(a)pyrene, and benzo(b)fluoranthene, exceeded National Oceanic and Atmospheric Administration (NOAA) effects-range median (ER-M) or effects-range low (ER-L) sediment quality guidelines for the protection of aquatic life, each at a minimum of one location.

6.4.2 Newark Bay

6.4.2.1 Surface Water Quality

As noted above (see Sections 5.0 and 6.1.1) the proposed reclassification is likely to have little impact on Newark Bay water quality since:

- Contaminants in groundwater from the reclassification area are not expected to reach Newark Bay due to natural attenuation of organic compounds, and adsorption of metals onto soil particles.
- Groundwater flows are an insignificant portion of the total hydrological inputs into Newark Bay (1:50,000 dilution).
- Many other significant contamination sources affecting Newark Bay water quality have been identified. The existing water quality of Newark Bay has been reported to be the result of contaminant discharges directly into the regional surface water system from industrial and municipal sources.

The ensuing discussion is primarily for the purpose of describing water quality characteristics of the bay as a *potential* receiving water body.

In some cases, measurements of surface water quality can provide an indication of whether the water body is impacted by contaminated groundwater. However, in Newark Bay the situation is complicated by the facts that the bay is contaminated from multiple sources, that it is tidal and well-mixed, and that the water volume of the bay is significantly larger than the groundwater volume entering it. Moreover, surface water quality measurements are instantaneous and may vary with tides, temperature, precipitation, and other factors that can vary daily or seasonally. As a result, no inferences can be made by comparison of groundwater quality results with surface water quality results in the bay. However, should groundwater contaminants be absent or present at levels not posing an ecological risk (i.e., below EPA ambient water quality criteria), it can be inferred that the effects of groundwater contamination on the water quality in the bay are insignificant. Conversely, if water quality criteria were to be exceeded in the bay, it could not be concluded on the basis of those results alone that the contamination resulted from groundwater, since there are many documented pollutant sources to the bay.

Table 6-1 summarizes surface water quality results measured at two locations in Newark Bay for groundwater contaminants of concern within the proposed reclassification area. Data are presented from the 1992 Battelle study (data collected in October 1991) for the New York City Department of Environmental Protection's (NYCDEP's) New York Harbor water quality monitoring program, in which a sample at location "A7" just off Port Elizabeth was collected and analyzed for selected metals (Battelle, 1992). Data are also presented from a 1995 groundwater study conducted by the Port Authority in which a single water quality sample was collected and analyzed for Priority Pollutant metals and VOCs, for comparison with groundwater results. Despite the wealth of studies on sediment quality within the Hudson-Raritan estuary, these were the only three studies of surface water quality found with data relevant to the groundwater reclassification petition.

During a fourth study conducted by Lawler, Matusky and Skelly (LMS) (Memorandum, 1995) for the Port Authority on sediment quality, a water quality sample was collected just off Port Elizabeth, but was only analyzed for traditional water quality parameters such as biological oxygen demand (BOD), TSS, TDS, and dissolved oxygen (DO).

NYCDEP also conducts routine water quality monitoring within the New York/New Jersey Harbor region (NYCDEP 1993). However, the closest point monitored to Newark Bay is Shooter's Island, near the juncture of the Arthur Kill and Kill Van Kull (station K2). NYCDEP only measures BOD, DO, nitrogen, chlorophyll a, and fecal coliform; these parameters are not directly applicable to the proposed Class II-B groundwater reclassification.

No inferences can be made by comparison of groundwater quality with surface water quality results from the bay, for the reasons noted above. However, comparison of results of these limited surface water quality studies within Newark Bay with EPA water quality criteria indicate that the compounds of potential concern in groundwater do not exceed EPA surface water quality criteria in Newark Bay. This comparison indicates that groundwater from the reclassification area is not significantly impacting surface water quality in the bay.

6.4.2.2 Sediment Quality

Contaminated groundwater from the proposed reclassification area is not expected to reach Newark Bay; therefore, sediment quality in the bay should remain unaffected by groundwater quality. The following discussion is intended to provide a profile of existing contamination in the bay sediments in the vicinity of the proposed reclassification area, as a result of other pollutant sources.

Sediment data measured in several studies (Table 6-2) conducted in Newark Bay show much higher values of most parameters as compared to surface water values. This is to be expected, since contaminants often adhere to suspended particles that eventually settle from the water column into the sediment. As a result, sediments within the bay are among the most toxic in the New York/New Jersey Harbor region (NOAA, 1995).

Appendix F shows results of metals concentrations in New York/New Jersey Harbor sediments measured as part of two regional studies. The first study was conducted by Battelle Ocean Sciences in 1992 on behalf of NYCDEP as part of the New York/New Jersey Harbor Estuary program (Battelle, 1992). That study measured concentrations of trace metals in sediment and pore water at 20 sampling locations within the harbor region. Location "A7" was located closest to Ports Newark and Elizabeth. The sample result plots for the metals of potential concern described above (arsenic, cadmium, copper, lead, mercury, nickel, and zinc) show that Location A7 has lower concentrations in the sediment than do other locations measured within the immediate vicinity. (No plots were available for selenium.) Nearly all of these metals were detected at substantially higher concentrations at location A5 (near the juncture of Newark Bay and the Kill Van Kull), and locations A8 and A9 in the Passaic and Hackensack Rivers, respectively. These data suggest that regional sources of contamination other than EWR and EPAMT are major determinants of sediment quality within Newark Bay.

The second study was conducted by NOAA (NOAA 1995) to characterize the extent of sediment toxicity within the Hudson-Raritan estuary. During Phase I of the study in 1991, 117 sediment samples were collected throughout the entire estuary and tested for toxicity using three different organisms. Some of these locations were also analyzed for chemical parameters, including two locations within Newark Bay. Location No. 16 was in upper Newark Bay, and is the closest sampled location to the proposed reclassification area. Location 17 was located in lower Newark Bay near the Kill Van Kull, and had higher concentrations of metals measured than those in Location 16.

During Phase II of the study in 1993, an additional 57 samples were collected within Newark Bay and the immediate vicinity and also measured for toxicity. Some of these samples were also analyzed for chemical parameters. Of the six locations analyzed by NOAA for sediment chemistry in Newark Bay in 1993, the two closest to Port Newark and Port Elizabeth are Stations 31 and 36, which are located closer to the eastern side of the bay. Table 6-2 summarizes analytical results from the above sediment quality studies in the vicinity of the proposed reclassification area, as well as a third study conducted by Squibb *et al.* (1991).

While sediment chemistry was not analyzed within the Port Elizabeth or Port Newark channels during either Phase I or Phase II of the NOAA investigation, five out of six of the sediment samples within the channels or immediate vicinity were considered highly toxic (<80% survival) to amphipods (benthic macroinvertebrates). Most of the sediments in Newark Bay and in the Passaic and Hackensack Rivers were also found to be highly toxic to the three organisms tested.

The above toxicity results confirmed results of the Squibb study, which found that several parameters (metals, DDT, PCBs, and polycyclic aromatic hydrocarbons [PAHs]) in Newark Bay sediments exceeded NOAA sediment quality guidelines for the protection of aquatic life. The report concluded that Newark Bay sediments have an extremely high potential for toxicity to aquatic biota, and are likely to be among the most impacted in the New York/New Jersey Harbor region.

Results of these three major sediment quality studies suggest that several contaminant sources present in the bay contribute to the observed sediment toxicity. These chemicals include several parameters that were not detected with high frequency at levels of concern in groundwater within the proposed reclassification area, such as dioxin congeners, PCBs, and PAHs. A review of the sediment quality plots (Appendix F) indicates that the presence of these contaminants in Newark Bay is clearly related to major sources in other locations, such as hazardous waste sites and industries along the Passaic and Hackensack Rivers. The Hackensack and Passaic Rivers flow southward into Newark Bay, and carry with them sediment loads that ultimately influence the toxicity of the bay sediments. This can be seen in the case of dioxins originating in the Passaic River, which have affected Newark Bay sediment quality (Bopp *et al.*, 1991).

In summary, contaminated groundwater from the proposed reclassification area is not expected to reach the bay sediments. However, if it did, its contribution to the pollutant load of the bay and subsequent sediment toxicity would likely be little, relative to the regional inputs from other sources.

6.4.3 Wetlands

A review of reports available on the proposed reclassification area revealed no information on water quality within the two wetland areas identified from the NWI map that were confirmed in the field as still existing (see Section 6.1.2). Only one freshwater wetland area was identified within the proposed reclassification area; this is associated with the Peripheral Ditch in the southeastern corner of the ditch, before the ditch exits EWR. A report by Killam (April 1995) noted that the wetlands present within the reclassification area are classified by NJDEP as FW-2 Non-Trout. Since the wetland is associated with the ditch, its water quality is probably degraded given that most of the area consists of disturbed fill material, much of which is thought to consist of dredge spoils (Killam, April 1995). However, the principal hydrological source for the Peripheral Ditch is stormwater runoff, as well as flows from upstream.

The remaining wetland area is an estuarine emergent wetland located at Port Newark. The hydrology of that wetland is associated with Newark Bay, and hence the water quality within the wetland is also largely determined by Newark Bay. Because groundwater contaminants are not expected to reach the bay, and the water quality of the wetland is determined by Newark Bay water quality, there should be no adverse effects to this wetland associated with reclassifying the shallow groundwater.

SECTION 7.0

DEMONSTRATION OF THE FIVE NJDEP CHARACTERISTICS FOR CLASS IIB

This section presents the five characteristics of a Class IIB groundwater unit and discusses how the information presented in the preceding sections demonstrates that the groundwater unit proposed for reclassification is characteristic of a Class IIB area.

7.1 CHARACTERISTIC NO. 1 - GROUNDWATER QUALITY EXHIBITS EXTENSIVE EXCEEDANCES OF ONE OR MORE OF THE GROUNDWATER QUALITY CRITERIA AS A RESULT OF PAST DISCHARGES

The groundwater quality in the region is shown to have numerous exceedances of the NJDEP Class II-A GWQSs a result of past discharges of groundwater pollutants for several contaminants, principally petroleum-derived VOCs, SVOCs, and metals. These contaminants are presumably associated with the fill material used to create the reclassification area. As discussed in Section 5.2, in 80% of the site area there is a greater than 80% probability of encountering groundwater contaminated above GWQSs. NJDEP, in correspondence with the Port Authority, acknowledged that contaminated fill had been utilized to create the area. Figure 3-2 depicts the suspected and known sites in and around EWR and EPAMT that exhibit exceedances for Class II-A GWQSs. The following discussion explains the determination of "extensive exceedances":

Existing shallow groundwater quality data from 218 wells in the area were compiled from available reports. All wells were screened in the same water-bearing zone. Data from each well were assessed to determine whether GWQSs were exceeded. Wells that had any exceedance were assigned a code of 1; wells that had no exceedances were assigned a code of 0. These codes represent the probability of exceeding GWQSs. Geostatistical techniques were then used to analyze the spatial correlation structure of the assigned codes.

Based on the correlation structure interpreted from the semivariogram, a contour map was generated using kriging estimators. Figure 5-9 illustrates the spatial probabilities of exceeding groundwater standards. The area covered by the geostatistical map was assessed to determine approximately how much of the area had a high probability of being contaminated. Figure 5-8 is a plot of the percentage of the mapped area that exceeds GWQSs at several probability levels. This graph indicates that the probability is high that groundwater beneath most of the mapped area is contaminated.

7.2 CHARACTERISTIC NO. 2 - GROUNDWATER RESTORATION CANNOT BE ACHIEVED USING TECHNOLOGICALLY PRACTICABLE MEANS

Under the EPA's Subpart S rule, the determination that aquifer restoration is not technologically practicable involves a consideration of the "engineering feasibility and reliability" of attaining media cleanup standards, as well as situations where remediation may be "technically possible," but the "scale of the operations required might be of such a magnitude and complexity that the alternative would be impracticable."

As discussed in Section 7.1, contaminated groundwater occurs in most of the reclassification area. Furthermore, GWQSs are widely exceeded. The contaminants of concern are petroleum-derived VOCs, SVOCs, and metals. Typical remedies for organic compounds include the following:

- Pump, treat, and dispose of.
- Pump, treat, and re-inject.
- Vent and sparge.
- Bioremediate and bioaugment.

Typical remedies for inorganic compounds (metals) include the following:

- Pump, treat, and dispose of.
- Pump, treat, and reinject.

As indicated above, the affected area is very large (approximately 10 square miles). The saturated thickness of the historic fill unit is small (approximately 10 feet), the permeability is low, and the unit is highly inhomogeneous. Because of these properties, the capture zone of any groundwater capture system (extraction wells or trenches) will be limited to, at best, a few tens of feet. Under these conditions, an extensive network of recovery points would be necessary. For example, assuming a capture zone of 20 feet, approximately 550,000 well points will be necessary, assuming that approximately 80% of the reclassification area (i.e., 8 square miles) is contaminated above the standards. At an average cost of $500 per well point, the cost of well installation will be $275 million. This number does not include the cost of constructing, operating, and maintaining a treatment system. This calculation demonstrates that hydrogeologic and economic constraints preclude remediation of the contaminated groundwater on a regional scale. Similarly, while natural biodegradation of organic compounds will lower their concentrations over time, any attempt to augment and accelerate the process on a regional scale by constructing a nutrient and oxygen delivery system will incur costs comparable to those listed above.

Source removal in areas of fuel spills indicates that the geometric constraints of the historic fill unit make recovery a long-term undertaking. Reportedly, free-phase product recovery at the EWR fuel terminal has been under way for 6 years and is expected to continue for an indefinite amount of time.

As discussed in other sections of this report, the reclassification area is underlain by historic fill, which includes construction demolition debris and trash from former municipal landfills. Both of these are sources of contamination, especially inorganic compounds. An exact estimate of the volumes of the demolition debris and trash does not exist. However, the debris and trash underlie most of the 10 square miles of the reclassification area. Consequently, a source removal action (such as excavation and treatment or disposal) or source control action (such as containment or stabilization) is technically and financially unimplementable, because it would require excavation or some form of in-situ or ex-situ treatment of almost the entire reclassification area.

7.3 CHARACTERISTIC NO. 3 - THERE ARE OR WILL NOT BE ANY POTABLE USES OF THE GROUNDWATER FOR RECLASSIFICATION

As described in Section 3.0, no public community supply wells or zones of contribution for such wells were identified within the proposed reclassification area. All potable water used in the proposed reclassification area and surrounding region is imported from off-site. There are no registered production wells within the limits of the proposed reclassification area.

Because of the anticipated very low groundwater yields from the historic fill, which is evidenced by a thin saturated thickness, long recovery times in monitoring wells, and the presence of dry wells, the potential use of the historic fill as a future potable water supply is not anticipated. All potable and industrial groundwater wells in the greater region draw from the bedrock aquifer, which is not hydraulically connected to the historic fill. Furthermore, saltwater intrusion into the bedrock aquifer, from historic overpumping, has rendered the bedrock aquifer unusable beneath and around the proposed reclassification area.

Furthermore, the Port Authority, which operates most of the area, does not have any plans to develop groundwater resources in the area. As a public agency, the Port Authority has the long-term authority and permanence to guarantee that groundwater will never be utilized in this area. Inquiries to the City of Newark and City of Elizabeth indicated that there are no plans for developing groundwater resources in this area. Inquiries to the City of Newark and City of Elizabeth indicated that there are no public or private wells in or near the reclassification area. Both the City of Newark and the City of Elizabeth are supplied by surface water, originating outside the region. Both cities indicated that they have adequate capacity for the next 25 years.

7.4 CHARACTERISTIC NO. 4 - NO SIGNIFICANT RISK OF POLLUTION MIGRATION INTO CLASS I, II-A, OR III-A AREAS

As discussed in detail in Section 4.0, there is no risk of pollution migration to an aquifer of higher water quality. The underlying middle sand and bedrock groundwater is isolated from the historic fill groundwater by the meadow mat and silt and clay layers. In addition, groundwater gradients are expected to be upward, further precluding migration into the underlying middle sand and bedrock. Consequently, because the petition area is situated along Newark Bay, it occupies a regional discharge zone and the predicted groundwater flow gradients will be upward, since there are no active pumping centers to deflect them.

There are no Class I or Class III-A aquifers within the proposed reclassification area.

7.5 CHARACTERISTIC NO. 5 - NATURAL ATTENUATION CAN BE RELIED ON TO RESTORE GROUNDWATER QUALITY FOR CRITERIA IDENTIFIED PURSUANT TO CHARACTERISTIC NO. 1

7.5.1 Natural Attenuation Processes

Based upon the principles of natural attenuation discussed in Section 5.3, it is reasonable to rely on the natural attenuation approach for remediation of the contamination at the reclassification area. Available data suggest that most of the organic contamination consists of low levels of petroleum hydrocarbon compounds, which have been demonstrated to be readily biodegradable and amenable to natural attenuation.

Whereas inorganic contaminants do not biodegrade, they will be adsorbed onto the soil matrix. Soil/water partitioning coefficients and solubility data for the contaminants of concern indicate that these compounds are generally moderately mobile to immobile and have a moderate to high affinity for soils. Because groundwater flow gradients are exceedingly low, most of the dissolved phase is expected to be adsorbed before it reaches the discharge zone. As a conservative measure, this report has assumed that the entire measured concentration of inorganics is in the dissolved phase, while in fact, observations indicate that the largest percentage of the measured concentrations is due to the presence of suspended fines in the groundwater samples.

Information that further bolsters these statements can be inferred from several ongoing projects at EPAMT. For example, known old petroleum plumes (e.g., Buildings 183 and 220, and the BP-Coastal facility at the intersection of Port Street and Navy Street) have been shown to exhibit diffuse, rather than drawn-out, expansion patterns. Furthermore, these diffuse patterns have migrated limited distances, although they are many years old (e.g., the BP-Coastal release occurred in 1978). These observations support the following:

- The hydraulic gradient is very flat and resulting flow velocities are very low. The dissolved contaminant plume is moving away from the assumed source at a slow rate by diffusion rather than by advection. The estimated rate of shallow groundwater flow (particle velocities) is 1 foot/year. At this rate, groundwater from the center of the reclassification area will take 2,000 to 4,000 years to reach the surrounding surface water.

- In the amount of time that groundwater will take to reach the discharge point, natural attenuation will degrade the contaminants to levels below concern. The estimates presented in Section 5.0 suggest that the contaminant concentrations will attenuate to undetectable within a 20-year time frame.

By granting CEAs at several EPAMT UST sites, NJDEP has recognized that natural attenuation is an acceptable solution for the dissolved phase contamination in the shallow groundwater in the area proposed for reclassification.

7.5.2 Types of Contaminants Having the Potential to Reach Receptors

The contaminants of concern are arsenic, cadmium, chromium, lead, and BTEX compounds. The analysis of the migration potential of the contaminants of concern indicates that the organic compounds will degrade and the inorganic compounds will be immobilized before groundwater discharges to Newark Bay. The estimates presented in Section 5.0 suggest that the contaminant concentrations will attenuate to undetectable within a 20-year time frame. Furthermore, as presented in Section 4.0, a 50,000-times dilution is estimated for water discharging into the surface water. At this rate of dilution, any contaminants that reach the surface water will have no effect on surface water quality.

7.5.3 Potential for Bioaccumulation

The contaminants of concern having the potential to bioaccumulate are metals. The extent of uptake is determined by the physiological and behavioral characteristics of the organism exposed, and the duration of exposure. Thus, bioconcentration factors vary not only between these metals, but also for the organisms exposed, and are difficult to predict. However, the preceding analysis has demonstrated that the metals will likely be adsorbed onto the site soils and will be immobilized before reaching the bay. Therefore, bioaccumulation does not represent a significant concern.

7.5.4 Potential for Metals Uptake into Plants

The review of available reports and information for the proposed reclassification area indicates that existing wildlife habitat is very limited; much of the area is developed and unvegetated.

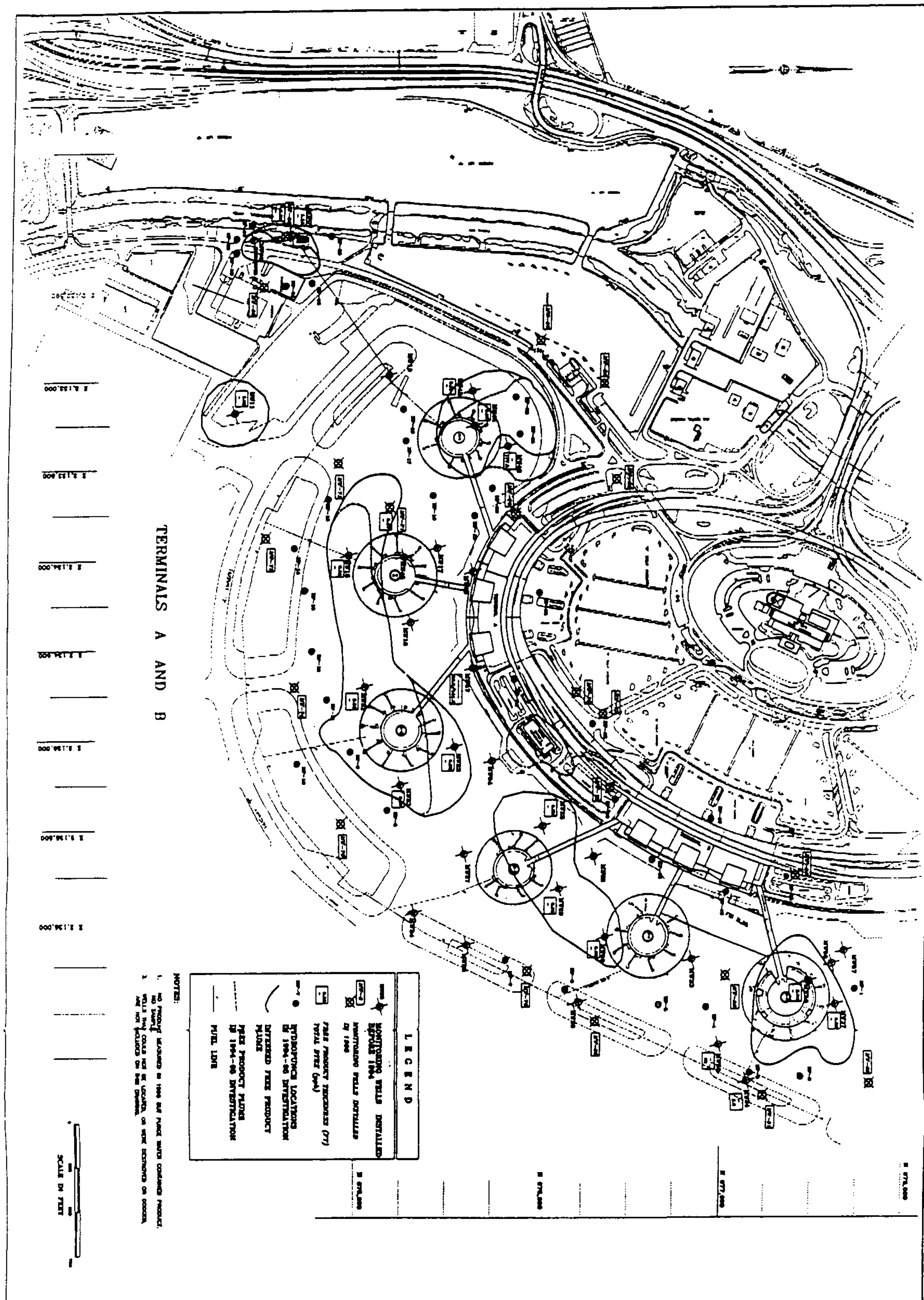
Plant species present in the proposed reclassification area are mostly indicative of disturbed conditions and represent poor wildlife habitat quality; hence, the potential for metals uptake into plants is not a significant ecological concern.

7.5.5 Wetlands

Only one freshwater wetland area is associated with the Peripheral Ditch. A report by Killam (April 1995) noted that the wetlands present within the reclassification area are classified by NJDEP as FW-2 Non-Trout. The water quality of this wetland is probably degraded given that most of the area consists of disturbed fill material, much of which is thought to consist of dredge spoils (Killam, April 1995). The principal hydrological source for the Peripheral Ditch is stormwater runoff, as well as flows from upstream.

The remaining wetland area is an estuarine intertidal emergent wetland located at Port Newark. The hydrology of that wetland is associated with Newark Bay, and hence, the water quality within the wetland is also largely determined by Newark Bay. Reclassification of the aquifer within the proposed reclassification area is not anticipated to have a significant effect on this wetland, relative to the influence of Newark Bay water quality.

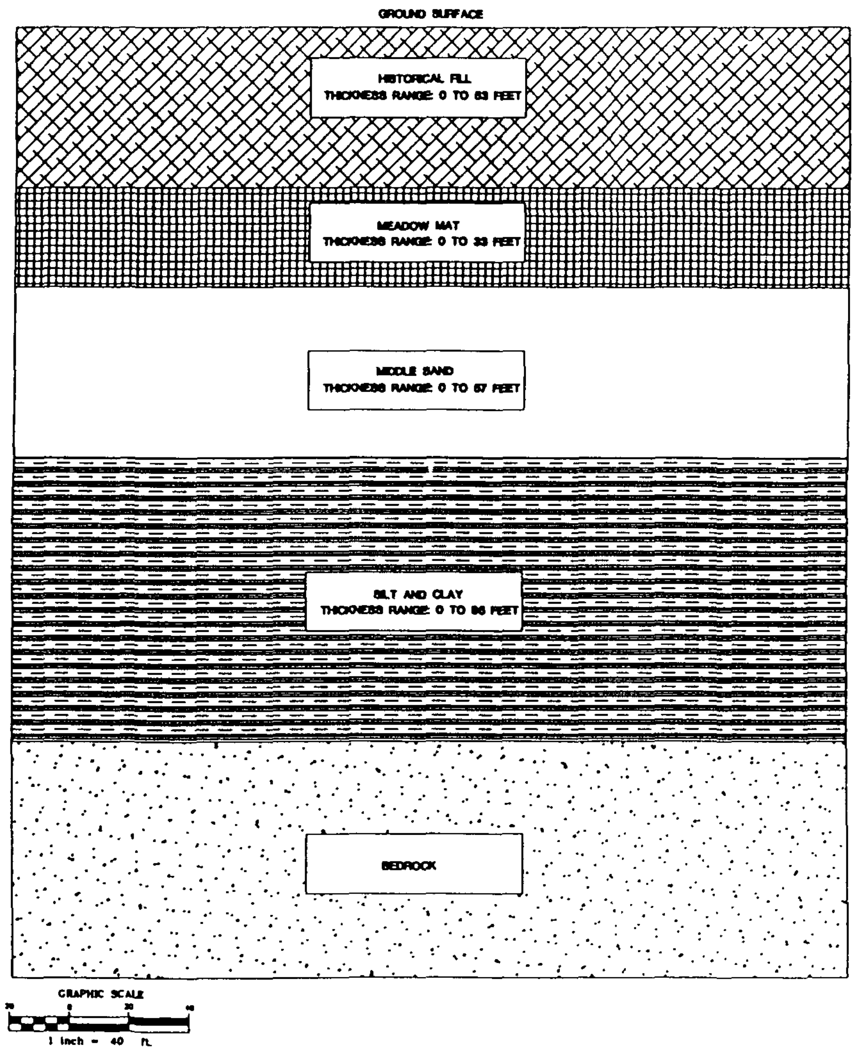
Figures



WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	TERMINALS A & B FREE PRODUCT PLUMES	
	CLIENT NAME: PORT AUTHORITY OF NY & NJ	DATE: AUGUST 1997	FIGURE #: 2-1

920920445

TIERRA-D-019083



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	NEW YORK / NEW YORK	GENERALIZED PETITION AREA STRATIGRAPHIC COLUMN	
CLIENT NAME: PORT AUTHORITY OF NY & NJ		DATE: SEPTEMBER 1997	FIGURE #: 1-2

920920446

TIERRA-D-019084


N
PROPOSED
RECLASSIFICATION
AREA LIMITS
NEWARK INTERNATIONAL
AIRPORT
Port
Newark
INTERCHANGE 14
NEW JERSEY TURNPIKE
EXTENSION
PORT NEWARK CHANNEL
Parking
Tollgate
Garden
Yards
Radio
Towers
NEW JERSEY
CONTOUR INTERVAL 10 FEET
PROPOSED
RECLASSIFICATION AREA
LIMITS
1-1
JULY 1997
GROUNDWATER RECLASSIFICATION
PETITION
PORT AUTHORITY OF NY & NJ
WESTON

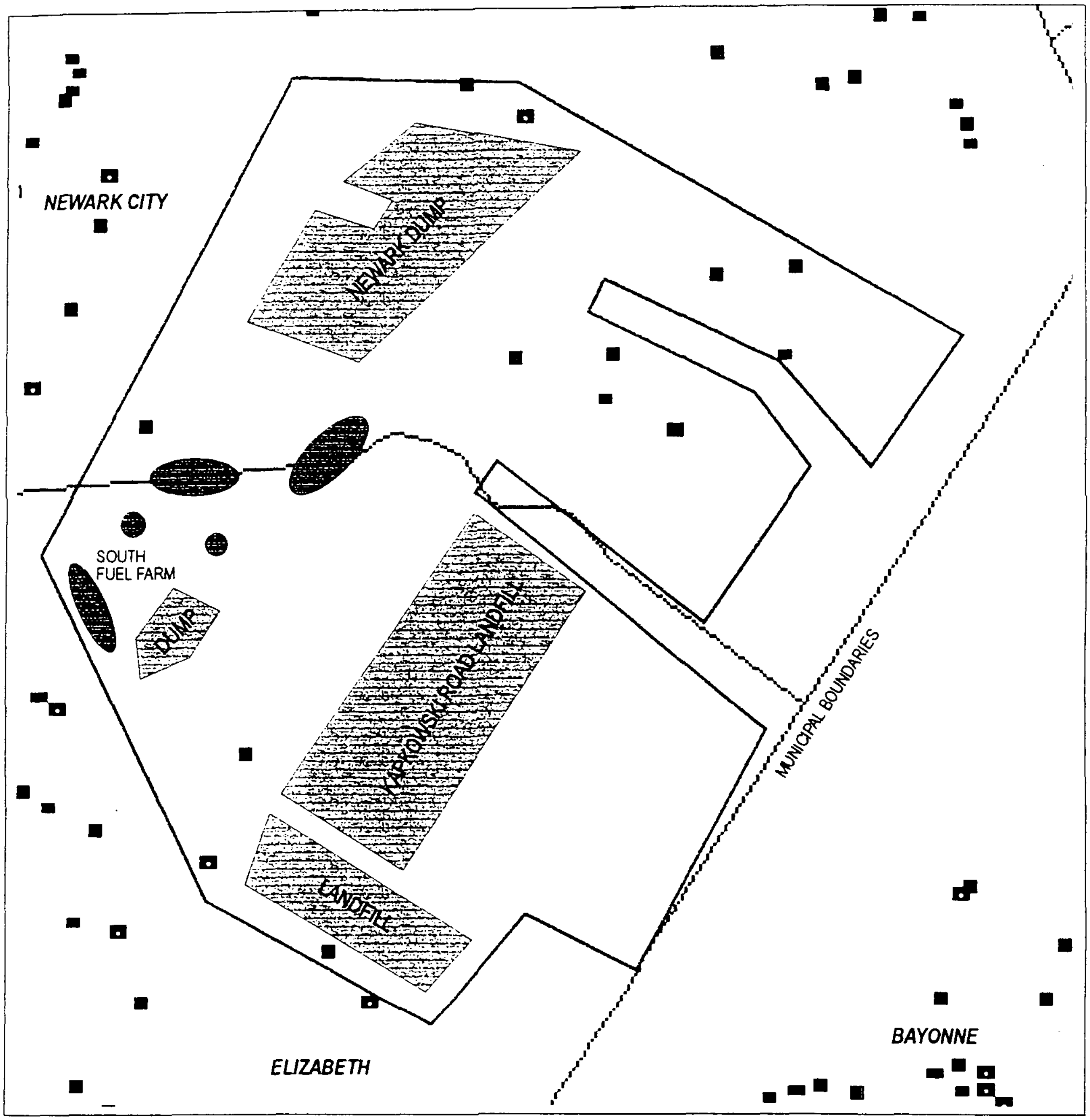
920920447

WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	LANDFILL AREAS ON NEWARK AIRPORT PROPERTY	
CLIENT NAME: PORT AUTHORITY OF NY & NJ	DATE: AUGUST 1997	FIGURE #: 3-1

920920448

TIERRA-D-019086



SCALE

3500 0 3500 7000

FEET

KEY

■ KNOWN CONTAMINATED SITE (from NJDEP GIS)

FREE-PHASE PRODUCT PLUMES

HISTORIC DUMPS AND LANDFILLS

Note: Location of features presented in this figure is approximate and for illustrative purposes only. Other contaminated sites may also exist within the area of the figure.

