The Constable Hook area of Bayonne was surveyed by Mr. Len Piontek of the Interstate Sanitation Commission (ISC) and Mr. David C. Longstreet on May 29, May 30, May 31, July 19 and July 20 of 1973. The purpose of the survey was to evaluate the extent of the oil pollution in the groundwaters, soil, and surface waters of the Constable Hook area. A report was written detailing the results of sampling of the surface waters and soils of the area. This memo will outline the visual determinations made on the various dates.

May 29, 1973

Between Avenue J and Avenue F paralleling New Hook Access Road sighted pools of oily water and oil soaked ground.

Along the railroad tracks paralleling the Exxon retaining wall pools of oil and oily water. A ditch in this area had oil flowing in it.

The storm water collecting system leading to the tidal waters had oil floating on top of the water in the ditch. On New Hook Access Road a simple oil/water separator had been installed, but evidently it is not very effective. The water downstream of the separator is very oily, and the vegetation on the banks was oil covered. A large pool of oil was noticed near the downstream end of the ditch.

In the afternoon, a vacuum truck owned by Coastal Services (an oil recovery and oil spill clean-up contractor) was observed servicing the oil/water separator. The foreman stated that the crew had been working on Exxon property and had been requested to service the separator by Exxon.

May 30, 1973

The area was visited to obtain soil samples. The ground was still oil soaked. The drainage ditch along New Hook Access Road had oil on it. The Exxon facility was inspected. During the tour of the Exxon facility Messrs. Longstreet and Piontek to File

Mr. Birns

Mr. Longstreet

November 15, 1973

Constable Hook Area, Bayonne, New Jersey

The Constable Hook area of Bayonne was surveyed by Mr. Ken Piontek of the Interstate Sanitation Commission (ISC) and Mr. David C. Longstreet on May 2[illegible], May 30, May 31, July 19 and July 20 of 1973. The purpose of the survey was to evaluate the extent of the oil pollution in the groundwaters, soil, and surface waters of the Constable Hook area. [illegible] report [illegible] written detailing the results of sampling of the [illegible] waters and soils of the area. This [illegible] will utilize [illegible] visual determination [illegible] on the various sites.

[illegible]

Between [illegible] oil [illegible] soil [illegible]

[illegible] railroad [illegible] parallel [illegible] Exxon petroleum [illegible] oil [illegible]

[illegible]

[illegible] Servo [illegible] servicing [illegible] stated that the [illegible] Exxon [illegible]

[illegible] 1973

[illegible]

were accompanied by Mr. John Grosso an employee of Exxon. The main interest of the tour centered in the area of the chain link fence and pipelines paralleling the railroad. Soil samples were taken. During this time, a relief valve connected to one of the pipes was open and depositing a steady flow of a liquid on the ground of Exxon's property.

May 31, 1973

Same general conditions of the soil and water were noted. During the taking of soil samples, especially those taken at 12 inches below grade oily liquid was present. The indications were that the oil was floating on the water table. The water table was very close to the grade level and in some cases, above grade.

July [illegible] and July [illegible]

Mr. [illegible] ([illegible] summer intern [illegible]) accompanied Messrs. [illegible] and [illegible]. [illegible] samples were taken at this time. The same general conditions prevailed as noted on [illegible] visit.

[illegible]

ADMINISTRATIVE CONSENT ORDER
SITE HISTORY DELIVERABLE ITEMS
EXXON COMPANY, U.S.A.
BAYONNE PLANT
BAYONNE, NEW JERSEY

January 1993

Prepared for

Exxon Company, U.S.A.
1400 Park Avenue
Linden, New Jersey 07036

Compiled by

Geraghty & Miller, Inc.
125 East Bethpage Road
Plainview, New York 11803
(516) 249-7600

and

Exxon Company, U.S.A.
1400 Park Avenue
Linden, New Jersey 07036

ADMINISTRATIVE CONSENT ORDER APPENDIX B, SECTION IIB - SITE HISTORY DELIVERABLES

VOLUME I

CONTENTS

append.toc

ADMINISTRATIVE CONSENT ORDER
SITE HISTORY DELIVERABLE ITEMS
EXXON COMPANY, U.S.A
BAYONNE PLANT
BAYONNE, NEW JERSEY

This document is a compilation of site history information (Site History Deliverable Items) in accordance with the Administrative Consent Order (ACO), Appendix B, Section IIB, Items 1 through 16. For organizational purposes, each Site History deliverable item has been referred to as an appendix and an appropriate tab has been used. Appendix D (Item 4) is being submitted as a separate volume because of its size. Some of the information provided in this document has also been included in the Site History Report (Geraghty & Miller, Inc. 1993), and was used for planning the scope of work of the Remedial Investigation (RI) Work Plan (Geraghty & Miller, Inc. 1993). This document is being submitted concurrently with those reports.

APPENDIX P

SPILLS AND FIRES

APPENDIX P

CONTENTS

TABLE

ATTACHMENTS

APPENDIX P

SPILLS AND FIRES

This section provides lists of fires, spills, and discharges that may have had an adverse impact on human health or the environment at the Exxon Company Plant, Bayonne, New Jersey. The material presented was compiled in accordance with the November 27, 1991 Administrative Consent Order (ACO), Appendix B, Section IIB, Item 16.