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	LANDFILLS, KNOWN CONTAMINATED SITES AND FREE PHASE PRODUCT PLUMES
	CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997 / FIGURE #: 3-2

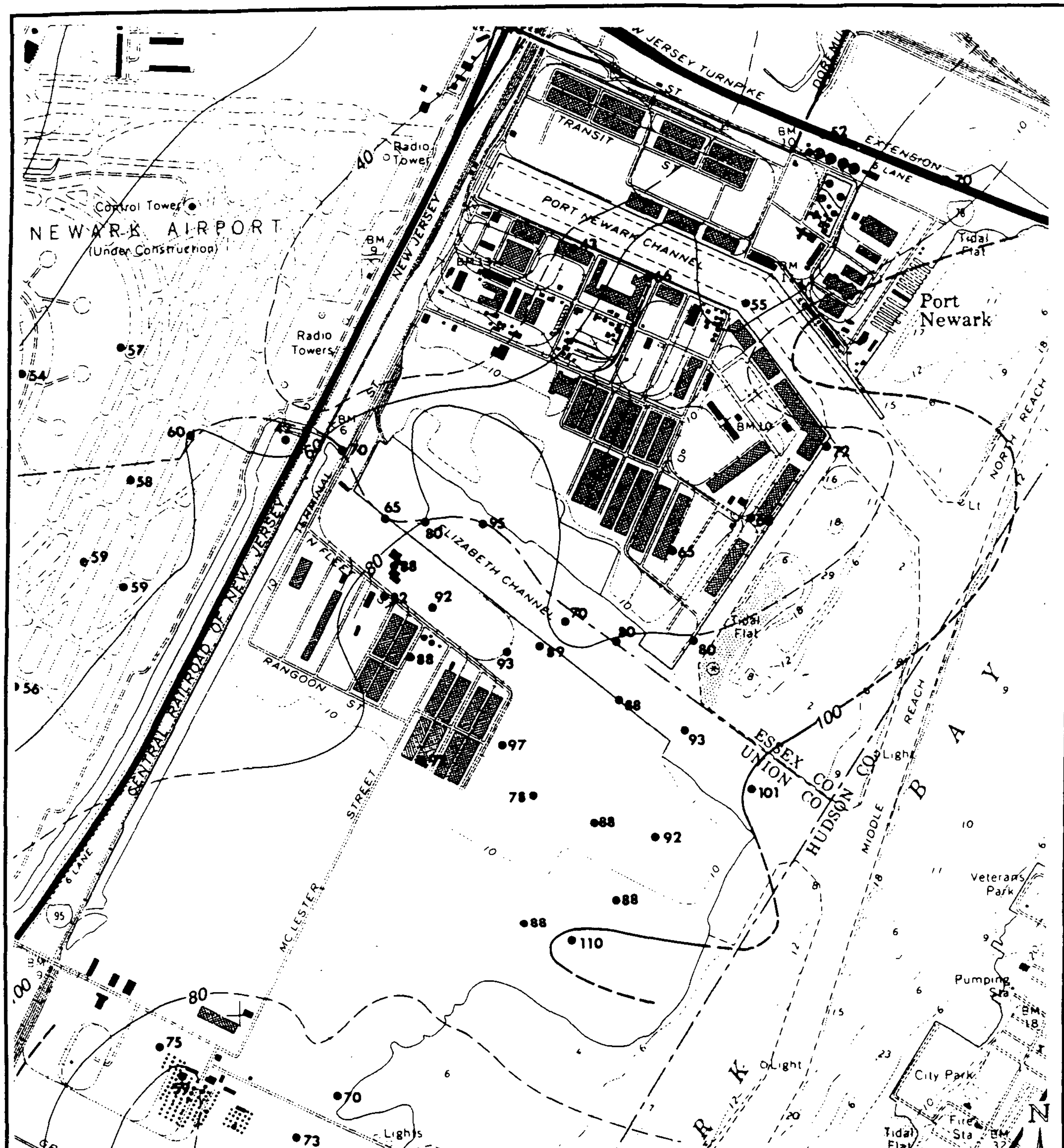
920920449

TIERRA-D-019087

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	LAND USE CLASSIFICATION
	CLIENT NAME: THE PORT AUTHORITY OF NY AND NJ	DATE: September 1997 FIGURE #: 3-3

920920450

TIERRA-D-019088



SCALE

2000 0 2000 4000

FEET

Source: "Bedrock Topography and Thickness of Pleistocene Deposits in Union County and Adjacent Areas, New Jersey" (USGS - B. Nemickas)

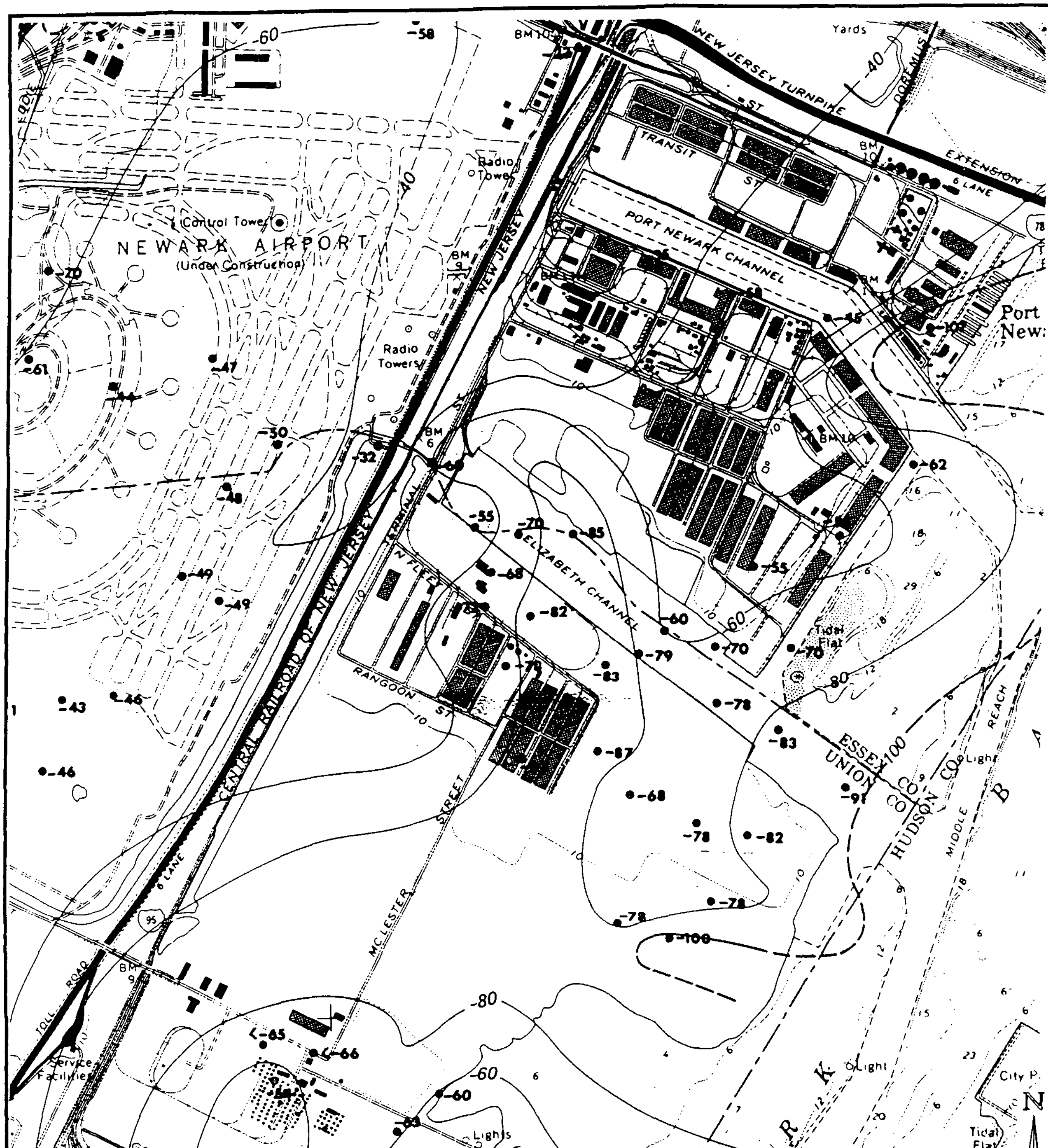
WESTON

MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	BEDROCK ELEVATION CONTOUR MAP	
CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997	FIGURE #: 4-1

920920451

TIERRA-D-019089



SCALE

2000 0 2000 4000

FEET

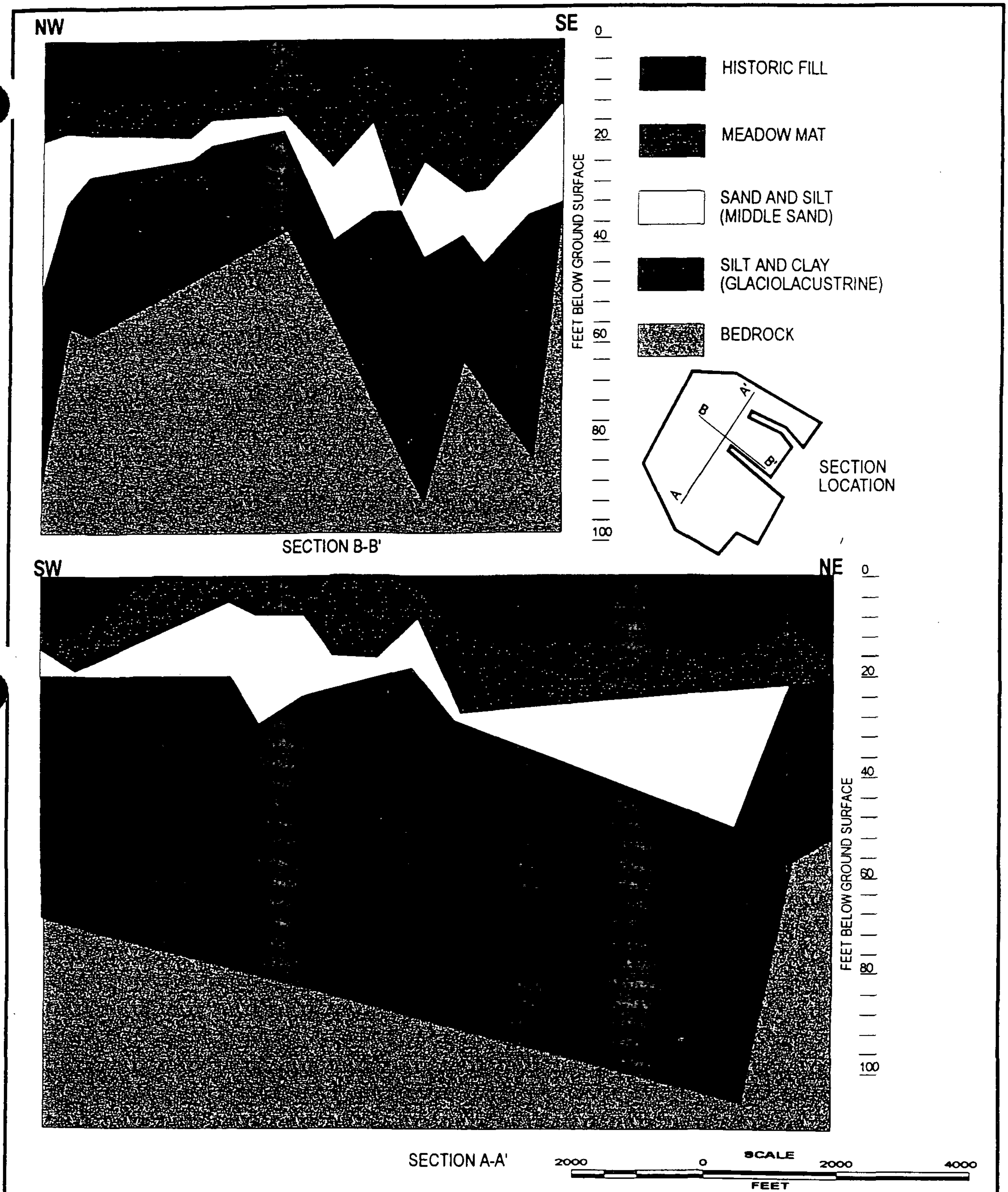
N

Source: "Bedrock Topography and Thickness of Pleistocene Deposits in Union County and Adjacent Areas, New Jersey" (USGS - B. Nemickas)

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	PLEISTOCENE SEDIMENT THICKNESS CONTOUR MAP	
	CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997	FIGURE #: 4-2

920920452

TIERRA-D-019090



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION

GEOLOGIC CROSS-SECTIONS

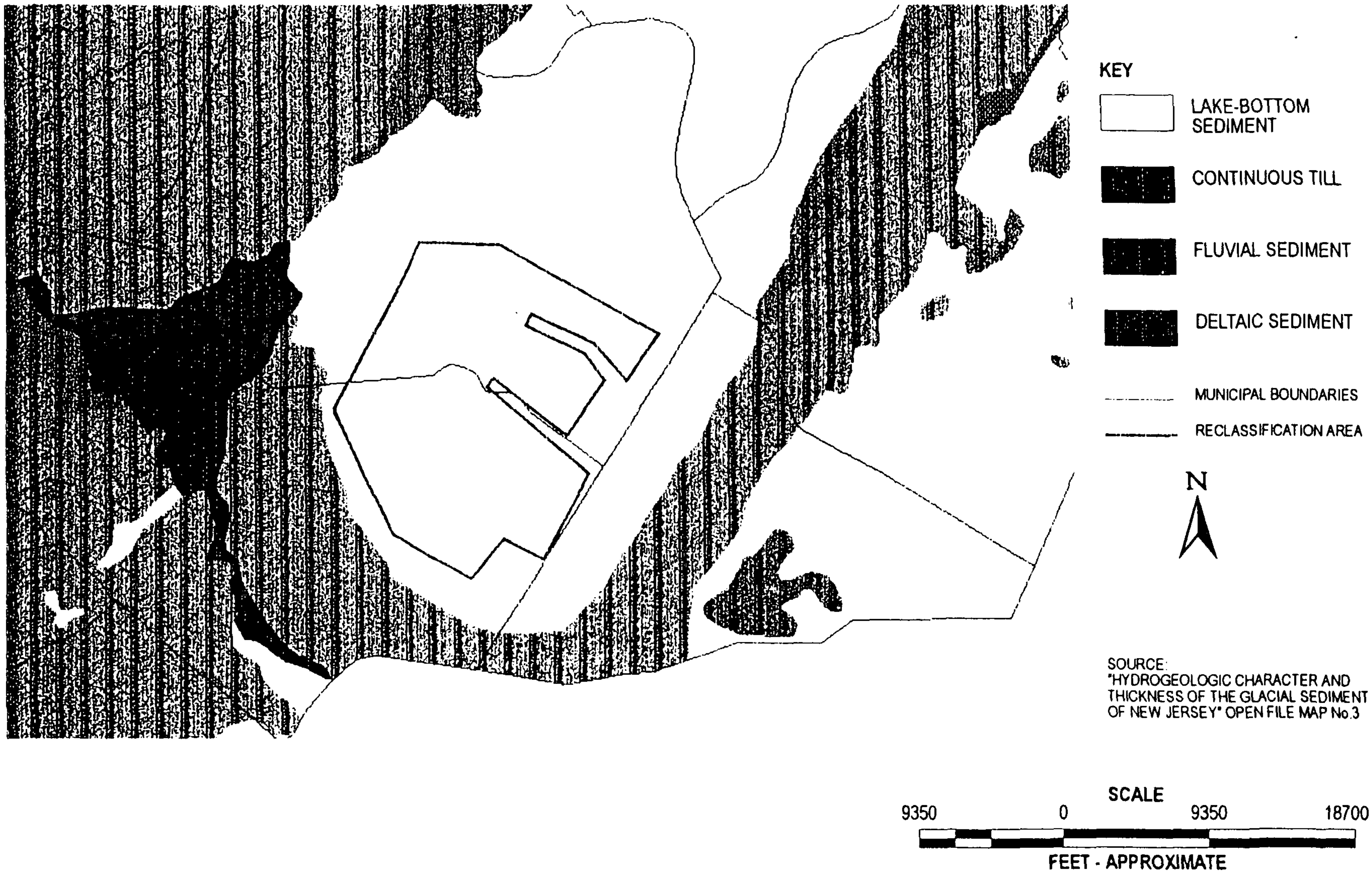
CLIENT NAME: THE PORT AUTHORITY OF NY & NJ

DATE: SEPTEMEBR 1997

FIGURE #: 4-3

920920453

TIERRA-D-019091



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MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION

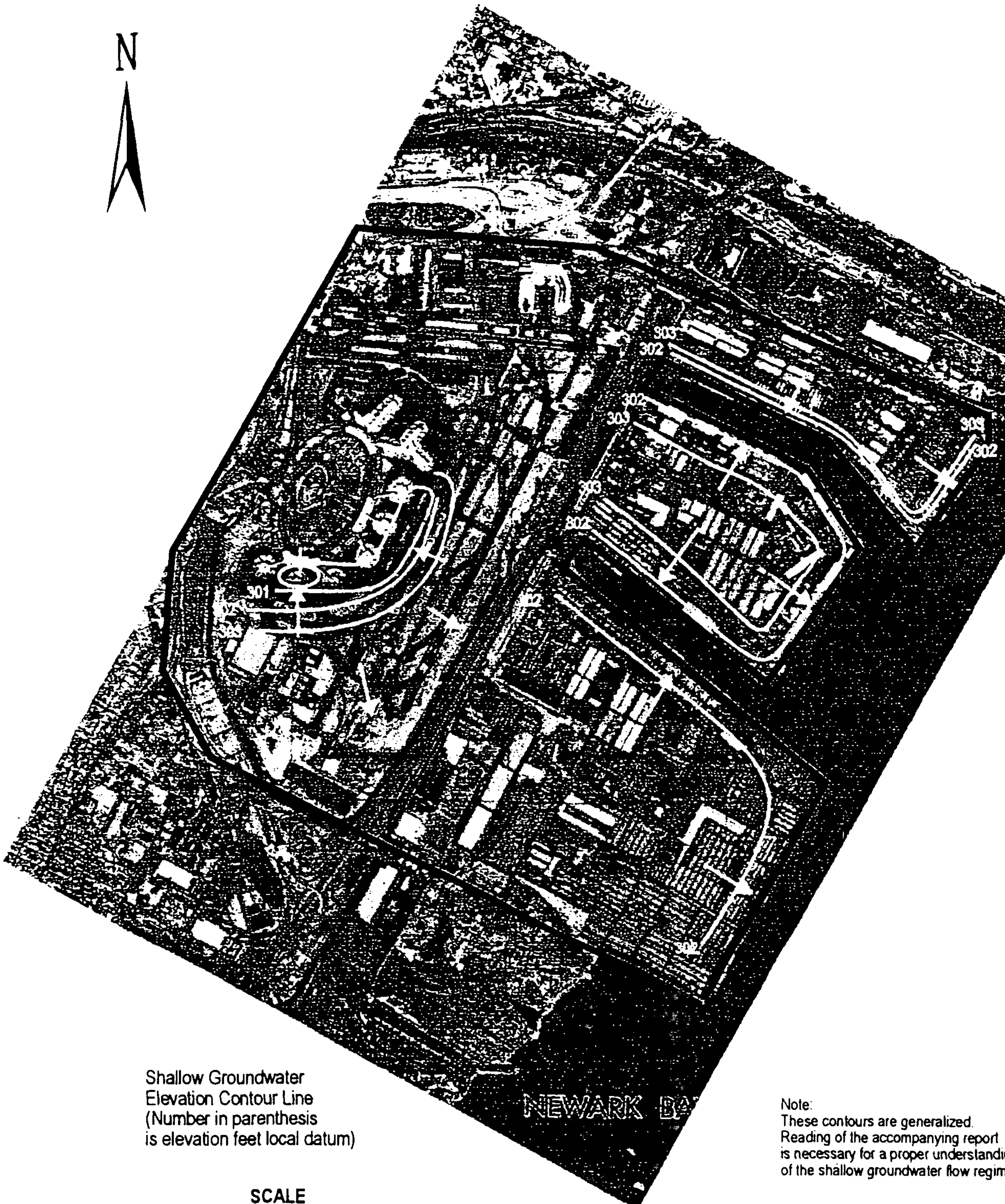
MAP OF GLACIAL DEPOSITS

CLIENT NAME: THE PORT AUTHORITY OF NY & NJ

DATE: September 1997

FIGURE #: 4-4

920920454



Shallow Groundwater
Elevation Contour Line
(Number in parenthesis
is elevation feet local datum)

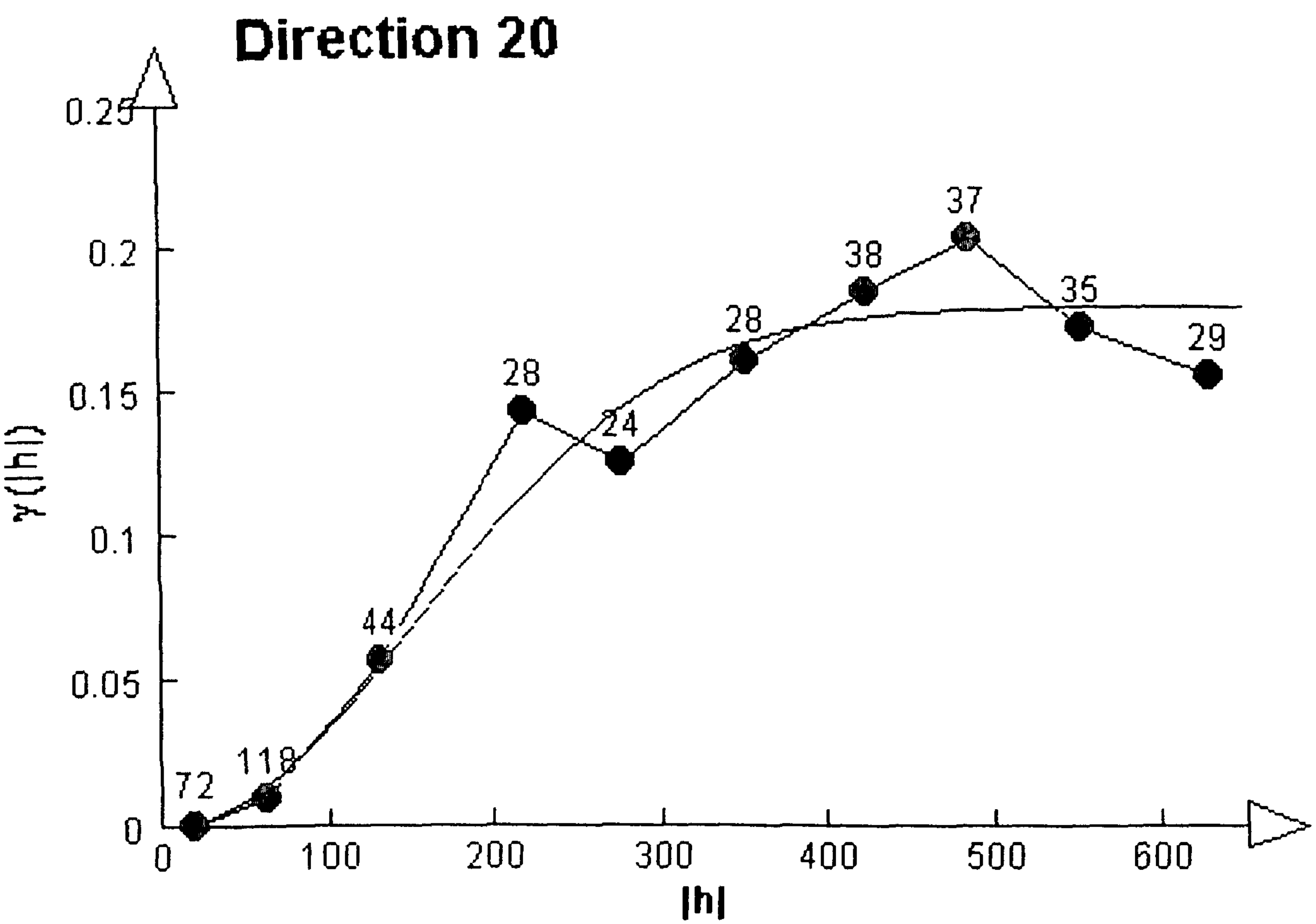
Note:
These contours are generalized.
Reading of the accompanying report
is necessary for a proper understanding
of the shallow groundwater flow regime

SCALE
3500 0 3500 7000
FEET

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	SHALLOW GROUNDWATER ELEVATION CONTOUR MAP	
	CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997	FIGURE #: 4-5

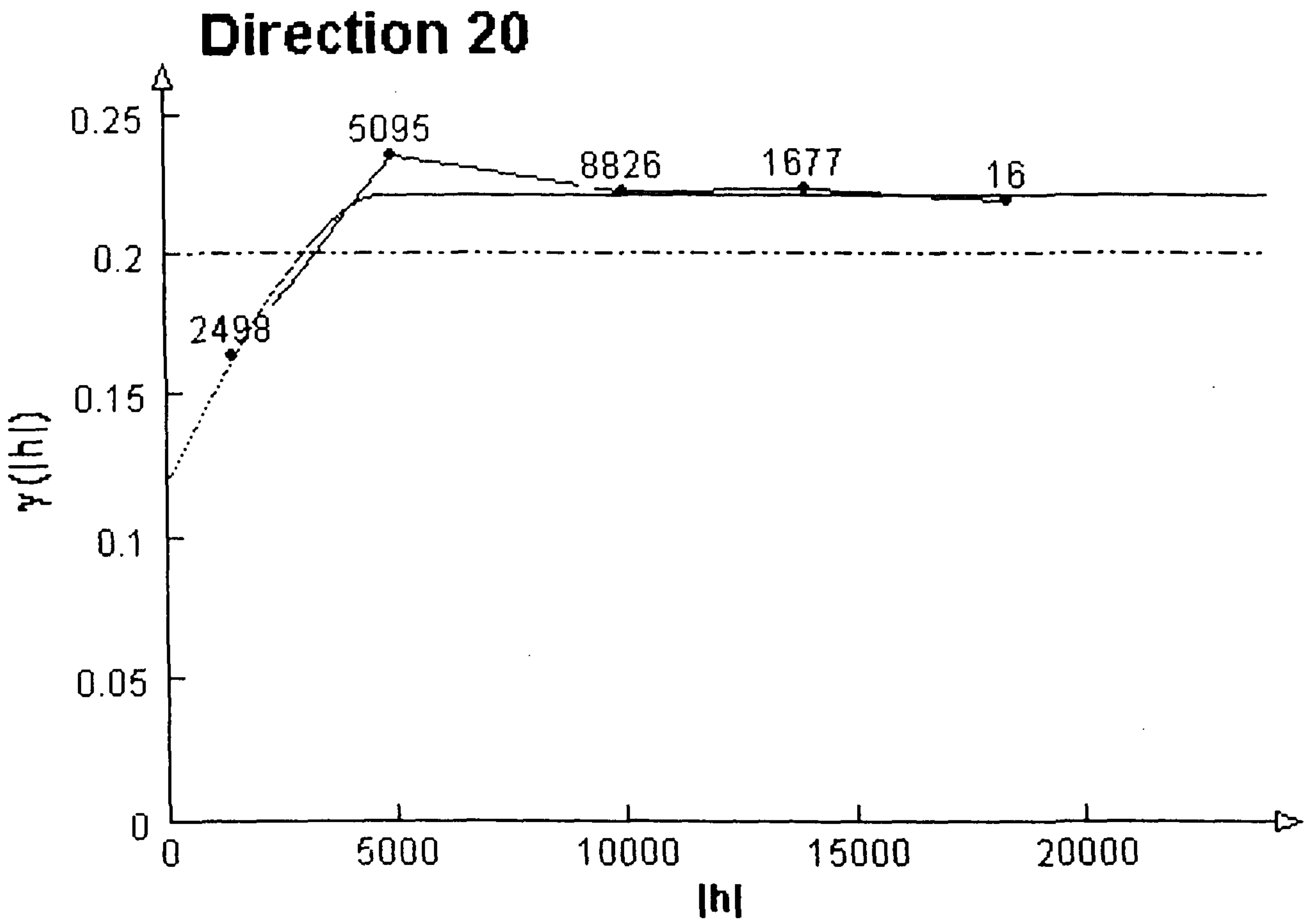
920920455

TIERRA-D-019093



WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	SAMPLE DIRECTIONAL VARIOGRAM FOR THE FIRST CORRELATION STRUCTURE	
	CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997	FIGURE #: 5-1

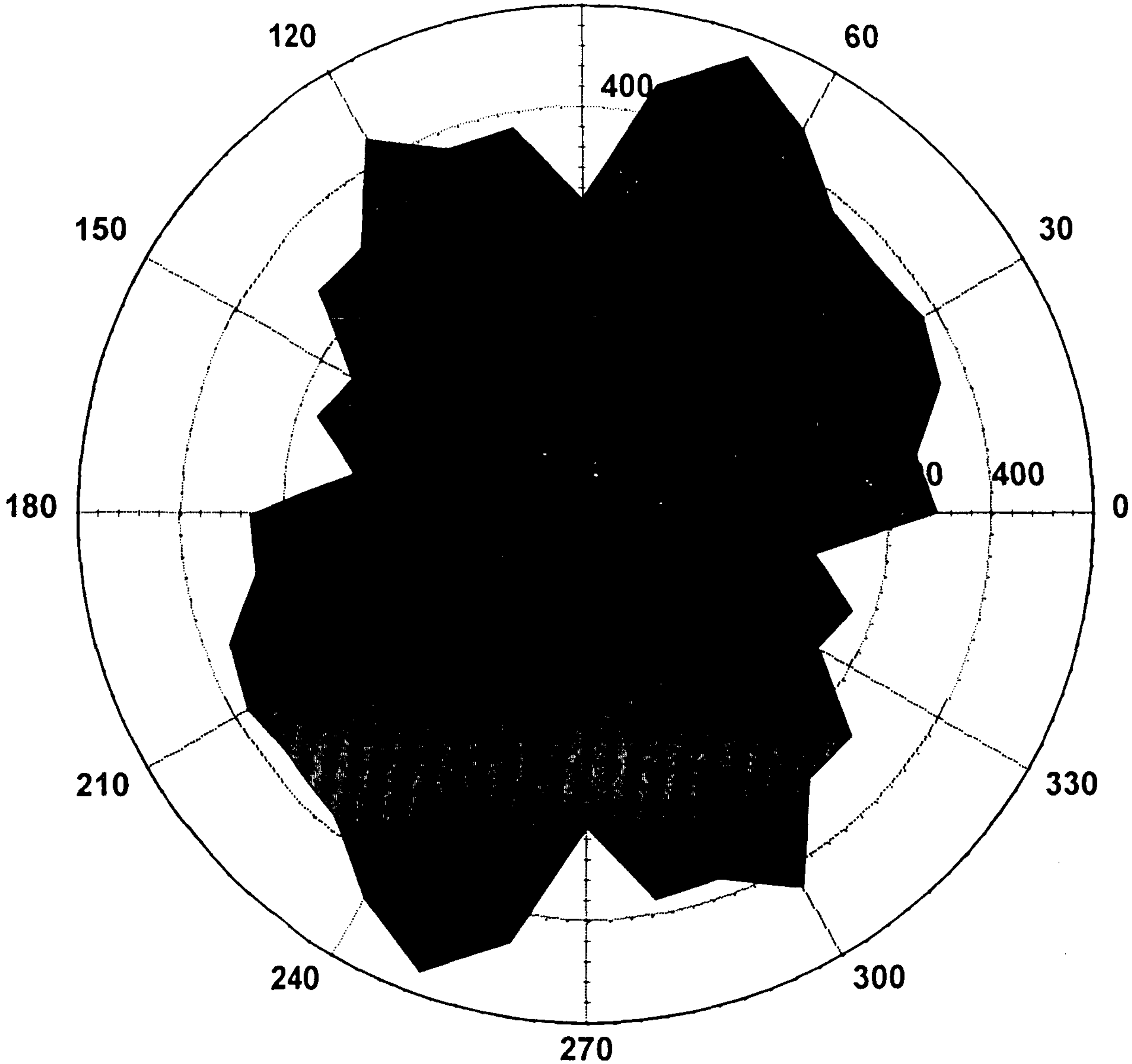
920920456



WESTON®
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	SAMPLE DIRECTIONAL VARIOGRAM FOR THE SECOND CORRELATION STRUCTURE	
CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997	FIGURE #: 5-2

920920457



9209204458

MANAGERS DESIGNERS/CONSULTANTS

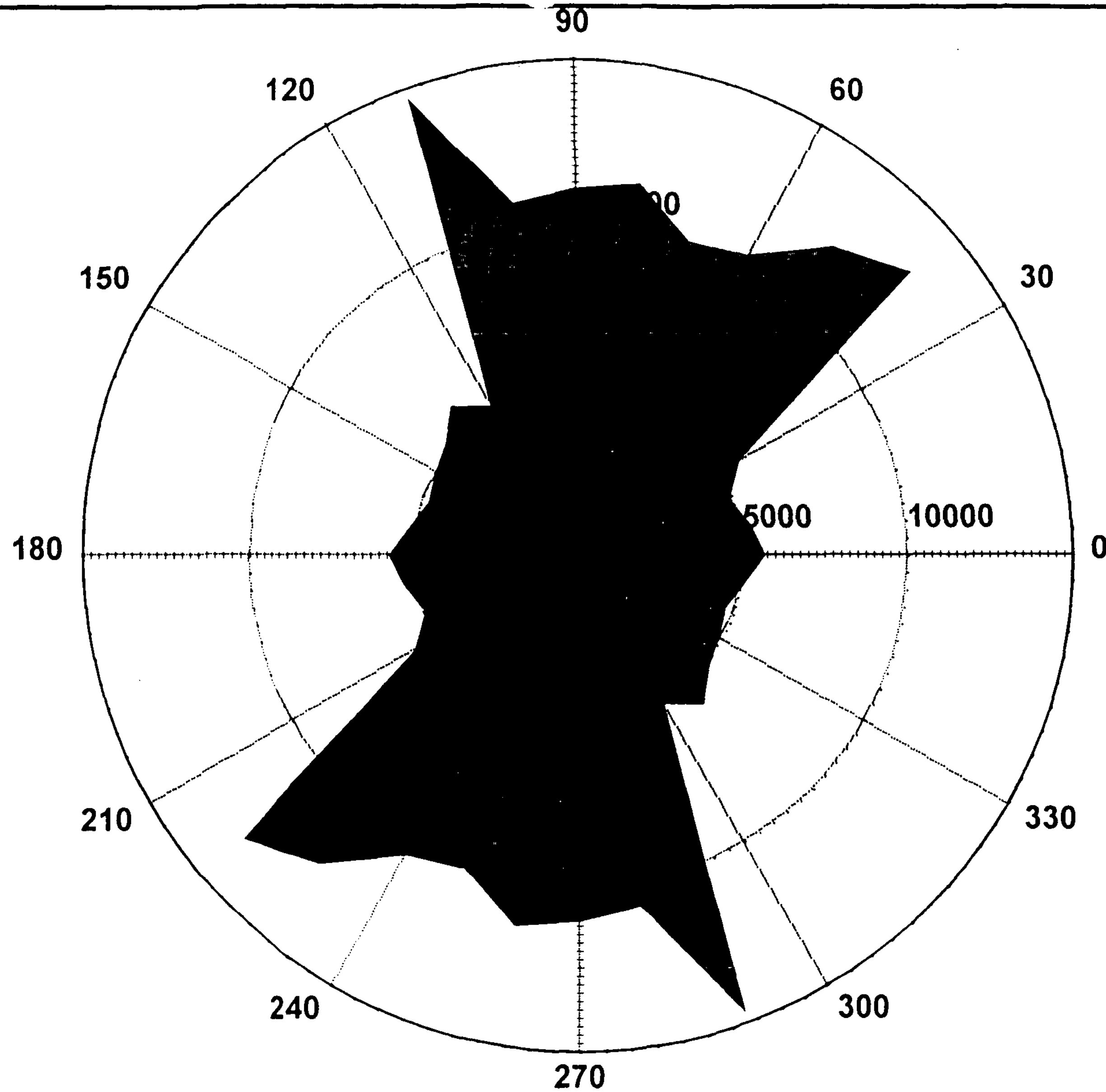
PROJECT NAME:
GROUNDWATER RECLASSIFICATION PETITION

ROSE DIAGRAM FOR THE
FIRST CORRELATION STRUCTURE

CLIENT NAME: THE PORT AUTHORITY OF NY & NJ

DATE: September 1997

FIGURE #: 5-3



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION

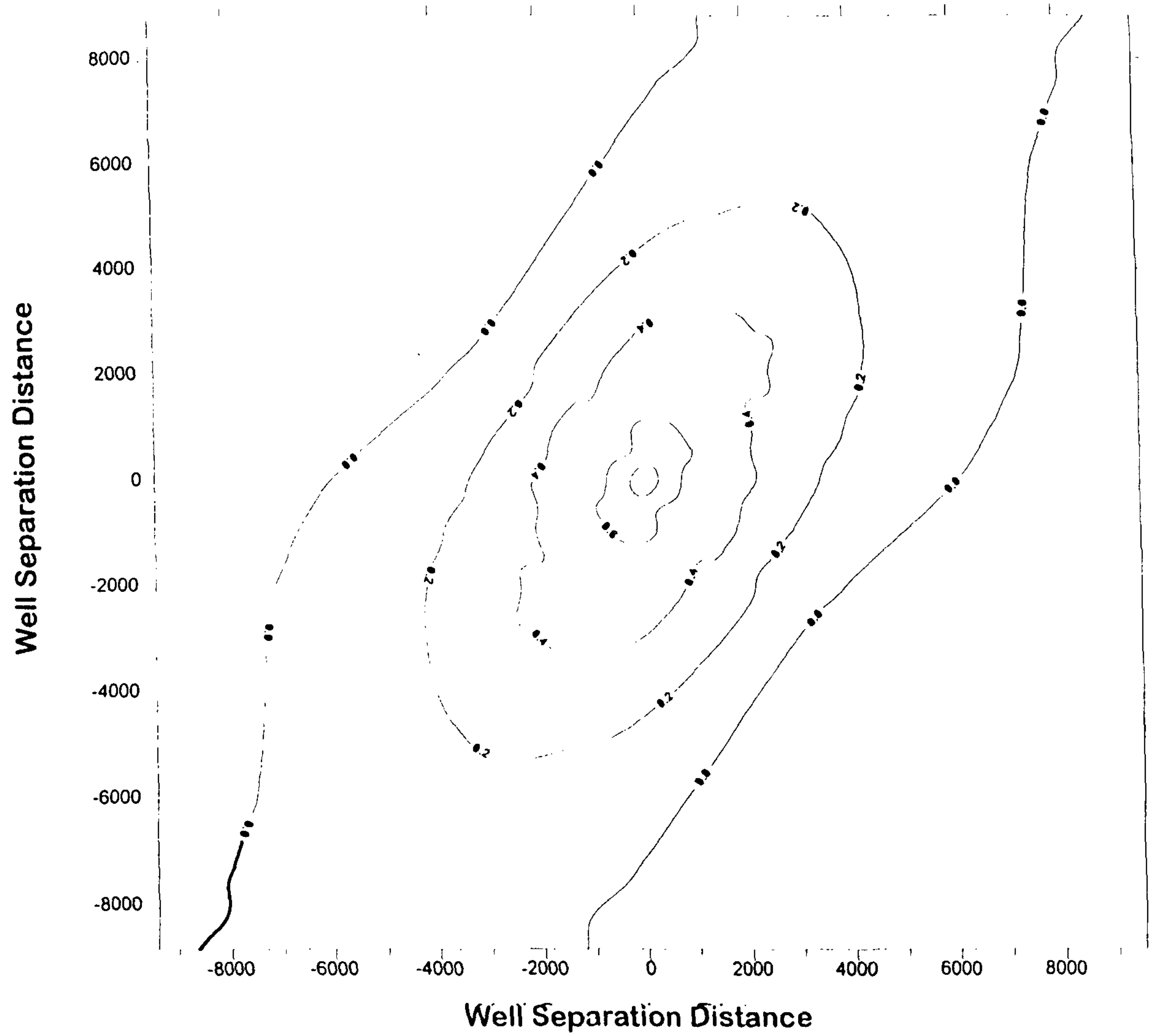
CLIENT NAME: THE PORT AUTHORITY OF NY & NJ

ROSE DIAGRAM FOR THE SECOND CORRELATION STRUCTURE

DATE: September 1997

FIGURE #: 5-4

920920459



WESTON® MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION

CLIENT NAME: THE PORT AUTHORITY OF NY & NJ

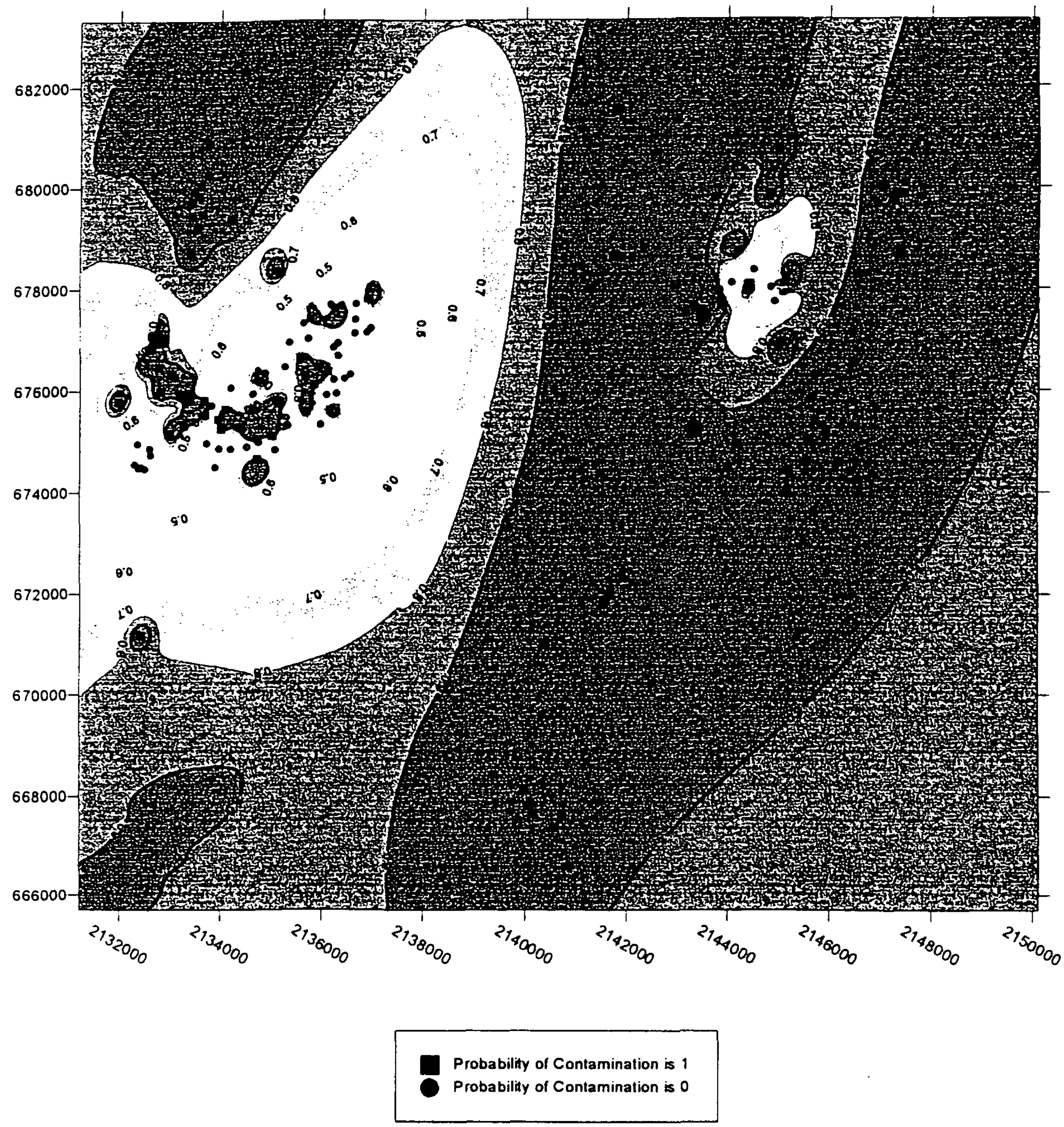
COMPOSITE SPATIAL CORRELATION PATTERN

DATE: September 1997

FIGURE #: 5-5

920920460

TIERRA-D-019098



WESTON

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION

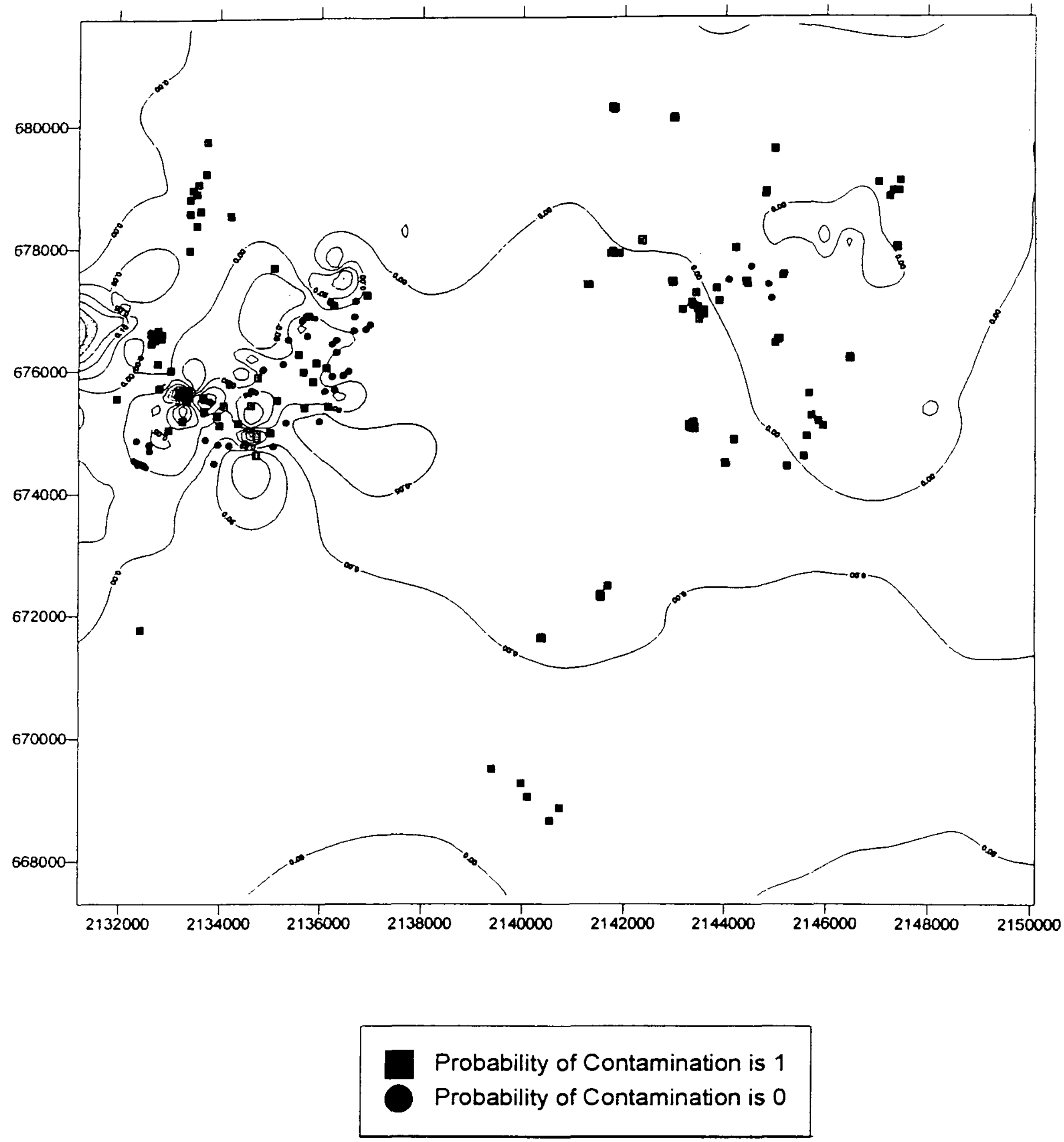
CLIENT NAME: THE PORT AUTHORITY OF NY AND NJ

GEOSTATISTICAL CONTOUR MAP OF THE PROBABILITY OF GROUNDWATER CONTAMINATION

DATE: September 1997

FIGURE #: 5-8

920920461

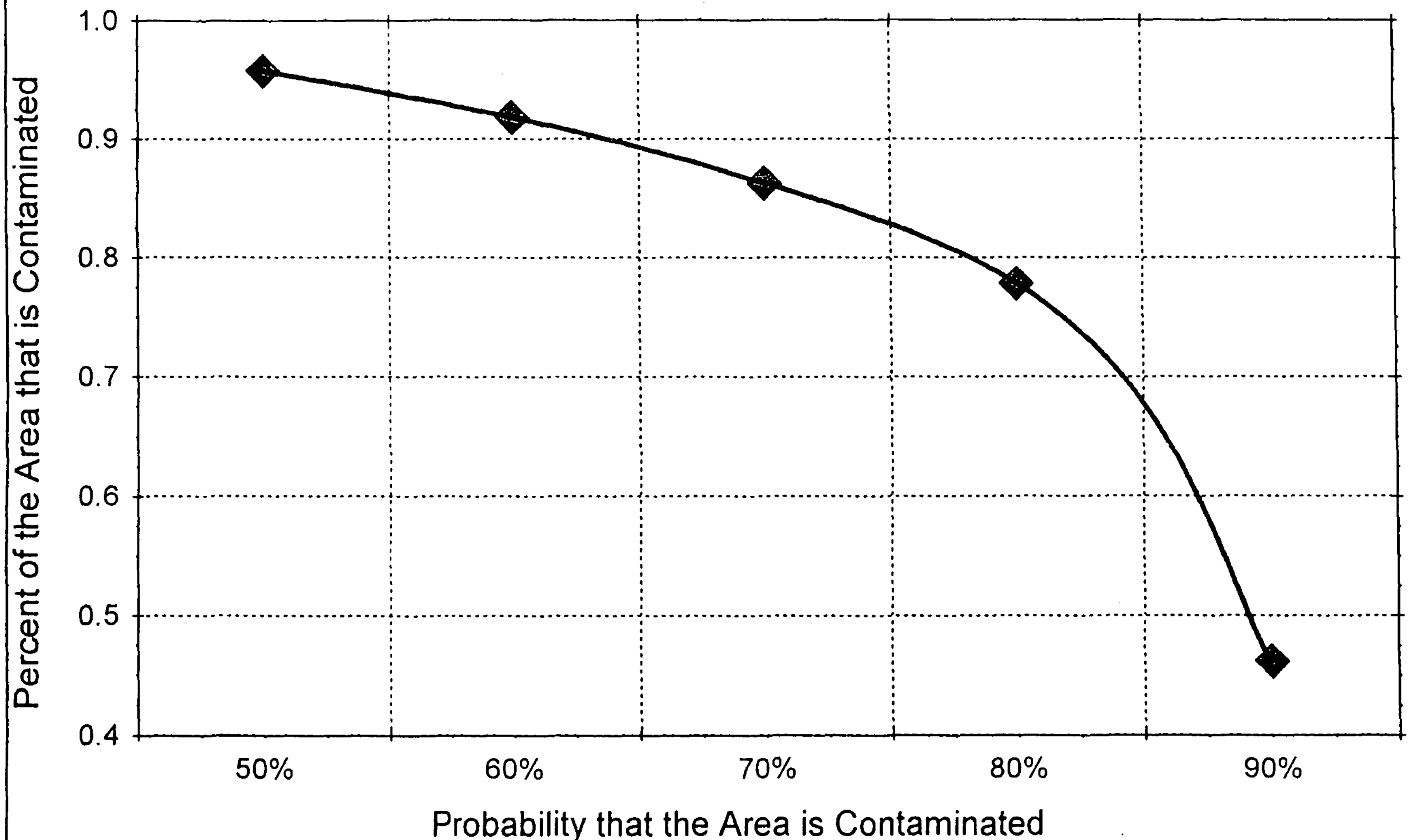


WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	CONTOUR MAP OF DEVIATIONS IN THE GEOSTATISTICAL MAP FROM THE ORIGINAL DATA
	CLIENT NAME: THE PORT AUTHORITY OF NY AND NJ	DATE: September 1997 FIGURE #: 5-7

920920462

TIERRA-D-019100

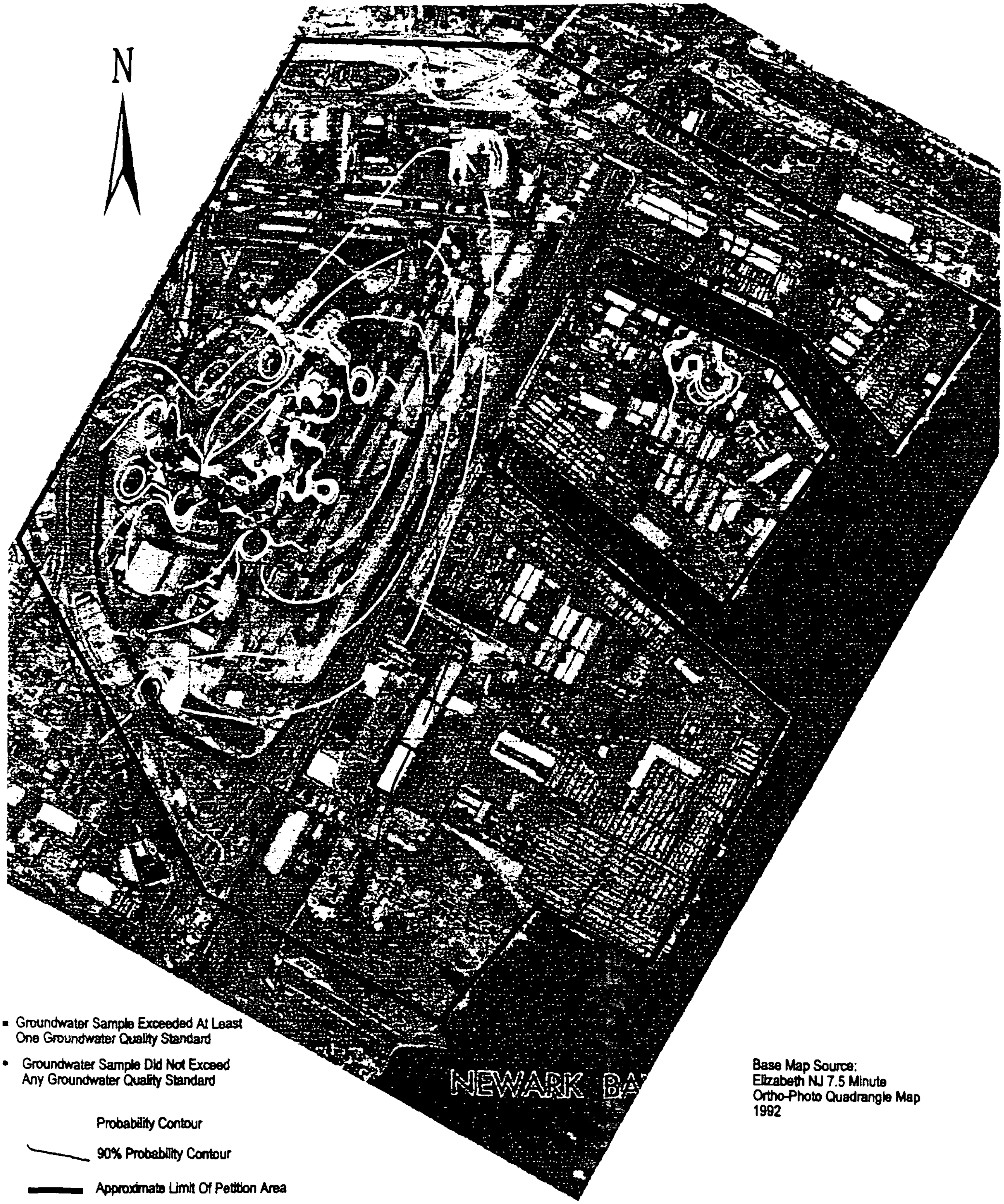
Probability that a Percentage of the Area is Contaminated



WESTON
MANAGERS DESIGNERS/CONSULTANTS

PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	PROPORTION OF AREA LIKELY TO BE CONTAMINATED
CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997 FIGURE #: 5-8

920920463



- Groundwater Sample Exceeded At Least One Groundwater Quality Standard
- Groundwater Sample Did Not Exceed Any Groundwater Quality Standard

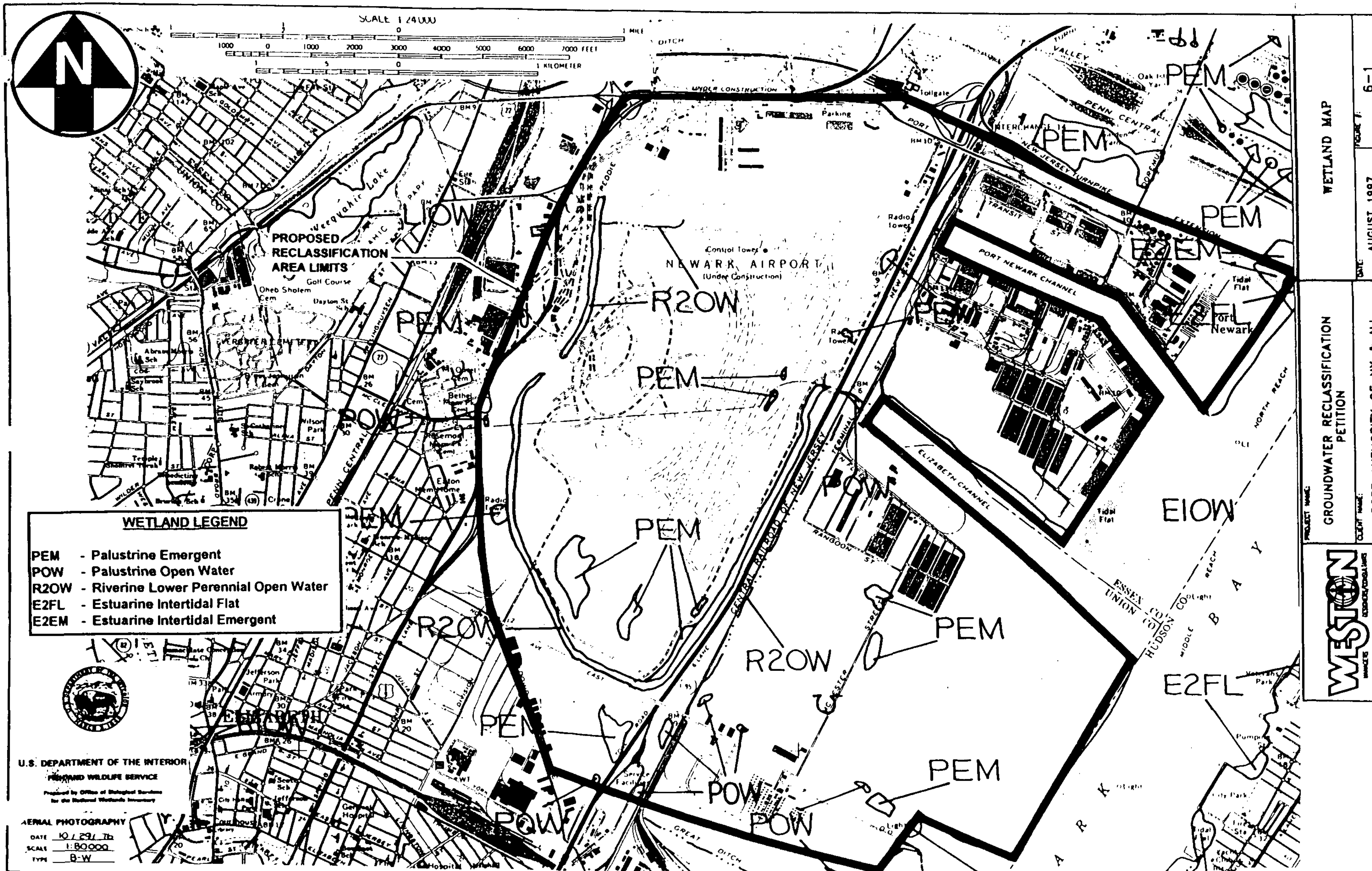
Probability Contour

90% Probability Contour

Approximate Limit Of Petition Area

Base Map Source:
Elizabeth NJ 7.5 Minute
Ortho-Photo Quadrangle Map
1992

WESTON MANAGERS DESIGNERS/CONSULTANTS	PROJECT NAME: GROUNDWATER RECLASSIFICATION PETITION	PROBABILITY OF GROUNDWATER CONTAMINATED ABOVE GROUNDWATER QUALITY STANDARDS
	CLIENT NAME: THE PORT AUTHORITY OF NY & NJ	DATE: September 1997 FIGURE #: 5-9



920920465

TIERRA-D-019103

Tables

Tables

TABLE 2-1

LIST OF TENANTS
EWR

BUILDING NO.	TENANT	FUNCTION
1	Multi-Occupancy	Passenger Terminal
2	Multi-Occupancy	Passenger Terminal
3	None	Passenger Terminal (Partially Constructed)
5	Dr. Lotman Port Authority	Medical Clinic Locker Room
10	Port Authority	Administration Building Police Garage
11	Port Authority	Maintenance Garage
12	Butler Aviation	Aircraft Hangar
14	United Airlines	Aircraft Hangar
22	Butler Aviation	Storage
23	Hertz Corporation	Administration Building
24	Hertz Corporation	Maintenance
25	National Car Rental	Administration Building
26	National Car Rental	Maintenance
27	Avis Corporation	Administration Building
28	Avis Corporation	Maintenance
33	Port Authority	Maintenance Garage
42	Port Authority	Pumping Station
44	Port Authority	Electrical Distribution
45	Port Authority	Electrical Distribution
46	Port Authority	Heating and Refrigeration Plant
49	Port Authority	Heating and Refrigeration Plant
51	U.S. Postal Service Weather Bureau	Airmail Handling
52	Butler Aviation	Auto Repair Shop
53	Port Authority	Maintenance Shop
54	Butler Aviation	Ancillary Building to Hangar 12
55	Multi-Occupancy	Vehicle and Aircraft Maintenance
57	Port Authority	Pump House
67	Port Authority	PAF/FAA Equipment
75	Getty Oil Company	Auto Service Station
77	Port Authority	Maintenance and Storage
82	Port Authority	Maintenance and Storage
83	Port Authority	Maintenance Garage and Shops

TABLE 2-1 (CONTINUED)

LIST OF TENANTS
EWR

BUILDING NO.	TENANT	FUNCTION
88	Port Authority/U.S. Customs	Passenger Terminal
93	Port Authority	Maintenance and Storage
94	Port Authority	PAF/FAA Equipment
95	Flagship	Commissary
102	Port Authority	Sand Storage
116	Allied Aviation	Vehicular Maintenance
117	Allied Aviation	Aircraft Fuel Control
119	Port Authority FAA	Aircraft Control Center
140	Cummins Diesel	Vehicle Engine Repairs
150	Multi-Occupancy	Air Cargo Services
151	Multi-Occupancy	Air Cargo Services
151U	United Airlines	Air Cargo Services
152	Multi-Occupancy	Air Cargo Services
153	Multi-Occupancy	Air Cargo Services
303	Multi-Occupancy	Vehicular Fueling Station
304	FAA	Maintenance Office
315	Buckeye	Fuel Metering Terminal
343	Public Service Electric and Gas	Electrical Substation

TABLE 2-2

LIST OF TENANTS
EPAMT

BLDG NO	TENANT
102	Kent Steel Corp.
114	Apostleship of the Sea
117	Waterfront Commission of New York Harbor
118	Seaman's Church Institute
122	Vanguard Pest Control Co.
124	M.J. Rudolph
125	Port Newark Refrigerated Warehouse
126	Fleetwash
131	Aarhus, Inc.
135	Akzo Nobel Salt, Inc.
136	Universal Maritime Service
138	Ecuadorian Line
140	ECDC Environmental, L.C.
146	Naporano Iron & Metal Co.
148	M.P. Howlett, Inc.
150	Marine Transport, Inc.
151	Swift Fuel Stop
154	Interamerican Juice Co., Inc.
160	K&S Tire Service Co.
161	Dray Con Transport, Inc.
171	Commercial Carriers
173	Hudson Tank Terminals
178	Essex Cement Co./Titan Atlantic Cement
178	Minteq International, Inc.
179	Essex Cement Co./Titan Atlantic Cement
182	Essex Cement Co./Titan Atlantic Cement
185	Essex Cement Co./Titan Atlantic Cement
186	Maersk Container Service
187	M.J. Rudolph
188	International Warehouse & Distribution
189	First Union National Bank
191	Glendale Warehouse & Distribution
192	Nationwide Transport & Wholesale

WESTON

TABLE 2-2 (CONTINUED)

LIST OF TENANTS
EPAMT

BLDG NO	TENANT
194	Tyler Distribution Centers, Inc.
195	Port Elizabeth Terminal & Warehouse
196	Van Brunt Port Jersey
198	International Warehouse & Distribution
198	Port Warehouse & Distribution, Corp.
200	Eastern Warehouse Inc.
201	Port Elizabeth Terminal & Warehouse
202	International Warehouse & Distribution
202	LG Electronics
211	Akzo Nobel Salt, Inc.
212	Akzo Nobel Salt, Inc.
221	Universal Maritime Service
222	Universal Maritime Service
230	Maersk Container Service
231	Maersk Container Service
232	Maersk Container Service
233	Maersk Container Service
236	Maersk Container Service
250	FAPS, Inc.
255	Port Authority Sign Shop
257	Port Newark Tire Repair
261	Linon Imports, Inc.
262	AZ Carriers/AZ Container
262	Performance Transport Systems, Inc.
263	Asiatic Corporation (USA) Inc./Newark Commercial Warehouse
263	State Consolidating Corp.
263	Varuna Distribution & Transportation Corp.
264	Pittston Warehouse Corp.
265	Continental Gypsum Co.
266	Linon Imports, Inc.
267	Continental Gypsum Co.
268	AZ Carriers/AZ Container
269	Continental Gypsum Co.

TABLE 2-2 (CONTINUED)

LIST OF TENANTS
EPAMT

BLDG NO	TENANT
270	Port Authority K-9 Unit
290	FAPS, Inc.
291	Visy Paper (NY) Inc.
292	Visy Paper (NY) Inc.
296	FAPS, Inc.
302	FAPS, Inc.
303	FAPS, Inc.
304	Kent Steel Corp.
305	AmRod Corporation
317	Nu Car Carrier, Inc.
318	Nu Car Carrier, Inc.
321	Banks Ship Rigging Corporation
325	FAPS, Inc.
350	B.P. Marine Americas
390	Toyota Logistics Services, Inc.
391	Toyota Logistics Services, Inc.
395	Best Transportation
400	New Jersey State Police
402	Security Park, Inc.
1010	Maher Terminals, Fleet Street
1020	Maher Terminals, Fleet Street
1030	Maher Terminals, Fleet Street
1100	Distribution & Auto Service
1130	East Coast Wholesale & Distribution Co.
1140	East Coast Wholesale & Distribution Co.
1150	East Coast Wholesale & Distribution Co.
1160	American Duty Free
1160	CA One Services, Inc.
1160	Dufrepex
1160	Oxford Organics
1160	Port Authority Human Resources Dept.
1160	Saima Avandero
1160	Viewmark USA Inc.

WESTON

TABLE 2-2 (CONTINUED)

LIST OF TENANTS
EPAMT

BLDG NO	TENANT
1170	Consotech/Pertech Industries, Inc.
1170	G.F. International Inc.
1170	Meggitt USA, Inc.
1170	Port Authority Sales Office
1170	Scaff Trucking & Warehousing
1170	Tokyo Kaneku International Corp.
1180	March Transfer Distribution Co.
1180	Mid America Overseas, Inc.
1180	Port Authority General Services
1180	Sambonet USA, Inc.
1180	Scaff Trucking & Warehousing
1180	Unistar Air Cargo
1200	Cargill-Citro America, Inc.
1210	Sea-Land Service, Inc.
1230	Maher Terminals, Fleet Street
1260	Maher Terminals, Fleet Street
1270	Maher Terminals, Fleet Street
1310	Harbor Freight Transportation Co.
1310	Sea-Land Service, Inc.
1320	P. Judge & Sons, Inc.
1320	Port Elizabeth Terminal & Warehouse
1330	Harbor Freight Transportation Co.
1340	Port Elizabeth Terminal & Warehouse
1400	Tyler Distribution Centers, Inc.
1500	Shipside Service, Inc.
2170	American Stevedoring LTD
2180	American Stevedoring LTD
2210	East Coast Wholesale & Distribution Co.
2220	ASA Appie Inc.
2230	Florence Warehouse
2230	T.R.T. International, LTD
2250	March Transfer Distribution Co.
2260	Export Transport Company

TABLE 2-2 (CONTINUED)

LIST OF TENANTS
EPAMT

BLDG NO	TENANT
2260	Rubicon Express, Inc.
2270	Port Authority Central Auto Shop
2270	Port Authority Stockroom
2280	Babb Warehousing Corporation
2280	Coty/RPM International Transport Svcs.
2280	RPM Warehouse, Inc.
2370	Maher Terminals, Tripoli Street
2400	Port Elizabeth Terminal & Warehouse
3210	New York Shipping Association, Inc.
4010	Maher Terminals, Tripoli Street
4020	Maher Terminals, Tripoli Street
4070	Maher Terminals, Tripoli Street
4080	Maher Terminals, Tripoli Street
4090	Maher Terminals, Tripoli Street
5000	Sea-Land Service, Inc.
5010	Sea-Land Service, Inc.
5070	Sea-Land Service, Inc.
5080	Sea-Land Service, Inc.
5130	Sea-Land Service, Inc.
5140	Sea-Land Service, Inc.
N/A	AFI Food Service Dist. Inc.
N/A	American Intermodal Svc., Inc.
N/A	BMW
N/A	Conrail Trainmaster
N/A	Continential Salt
N/A	DonJon Marine
N/A	Garfield Transport Systems Inc.
N/A	Hudson Refrigerating Co.
N/A	International Terminal Operating Co.
N/A	Loma Equipment
N/A	Maher Auto Division
N/A	Marine Spill Response Corp.
N/A	Metro Metal Recycling Corp.

WESTON

TABLE 2-2 (CONTINUED)

LIST OF TENANTS
EPAMT

BLDG NO	TENANT
N/A	Morton International Salt Group
N/A	Northeast Auto Terminal-CARGO
N/A	Owens New World Trucking Inc.
N/A	Sea Trux
N/A	United Transport, Inc.
N/A	Weeks Marine Inc.
N/A	Weeks Stevedoring Co., Inc.

TABLE 2-3

ENVIRONMENTAL DATABASE SEARCH RESULTS

SITE	BUILDING NO./ADDRESS	DATABASE(S)	COMMENTS
Vehicle Processors, Inc.	390	UST, FINDS, RCRIS, LUST	Also listed as Toyota Vehicle Processors and Toyota Motor Sales. Tanks store(d) unleaded gasoline, waste oil, kerosene, and No. 2 fuel oil. RCRA small-quantity generator.
Dist. & Auto Svc.	392	RCRIS, FINDS	RCRA small-quantity generator.
Nu-Car Carriers	318	FINDS, RCRIS	RCRA large-quantity generator.
Consolidated Freightways	300	RCRIS, FINDS, UST, LUST	LUST involves medium diesel fuel No. 2. RCRA small-quantity generator.
Seaport Auto Service Inc.	151	UST	USTs store(d) leaded gasoline, unleaded gasoline, and light diesel fuel No. 1.
Highwat Freight Inc.	147	UST	Tank contents not reported.
Dobbs International Services Inc.	156	UST	Tanks store(d) leaded gasoline.
Butler Fleet Services	98-156 Port Street	FINDS, RCRIS	RCRA large-quantity generator.
Airborne Freight Corporation	98/156 Port Street	UST	Tanks store(d) unleaded gasoline and medium diesel fuel No. 2.
Emery Worldwide	100	FINDS, RCRIS, HMIRS, LUST, UST	Tanks store(d) No. 2 fuel oil. Other tank contents not reported. RCRA large-quantity generator.
Pittston Warehouse Corp.	264	FINDS, RCRIS	RCRA large-quantity generator.
Port Authority	260	UST	Tanks store(d) leaded gasoline, unleaded gasoline, alcohol-enriched gasoline, light diesel fuel No. 1, medium diesel fuel No. 2, waste oil, and No. 2 fuel oil.
T&J Landfill	70 Port Street	CERCLIS, FINDS, SWF/LF	Authorized to accept bulky waste. Preliminary Assessment completed in 1987, recommendation of No Further Remedial Action Planned (NFRAP) given.
Avis Rent A Car	30-116 Port Street	UST, FINDS, RCRIS	Tank contents not reported. RCRA large-quantity generator.
New Jersey Turnpike Authority	14 Port Street	FINDS, RCRIS	RCRA large-quantity generator.
Hudson County Chromate 148	350 Coastal Street	SHWS	
Balco Warehouse	Marsh and Maritime Streets	LUST	Tank contents not reported.
M&G Convoy	142 Marsh Street	FINDS, RCRIS, LUST	Tank contents not reported. RCRA large-quantity generator.
Commercial Carriers	142 Marsh Street	UST	Tanks store(d) waste oil.
LJN Toys LTD	135 Marsh Street	RCRIS, FINDS	RCRA small-quantity generator.

TABLE 2-3 (CONTINUED)

ENVIRONMENTAL DATABASE SEARCH RESULTS

SITE	BUILDING NO./ADDRESS	DATABASE(S)	COMMENTS
Aarhus Inc.	131	RCRIS, FINDS	RCRA small-quantity generator. Facility has an active water discharge permit.
Employment Information Center 11	117	UST	Tanks store(d) unleaded gasoline.
Orient Chemical Corporation	121	FINDS, RCRIS, TSCA, SHWS	RCRA large-quantity generator.
Waterfront Commission of New York	117	LUST	Tank contents not reported.
Diamond Crystal Salt Co.	211	FINDS	Facility has active water discharge and air emissions permits.
International Salt Company	211	UST	Tanks store(d) hazardous substances.
Koppers Company	Maritime and Tyler Streets	SHWS, CERCLIS, FINDS, RCRIS, UST	RCRA large-quantity generator and treatment, storage, and disposal facility (TSDF). Preliminary Assessment completed in 1989; no final recommendation given. Tank contents not reported.
Maersk Container Service	231	FINDS, RCRIS, UST, LUST	Tanks store(d) unleaded gasoline, medium diesel fuel No. 2, and No. 4 fuel oil. RCRA large-quantity generator.
Universal Maritime Service Corp.	221	RCRIS	RCRA large-quantity generator.
Filo Chemical Corp.	Clipper and Calcutta Streets	FINDS, RCRIS	RCRA large-quantity generator.
Nu-Car Carriers	188 Calcutta Street	RCRIS	RCRA large-quantity generator.
Manchem Inc.	199D Panama Street	FINDS, RCRIS	RCRA large-quantity generator.
Biddle Sawyer Corp.	196 Maracaibo Street	RCRIS, FINDS	RCRA small-quantity generator. There is (was) a civil, judicial, and enforcement case against the facility.
Prmmi Inc.	North Fleet and Bombay	UST	Tank contents not reported.
Atlantic Technical Services	3220 Bay Avenue	FINDS, RCRIS	RCRA large-quantity generator.
Orient Chemical Corp.	1201 Corbin Street	FINDS	
IntermodalTech Service Inc. (Mazda Cars)	1201 Corbin Street	FINDS	
Port Authority Industrial Park Elizabeth	Bay Avenue and Corbin Street	UST	Tanks store(d) waste oil.
Atlantic Coast Express Inc.	2170	RCRIS, FINDS	RCRA small-quantity generator.
Port Authority Central Stockroom	Egypt Street and Bay Avenue	FINDS, RCRIS	RCRA large-quantity generator.

WESTON

TABLE 2-3 (CONTINUED)

ENVIRONMENTAL DATABASE SEARCH RESULTS

SITE	BUILDING NO./ADDRESS	DATABASE(S)	COMMENTS
1500 Bay Avenue	1500 Bay Avenue	HMIRS	
Sea-Land Services Inc.	Tripoli and McLester Streets	UST	Tanks store(d) unleaded gasoline, medium diesel fuel No. 2, and No. 2 fuel oil.
C&M Shell Inc.	866 Bay Circle	LUST	Tanks contents not reported.
East Coast Warehouse & Distribution Co.	1140	RCRIS, FINDS	RCRA small-quantity generator.
U.S. Customs Service	201	RCRIS, FINDS	RCRA large-quantity generator.
MTM Partners LP	201	RCRIS, FINDS	RCRA small-quantity generator.
Westfield Lumber and Home Center	700 North Avenue East	UST	Tank contents not reported.
5/61 Bay Avenue	5/61 Bay Avenue	HMIRS	
American Select Distribution Inc.	5-61 Bay Avenue	FINDS	
Distribution & Auto Service	1100	FINDS	
Silver Star Express	295 North Avenue East	FINDS, RCRIS	RCRA large-quantity generator.
New Deal Delivery	250 North Avenue East	LUST	Tanks contents not reported.
Industrial Truck Body Corp.	251 North Avenue East	FINDS, RCRIS	RCRA large-quantity generator.
Instant Air Freight Company	250 North Avenue East	UST	Tanks store(d) unleaded gasoline and light diesel fuel No. 1.
Centennial Trucking Co.	250 North Avenue East	UST	Tanks store(d) unleaded gasoline.
Northern Real Estate	225 North Avenue East	UST	Tanks store(d) light diesel fuel No. 1.
Instant Air Freight Company	225 North Avenue East	UST, LUST	Tanks store(d) leaded gasoline and light diesel fuel No. 1.
Disposal Areas Incorporated Landfill	Kapkowski Road and North Avenue	SHWS	
New England Motor Freight	171 North Avenue	LUST	Tank contents not reported.
Baron-Blakeslee	140 North Avenue	RCRIS, UST	RCRA large-quantity generator. Tank contents not reported.
Allied-Signal	140 North Avenue East	FINDS, RCRIS	RCRA large-quantity generator.
General Chemical Corporation	100 North Avenue	FINDS, RCRIS	RCRA large-quantity generator.
Elizabeth Works	100 North Avenue East	FINDS	Facility is permitted for air emissions.

TABLE 2-3 (CONTINUED)

ENVIRONMENTAL DATABASE SEARCH RESULTS

SITE	BUILDING NO./ADDRESS	DATABASE(S)	COMMENTS
Central Railroad of New Jersey	2-330 North Avenue East	CERC-NFRAP	Preliminary Assessment completed in 1986; Site Inspection completed in 1989. NFRAP recommendation given.
Allied-Signal	10 North Avenue East	Major Facilities, FINDS, RCRIS, TRIS, TSCA, CORRACTS, CERC-NFRAP, UST	Listed as a Major Facility for the storage of 7,000 gallons of hydrochloric acid, 11,560 gallons of sodium hydroxide, and 68,200 gallons of No. 4 fuel oil. RCRA large-quantity generator and TSDF. RCRA Facility Investigation (RFI) completed, RFI Workplan approved, and stabilization measures evaluated. Facility has an active water discharge permit and air emissions permit. Tank contents not reported.
New England Motor Freight	1-71 North Avenue East	FINDS, RCRIS, UST	RCRA large-quantity generator. Tanks store(d) medium diesel fuel No. 2 and unleaded gasoline.
Tinmet Corp.	700 Kapkowski Road	RCRIS, FINDS, CERC-NFRAP	RCRA small-quantity generator and TSDF. Preliminary Assessment completed in 1992; recommendation of NFRAP given. Facility has an air emissions permit.
Elizabeth City Dump	North Avenue East and Bay Avenue	CERCLIS, FINDS	Preliminary Assessment and Site Inspection completed in 1980; recommendation of NFRAP given.
Hampton Inn	N/A	RCRIS, FINDS	RCRA large-quantity generator.
Federal Express	Building 347	RCRIS, FINDS	RCRA small-quantity generator.
AVIS Rent A Car	Building 27	RCRIS, FINDS, UST	RCRA large-quantity generator.
Newark Airport	Former Fuel Farm	RCRIS, FINDS, UST, LUST	RCRA large-quantity generator, LUST site.
Sage Aviation Svc	Hangar 55	RCRIS, FINDS	RCRA large-quantity generator.
United Airlines	Hangar 14	RCRIS, FINDS	RCRA large-quantity generator.
Butler Aviation	Hangar 12	RCRIS, FINDS, UST, LUST	RCRA large-quantity generator, LUST site.
Continental Airlines	Hangar 55A	RCRIS, FINDS, UST, LUST	RCRA large-quantity generator, LUST site.
Ogden Allied Aviation Service	N/A	RCRIS, FINDS	RCRA large-quantity generator.
Allied Aviation Service	N/A	RCRIS, FINDS	RCRA large-quantity generator.
Eastern Airlines	N/A	RCRIS, FINDS	RCRA large-quantity generator.
Hertz Rent A Car	Building 24	RCRIS, FINDS, UST, LUST	RCRA large-quantity generator, LUST site.

WESTON

TABLE 2-3 (CONTINUED)

ENVIRONMENTAL DATABASE SEARCH RESULTS

SITE	BUILDING NO./ADDRESS	DATABASE(S)	COMMENTS
National Car Rental	Building 25	RCRIS, FINDS, UST, LUST	RCRA small-quantity generator, LUST site.
Continental Airlines	Terminal C	RCRIS, FINDS, UST	RCRA large-quantity generator.
Chelsea Catering	Building 30	RCRIS, FINDS	RCRA small-quantity generator.
United Airlines	Terminal A	RCRIS, FINDS, UST, LUST	RCRA small-quantity generator, LUST site.
Braniff International Airways	Terminal A	RCRIS, FINDS	RCRA small-quantity generator.
People Express Airlines	North Terminal	RCRIS, FINDS	RCRA large-quantity generator.
American Airlines	Terminal A	RCRIS, FINDS	RCRA large-quantity generator.
USAir Inc.	Terminal A	RCRIS, FINDS	RCRA small-quantity generator.
Newark Airport	Building 27	UST, LUST	--
Port Authority of NY&NJ	Building 51	UST, LUST	--
Newark Airport - Marriott Hotel	N/A	UST, LUST	--
Avis Rent A Car	Building 25	UST, LUST	--
Zantop International Airlines	N/A	UST, LUST	--

N/A - Not available

WESTON

TABLE 2-4

KNOWN CONTAMINATED SITES

SITE	LOCATION	STATUS (DATE)	NJDEP CONTACT
Airborne Express	98 156 Port Street	Pending (2/8/96)	BUST
Avis Rent A Car	EWR Building 25	Active (9/14/95)	BUST
BP North America Petroleum Incorporated	Coastal Street	Active (10/4/92) Pending (5/17/93) Active (6/7/95)	BFO-N BFO-N BUST
Consolidated Freightways	300 Port Street	Active (11/2/95)	BUST
Continental Airlines	EWR Hangar 55	Active (3/23/94)	BUST
Hertz Rent A Car	EWR Building 23	Active (10/1/88)	BUST
Hudson County Chromate 148	350 Coastal Street	Active (4/17/90)	BFCM
Kent Steel Corporation	Navy Street - Building 304	Active (10/6/95)	BUST
M&G Convoy Inc., Port Newark Shop	142 Marsh Street	Active (11/11/93)	BUST
National Car Rental	EWR	Active (12/6/93)	BUST
Newark International Airport	EWR	Active (10/14/94)	BFO-N
Orient Chemical Corporation	121 Tyler Street	Active (5/31/95)	BEECRA
Port Authority	260 Kellogg Street	Active (11/4/94)	BUST
Port Authority	Marsh Street	Pending (2/17/95)	BFO-CA
Port Authority	Corbin Street	Active (3/29/96)	BUST
Seaport Auto Service Incorporated	Corbin and Tyler Streets	Active (1/22/96)	BUST
United Airlines	EWR	Active (1/3/89)	BUST
Universal Maritime Service Corporation	231 Tyler Street	Active (11/9/93)	BUST
Zantop International Airlines	EWR Building 153	Active (1/18/88)	BUST
Buckeye Pipeline Company	EWR Building 115	Active (8/21/91)	BEECRA
Disposal Areas Incorporated Landfill	Kapkowski Road and North Avenue	Active (2/14/94)	BSCM
Federal Express Metroplex	EWR Building 347	Pending (8/27/93) Active (10/12/95)	BFO-N BFO-N
Port Authority Landfill	Bay Avenue and Kapkowski Road	Active (3/8/93)	BSCM
Port Authority Regional Fill	EPAMT	Pending (9/23/94)	BUST
Reality Transfer Corporation	987 to 1176 McLester Street	Pending (9/9/92)	BFO-N

TABLE 2-5

ENVIRONMENTAL DATABASE SEARCH RESULTS
NEARBY FACILITIES

SITE	ADDRESS	DATABASE(S)	COMMENTS
Toys "R" Us	888 Doremus Avenue, Newark	UST	Tanks store(d) medium diesel fuel No. 2-D and waste oil
Firmenich, Inc./Chem-Fleur Processing Facility	928-964 Doremus Avenue, Newark	FINDS, Major Facilities, RCRIS, TRIS, TSCA	Listed as a major facility for the storage of 8,500 gallons of dimethyl sulfate, 27,500 of assorted finished product and raw materials, 9,600 gallons of acetic acid, 9,500 gallons of methyl formcel, 9,600 gallons of methanol, 4,300 gallons of dimethyl sulfate residue, and 10,000 gallons of hazardous waste. RCRA large-quantity generator. Facility is monitored or permitted for air emissions.
New Jersey Galvanizing Tinning Works	139 Haynes Avenue, Newark	RCRIS, FINDS	RCRA large-quantity generator. Facility has a civil and administrative enforcement case and is monitored or permitted for air emissions.
United Airlines	146 Haynes Avenue, Newark	SHWS	Case status is pending.
Bessemer Processing Company Inc.	135 Haynes Avenue, Newark	SHWS, RCRIS	Case status is pending. Facility has a civil and administrative enforcement case and is monitored or permitted for air emissions.
Waverly Yards	Bessemer Street/Haynes Avenue, Newark	SHWS	Case status is active.
Dollar Rent-A-Car	162 U.S. Highway 1, Newark	LUST	Tank contents not reported.
Penick Corp.	158 Mount Olivet Avenue, Newark	Major Facilities, RCRIS, TRIS, TSCA, CORRACTS, CERC-NFRAP	Listed as a major facility for the storage of 275 gallons of diesel fuel, 95,000 gallons of No. 6 fuel oil, 1,500 gallons of ammonium hydroxide, 60,000 gallons of methanol, 1,000 gallons of ammonia, 1,500 gallons of sodium hydroxide, 1,500 gallons of ammonium hydroxide, 275 gallons of gasoline, and 8,000 gallons of various bases and solvents. RCRA large-quantity generator and treatment, storage, and disposal facility. Preliminary Assessment completed in 1992, NFRAP recommendation given. Facility is involved with pesticide production and has a civil and administrative case.

TABLE 2-5 (CONTINUED)

ENVIRONMENTAL DATABASE SEARCH RESULTS
NEARBY FACILITIES

SITE	ADDRESS	DATABASE(S)	COMMENTS
Leaseway Transp	1000 Jefferson Avenue, Elizabeth	FINDS, RCRIS	RCRA large-quantity generator.
Sears Roebuck and Company	1000 Jefferson Avenue, Elizabeth	UST	Tanks store(d) medium diesel fuel No. 2-D.
Papettis Hygrade Egg Products Inc.	847 North Avenue East, Elizabeth	RCRIS, FINDS, UST	RCRA small-quantity generator. Tanks store(d) unleaded gasoline, medium diesel fuel No. 2-D, and home heating oil No. 2.
BLW Associates	901 North Avenue East	LUST	Tank contents not reported.
Metalwash Machinery Corp.	901-15 North Avenue, Elizabeth	RCRIS, FINDS	RCRA small-quantity generator. Facility is monitored or permitted for air emissions.
Aloyco Inc.	879 North Avenue, Elizabeth	FINDS, RCRIS	RCRA large-quantity generator.
Wakefern Food Corporation	610-620 Spring Street, Elizabeth	UST	Tank contents not reported.
Merit Spring	623 Spring Street, Elizabeth	UST, LUST	Tanks store(d) unleaded gasoline, light diesel fuel No. 1-D, and kerosene.
Value Gasoline Station	623 Spring Street, Elizabeth	FINDS, RCRIS	RCRA large-quantity generator.
Value Spring	623 Spring Street, Elizabeth	UST	Tank contents not reported.
Bowman Transportation Inc.	700 Division Street, Elizabeth	UST, LUST	Tanks contents not reported.
Browning-Ferris Ind.	714 Division Street, Elizabeth	RCRIS, FINDS, CERC-NFRAP, UST, SWF/LF	RCRA small-quantity generator. Preliminary Assessment completed in 1985; NFRAP recommended. Tanks store(d) medium diesel fuel No. 2-D. The landfill was authorized to accept municipal, commercial, and industrial wastes, bulky wastes, vegetative waste, animal and food processing waste, and dry industrial waste and is currently closed.
Jerome Industries Corp.	730 Division Street, Elizabeth	RCRIS, FINDS	RCRA small-quantity generator.
Gavin Graham/Vacant	669 Division Street, Elizabeth	UST	Tank store(d) home heating oil No. 2.
DHL Airways Inc. EWR	675 Division Street, Elizabeth	RCRIS, FINDS	RCRA small-quantity generator.
Columbia Cheese Co.	631 Division Street, Elizabeth	UST, LUST	Tanks store(d) medium diesel fuel No. 2-D and home heating oil No. 2.
Stone Container Corp.	750 Dowd Avenue, Elizabeth	FINDS, RCRIS, UST	RCRA large-quantity generator. Tanks contents not reported.

TABLE 2-5 (CONTINUED)

ENVIRONMENTAL DATABASE SEARCH RESULTS
NEARBY FACILITIES

SITE	ADDRESS	DATABASE(S)	COMMENTS
Walker Manufacturing	614 Progress Street, Elizabeth	UST	Tanks store(d) home heating oil No. 2.
BASF Corp.	731 Dowd Avenue, Elizabeth	RCRIS	RCRA small-quantity generator.
Diebold, Inc.	700 Dowd Avenue, Elizabeth	RCRIS, FINDS	RCRA small-quantity generator.
Jaynes Motor Freight Inc.	860 North Avenue, Elizabeth	FINDS, RCRIS, UST	RCRA large-quantity generator. Tanks store(d) waste oil.

TABLE 5-1
PETITION FOR GROUNDWATER RECLASSIFICATION
PORT AUTHORITY OF NY/NJ
SUMMARY OF ANALYTICAL DATA

ANALYTE NAME	NUMBER OF ANALYSES	NUMBER OF DETECTIONS	DETECTED CONCENTRATIONS			NUMBER OF DETECTIONS ABOVE GWQS	NJDEP GWQS
			MINIMUM	MAXIMUM	AVERAGE		
SVOCs							
2,4-DICHLOROPHENOL	57	1	120	120	120	1	20
2,4-DIMETHYLPHENOL	57	8	3	750	225.25	4	100
ACENAPHTHENE	143	33	1	1400	104.52	2	400
FLUORANTHENE	190	24	1	690	60.26	2	300
FLUORENE	190	35	1	880	57.13	2	300
HEXACHLOROETHANE	135	1	63	63	63	1	10
ISOPHORONE	135	1	2200	2200	2200	1	100
PYRENE	190	19	1	440	48.04	2	200
INORGANICS							
CYANIDE, TOTAL	25	8	0.088	240	47.89	1	200
METALS							
ARSENIC, TOTAL	74	43	2	5100	214.49	34	8
BARIUM, TOTAL	10	7	57	3140	565.29	1	2000
CADMIUM, TOTAL	64	19	0.79	228	21.29	16	4
CHROMIUM, TOTAL	75	34	12.1	1280	353.26	20	100
COPPER, TOTAL	65	34	3.6	3390	250.93	2	1000
LEAD, TOTAL	127	75	2	22500	799.79	65	10
MERCURY, TOTAL	58	15	0.3	432	31.44	5	2
NICKEL, TOTAL	62	20	17.7	670	145.84	8	100
SELENIUM, TOTAL	57	8	1.4	510	69.7	1	50
THALLIUM, TOTAL	50	5	5	36	21.58	3	10
ZINC, TOTAL	65	37	4.2	10900	892.96	1	5000
PESTICIDES							
ALPHA-BHC	17	1	0.026	0.026	0.03	1	0.02
VOCs							
1,1,1-TRICHLOROETHANE	295	3	7	140	89	2	30
1,1,2,2-TETRACHLOROETHANE	292	1	2.3	2.3	2.3	1	2
1,1-DICHLOROETHANE	293	5	29	290	165.6	3	70
ACETONE	234	88	2	730	49.9	1	700
BENZENE	433	92	0.071	11000	1141.36	79	1
BROMOMETHANE	295	2	11	11	11	2	10
CHLOROBENZENE	300	4	6.8	600	158.2	1	50
CHLOROFORM	294	7	2.2	7.6	5.03	2	6
CHLOROMETHANE	295	3	1	290	193.67	2	30
HEXACHLOROBUTADIENE	57	1	3.2	3.2	3.2	1	1
METHYLENE CHLORIDE	372	205	0.7	99	6.95	148	2
STYRENE	220	1	830	830	830	1	100
TOLUENE	430	82	0.12	39000	1860.3	14	1000
XYLENES (TOTAL)	403	80	0.12	100000	3306.88	40	40

Notes:
NJDEP GWQS: New Jersey Department of Environmental Protection Groundwater Quality Standards for Class II-A Groundwater.
SVOCs: Semivolatile Organic Compounds.
VOCs: Volatile Organic Compounds.
All units are in µg/L.

TABLE 6-1

COMPARISON OF GROUNDWATER QUALITY DATA WITH SURFACE WATER QUALITY DATA FROM NEWARK BAY

Compound	Groundwater Concentration Range (µg/L) Multiple Studies	Surface Water Concentration Range in Newark Bay (µg/L)				EPA Ambient Marine Water Quality Criteria	
		Sample A7 - Battelle January 1991	Sample A7 - Battelle October 1991	Port Authority April 1996	SAIC/EPA July 1991, January 1992	Acute	Chronic
Antimony	23-41	NA	NA	NA	13U	NC	NC
Arsenic	2-5100	NA	NA	ND	5U	69	36
Barium	57-3140	NA	NA	NA	NA	NC	NC
Beryllium	NA	NA	NA	NA	3U	NC	NC
Cadmium	0.79-228	0.103	0.149-0.157	ND	4U	43	9.3
Chromium	12.1-1280	NA	NA	ND	NA	NC	NC
Copper	3.6-3390	4.2	5.84-5.86	ND	4U	2.9	2.9
Lead	2-22500	2.8	2.91-2.95	ND	5U	140	5.6
Mercury	0.3-432	0.036	0.037-0.09	ND	0.2U	2,136	0.025
Nickel	17.7-670	2.2	3.71	ND	8U	95	54
Selenium	1.4-510	NA	NA	NA	6U	NC	NC
Thallium	5-36	NA	NA	5.9	3U	NC	86
Zinc	4.2-10,900	14.8	20.18-21.83	ND	9U-17.1	NC	NC
Methoxychlor	NE	NA	NA	3.9	NA	NC	0.03
Total Petroleum Hydrocarbons	1.4-324	NA	NA	ND	NA	NC	NC
Methylene Chloride	0.7-99	NA	NA	ND	NA	NC	NC
Benzene	0.071-11000	NA	NA	ND	NA	NC	NC
Toluene	0.12-100000	NA	NA	ND	NA	NC	NC
Ethylbenzene	60-3000	NA	NA	ND	NA	NC	NC
Xylene	0.12-10000		NA	ND	NA	NC	NC
bis(2-ethylhexyl) phthalate	75	NA	NA	NA	NA	NC	NC
Styrene	830	NA	NA	NA	NA	NC	NC
TCE	4-5	NA	NA	ND	NA	NC	NC
Acenaphthene	1-1400	NA	NA	NA	NA	NC	NC
Fluorene	1-880	NA	NA	NA	NA	NC	NC
Anthracene	29000	NA	NA	NA	NA	NC	NC

NA - Not analyzed for
NC - No criteria established
ND - Not detected
U - Not detected at the listed concentration
ug/L - microgram per liter

92092485

TABLE 6-2

SUMMARY OF SEDIMENT SAMPLING RESULTS FOR NEWARK BAY ADJACENT TO THE PROPOSED RECLASSIFICATION AREA

Compound	Battelle, October 1991 Location A7		NOAA 1991 Locations 16, 17 (mg/kg)(1)	NOAA 1993 Locations 31, 36 (mg/kg unless otherwise noted)
	Pore Water (µg/L)	Sediment (mg/kg)		
Aluminum	NA	NA	40000 - 68000	55600 - 65200
Antimony	NA	NA	0.46 - 2.7	<5.24
Arsenic	39.4	8.83	6.9 - 21	9.83 - 13.4
Cadmium	0.028	1.38	0.8 - 3.1	1.2 - 1.46
Copper	4.97	105.3	31 - 190	82.4 - 113
Chromium	NA	NA	83 - 160	106 - 122
Iron	NA	NA	15000 - 38000	29.3 - 37.2
Lead	2.23	109	41 - 240	95.9 - 124
Manganese	NA	NA	224 - 590	NR
Mercury	0.026	1.75	1.1 - 3.9	1.51 - 1.59
Nickel	3.75	1.75	15- 54	NR
Selenium	NA	NA	< 0.16 - 34	0.55 - 0.713
Silver	0.1	4.35	0.5 - 2.2	NR
Tin	NA	NA	7.5 - 34	21.8 - 25.6
Zinc	17.8	188	77 - 400	173 - 214
Hexachlorobenzene	NA	NA	0.0033 - 0.0038	0.004 - 0.0056
Chlordane	NA	NA	0.0031 - 0.0046	0.0072 - 0.0089
Dieldrin	NA	NA	0.0016 - 0.0023	0.003 - 0.0062
2,4-DDE	NA	NA	0.0021 - 0.0033	NR

920920486

WESTON

TABLE 6-2 (CONTINUED)

SUMMARY OF SEDIMENT SAMPLING RESULTS FOR NEWARK BAY ADJACENT TO THE PROPOSED RECLASSIFICATION AREA

Compound	Battelle, October 1991 Location A7		NOAA 1991 Locations 16,17 (mg/kg)[1]	NOAA 1993 Locations 31, 36 (mg/kg unless otherwise noted)
	Pore Water (µg/L)	Sediment (mg/kg)		
2,4-DDD	NA	NA	0.0316 - 0.007	NR
4,4-DDD	NA	NA	0.010 - 0.0129	NR
4,4-DDT	NA	NA	0.0146 - 0.0394	NR
Total PAHs	NA	NA	8.068 - 18.879	NR
Total DDTs	NA	NA	NR	0.142 - 0.152
Cumulative Dioxins (TEQ) (pg/g)	NA	NA	NR	97.785 - 108.77 pg/g
Total PCBs	NA	NA	NR	0.565 - 0.577

(1) Concentrations of several metals were measured by X-Ray Fluorescence and are not so accurate as 1993 data analyzed by atomic absorption spectrometry.

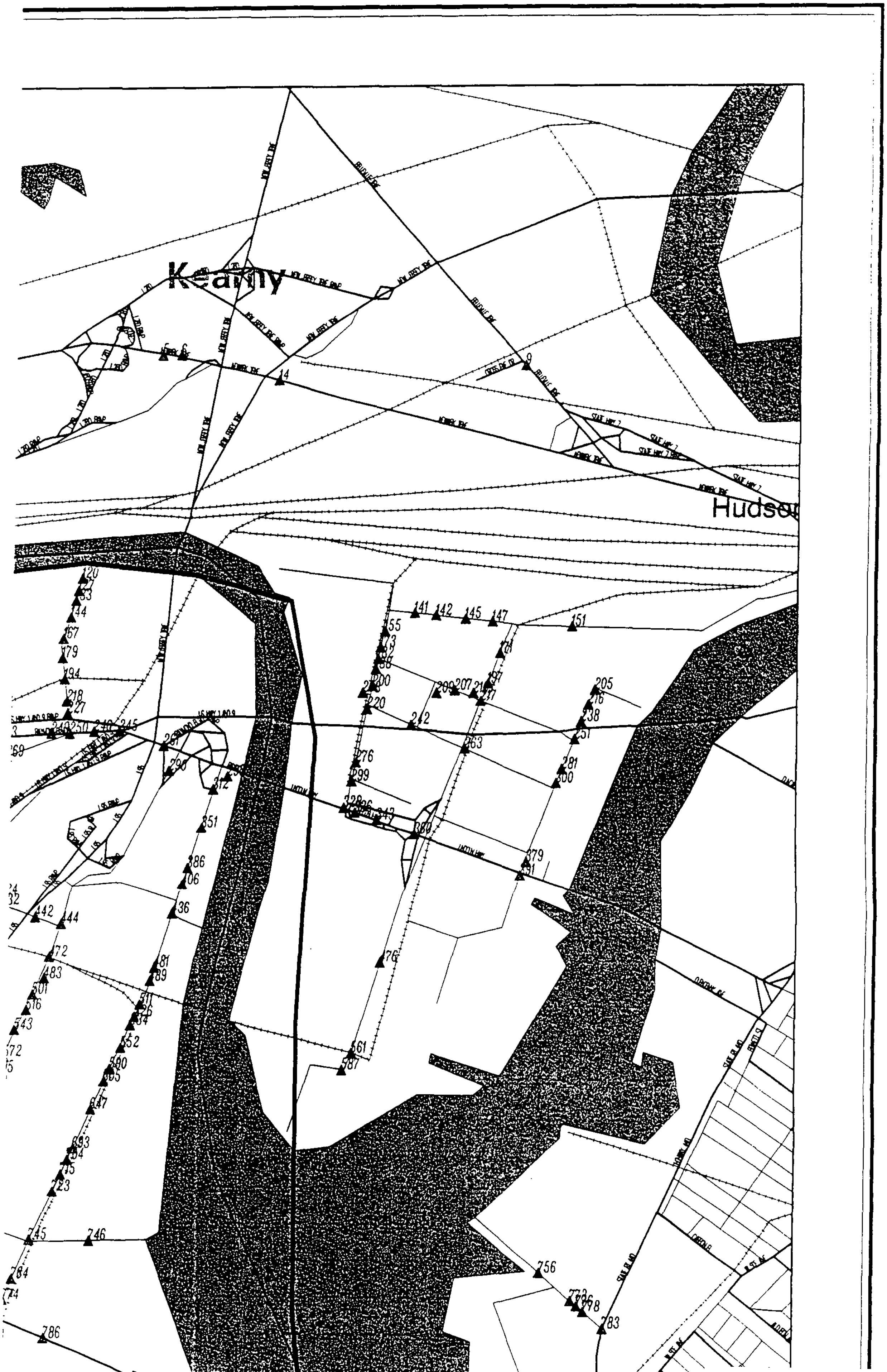
NOTES:
NA - Not analyzed for
NR - Not reported
PCBs - Polychlorinated biphenyls
PAHs - Polycyclic aromatic hydrocarbons
TEQ - Toxic equivalency factor
ug/L - Micrograms per liter
mg/kg - Milligrams per kilogram
pg/g - Picograms per gram

Appendix A

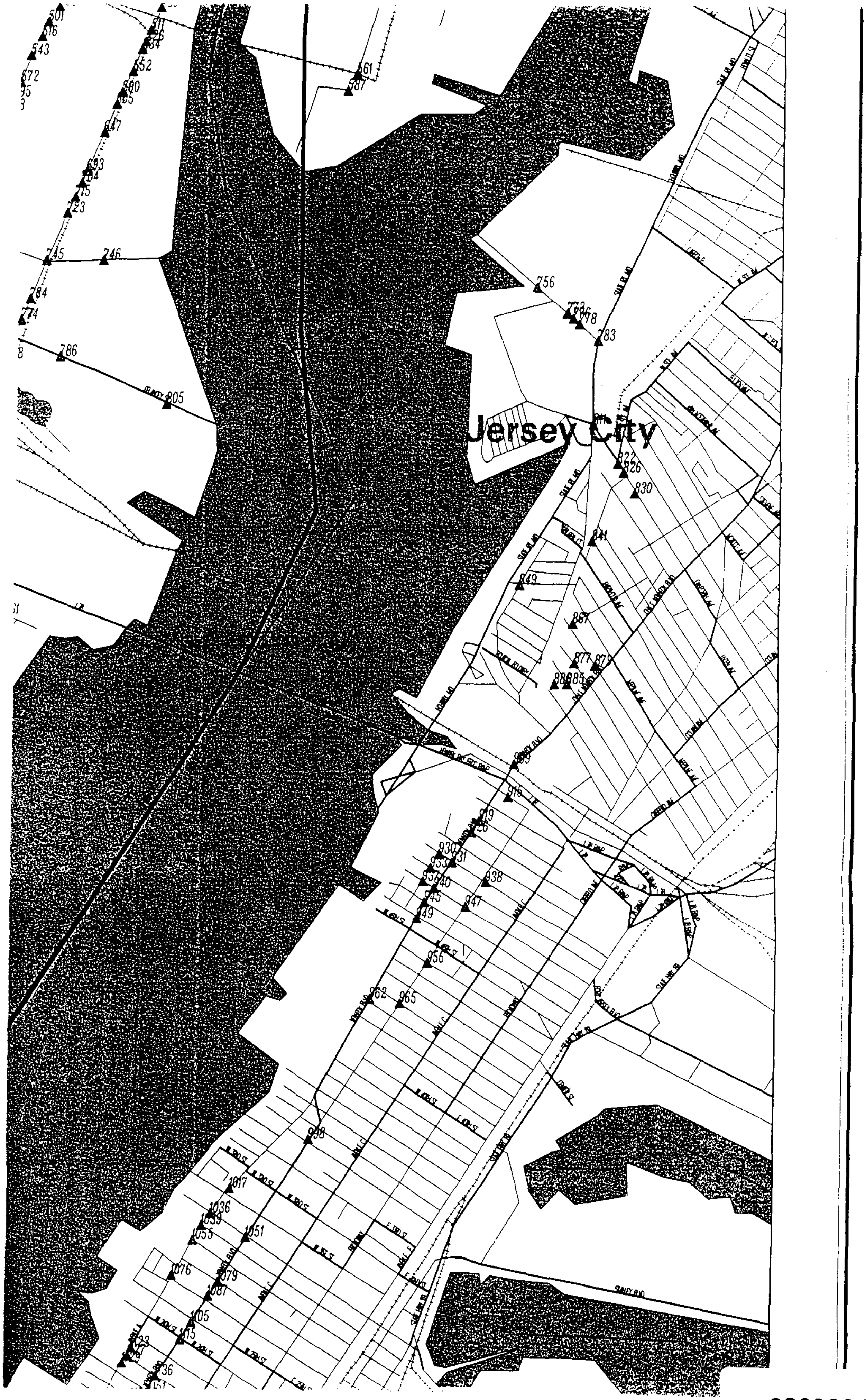
WESTON

APPENDIX A

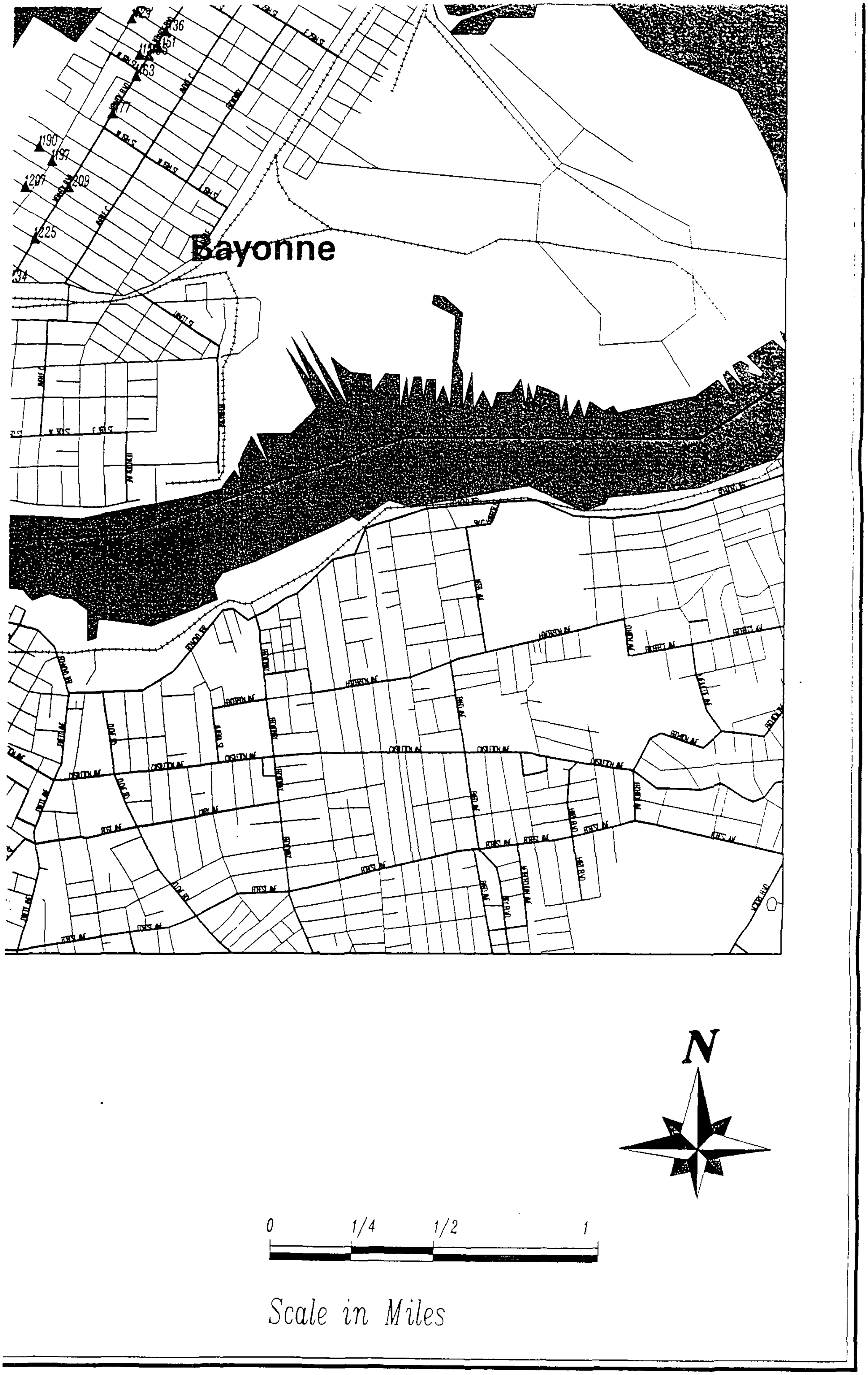
EDR MAP

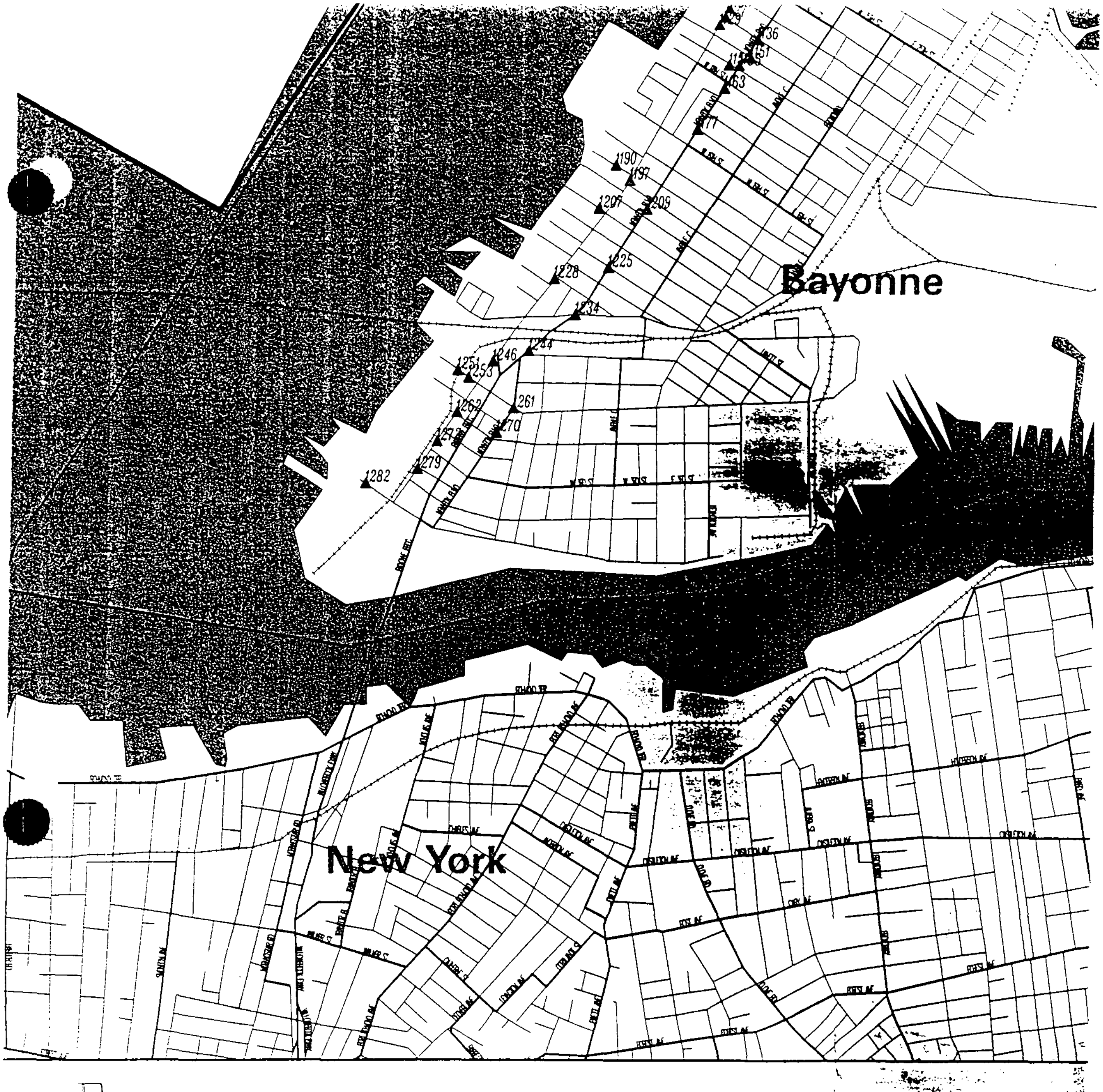


Kearny
Hudson



Jersey City


Bayonne
N
0
1/4
1/2
1
Scale in Miles



ea For

lizabeth

Water

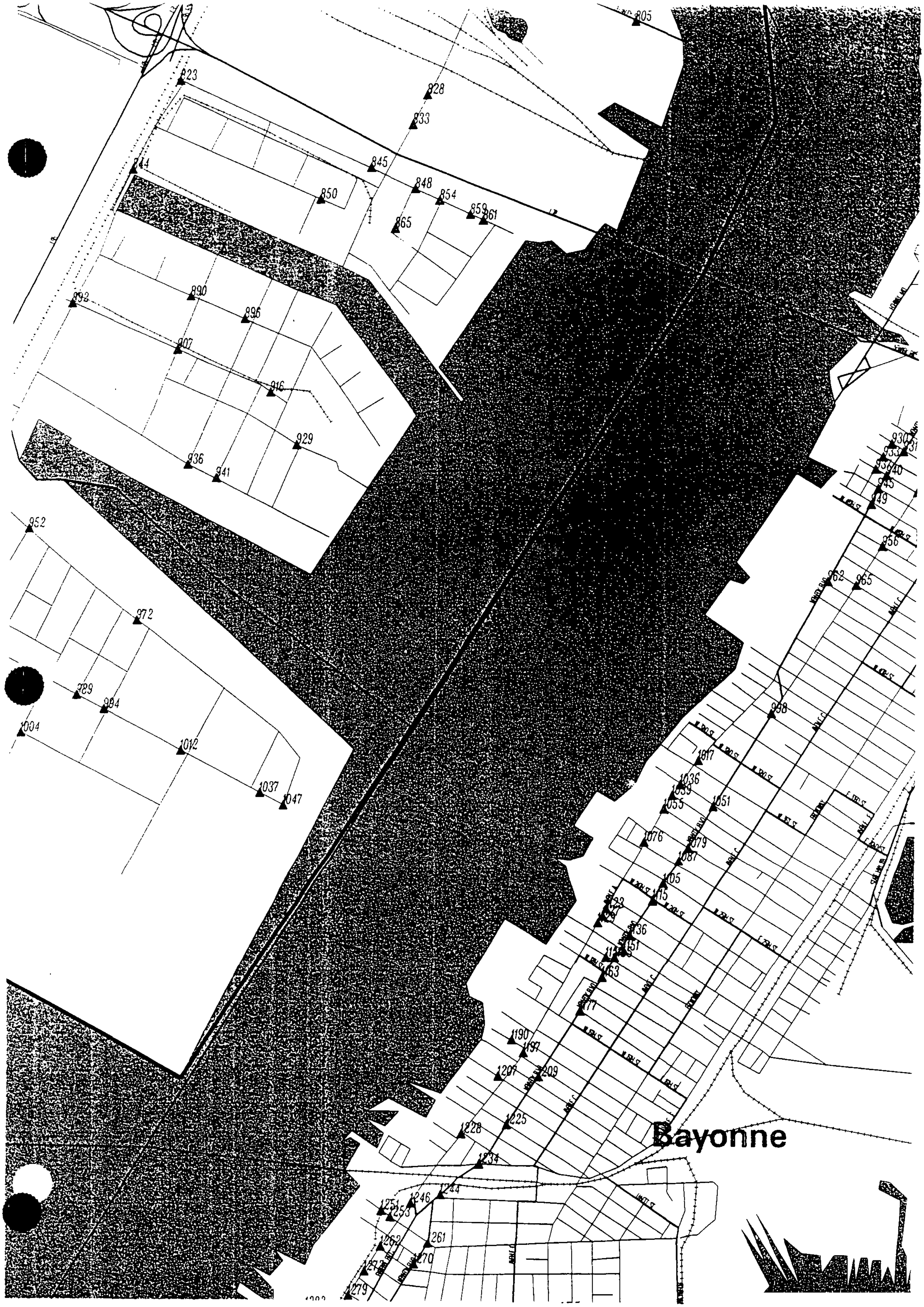
Superfund Sites

0 1/4 1/2

Scale in Miles

920920493

TIERRA-D-019131


Bayonne
805
823
828
833
844
845
848
850
854
859
861
865
890
892
896
907
916
929
936
941
952
972
989
994
1004
1012
1037
1047
930
956
962
965
998
1017
1036
1051
1055
1076
1079
1087
1105
1115
1136
1151
1163
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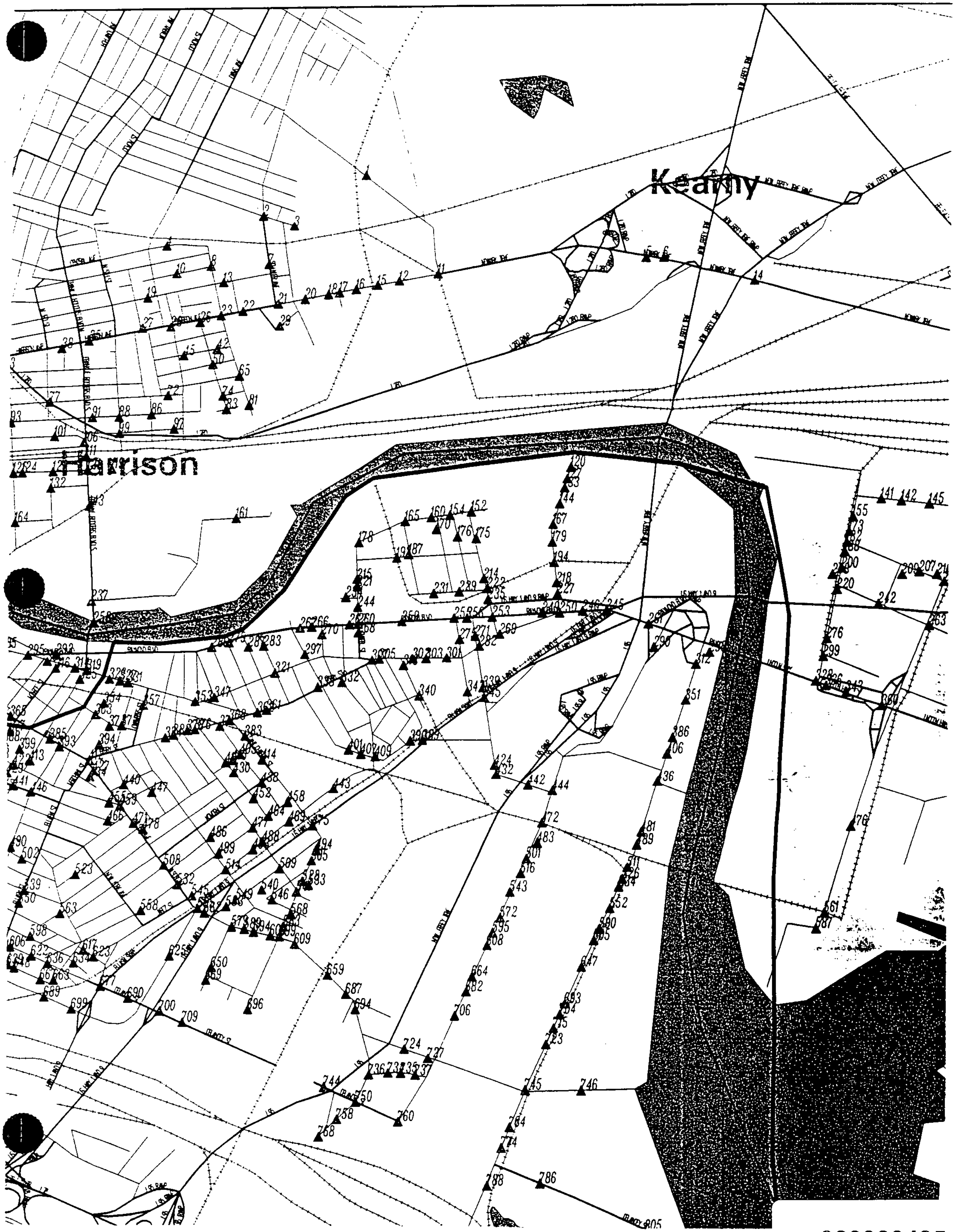
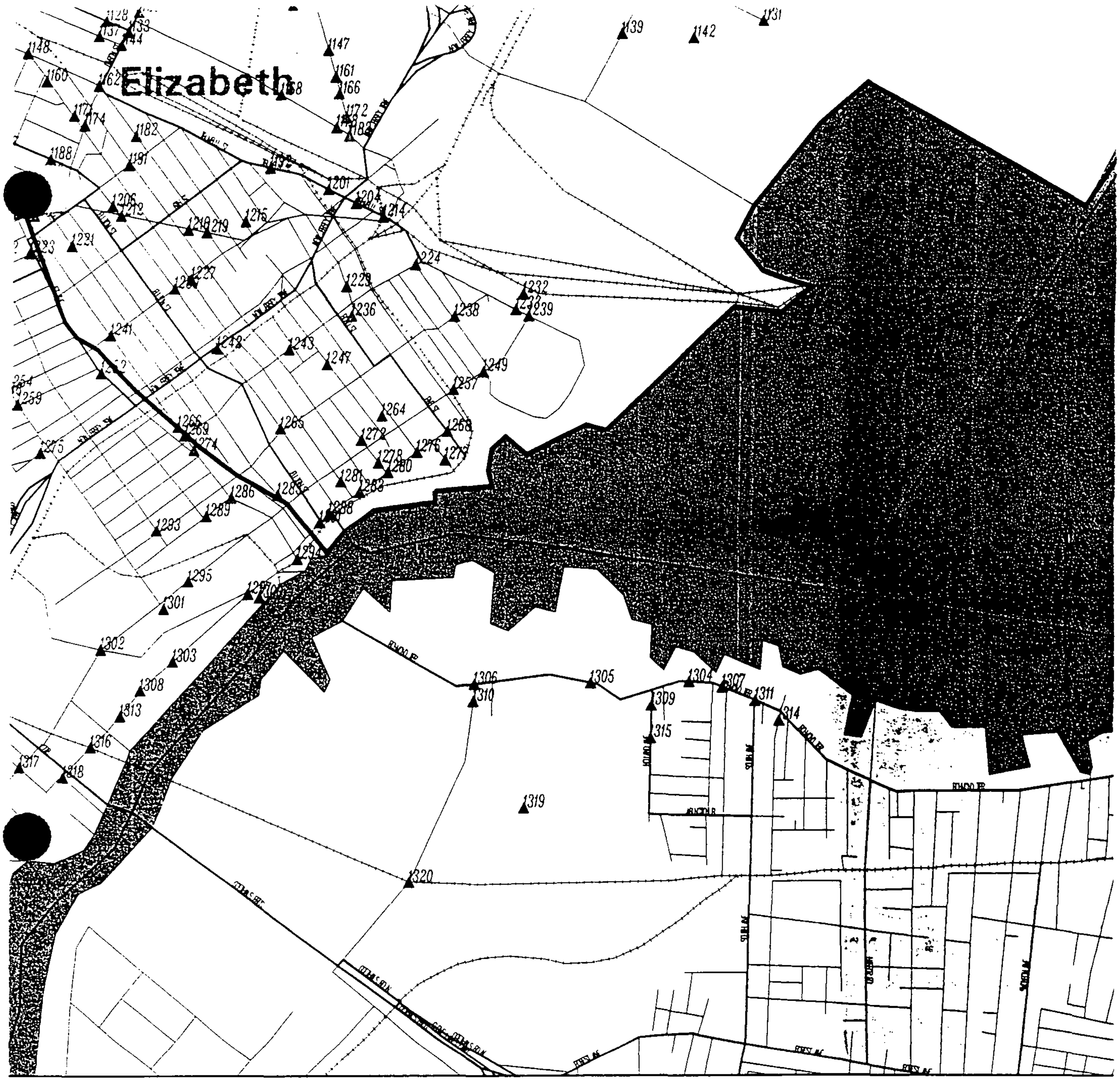
1261
1262
1270
1279



920920495

TIERRA-D-019133



Study Area For

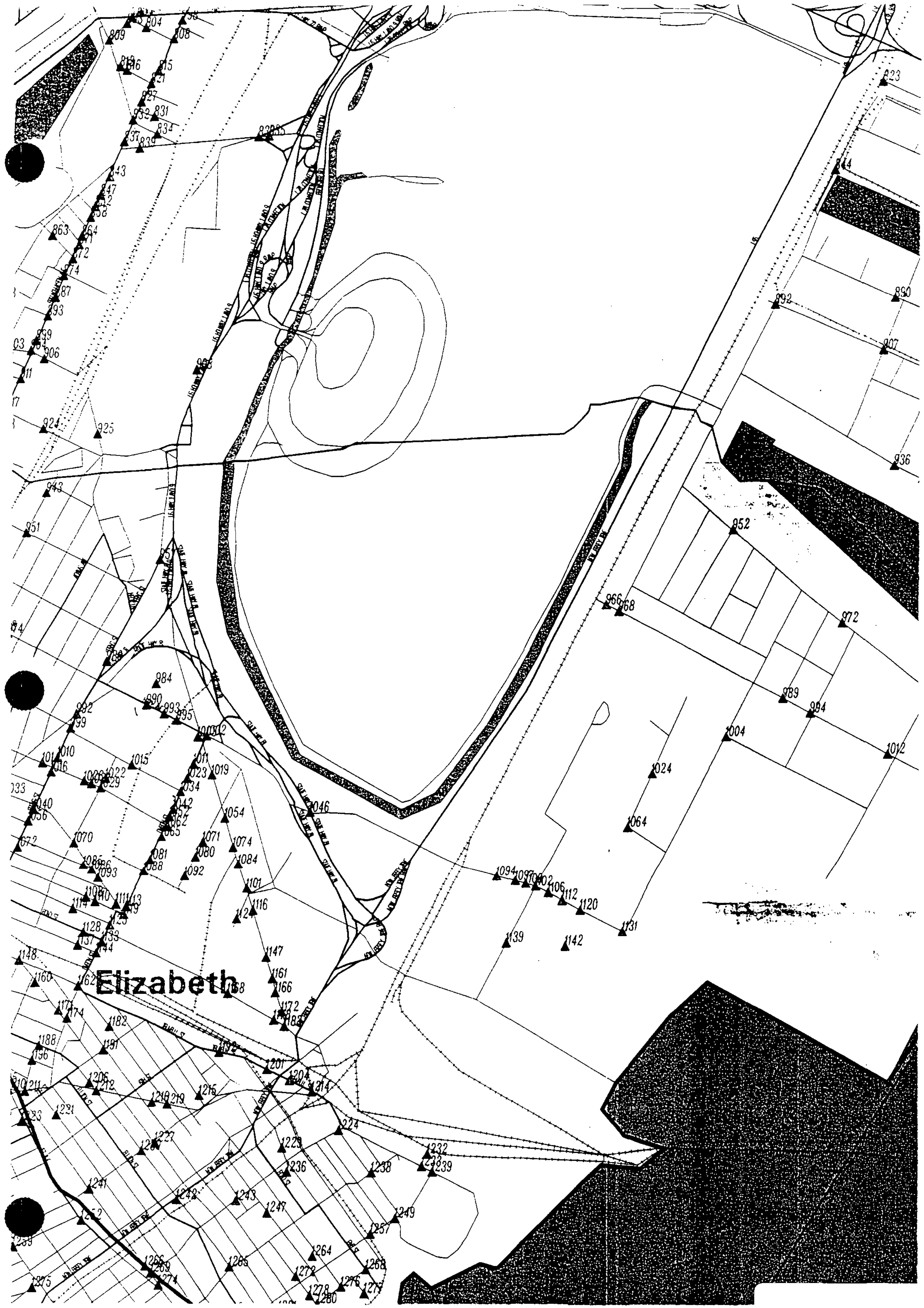
Newark & Elizabeth

and

Study Area Boundary	Waterways	Pipelines	Water
Roads	Railroads	Powerlines	Superfund Sites
Major Roads	Contour Lines	Fault Lines	

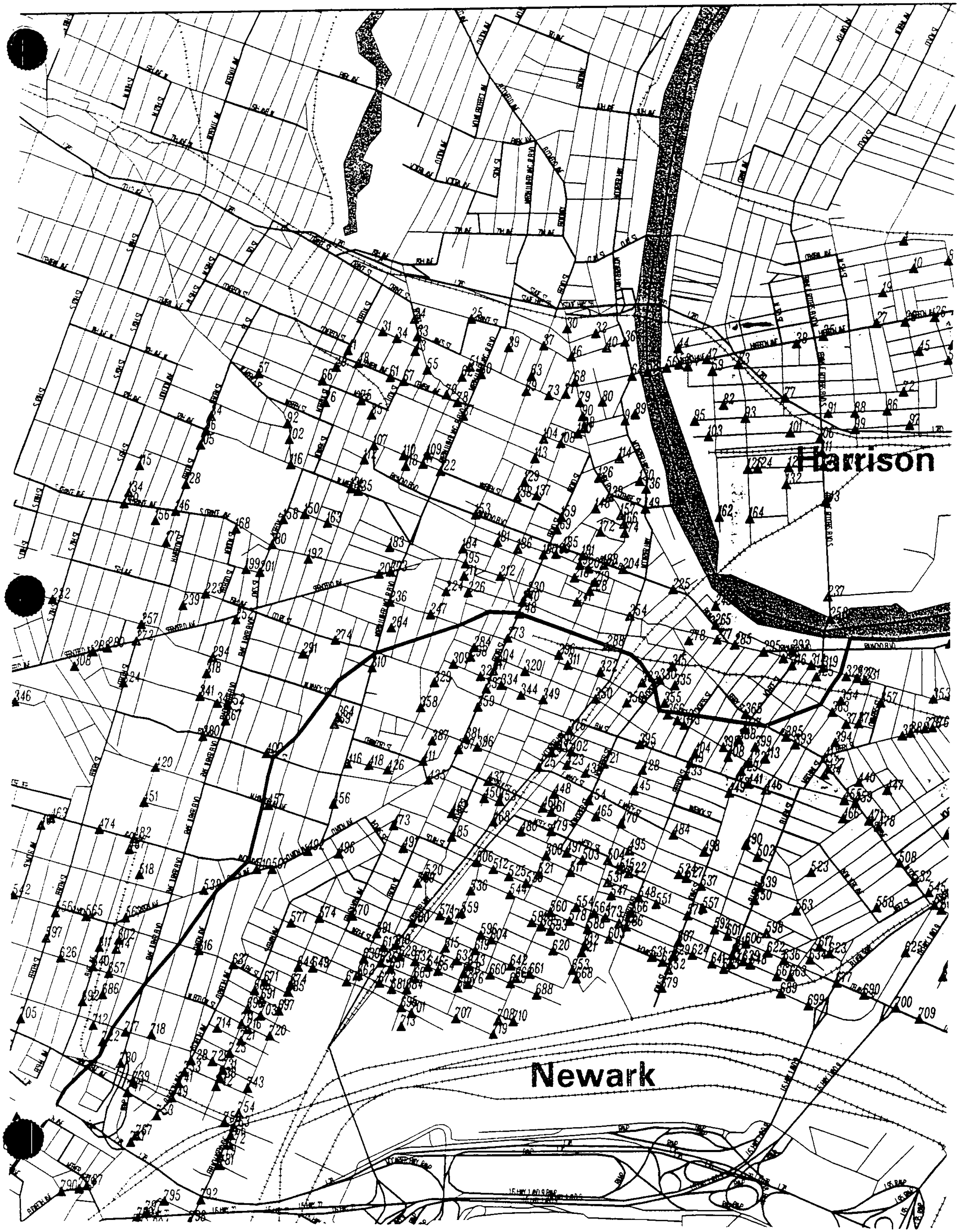
920920496

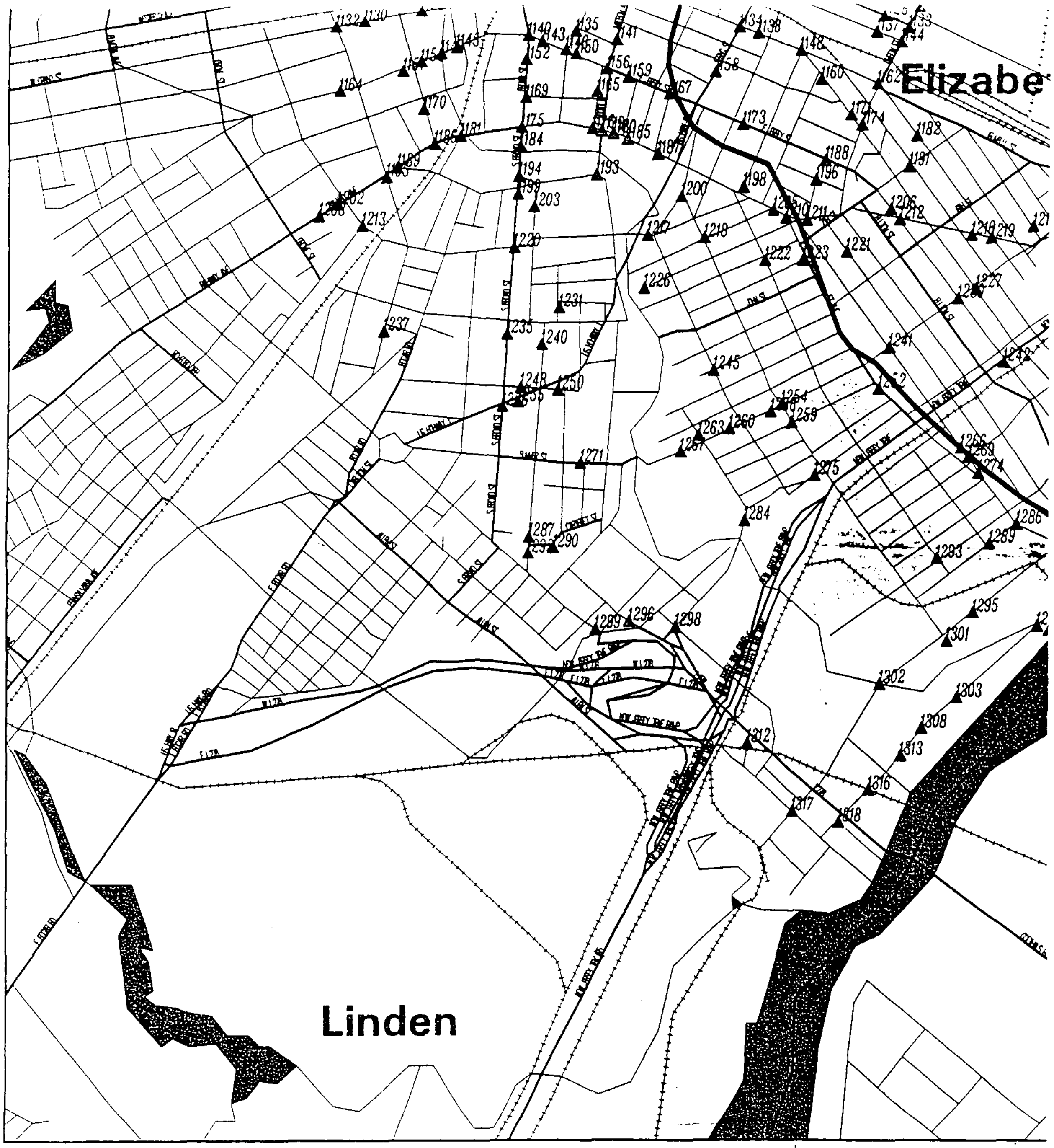
TIERRA-D-019134



920920497

TIERRA-D-019135


Harrison
Newark



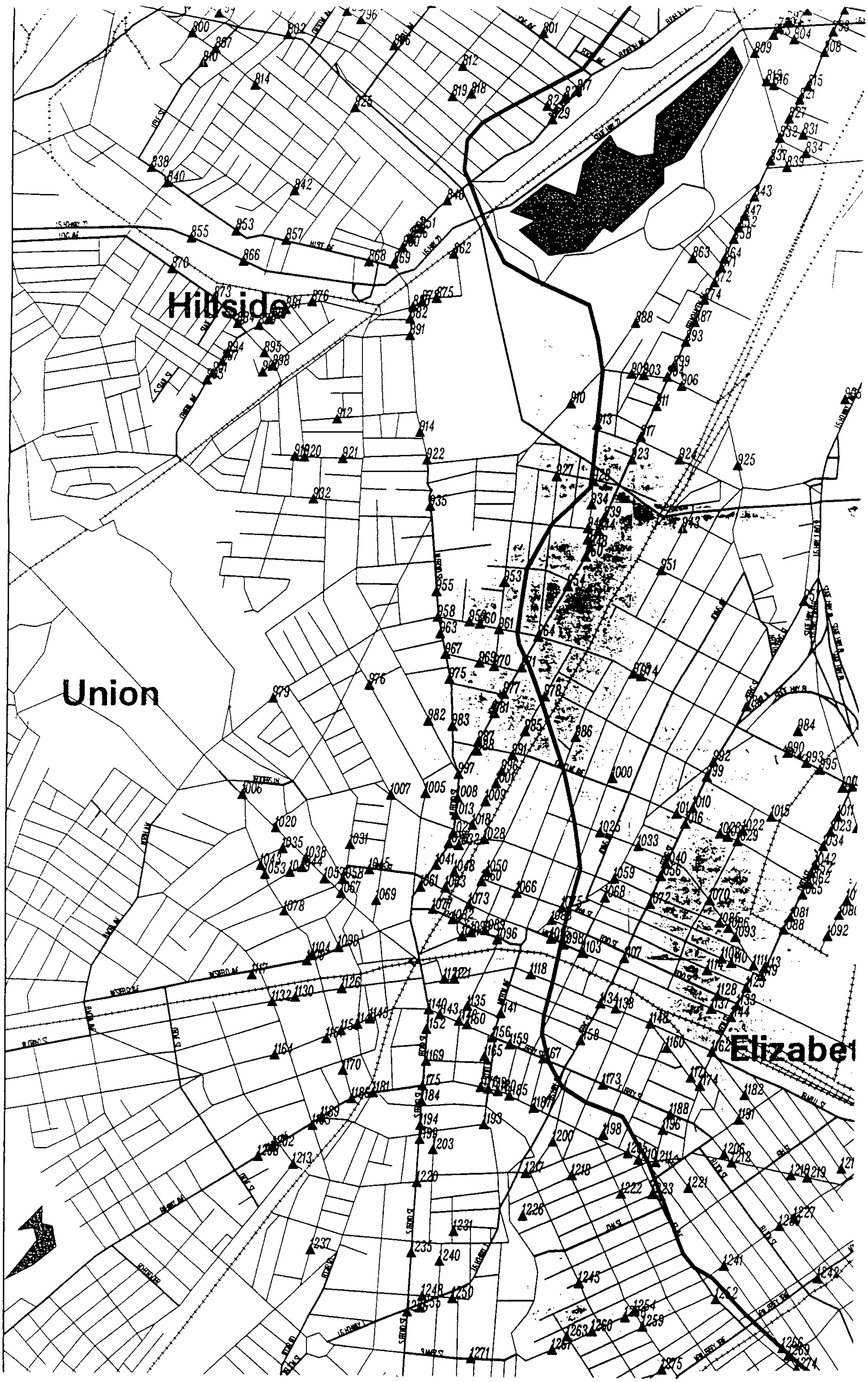
Environmental Data Resources, Inc.

Creators of Toxicheck®

1-800-352-0050

Legend

- Listed Sites
- Earthquake Epicenters (Richter 5 or greater)
- Study A
- Roads
- Major R


Hillside
Union
Elizabet

920920501

Appendix B

Appendix B

920920502

TIERRA-D-019140

APPENDIX B

NJDEP LETTER ON HISTORIC FILL

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Underground Storage Tanks
CN-028
401 East State Street
Trenton, NJ 08625

CHRISTINE TODD WHITMAN
Governor

ROBERT C. SHINN, JR.
Commissioner

Mr. Marvin Kirshner
The Port Authority of NY & NJ
Environmental Engineering Unit
One World Trade Center
NY, NY 10048

SEP 15 199[illegible]

Re: Historical Fill
NJ Marine Terminal, Port Elizabeth
Elizabeth, Union County
UST #0011026

Dear Mr. Kirshner:

During July 1994, the New Jersey Department of Environmental Protection (Department) received report(s) from The Port Authority of NY & NJ. These reports document the site investigation, remedial investigation and/or remedial action undertaken in response to the closure and/or discharges from your underground storage tank systems.

Based on our review of the information submitted, the Department finds that the presence of lead within the soil and ground water samples collected may be from historical fill associated with the site. Based upon the presence of lead from historical fill, a copy of this case is being transferred from the Division of Responsible Party Site Remediation (DRPSR), Bureau of Underground Storage Tanks to the DRPSR, Bureau of Field Operations. Please direct all correspondence regarding the historic fill to:

New Jersey Department of Environmental Protection
Bureau of Field Operations
Case Assignment Section
Attention: Mark Pederson
401 E. State Street, 4th Floor
CN 028
Trenton, NJ 08625

Please be advised that this letter only addresses the historic fill. All aspects of the site investigation, remedial investigation, and remedial action associated with the underground storage tanks remains within the Bureau of Applicability and Compliance and the Bureau of Underground Storage Tanks. This letter makes no representation regarding the environmental conditions of any other areas for the referenced property.

On April 5, 1993, the UST Fee Rule (Amendments and New Rules at N.J.A.C. 7:14B) was proposed. This rule appeared in the February 22, 1994, New Jersey Register.

Effective February 22, 1994, the Department will be billing you for the Department's oversight of all work conducted at your site. Documents submitted to the Department in accordance with the "Technical Requirements for Site Remediation" (N.J.A.C. 7:26E) will help reduce the time necessary for the Department oversight of your case. At this time, the Department intends to process bills on a semi-annual basis. Please consult the April 5, 1993 and February 22, 1994, State Registers for details. Copies can be obtained by contacting the Office of Administrative Law at (609) 588-6500. Your case manager should be contacted with any additional questions.

Thank you for your cooperation in this matter.

Sincerely,

Kevin F. Kratina

for Wayne C. Howitz, Assistant Director
Industrial Site Evaluation Element

c: Mark Pedersen, BFO-SA
Joseph P Eaker, BUST,
Renee' Wright, BUST
Robert Posey, BAC
Elizabeth Health Department

920920505

TIERRA-D-019143

Appendix C

Appendix C

Appendix D

Appendix D

920920507

TIERRA-D-019145

APPENDIX D

ECOLOGICAL COMMUNITIES
POTENTIALLY AFFECTED BY THE CLASS
II-B GROUNDWATER RECLASSIFICATION

vegetated areas within the ditch. These species have adapted well to urban environments, and would remain unaffected by the proposed groundwater reclassification.

Reptiles and Amphibians

Some reptiles and amphibians may utilize the ditch, particularly towards its upper end where freshwater conditions are predominant. Since the direction of groundwater flow is toward the southern, brackish portion of the ditch, these species should remain largely unaffected by the proposed groundwater reclassification, regardless of existing groundwater quality.

Newark Bay

Potential ecological receptors associated with Newark Bay include wetland and mudflat habitats along the shores of the bay north and south of the Elizabeth and Newark Channels, marine benthic and open water habitats both within the channels and in the bay itself, and the species assemblages associated with these habitats that may be directly affected by degradation of surface water and sediment. The communities that are present within these habitats are well documented. A summary of these communities is presented below, based upon an extensive literature base of studies conducted within the area. Surveys of aquatic biota within Newark Bay have been conducted for Port Authority by Lawler, Matusky and Skelly (LMS) (1995) and others reviewed by LMS (e.g., Will and Houston 1988). These studies have characterized species assemblages within both shallow- and deep-water habitats, including fish, invertebrates, and other marine life. Additional studies include a literature review for the Port Authority prepared by Malcolm Pirnie (1995), a literature review of studies conducted in the nearby Arthur Kill prepared by IT Corporation (1991), and studies of regional dioxin effects on marine life such as the risk assessment conducted for the Port Authority by EA Engineering (1991). In addition, a letter sent by the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service to LMS dated July 26, 1995 lists endangered/threatened species that have been documented in the New York Harbor region, which would be used in evaluating effects to surface water receptors (Attachment D-1).

The primary ecological communities of concern are associated with open water areas of Newark Bay located immediately adjacent to Ports Newark and Elizabeth. These open water areas provide habitat for a variety of fish and wildlife species that utilize the vicinity of the site. Studies of existing biota were recently summarized in the Draft Environmental Impact Statement (EIS) for Newark Bay Confined Disposal Facility, prepared by the U.S. Army Corps of Engineers (USACE) New York District in 1997, upon which the discussion below is largely based.

It should be noted that the fish species noted within each study varied highly with the sampling method used. For example, prior studies (Will and Houston, 1989) of fish distribution in Newark Bay found that 91% of the fish caught in seine nets were Atlantic menhaden, with striped bass and Atlantic tomcod comprising most of the remaining individuals. However, Atlantic tomcod, bay anchovy, and winter flounder collectively accounted for 88% of the trawl catch. Since the trawling studies underestimated the numbers of fish inhabiting shallow areas, other studies were considered in developing a species list for the vicinity of the proposed reclassification area. These included studies conducted at local power plants and other facilities where impingement and entrapment of smaller species occur that may be missed using conventional collection techniques.

Studies conducted in Newark Bay within the immediate vicinity of the proposed reclassification area (Hecht, 1995) found marked differences in species composition between shallow water versus dredged channel areas. Striped bass and blue crabs were found to be abundant in the flat, shallow areas in spring and early summer surveys, although summer and winter flounder as well as other species were recorded in smaller numbers. While fish were nearly absent from these shoal areas in the winter, the deeper dredged channel areas were used year-round. The winter fish community in the channel areas was dominated by striped bass and white perch. Will and Houston (1989) noted that most species were more common in the deeper channel areas, but that bay anchovy was more common in the shallows, and blueback herring was limited exclusively to the shallows. Will and Houston (1989) also suggested that the bay is an important nursery ground for some species. This point is supported by studies in Newark Bay finding a large number of smaller-sized individuals of the dominant species (USACE 1996). Within the area of Newark Bay immediately adjacent to the proposed reclassification area, the deeper water areas consist of the two channels at Ports Newark and Elizabeth, which are approximately 31-33 feet deep, while shallow water areas less than 2 feet deep exist immediately east of the shoreline areas outside of the channels.

None of the species previously recorded from Newark Bay are listed as federally endangered or threatened. While the short-nosed sturgeon is listed as endangered, it has not been found in Newark Bay.

Newark Bay Wildlife

A comprehensive review of wildlife species known to use or potentially use Newark Bay has been compiled for the USACE Draft EIS for the Newark Bay Confined Disposal Facility. Over 227 species of mammals, birds, reptiles, and amphibians have been identified in the Newark Bay area (Attachment D-4). However, proposed reclassification of the aquifer below Ports Newark and Elizabeth would potentially impact primarily aquatic species associated with Newark Bay. This is because nearly all of the terrestrial habitat within the proposed reclassification area has been developed, and the freshwater wetland areas have been largely filled. The Peripheral Ditch provides some limited habitat for wetland wildlife such as ducks, shorebirds, wading birds, and affected are those using the area on an occasional or seasonal basis, such as wintering sea ducks or migratory waterfowl.

Marine Mammals

Both the harbor seal and harbor porpoise have been reported as uncommon visitors to Newark Bay (USACE 1997). Otherwise, the possibility of marine mammals entering the bay is remote.

Marine Turtles

Three species of marine turtles are known to inhabit the New York/New Jersey Harbor Estuary: the loggerhead sea turtle, Kemp's ridley sea turtle, and the green turtle. All of these species use the area on a seasonal basis (May to November), and none nest as far north as Newark Bay (USACE 1997). Marine turtles primarily feed on estuarine invertebrates such as blue crabs and molluscs, but are considered uncommon visitors to Newark Bay.

10. Killam Associates, Inc. April 1995. Environmental Document Report, North Avenue East Improvements Project. City of Elizabeth, NJ.

11. Lawler, Matusky and Skelly, June 15, 1995. Memorandum to Jack Hecht and Susan Metzger, "Newark Bay, Port Authority NY/NJ Information and Results of April/May 1995 Surveys".

12. Malcolm Pirnie, Inc. November 1995. Literature Review and Environmental Practicability Analysis for Construction of a Containment Island in the NY/NJ Harbor Region.

13. Memorandum from John Bullard to E. Knoesel and R. Pruno. September 18, 1995 Re: Newark Bay Combined Disposal Facility (CDF) Additional Metals Testing.

14. Memorandum from John Bullard to E. Knoesel, R. Pruno and M. Masters. October 23, 1995. Re: Port Newark Reach - Dioxin.

15. Memorandum from Joseph DiSorbo to Thomas Wakeman. June 15, 1995. Re: Newark Bay Confined Disposal Facility (sediment toxicity testing results).

16. National Oceanic and Atmospheric Administration. 1995. Magnitude and Extent of Sediment Toxicity in the Hudson-Raritan Estuary.

17. New York City Department of Environmental Protection. 1993. New York Harbor Water Quality Survey (and Appendices).

18. Ney, R.E. 1995. Fate and Transport of Organic Chemicals in the Environment. Government Institutes, Inc. Rockville, MD. 299 pp.

19. Port Authority of New York and New Jersey, April 1995. Environmental Baseline Investigation, Berths 30 and 32, Upland. Port Newark, NJ.

20. Science Applications International Corporation (SAIC), 1993. Toxic Assessment of New York/New Jersey Harbor Ambient Waters. Final Report. Submitted to Office of Water Enforcement and Compliance, US Environmental Protection Agency.

21. Squibb, K.S., J.M. O'Connor, and T.J. Kneip. 1991. New York/New Jersey Harbor Estuary Program. Module 3.1: Toxics Characterization Report. Prepared by Institute of Environmental Medicine, New York University Medical Center, for US EPA Region II, New York City. 188 pp.

ATTACHMENT D-1

TABLE 3.08-2

Benthic Fauna Identified In Newark Bay

1993-1994

CNIDARIA
- *Anthozoa*

RHYNCHOCOELA
- *Rhynchocoela*

POLYCHAETA
- *Lepidonotus squamatus*
- *Lepidonotus sublevis*
- *Hypereteone heteropoda*
- *Hypereteone foliosa*
- *Paranaitis speciosa*
- *Eumida sanguinea*
- *Podarkeopsis levifuscina*
- *Microphthalmus sczelkowii*
- *Proceraea cornuta*
- *Streptosyllis pettiboneae*
- Nereididae
- *Neanthes succinea*
- *Nephtys incisa*
- *Glycera spp.*
- *Glycera americana*
- *Leitoscoloplos* sp.
- *Leitoscoloplos robustus*•
- *Polydora spp.*
- *Polydora cornuta*•
- *Spio setosa*
- *Pygospio elegans*
- *Streblospio benedicti*•
- *Marenzelleria viridis*
- *Tharyx sp. A*•
- *Heteromastus filiformis*
- *Mediomastus ambiseta*•
- *Sabellaria vulgaris*•
- *Pectinaria gouldii*
- Ampharetidae
- *Asabellides oculata*
- *Sabellidae*
- *Polychaete fragments*

OLIGOCHAETA
- Oligochaeta•

MOLLUSCA
- Gastropoda
- *Epitonium sp.*
- *Odostomia* sp.•
- *Rictaxis punctostriatus*
- *Cylichnella bidentata*
- *Doradella obscura*
- *Mytilus edulis*
- *Mulinia lateralis*•
- *Ensis directus*
- *Macoma balthica*
- *Tellina agilis*
- *Mya arenaria*•
- *Barnea truncata*
- Bivalve siphons

CRUSTACEA
- *Balanus improvisus*
- *Neomysis americana*
- *Leucon americanus*•
- *Oxyurostylis smithi*
- *Cyathura polita*
- *Sphaeroma quadridentata*
- *Edotea triloba*
- *Ampelisca* spp.
- *Ampelisca abdita*
- *Microdeutopus* spp.
- *Microdeutopus gryllotalpa*
- *Corophium* spp.
- *Corophium acutum*
- *Unciola serrata*
- *Elasmopus laevis*
- *Melita nitida*
- *Monoculodes* sp. 1
- *Parapleustes aestuarius*
- *Paracaprella tenuis*
- *Crangon septemspinosa*
- *Cancer irroratus*
- Xanthidae
- *Rhithropanopeus harrisii*

INSECTA
- Chironomidae

ECHINODERMATA
- Asteroidea
- Echinoidea

ASCIDIACEA
- Molgula manhattensis

•Dominant taxon

ATTACHMENT D-3

Table 3.06-8 (Page 1 of 14)

Fish Species Collected in Newark Bay and Adjacent Waters[a]

Family Genus Species	Common Name	A 1972-73	B 1972-73	C 1972	D 1984-85	E 1987-88	F 1987-88	G 1987-88	H 1988
Carcharhinidae	**Requiem sharks**								
Mustelus canis	Smooth dogfish					X			
Rajidae	**Skates**								
Raja erinacea	Little skate								
Acipenseridae	**Sturgeons**								
Acipenser oxyrhyncus	Atlantic sturgeon		X						
Anguillidae	**Freshwater Eels**								
Anguilla rostrata	American eel	X	X		X	X	X	X	X
Ophichthidae	**Snake eels**								
Myrophis punctatus	Speckled worm eel								
Congridae	**Conger Eels**								
Conger oceanicus	Conger eel					X			
Clupeidae	**Herrings**								
Alosa aestivalis	Blueback herring	X	X			X	X	X	
Alosa pseudoharengus	Alewife	X	X		X	X	X	X	X
Alosa sapidissima	American shad	X	X		X	X	X	X	X
Alosa mediocris	Hickory shad					X	X	X	
Brevoortia tyrannus	Atlantic menhaden			X		X	X		
Clupea harengus	Atlantic herring					X	X		
Dorosoma cepedianum	Gizzard shad					X	X	X	
Engraulidae	**Anchovies**								
Anchoa mitchilli	Bay anchovy	X	X	X	X	X	X	X	X
Anchoa hepsetus	Striped anchovy					X		X	
Cyprinidae	**Carps & Minnows**								
Carassius auratus	Goldfish	X				X	X		
Notropis amoenus	Comely shiner								
Cyprinus carpio	Carp					X			

rpf/11-26-96 4:25pm/HS10021/459-074/Tb3-06-8

ATTACHMENT D-3 (CONTINUED)

Fish Species Collected in Newark Bay and Adjacent Waters[a]

Family Genus Species	Common Name	A 1972-73	B 1972-73	C 1972	D 1984-85	E 1987-88	F 1987-88	G 1987-88	H 1988
Belonidae	**Needlefishes**								
Strongylura marina	Atlantic needlefish		X						
Cyprinodontidae	**Killifishes**								
Fundulus heteroclitus	Mummichog	X	X	X	X			X	X
Fundulus majalis	Striped killifish					X	X	X	X
Fundulus diaphanus	Banded killifish								
Atherinidae	**Silversides**								
Menidia peninsulae	Tidewater silverside	X	X	X		X	X		
Menidia menidia	Atlantic silverside								
Membras martinica	Rough silverside								
Gasterosteidae	**Sticklebacks**								
Gasterosteus aculeatus	Threespine stickleback	X	X			X	X		
Apeltes quadracus	Fourspine stickleback								
Syngnathidae	**Pipefishes**								
Hippocampus erectus	Lined seahorse	X	X					X	
Syngnathus fuscus	Northern pipefish	X	X	X	X	X	X	X	X
Triglidae	**Searobins**								
Prionotus carolinus	Northern searobin	X	X			X	X	X	
Prionotus evolans	Striped searobin		X		X	X	X	X	X
Cottidae	**Sculpins**								
Myoxocephalus aenaeus	Grubby	X			X	X	X	X	
Myoxocephalus octodecemspinosus	Longhorn sculpin					X	X		
Percichthyidae	**Temperate Basses**								
Morone americana	White perch	X	X			X	X		
Morone saxatilis	Striped bass	X	X	X	X	X	X		
Serranidae	**Sea Basses**								
Centropristis striata	Black sea bass		X			X	X		

rpf/1-8-97 12:21pm/HS10021/459-074/Tb3-06-8

Table 3.06-8 (Page 5 of 14)

Fish Species Collected in Newark Bay and Adjacent Waters[a]

ATTACHMENT D-3 (CONTINUED)

Family Genus Species	Common Name	A 1972-73	B 1972-73	C 1972	D 1984-85	E 1987-88	F 1987-88	G 1987-88	H 1988
Sciaenidae (Continued)	**Drums (Continued)**								
Menticirrhus saxatilis	Northern kingfish								
Bairdiella chryosura	Silver perch								
Micropogon undulatus	Atlantic croaker						X		
Chaetodontidae	**Butterflyfishes**								
Chaetodon ocellatus	Spotfin butterflyfish								
Mugilidae	**Mullets**								
Mugil cephalus	Striped mullet					X	X		
Mugil curema	White mullet					X	X		
Sphyraenidae	**Barracudas**								
Sphyraena borealis	Northern sennet								
Labridae	**Wrasses**								
Tautoga onitis	Tautog		X			X	X		
Tautogolabrus adspersus	Cunner	X				X	X		
Pholidae	**Gunnels**								
Pholis gunnellus	Rock gunnel					X			
Uranoscopidae	**Stargazers**								
Astroscopus guttatus	Northern stargazer								
Blenniidae	**Combtooth Blennies**								
Hypsoblennius hentz	Feather blenny								
Ammodytidae	**Sand Lances**								
Ammodytes americanus	American sand launce					X			
Gobiidae	**Gobies**								
Gobiosoma bosci	Naked goby	X	X	X		X			
Gobiosoma ginsburghi	Seaboard goby	X		X		X			
Scombridae	**Mackerels**								
Scomberomorus maculatus	Spanish mackerel								

ATTACHMENT D-3 (CONTINUED)

Fish Species Collected in Newark Bay and Adjacent Waters[a]

Family Genus Species	Common Name	I 1988-89	J 1988-89	K 1988-89	L 1991-92	M 1993-94	N 1994	O 1995-96
Carcharhinidae	**Requiem sharks**							
Mustelus canis	Smooth dogfish							
Rajidae	**Skates**							
Raja erinacea	Little skate				X	X		
Acipenseridae	**Sturgeons**							
Acipenser oxyrhyncus	Atlantic sturgeon					X		
Anguillidae	**Freshwater Eels**							
Anguilla rostrata	American eel	X	X	X	X	X	X	
Ophichthidae	**Snake eels**							
Myrophis punctatus	Speckled worm eel				X			
Congridae	**Conger Eels**							
Conger oceanicus	Conger eel	X			X	X		
Clupeidae	**Herrings**							
Alosa aestivalis	Blueback herring	X	X	X	X	X		X
Alosa pseudoharengus	Alewife	X	X	X	X	X	X	X
Alosa sapidissima	American shad	X	X	X	X	X	X	X
Alosa mediocris	Hickory shad				X		X	
Brevoortia tyrannus	Atlantic menhaden	X	X	X	X	X		
Clupea harengus	Atlantic herring	X	X	X		X		X
Dorosoma cepedianum	Gizzard shad	X	X	X	X	X		X
Engraulidae	**Anchovies**							
Anchoa mitchilli	Bay anchovy	X	X	X	X	X	X	X
Anchoa hepsetus	Striped anchovy	X	X	X				X
Cyprinidae	**Carps & Minnows**							
Carassius auratus	Goldfish							
Notropis amoenus	Comely shiner	X	X					
Cyprinus carpio	Carp							

rpf/11-26-96 4:25pm/HS10021/459-074/Tb3-06-8

Table 3.06-8 (Page 9 of 14)

Fish Species Collected in Newark Bay and Adjacent Waters[a]

ATTACHMENT D-3 (CONTINUED)

Family Genus Species	Common Name	I 1988-89	J 1988-89	K 1988-89	L 1991-92	M 1993-94	N 1994	O 1995-96
Belonidae	**Needlefishes**							
Strongylura marina	Atlantic needlefish	X	X		X			
Cyprinodontidae	**Killifishes**							
Fundulus heteroclitus	Mummichog				X		X	
Fundulus majalis	Striped killifish	X	X	X	X	X	X	
Fundulus diaphanus	Banded killifish				X			
Atherinidae	**Silversides**							
Menidia peninsulae	Tidewater silverside				X			
Menidia menidia	Atlantic silverside	X	X	X		X		X
Membras martinica	Rough silverside	X						
Gasterosteidae	**Sticklebacks**							
Gasterosteus aculeatus	Threespine stickleback	X	X	X	X	X		
Apeltes quadracus	Fourspine stickleback	X			X			
Syngnathidae	**Pipefishes**							
Hippocampus erectus	Lined seahorse				X	X		
Syngnathus fuscus	Northern pipefish	X	X	X	X		X	X
Triglidae	**Searobins**							
Prionotus carolinus	Northern searobin	X	X	X	X			
Prionotus evolans	Striped searobin	X	X	X	X			
Cottidae	**Sculpins**							
Myoxocephalus aenaeus	Grubby	X	X	X	X		X	X
Myoxocephalus octodecemspinosus	Longhorn sculpin							
Percichthyidae	**Temperate Basses**							
Morone americana	White perch	X	X	X	X	X	X	X
Morone saxatilis	Striped bass	X	X	X	X	X	X	X
Serranidae	**Sea Basses**							
Centropristis striata	Black sea bass	X	X	X	X			

Fish Species Collected in Newark Bay and Adjacent Waters[a]

ATTACHMENT D-3 (CONTINUED)

Family Genus Species	Common Name	I 1988-89	J 1988-89	K 1988-89	L 1991-92	M 1993-94	N 1994	O 1995-96
Sciaenidae (Continued)	Drums (Continued)							
Menticirrhus saxatilis	Northern kingfish	X	X	X	X	X		X
Bairdiella chrysura	Silver perch		X		X	X		
Micropogon undulatus	Atlantic croaker							X
Chaetodontidae	Butterflyfishes							
Chaetodon ocellatus	Spotfin butterflyfish	X	X	X	X			
Mugilidae	Mullets							
Mugil cephalus	Striped mullet	X		X	X			
Mugil curema	White mullet	X	X					
Sphyraenidae	Barracudas							
Sphyraena borealis	Northern sennet	X	X					
Labridae	Wrasses							
Tautoga onitis	Tautog	X	X	X	X	X	X	
Tautogolabrus adspersus	Cunner	X	X	X	X	X	X	X
Pholidae	Gunnels							
Pholis gunnellus	Rock gunnel	X	X		X	X		
Uranoscopidae	Stargazers							
Astroscopus guttatus	Northern stargazer	X			X			
Blenniidae	Combtooth Blennies							
Hypsoblennius hentz	Feather blenny	X	X		X			
Ammodytidae	Sand Launces							
Ammodytes americanus	American sand launce	X			X		X	
Gobiidae	Gobies							
Gobiosoma bosci	Naked goby				X			
Gobiosoma ginsburghi	Seaboard goby				X			
Scombridae	Mackerels							
Scomberomorus maculatus	Spanish mackerel	X	X	X	X			

Table 3.06-8 (Page 13 of 14)

Fish Species Collected in Newark Bay and Adjacent Waters[a]

ATTACHMENT D-3 (CONTINUED)

ITEM No.	STUDY LOCATION	REFERENCE
A	Linden Generating Station	Ichthyological Associates (IA). 1979. Demonstration for Section 316(b) of the Federal Water Pollution Control Act Amendments of 1972, PL92-500, Linden Generating Station. Report to: Public Service Electric & Gas Company, New Jersey.
B	Sewaren Generating Station	Ichthyological Associates (IA). 1979. Demonstration for Section 316(b) of the Federal Water Pollution Control Act Amendments of 1972, PL92-500, Sewaren Generating Station. Report to: Public Service Electric & Gas Company, New Jersey.
C	Arthur Kill Generating Station	Lawler, Matusky & Skelly Engineers (LMS). 1975. Arthur Kill Generating Station Study, Section 316(a) Demonstration. Prepared for Consolidated Edison Company of New York, Inc.
D	Newark Bay and Kill Van Kull	U.S. Army Corps of Engineers (USACE). 1987b. Feasibility Report, Navigation Study on Improvements to Existing Navigation Channel. Technical Appendices.
E	Hackensack River	EA Engineering, Science and Technology (EA). 1988. Hudson Generating Station Units 1 and 2. Supplemental 316(b) Report. Prepared for Public Service Electric & Gas Company.
F	Hudson Generating Station	EA Engineering, Science and Technology (EA). 1988. Hudson Generating Station Units 1 and 2. Supplemental 316(b) Report. Prepared for Public Service Electric & Gas Company.
G	Newark Bay	Will, R., and L.J. Houston. 1992. Fish Distribution Survey of Newark Bay, May 1987-April 1988. *In*: Estuarine Research in the 1980s (Edited by C. Lavett Smith). The Hudson River Environmental Society, Seventh Annual Symposium on Hudson River Ecology.
H	Arthur Kill and Old Place Creek	Louis Berger & Associates, Inc. (LBA). 1992. Staten Island Bridges Program Environmental Report. Submittal to the Port Authority of New York/New Jersey.
I	Arthur Kill	EA Engineering, Science and Technology. 1989. Sewaren Generating Station, Units 1 through 4 Supplemental 316(b) Report. Report to Public Service Electric & Gas Company.
J	Sewaren Generating Station	EA Engineering, Science and Technology. 1989. Sewaren Generating Station, Units 1 through 4 Supplemental 316(b) Report. Report to Public Service Electric & Gas Company.
K	Linden Generating Station	EA Engineering, Science and Technology. 1989. Linden Generating Station Supplemental 316(b) Report. Report to Public Service Electric & Gas Company.

ATTACHMENT D-4

Table 3.07-1 (Page 1 of 6)

Wildlife Species Likely to Use the Newark Bay Area as Identified During Studies in the NY/NJ Harbor Area

Common Name	Scientific Name	USCG 1986	Harbor Herons Report (1990) Individuals	Andrle and Carroll (1988) Breeding Birds	Aquila and Alderson (1994) Overwintering Birds	Liberty State Park TI (1976)	LMS (1984 a)	LMS (1984 b)	LMS (1984 c)	LMS (1996b)
		Upland, Marine and Adjacent Shoreline Sites					Marine and Adjacent Shoreline Sites Hudson River Waterfront LMS Unpublished			Marine and Open Water Sites Pany/NJ Newark Bay
Mammals										
Virginia opossum	*Didelphis virginiana*	x	x							
Eastern mole	*Scalopus aquaticus*		x							
Unidentified bat	*Unidentified bat*	x	x							
Red bat	*Lasiurus borealis*		x							
Hoary bat	*Lasiurus cinereus*		x							
Little brown bat	*Myotis lucifugus*		x							
Eastern cottontail	*Sylvilagus floridanus*	x	x							
Grey squirrel	*Sciurus carolinensis*	x	x							
White-footed mouse	*Peromyscus leucopus*	x								
Meadow vole	*Microtus pennsylvanicus*	x	x							
Muskrat	*Ondatra zibethica*	x	x							
Norway rat	*Rattus norvegicus*	x	x							
House mouse	*Mus musculus*	x								
Raccoon	*Procyon lotor*	x	x							
White-tailed deer	*Odocoileus virginianus*	x								
Number of species		11	12	Not Applicable	Not Applicable					
Birds										
Common loon	*Gavia immer*				x	x				
Red-throated loon	*Gavia stellata*				x	x				
Pied-billed grebe	*Podilymbus podiceps*	x	x	x	x	x				x
Horned greue	*Podiceps uritus*				x	x				
Great cormorant	*Phalacrocorax carbo*				x					x
Double-crested cormorant	*Phalacrocorax auritus*	x	x		x	x	x	x	x	x
Great blue heron	*Ardea herodias*	x	x		x	x	x		x	
Green heron	*Butorides virescens*	x	x	x		x	x		x	
Little blue heron	*Egretta caerulea*		x	x						
Cattle egret	*Bulbucus ibis*		x	x						
Great egret	*Ardea albus*	x	x	x						
Snowy egret	*Egretta thula*	x	x	x		x	x			
Black-crowned night heron	*Nycticorax nycticorax*	x	x	x	x	x	x		x	
Yellow-crowned night heron	*Nycticorax violacea*	x	x							
Least bittern	*Ixobrychus exilis*		x	x						
American bittern	*Botaurus lentiginosus*		x	x						
Glossy ibis	*Plegadis falcinellus*	x	x	x		x				
Louisiana heron	*Hydranassa tricolor*		x							
White-faced ibis	*Plegadis chihi*		x							
Brant goose	*Branta bernicla*		x		x	x	x			x
Snow goose	*Chen caerulescens*					x				
Canada goose	*Branta canadensis*	x	x	x	x	x	x		x	x
Mallard	*Anas platyrhynchos*	x	x	x	x	x	x	x	x	x
Black duck	*Anas rubripes*	x	x	x	x	x	x	x	x	x
Gadwall	*Anas strepera*	x	x	x	x	x	x	x	x	x
Northern pintail	*Anas acuta*		x			x				

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ATTACHMENT D-4 (CONTINUED)

Table 3.07-1 (Page 3 of 6)

Wildlife Species Likely to Use the Newark Bay Area as Identified During Studies in the NY/NJ Harbor Area

Common Name	Scientific Name	Upland, Marine and Adjacent Shoreline Sites: USCG (1995)	Harbor Herons Report (1990) Individuals	Andrle and Carroll (1988) Breeding Birds	Aquila and Alderson (1994) Overwintering Birds	Liberty State Park TI (1978)	Marine and Adjacent Shoreline Sites, Hudson River Waterfront, LMS Unpublished: LMS (1984 a)	LMS (1984 b)	LMS (1984 c)	Marine and Open Water Sites, Pany/NJ Newark Bay: LMS (1996b)
Birds										
Purple sandpiper	*Calidris maritima*				x	x				
Greater yellowlegs	*Tringa melanoleuca*	x	x			x				
Lesser yellowlegs	*Tringa flavipes*	x	x							
Pectoral sandpiper	*Calidris melanotos*	x	x							
Least sandpiper	*Calidris minutilla*	x				x	x		x	
Dunlin	*Calidris alpina*				x	x				
Short-billed dowitcher	*Limnodromus griseus*									
Stilt sandpiper	*Micropalama himantopus*									
Semipalmated sandpiper	*Calidris pusilla*	x	x			x				
Black-bellied plover	*Pluvialis squatarola*		x							
Red knot	*Calidris canutus*		x							
Sanderling	*Calidris alba*		x		x					
Dowitcher sp	*Limnodromus sp*		x							
Wilson's phalarope	*Steganopus tricolor*		x							
Great black-backed gull	*Larus marinus*	x	x	x		x	x	x	x	x
Herring gull	*Larus argentatus*	x	x	x	x	x	x	x	x	x
Ring-billed gull	*Larus delawarensis*	x	x		x	x	x	x	x	x
Laughing gull	*Larus atricilla*	x	x	x		x	x	x	x	x
Bonaparte's gull	*Larus philadelphia*		x		x	x	x		x	
Common tern	*Sterna hirundo*		x			x			x	
Roseate tern	*Sterna dougallii*		x							
Least tern	*Sterna antillarum*		x			x			x	
Arctic tern	*Sterna paradisaea*								x	
Black skimmer	*Rynchops niger*		x			x				
Rock dove	*Columba livia*	x	x	x	x	x	x	x	x	x
Mourning dove	*Zenaida macroura*	x	x	x	x	x	x	x	x	
Yellow-billed cuckoo	*Coccyzus americanus*	x		x						
Common barn-owl	*Tyto alba*	x	x	x						
Screech-owl	*Otus asio*		x		x					
Great horned owl	*Bubo virginianus*		x		x					
Snowy owl	*Nyctea scandiaca*		x							
Short-eared owl	*Asio flammeus*		x		x	x				
Ruby-throated hummingbird	*Archilochus colubris*		x							
Chimney swift	*Chaetura pelagica*	x		x		x				
Belted kingfisher	*Ceryle alcyon*	x	x		x	x	x		x	
Northern flicker	*Colaptes auratus lutus*	x	x	x	x	x				
Red-bellied woodpecker	*Melanerpes centurus*				x					
Yellow-bellied sapsucker	*Sphyrapicus varius vrius*				x					
Hairy woodpecker	*Dendrocopus villosus*	x	x	x	x					
Downy woodpecker	*Dendrocopus pubescens*	x		x	x					
Eastern kingbird	*Tyrannus tyrannus*	x	x	x						
Flycatcher sp	*Empidonax sp*	x	x							
Great crested flycatcher	*Myiarchus crinitus*	x	x							
Eastern phoebe	*Sayornis phoebe*	x				x				
Eastern wood-pewee	*Contopus virens*	x	x	x						

ATTACHMENT D-4 (CONTINUED)

Table 3.07-1 (Page 6 of 6)

Wildlife Species Likely to Use the Newark Bay Area as Identified During Studies in the NY/NJ Harbor Area

		Upland, Marine and Adjacent Shoreline Sites					Marine and Adjacent Shoreline Sites Hudson River Waterfront LMS Unpublished			Marine and Open Water Sites Pany/NJ Newark Bay
Common Name	Scientific Name	USCG (1995)	Harbor Herons Report (1990) Individuals	Andrle and Carroll (1988) Breeding Birds	Aquila and Alderson (1994) Overwintering Birds	Liberty State Park TI (1976)	LMS (1984 a)	LMS (1984 b)	LMS (1984 c)	LMS (1996b)
Birds										
Blackpoll warbler	*Dendroica striata*	x								
Pine warbler	*Dendroica pinus*	x								
Prairie warbler	*Dendroica discolor*									
Palm warbler	*Dendroica palmarum*	x								
Ovenbird	*Seiurus aurocapillus*	x		x						
Common yellowthroat	*Geothlypis trichas*	x	x	x		x				
American redstart	*Setophaga ruticilla*	x	x							
Connecticut warbler	*Oporornis agilis*		x							
Blue-winged warbler	*Vermivora pinus*		x							
House sparrow	*Passer domesticus*	x	x	x		x	x	x		
Bobolink	*Dolichonyx oryzivorus*		x							
Eastern meadowlark	*Sturnella magna*	x								
Red-winged blackbird	*Agelaius phoeniceus*	x	x	x	x	x				
Orchard oriole	*Icterus spurius*									
Northern oriole	*Icterus galbula*	x	x			x				
Boat-tailed grackle	*Quiscalus major*									
Common grackle	*Quiscalus quiscula*	x	x	x		x	x	x	x	
Brown-headed cowbird	*Molothrus ater*	x		x	x	x				
Scarlet tanager	*Piranga olivacea*	x								
Boat-tailed grackle	*Quiscalus major*									
Northern cardinal	*Cardinalis cardinalis*	x	x	x	x					
Rose-breasted grosbeak	*Pheucticus ludovicianus*	x								
Indigo bunting	*Passerina cyanea*	x		x		x				
Purple finch	*Carpodacus purpureus*									
House finch	*Carpodacus mexicanus*	x		x	x	x				
Common redpoll	*Carduelis flammea*		x							
American goldfinch	*Spinus carduelis tristis*	x	x	x	x	x				
Rufous-sided towhee	*Pipilo erythrophthalmus*	x	x	x	x	x				
Savannah sparrow	*Passerculus sandwichensis*	x				x				
Dark-eyed junco	*Junco hyemalis*				x	x				
American tree sparrow	*Spizella arborea*	x	x		x	x				
Chipping sparrow	*Spizella passerina*									
Field sparrow	*Spizella pusilla*	x			x	x				
White-crowned sparrow	*Zonotrichia leucophrys*	x			x					
White-throated sparrow	*Zonotrichia albicollis*	x	x		x	x				
Seaside sparrow	*Ammodramus caudacutus*									
Sharp-tailed sparrow	*Ammospiza maritimaus*		x							
Fox sparrow	*Passerella iliaca*				x					
Lincoln's sparrow	*Melospiza lincolnii*	x								
Swamp sparrow	*Melospiza georgiana*	x	x	x	x	x				
Song sparrow	*Melospiza melodia*	x	x	x	x	x				
Snow bunting	*Plectrophenax nivalis*				x	x				
House sparrow		x	x							
Number of species:		117	124	72	83	98	45	18	36	20

ATTACHMENT D-4 (CONTINUED)

Table 3.07-2

Confirmed, Probable, and Possible Wildlife Species Using The Newark Bay Shoal Areas

Common Name	Scientific Name	Status	Season	Habitat
Mammals				
Eastern pipistrelle	*Pipistrellus subflavus*	Possible	Spring to fall	Aerial - over land and water
Big brown bat	*Eptesicus fuscus*	Possible	Spring to fall	Aerial - over land and water
Red bat	*Lasiurus borealis*	Possible	Spring to fall	Aerial - over land and water
Hoary bat	*Lasiurus cinereus*	Possible	Spring to fall	Aerial - over land and water
Evening bat	*Nycticeius humeralis*	possible	Spring to fall	Aerial - over land and water
Silver-haired bat	*Lasionycteris noctivagans*	Possible	Spring to fall	Aerial - over land and water
Small-footed bat	*Myotis leibi*	Possible	Spring to fall	Aerial - over land and water
Little brown bat	*Myotis lucifugus*	Possible	Spring to fall	Aerial - over land and water
Northern long eared bat	*Myotis septentrionalis*	Possible	Spring to fall	Aerial - over land and water
Muskrat	*Ondatra zibethica*	Possible	Spring to fall	Marsh - wetland, riverine, small bays and creeks
Harbor seal	*Phoca vitulina*	Possible	All year	Marine bays, channels and coastal waters
Birds				
Common loon	*Gavia immer*	Possible	Late fall - early spring	Open water
Red-throated loon	*Gavia stellata*	Possible	Late fall - early spring	Open water
Pied-billed grebe	*Podilymbus podiceps*	Possible	Late fall - early spring	Open water
Great cormorant	*Phalacrocorax carbo*	Probable	Winter	Open water
Double-crested cormorant	*Phalacrocorax auritus*	Confirmed	All year	Open water
Great blue heron	*Ardea herodias*	Probable	All year	Marshes - shallow water
Green heron	*Butorides virescens*	Possible	All year	Marshes - shallow water
Great egret	*Ardea albus*	Probable	Summer	Marshes - shallow water
Snowy egret	*Egretta thula*	Possible	Summer	Marshes - shallow water
Black-crowned night heron	*Nycticorax nycticorax*	Possible	Summer	Marshes - shallow water
Yellow-crowned night heron	*Nycticorax violacea*	Possible	Summer	Marshes - shallow water
Glossy ibis	*Plegadis falcinellus*	Possible	Summer	Marshes - shallow water
Brant goose	*Branta bernicla*	Probable	Winter	Marshes - shallow water
Snow goose	*Chen caerulescens*	Possible	Winter	Marshes and adjacent open water
Canada goose	*Branta canadensis*	Confirmed	All year	Marshes and adjacent open water
Mallard	*Anas platyrhynchos*	Confirmed	All year	Marshes and adjacent open water
Black duck	*Anas rubripes*	Confirmed	All year	Marshes and adjacent open water
Gadwall	*Anas strepera*	Confirmed	All year	Marshes and adjacent open water
Northern pintail	*Anas acuta*	Possible	Fall and early winter	Open water
Ruddy duck	*Oxyura jamaicensis*	Probable	Fall and early winter	Open water
Canvasback	*Aythya valisineria*	Confirmed	Late fall - early winter	Open water
Lesser scaup	*Aythya affinis*	Probable	Late fall - early winter	Open water
Greater scaup	*Aythya marila*	Probable	Late fall - early winter	Open water
Common goldeneye	*Bucephala clangula*	Probable	Late fall - early winter	Open water
Green-winged teal	*Anas crecca*	Probable	Late fall - early spring	Marshes - open water
Blue-winged teal	*Anas discors*	Probable	All year	Marshes - open water
American wigeon	*Anas americana*	Confirmed	Late fall - early spring	Marshes - open water
Northern shoveler	*Anas clypeata*	Possible	Late fall - early spring	Marshes - open water
Redhead	*Aytha americana*	Possible	Late fall - early spring	Open water
Ring-necked duck	*Aytha collaris*	Posssible	Late fall - early spring	Marshes - open water
Bufflehead	*Bucephala albeola*	Confirmed	Late fall - early spring	Open water
White-winged scoter	*Melanitta deglandi*	Possible	Late fall - early spring	Open water
Oldsquaw	*Clangula hyemalis*	Possible	Late fall - early spring	Open water
Hooded merganser	*Lophodytes mergus*	Probable	Late fall - early spring	Open water
Common merganser	*Mergus merganser*	Probable	Late fall - early spring	Open water
Red-breasted merganser	*Mergus serrator*	Confirmed	Late fall - early spring	Open water
Red-tailed hawk	*Buteo jamaicensis*	Possible	All year	Upland
Northern harrier	*Circus cyaneus*	Possible	All year	Marshes
Osprey	*Pandion haliaetus*	Possible	Summer	Over open water
Peregrine falcon	*Falco peregrinus*	Probable	All year	Over water and land
Merlin	*Falco columbarius*	Possible	Winter	Over water and land
American kestrel	*Falco sparverius*	Possible	All year	Over land
American coot	*Fulica americana*	Possible	Summer	Marshes, tidal creeks and open water
Great black-backed gull	*Larus marinus*	Confirmed	All year	Open water
Herring gull	*Larus argentatus*	Confirmed	All year	Open water
Ring-billed gull	*Larus delawarensis*	Confirmed	All year	Open water
Laughing gull	*Larus atricilla*	Confirmed	Summer	Open water
Common tern	*Sterna hirundo*	Probable	Summer	Open water
Roseate tern	*Sterna dougallii*	Possible	Summer	Open water
Least tern	*Sterna albifrons*	Probable	Summer	Open water
Black skimmer	*Rynchops niger*	Possible	Summer	Open water, tidal creeks and rivers
Tree swallow	*Iridoprocne bicolor*	Probable	Summer	Over land and water
Barn swallow	*Hirundo rustica*	Probable	Summer	Over land and water
American crow	*Corvus brachyrhynchos*	Confirmed	All year	Along shores and mudflats
Reptiles				
Loggerhead	*Caretta caretta*	Possible	Summer	Coastal waters
Kemp's ridley	*Lepidochelys kempi*	Possible	Summer	Coastal waters
Green sea turtle	*Chelonia mydas*	Possible	Summer	Coastal waters

Appendix E

Appendix E

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APPENDIX E

BIOACCUMULATION POTENTIAL
OF GROUNDWATER CONTAMINANTS
OF POTENTIAL CONCERN

To evaluate the bioaccumulation potential of groundwater pollutants, a screening assessment was undertaken of contaminants exceeding New Jersey GWQSs in groundwater within the proposed reclassification area.

The contaminants of potential concern identified in the groundwater quality review (see Section 5.0) include VOCs and metals. As a conservative screening measure, contaminants detected in groundwater at concentrations exceeding NJDEP GWQSs were also compared to surface water quality criteria (NJDEP). Groundwater concentrations should not be compared directly to surface water quality standards or criteria, since dilution or, in the case of organics, volatilization occurs when groundwater enters the surface water body. However, such a comparison provides a "worst case" picture of which contaminants would potentially pose a risk to aquatic receptors. This comparison revealed that metals (particularly arsenic, copper, lead, and mercury) exist at concentrations that could impact surface waters should they reach surface waters at these undiluted, unattenuated concentrations. Of these, arsenic and lead were the most widely detected at levels that exceeded GWQSs in wells.

It should be noted that New Jersey State surface water quality criteria are largely based upon potential human health exposure, which should be minimal in the vicinity of the reclassification area (see Section 6.1.1 of this report). The criteria are often very conservative, being based upon the possibility of an increased cancer risk to 1 out of 1 million individuals. A more appropriate comparison is provided by ecologically-based criteria. If the groundwater concentrations were instead compared to EPA Ambient Water Quality Criteria for Protection of Aquatic Life as a conservative screening measure of potential ecological risk (Table 6-1), there would be far fewer exceedances of the criteria for the metals present in groundwater. Groundwater concentrations of arsenic, lead, cadmium, copper, mercury, nickel, selenium, and zinc exceed EPA marine acute water quality criteria in at least one of the wells measured within the reclassification area. However, the mean concentration of these analytes in the wells measured would exceed the EPA marine acute criterion for the following metals only: arsenic, copper, lead, and mercury.

A comparison with existing screening criteria suggests that few organic compounds are present in groundwater at levels that would pose a risk if they entered surface waters at an undiluted, unattenuated concentration. If very conservative NJDEP human health criteria for surface water are used, the primary organic compound of concern would be benzene, based upon the frequency of exceedances in groundwater wells sampled within the proposed reclassification area. However, a comparison of groundwater data from within the proposed reclassification area to the EPA marine acute water quality criterion reveals that while the maximum benzene concentration of 11,000 ug/L would exceed the EPA marine acute criterion of 5,500 ug/L, the average concentration in these wells of 5,100 ug/L is below the criterion indicative of acute ecological risks.

A sufficient literature base of information exists to determine the bioaccumulation potential of each contaminant found in groundwater wells at concentrations exceeding New Jersey GWQSs.

Generally, highly lipophilic compounds with a high octanol-water partitioning coefficient (K_{ow}), such as pesticides and PCBs, have a higher potential to bioaccumulate in aquatic ecosystems. Since they are poorly soluble in water, their threat to aquatic food chains comes largely from their presence in sediment, where they may be ingested by benthic invertebrates and passed upward through the food chain via ingestion of contaminated tissue. No PCBs were detected in the groundwater wells measured within the proposed reclassification area, and only one pesticide (alpha-BHC) was detected (in one well).

Table E-1 provides a list of K_{ow} values for contaminants detected in exceedance of New Jersey GWQSs. In general, compounds with K_{ow} values less than 500 are highly water-soluble and mobile, with little to no bioaccumulation potential, and are readily biodegraded (Ney, 1995). Most of the VOCs detected in groundwater at levels exceeding NJDEP GWQSs fall into this category. Compounds with K_{ow} values greater than 1,000 have low solubility, are largely immobile in soil, are readily bioaccumulated, and are not readily biodegradable. Compounds detected in groundwater at exceedance levels having K_{ow} values greater than 1,000 include PAHs such as acenaphthene, fluoranthene, fluorene, and pyrene. These compounds were each detected in less than 25% of the groundwater wells analyzed for these compounds within the proposed reclassification area, and none exceeded NJDEP GWQSs in more than two wells sampled. Of these, only fluoranthene and fluorene would exceed EPA acute ambient marine water quality criteria for protection of aquatic life (Table 6-1), should the groundwater from the two wells affected reach the bay at a totally undiluted, unattenuated concentration.

Other compounds detected in groundwater at concentrations exceeding NJDEP GWQSs were hexachlorobutadiene, hexachloroethane, and xylenes. The first two compounds were each detected within only one well. Xylenes, however, were detected in 80 of the 403 samples for which they were analyzed, with 40 (a little over 10%) exceeding the NJDEP GWQS of 40 ug/L. There are no New Jersey state or EPA marine water quality criteria or standards for xylenes. Concentrations of xylenes ranged from 0.12 to 100,000 ug/L.

The remaining compounds detected at levels exceeding NJDEP GWQSs have K_{ow} values between 500 and 1,000, implying that their solubility, mobility, and bioaccumulative and biodegradation characteristics are variable (Ney, 1995). These compounds, chlorobenzene, alpha-BHC, and 2,4-dichlorophenol, were each detected in two wells or less. In summary, xylene is the organic compound with the most significant bioaccumulation potential, based upon its frequency and magnitude of contamination in groundwater, and its K_{ow} value; however, it was detected at exceedance levels at less than 10% of the wells where it was analyzed for. Moreover, given its K_{ow} value (1,585), it is not considered to be highly mobile, and hence is less likely to reach surface water bodies such as Newark Bay.

Metals often adhere to organic or minute suspended sediment particles, and settle out of the water column where they may be available to consumers in the sediment. Transport of metals from groundwater into surface water may occur in the dissolved or suspended solids phases.

However, ultimately, if metals were to reach the marine ecosystem, the greatest threat would likely to be posed by metals in the sediment, where concentrations are often an order of magnitude higher than those in the water column.

Metals of potential concern in groundwater are arsenic, cadmium, copper, lead, mercury, nickel, and zinc. All of these metals may bioaccumulate to some extent if they were to reach surface waters or sediment associated with the surface water body. The degree of bioaccumulation is determined by site-specific conditions determining the species of metal present and subsequent bioavailability. Factors affecting uptake include physical and chemical characteristics of the sediment and water (pH, salinity, total organic carbon, particle distribution of the sediment, degree of bioturbation of the sediment, form of the metal [dissolved or adhered to particles], and exposure route [ingestion, absorption, etc.]). For instance, the presence of selenium in the tissues of an organism may act to bind mercury, making it unavailable, while the presence of calcium in sediments may bind lead, making it unavailable.

The extent of uptake is also determined by the physiological and behavioral characteristics of the organism exposed, and the duration of exposure. Thus, bioconcentration factors (the concentration in the animal's tissue divided by the concentration in the sediment and/or water) vary not only between these metals, but for the organisms exposed, and are difficult to predict. However, in the present case, the bioaccumulation potential of these metals is a moot point, given that it is highly unlikely that they would ever reach surface waters (see Section 5.0).

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TABLE E-1

OCTANOL-WATER PARTITIONING COEFFICIENTS FOR ORGANIC CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER. PETITION FOR GROUNDWATER RECLASSIFICATION PORT AUTHORITY OF NY/NJ

SVOCs	K_{ow} Value
2,4-Dichlorophenol	562
2,4-Dimethylphenol	302
Acenaphthene	21,380
Fluoranthene	213,796
Fluorene	15,136
Hexachloroethane	2,187
Isophorone	6
Pyrene	63,400
Pesticides	
alpha-BHC (benzene hexachloride)	911 (for lindane, gamma isomer of BHC)
VOCs	
1,1,1-Trichloroethane	302
1,1,2,2-Tetrachloroethane	363
1,1-Dichloroethane	61.66
Acetone	0.95
Benzene	135
Bromomethane (methyl bromide)	12.59
Chlorobenzene	692
Chloroform	87
Chloromethane (methyl chloride)	8
Hexachlorobutadiene	5,495
Methylene Chloride	17.78
Styrene	NL
Toluene	490
Xylenes (Total)	1,585

NL - value not located

K_{ow} - octanol water partitioning coefficient

Appendix F

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APPENDIX F

SEDIMENT CONCENTRATION PLOTS OF THE NY/NJ HARBOR ESTUARY FROM THE BATTELLE (1992) AND NOAA (1995) STUDIES PETITION FOR GROUNDWATER RECLASSIFICATION PORT AUTHORITY OF NY/NJ

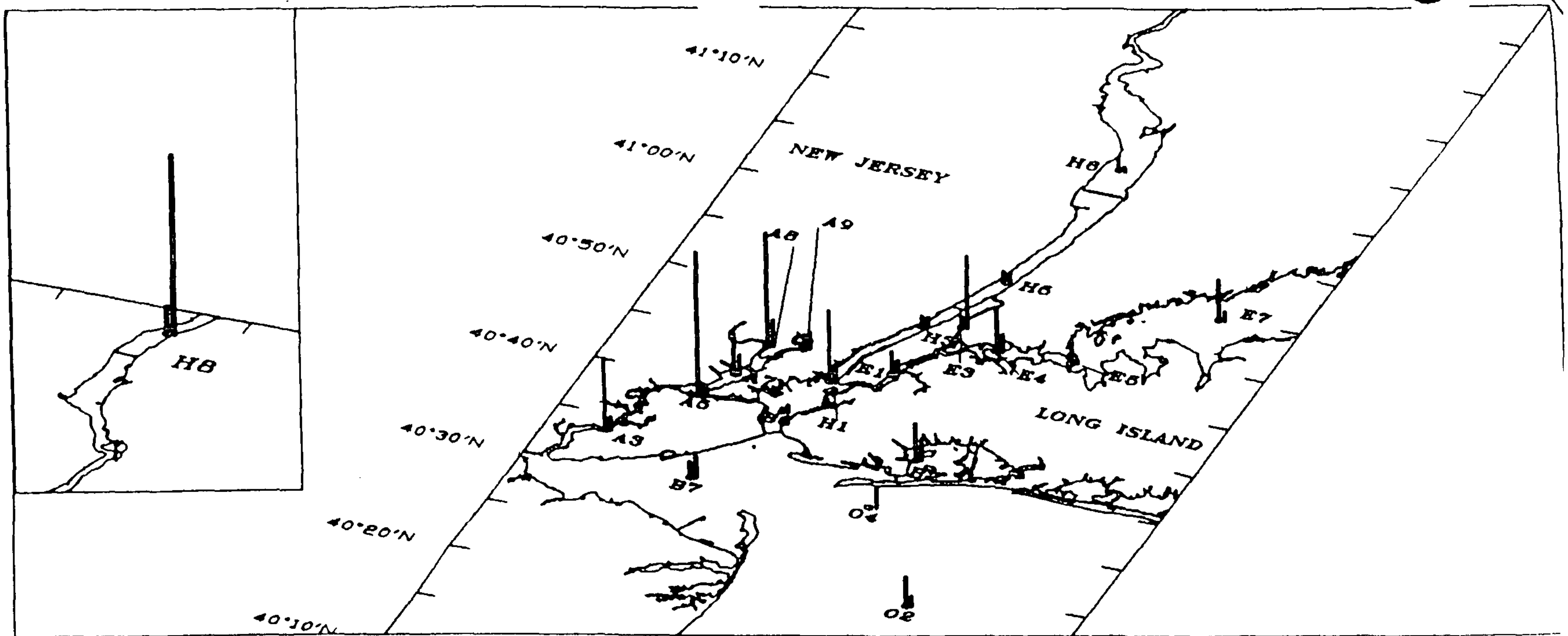
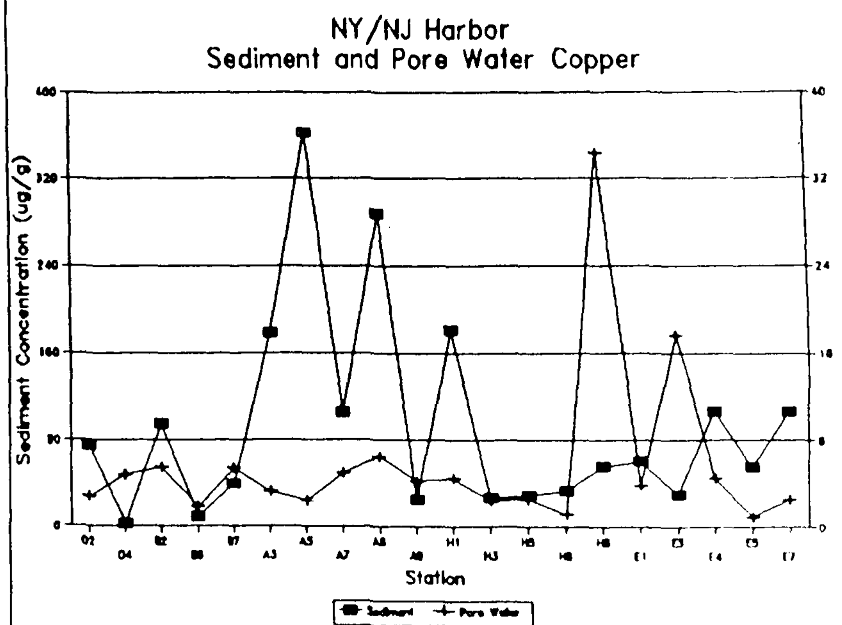


FIGURE 5A. COPPER RESULTS

SEDIMENT COPPER

PORE WATER COPPER



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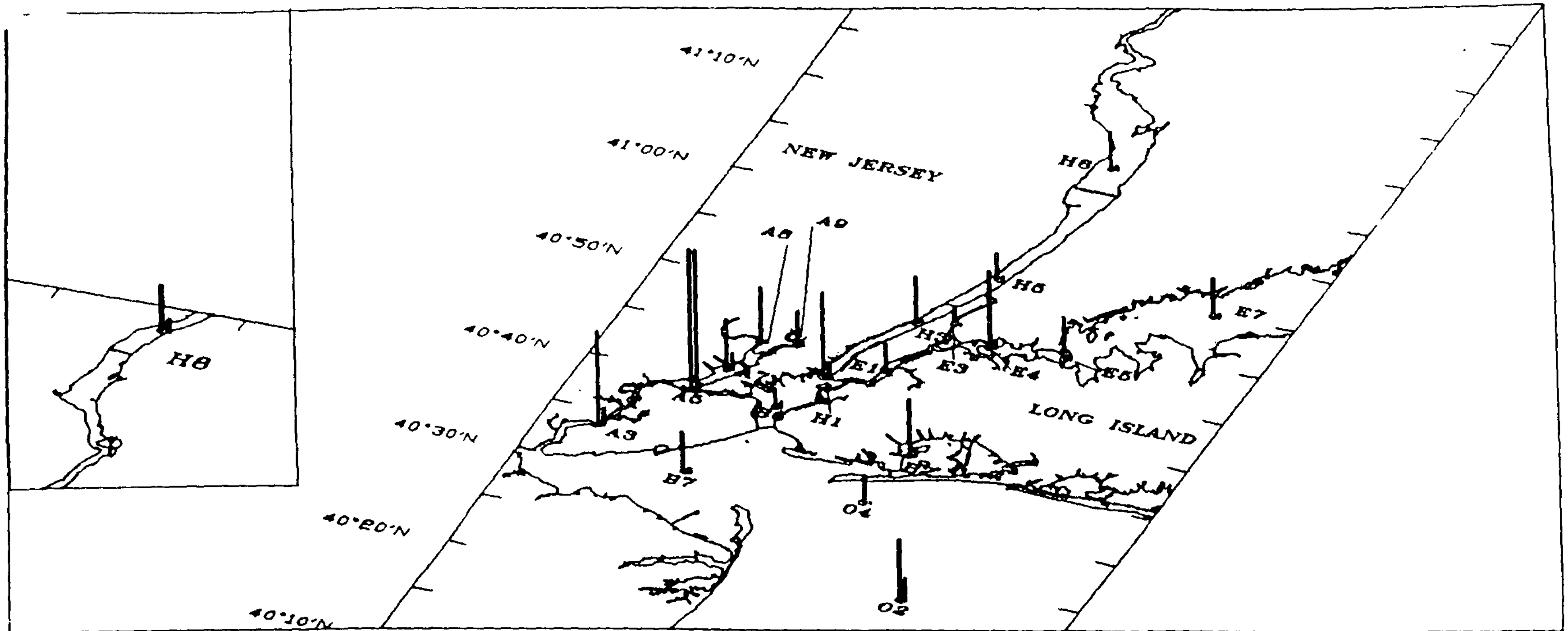
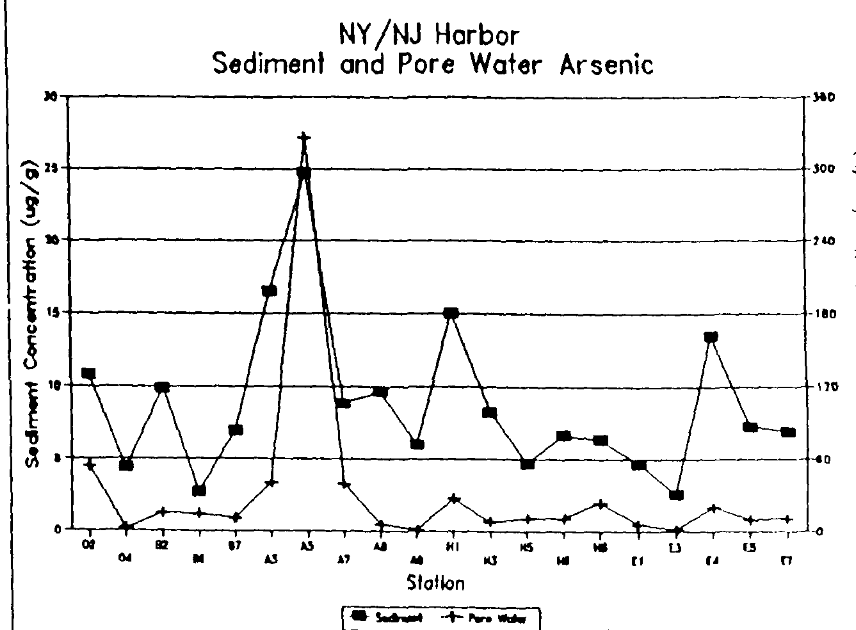


FIGURE 5D. ARSENIC RESULTS

SEDIMENT ARSENIC

PORE WATER ARSENIC



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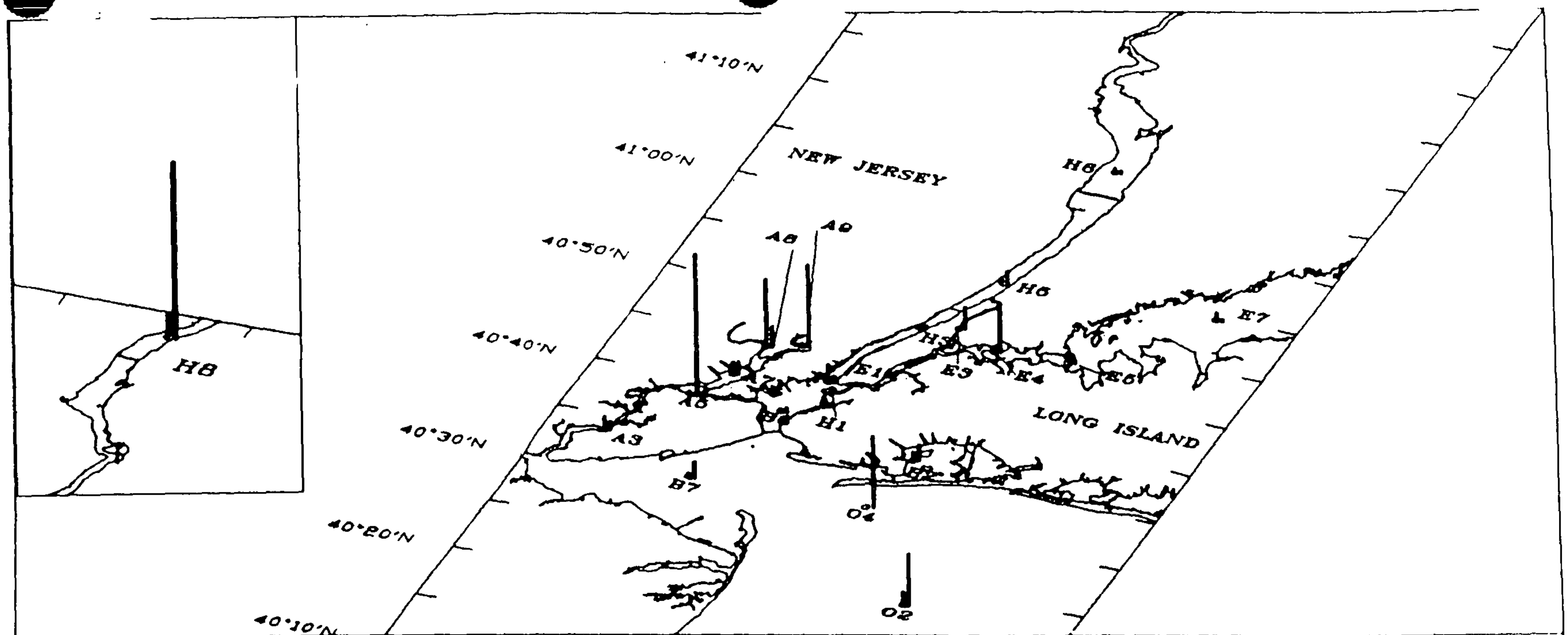
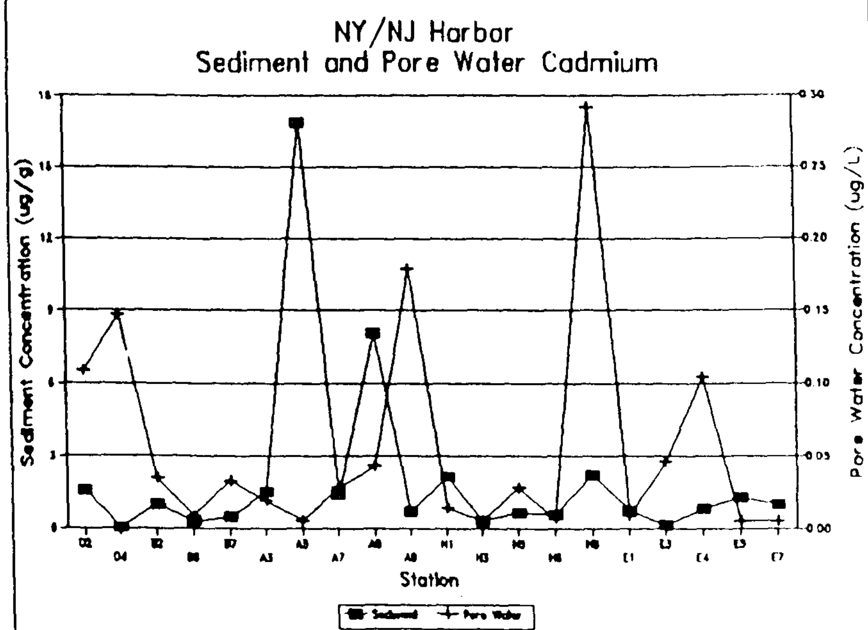


FIGURE 5E. CADMIUM RESULTS

| SEDIMENT CADMIUM

| PORE WATER CADMIUM



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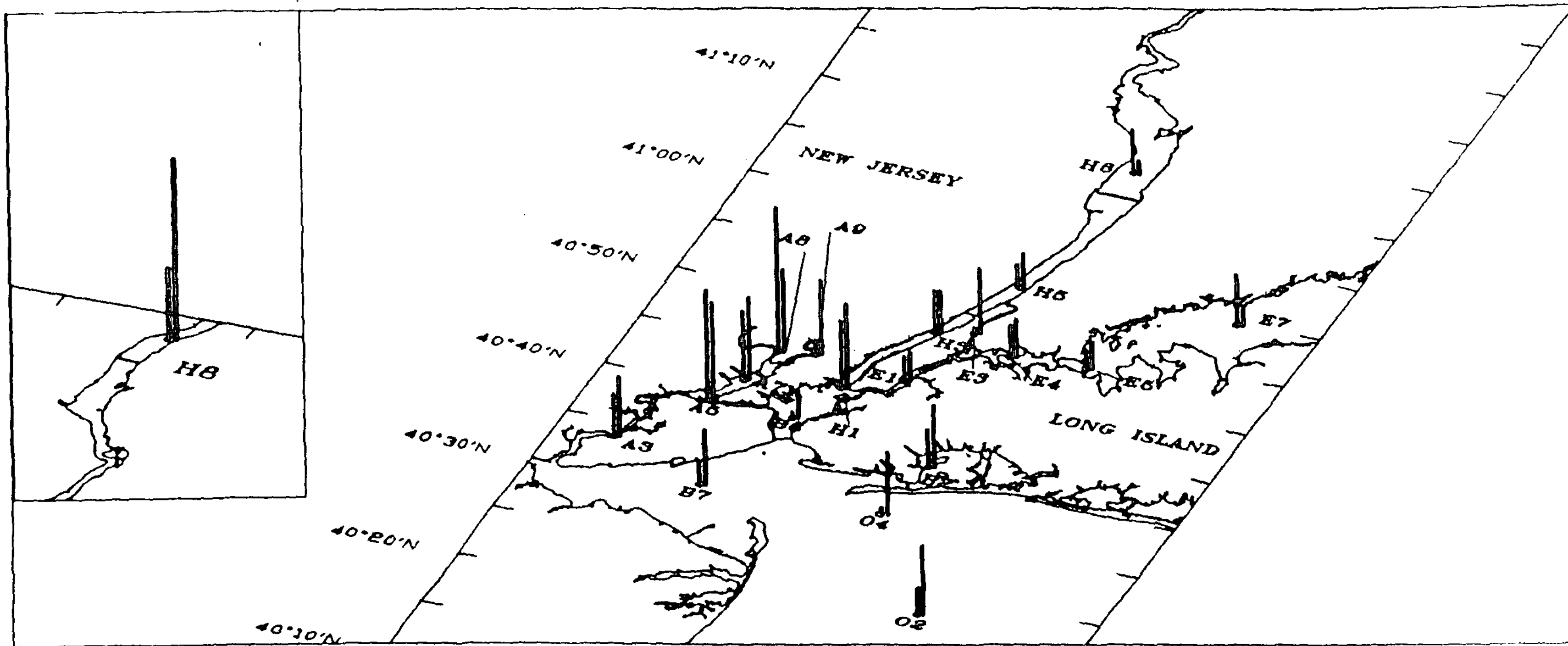
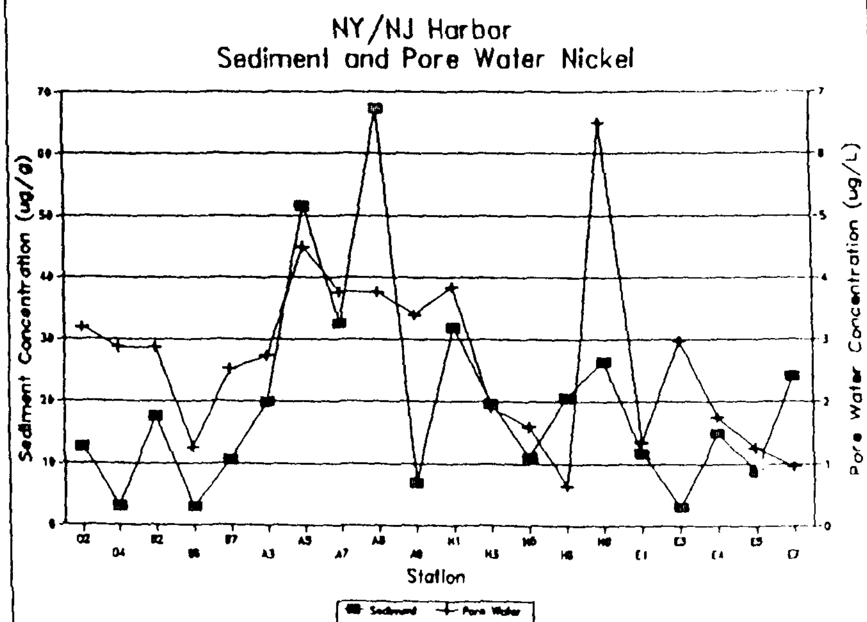


FIGURE 5F. NICKEL RESULTS

▌SEDIMENT NICKEL

▌PORE WATER NICKEL



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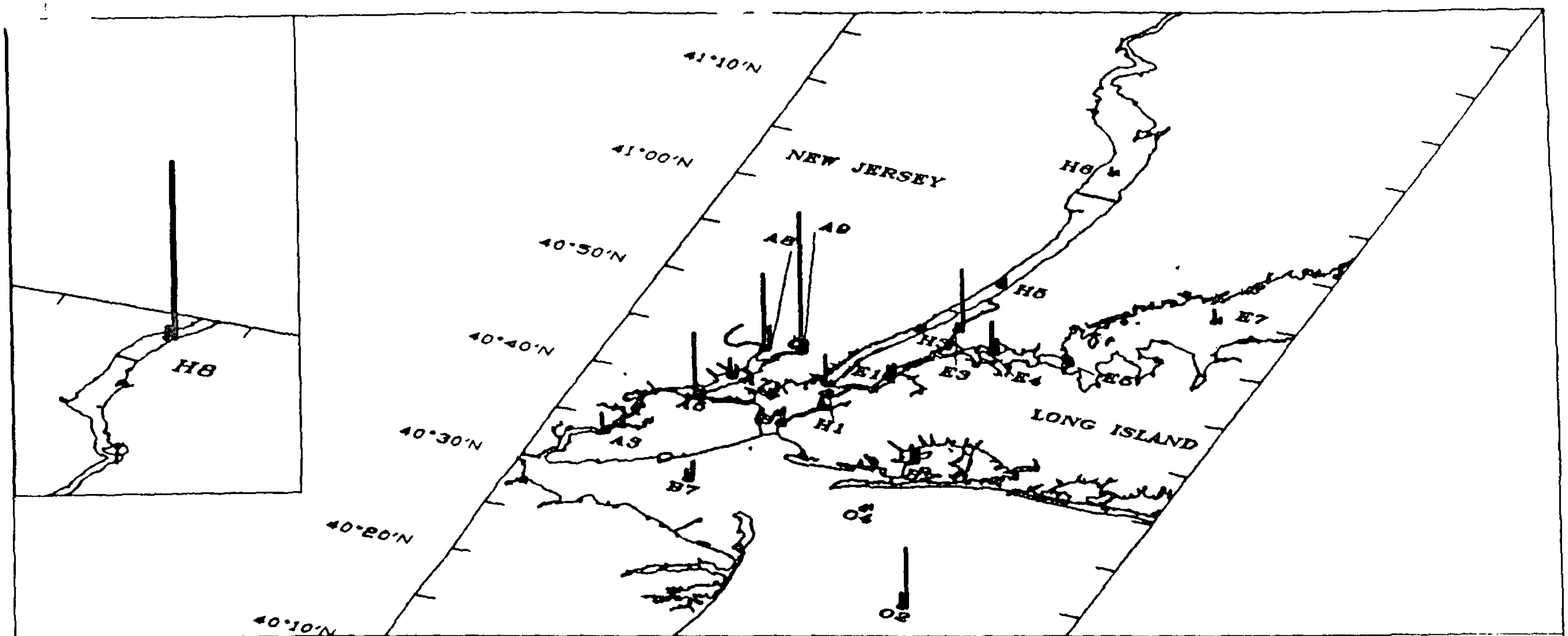
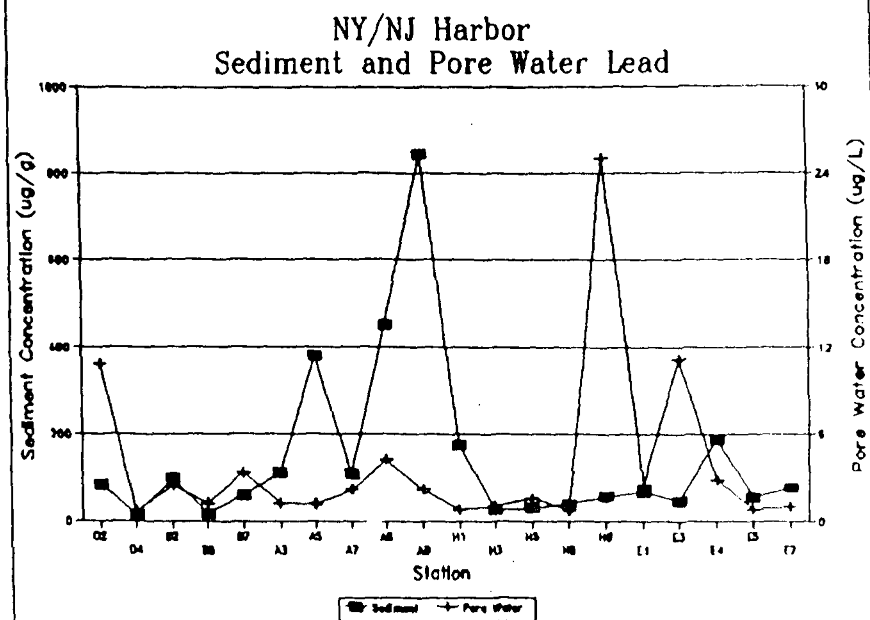


FIGURE 5G. LEAD RESULTS

| SEDIMENT LEAD

| PORE WATER LEAD



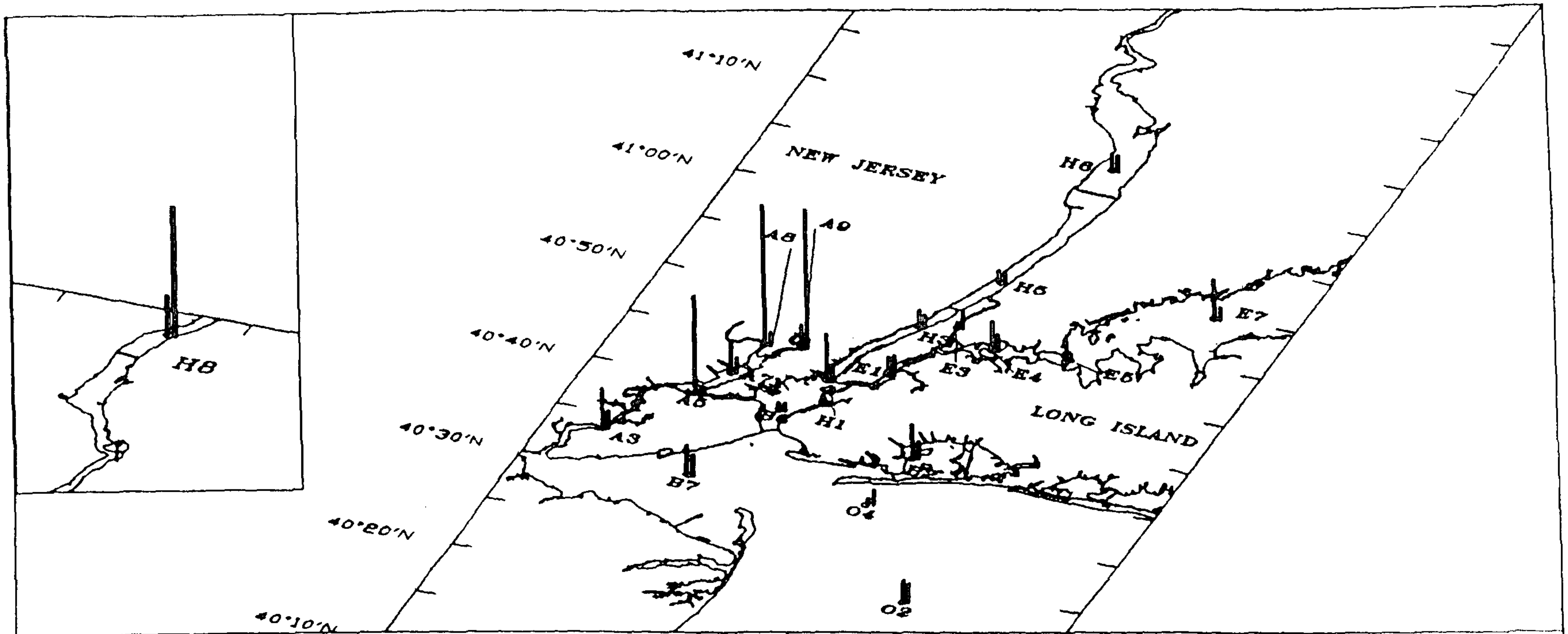


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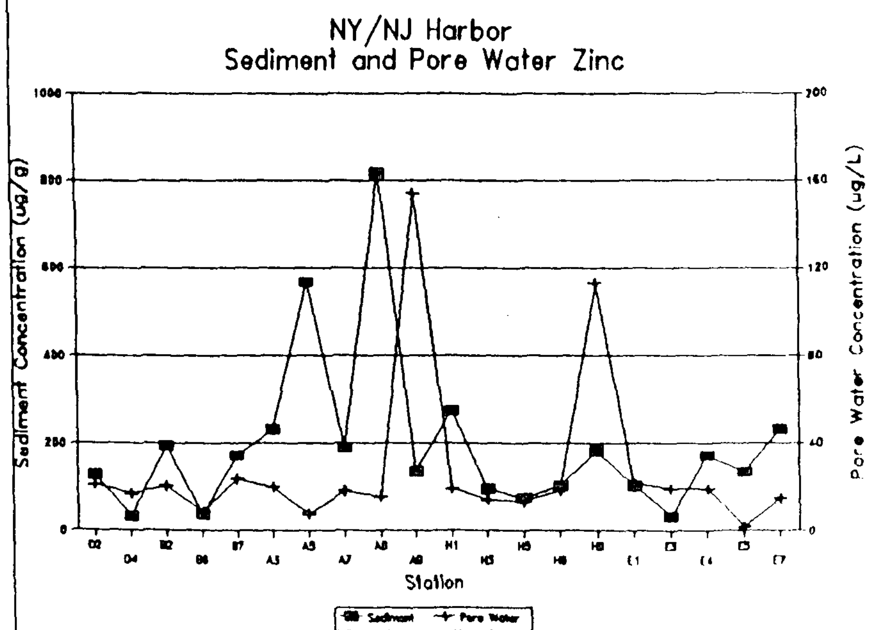
FIGURE 5H. ZINC RESULTS

SEDIMENT ZINC

PORE WATER ZINC



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NOAA (1995)

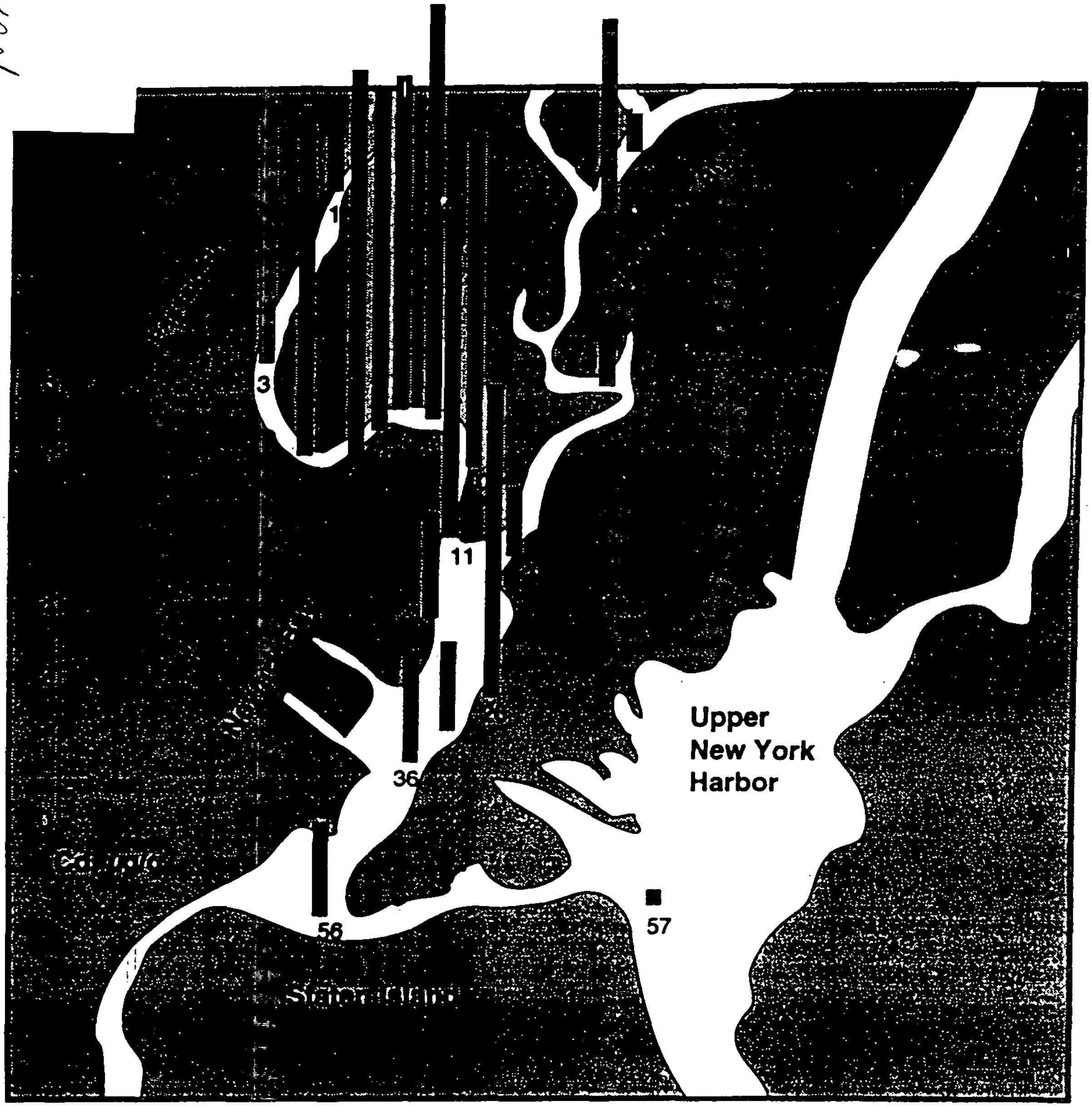

Figure 21. Concentrations of cadmium at selected stations in Newark Bay and vicinity.

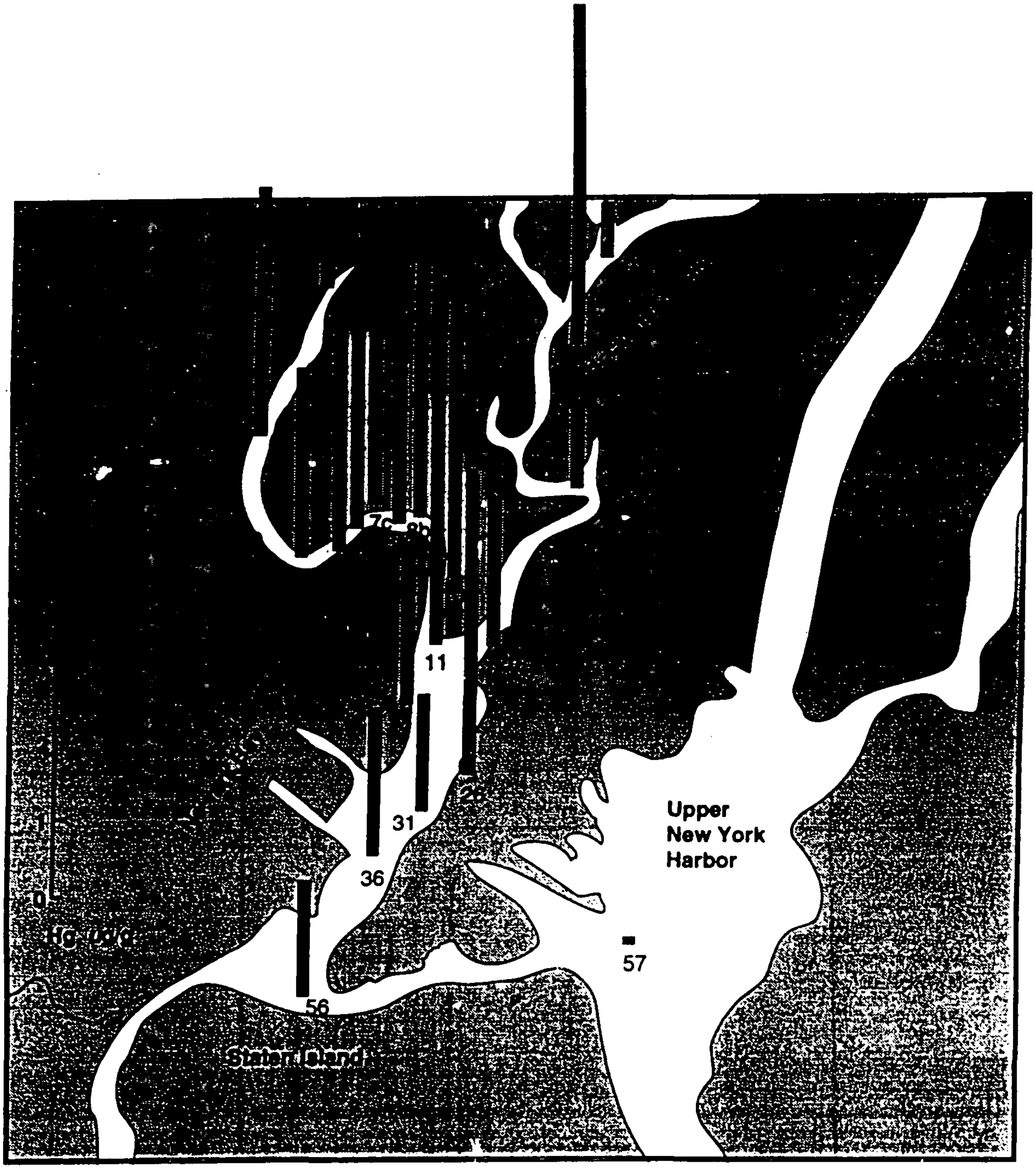

Figure 22. Concentrations of mercury at selected stations in Newark Bay and vicinity.

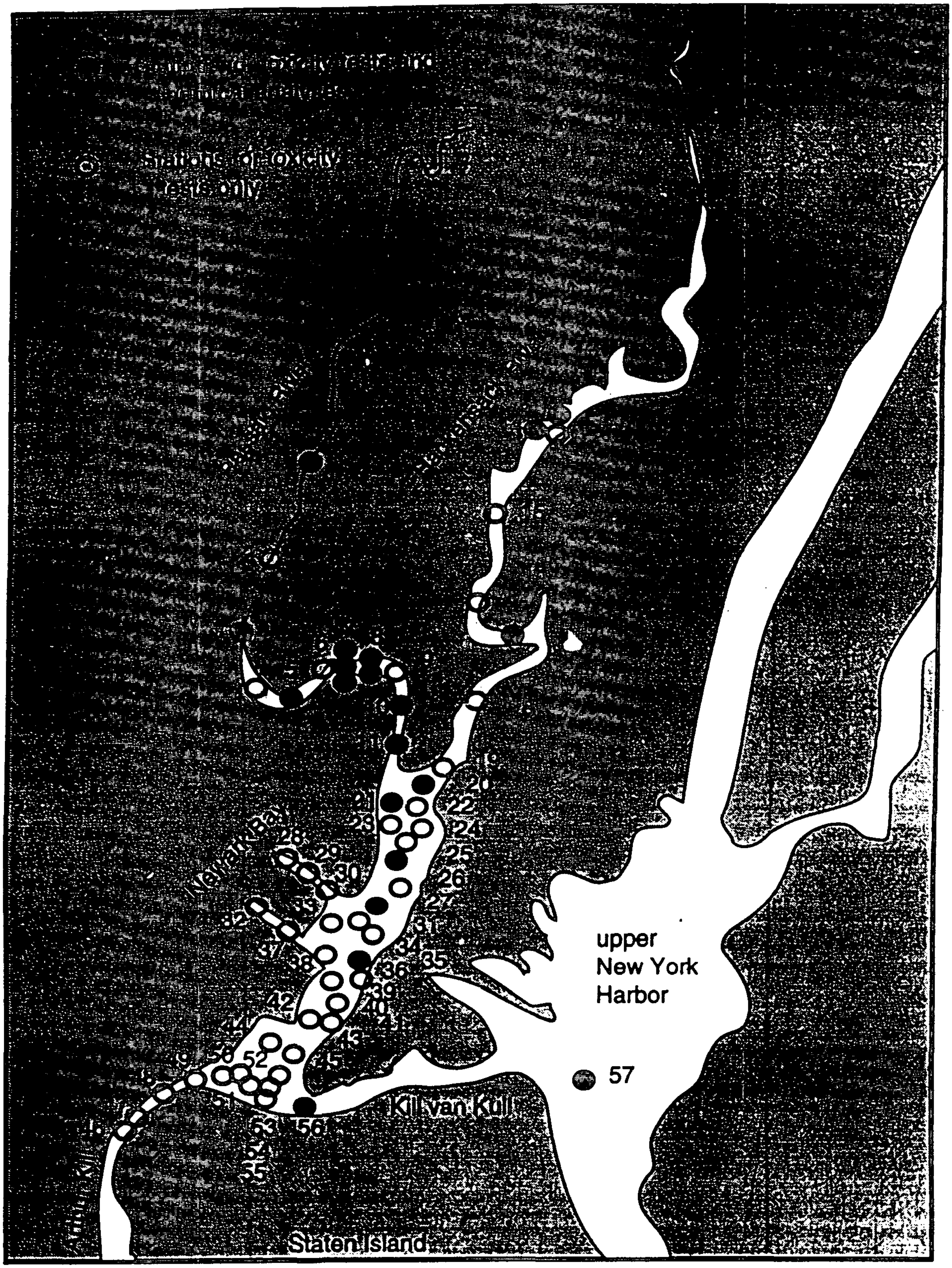

Figure 5. Stations sampled in the Passaic River, Hackensack River, Newark Bay, upper Arthur Kill, Kill van Kull, and upper New York Harbor during Phase 2.

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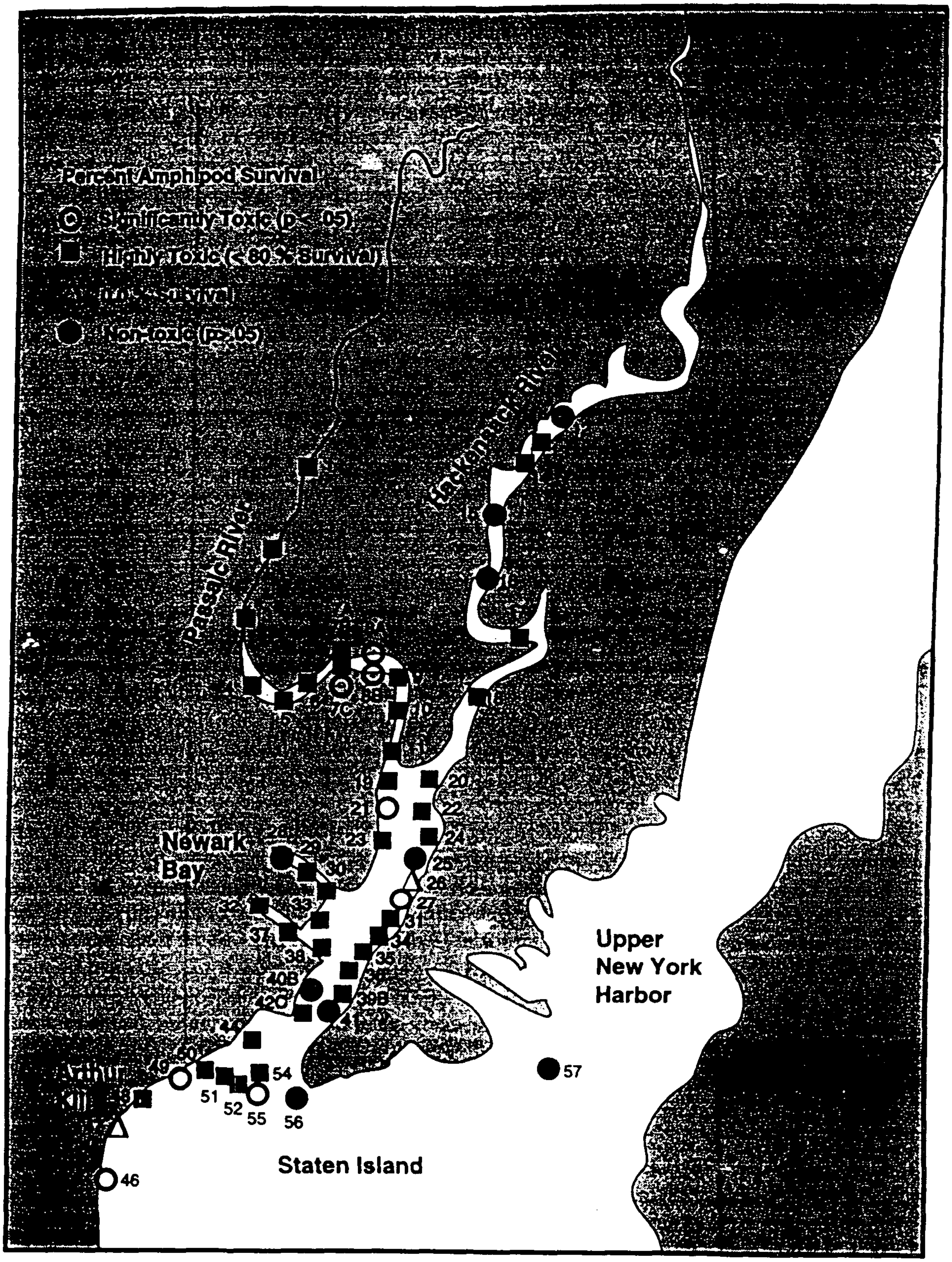

Figure 8. Distribution of stations in Newark Bay and vicinity that were toxic, highly toxic, and non-toxic in amphipod (A. *abdita*) survival tests.

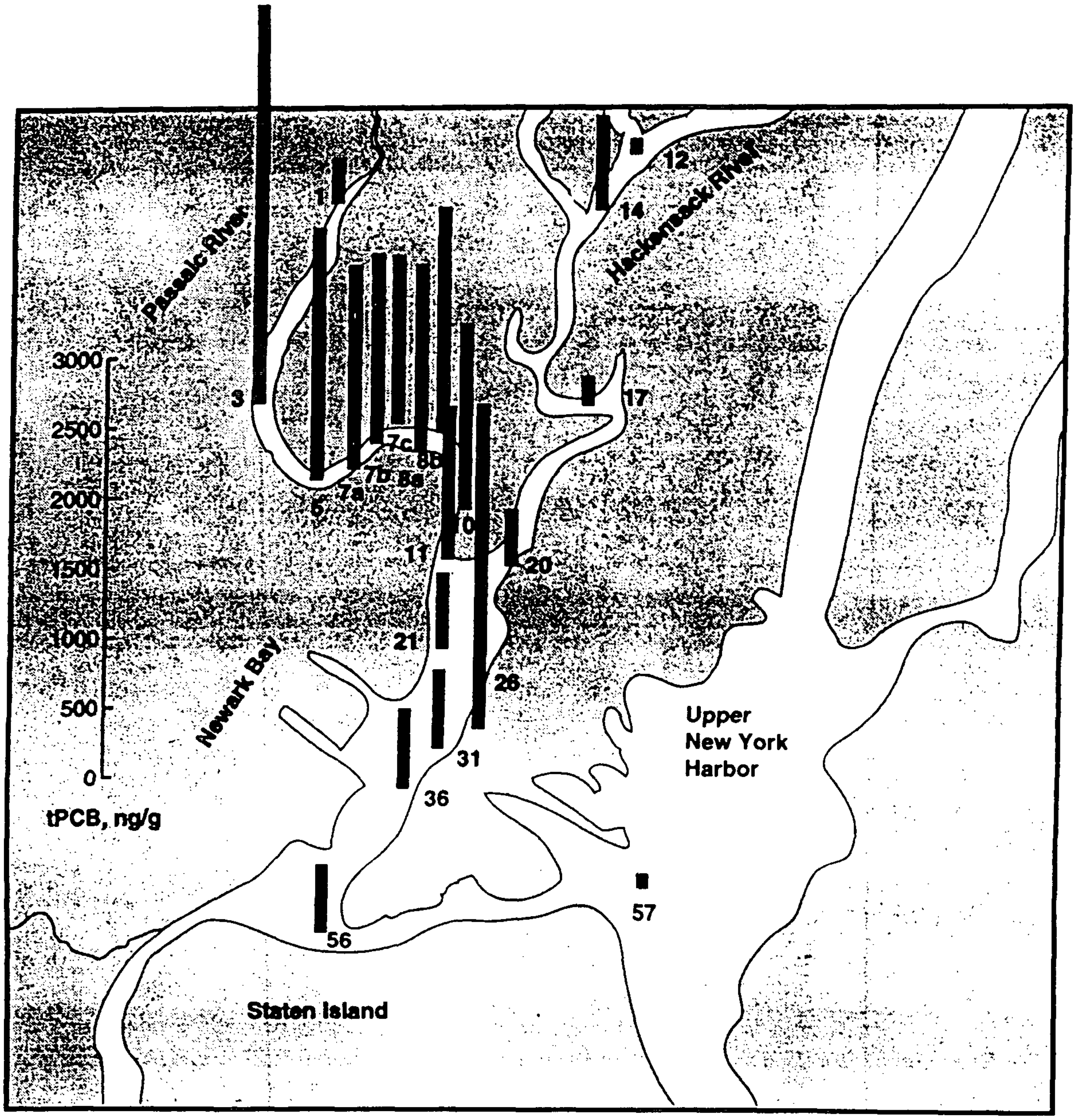

Figure 24. Concentrations of total PCBs at selected stations in Newark Bay and vicinity.

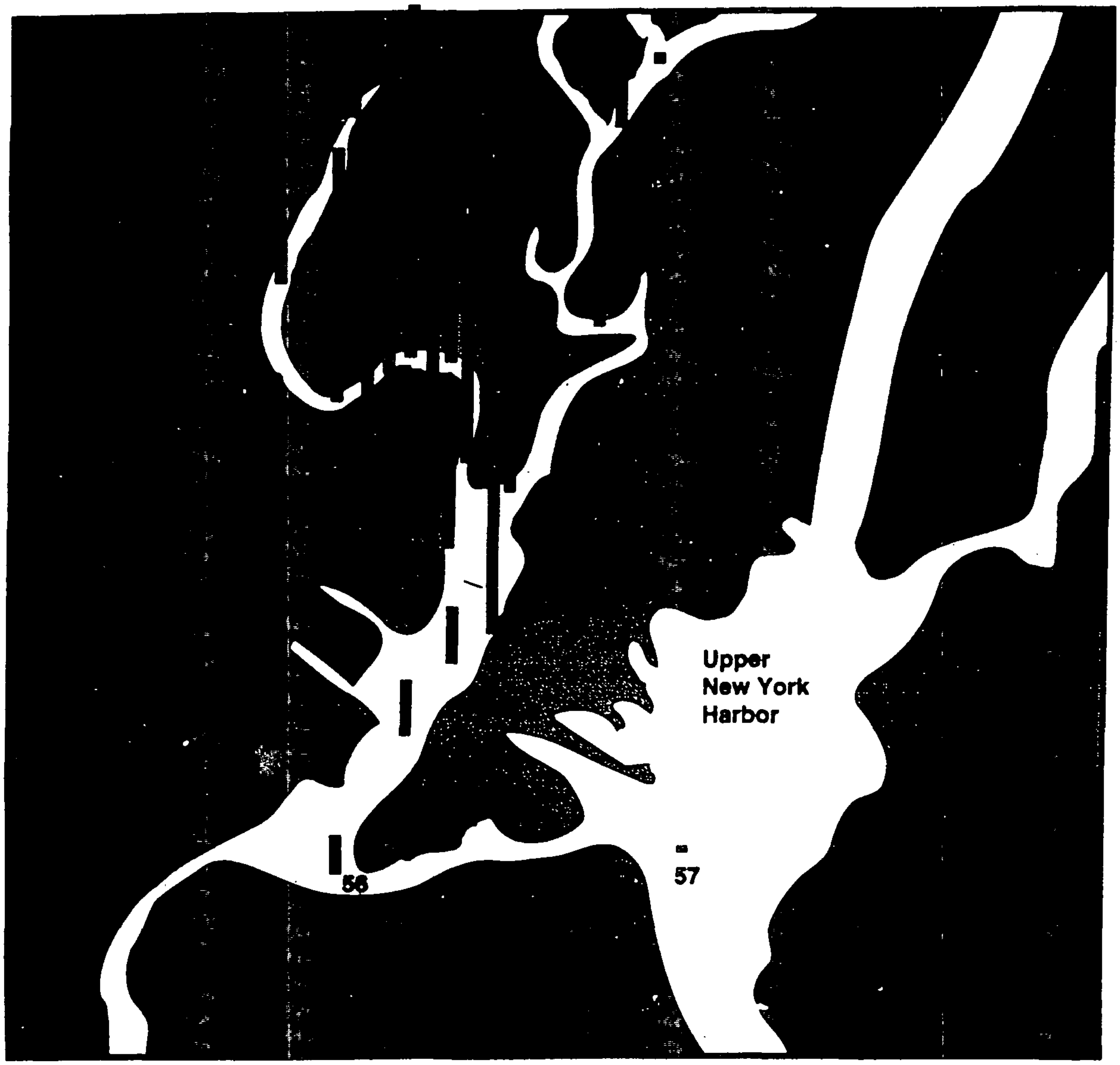

Figure 25. Concentrations of total 2,3,7,8-tcdd toxicity equivalency quotients (TEQ) at selected stations in Newark Bay and vicinity.