A table of documented spills at the Exxon Company Plant, Bayonne, New Jersey was compiled from the following plant files: General Incident Reports, General Accident Reports, Spill/Mixture/Leak Reports, Spill Incident Reports, shift supervisor spill logs, telephone call logs to the "Emergency Spill Hotline", summary reports (i.e., Annual Oil Spill Reports; spill tables in Spill Prevention Control and Countermeasure Plans; and Leaks, Discharges and AIINS Incident Reports) spill-discharge reports to United States Coast Guard, and spill-discharge reports to the New Jersey Department of Environmental Protection and Energy (NJDEPE). In addition, the June 1992 New Jersey state spill database, obtained from Vista Environmental Information, Inc., was compared to the cited spills and did not yield any additional information. Spills and discharges greater than 100 gallons were chronologically organized into the 13 operational areas in Table P-1. Apparent in Table P-1 is that the Asphalt Plant Area had the most documented spills, greater than 100 gallons. However, the largest documented spill (2,400 gallons) occurred in Solvent Tank Field Area (Tank No. 1033) in 1982. Those ground spills that could be specifically located were plotted on Figure C-1.

Fires and incidences recorded by the City of Bayonne Health Department from 1966 through 1992 and fires and incidences recorded by the City of Bayonne Fire Department from 1955 through 1992 are attached. These lists record the incident number, the date of the incident, and a brief description of the incident. Some of the reportings were duplicated.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		"A"-HILL TANK FIELD		
No documented spills greater than 100 gallons.				
		LUBE OIL AREA		
03/28/72	1,500	Roadway in Plant	Lube Oil Additive	Exxon Company, U.S.A.: Ground Spills
04/21/73	700	Roadway in Plant	Lube Oil	Exxon Company, U.S.A.: Ground Spills
12/23/78	840-1,050	Tank No. 1	Electric Insulating Oil	General Accident Report (12/23/78)
12/24/78	6,300	Tank No. 1	Univolt 60	Letter to New Jersey Department of Environmental Protection (02/20/79)
03/24/87	10,000	Tank No. 6	1919 Motor Oil	Spill/Mixture/Leak Report (03/24/87)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		LUBE OIL AREA (Continued)		
08/23/89	100	Tank No. 8	Exxon Formula No. 1367	Spill/Mixture/Leak Report (08/23/89)
01/03/90	100	Pump on Tank No. 139	Slop Oil	Spill/Mixture/Leak Report (01/03/90)
07/30/90	400	Tank No. 581	Wax	Spill/Mixture/Leak Report (07/30/90)
08/14/90	300	Tank No. 94	Lube Oil	Spill/Mixture/Leak Report (08/14/90)
08/28/90	250	Tank No. 545	Slop Oil	Spill/Mixture/Leak Report (08/28/90)
09/10/90	1,114	Truck Loading Rack	Xylene	Spill/Mixture/Leak Report (09/10/90)
11/28/90	100	Truck Loading Rack	Lube Oil	Spill/Mixture/Leak Report (11/28/90)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		LUBE OIL AREA (Continued)		
01/15/91	2,500	Tank No. 1	Univolt 60	Spill Incident Report (1991)
07/08/91	421	Ground	Turbo Oil	Spill Incident Report (1991)
08/26/91	100	Truck Loading Rack	Wax	Spill Incident Report (1991)
02/14/92	100	Between Tank	Nuto H-46 Nos. 106 and 107	Leaks, Discharges and AIINS Incidents (1992)
02/18/92	600	Tank No. 107	Unknown	Leaks, Discharges and AIINS Incidents (1992)
07/09/92	840	Wax at Tank	Wax Nos. 558 and 586	Leaks, Discharges and AIINS Incidents (1992)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		PIER NO. 1 AREA		
09/22/72	2,100	Pier 1 Kill Van Kull Waterway	Wax (MEK Feed)	Oil Spill Report Second Half (1972)
06/28/78	670	Kill Van Kull Waterway	Waste Oil	United States Coast Guard (02/06/79)
10/30/79	1,050-2,100	Kill Van Kull Waterway	Heavy Fuel Oil	Letter to HQ (11/01/79)
11/15/79	> 672	Kill Van Kull Waterway	Emulsion Flux	Letter to HQ (11/26/79)
06/04/89	840	Pier 1 Kill Van Kull Waterway	Fuel Oil	Bayonne Terminal Incidents (1989)
		NO. 2 TANK FIELD		
3/01/89	Unknown	Tank No. 1005	No. 2 Fuel Oil	General Incident Report (03/01/89)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA		
11/19/70	300	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
11/22/70	300	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
11/25/70	100	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/02/70	300	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/15/70	150	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/23/70	400	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA (Continued)		
01/05/71	600	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
01/08/71	300	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
03/19/71	350	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
05/25/71	100	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
05/28/71	200	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
07/15/71	200	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA (Continued)		
07/30/71	1,000	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
08/09/71	500	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
08/11/71	200	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
08/13/71	300	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
09/03/71	100	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
09/10/71	100	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA (Continued)		
10/03/71	600	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
01/18/72	100	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
02/09/72	200	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
05/08/72	100	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/14/72	1,000	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
01/05/73	300	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA (Continued)		
03/20/73	100	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
03/20/73	500	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
04/04/73	1,500	Roadway in Plant	Asphalt	Exxon Company, U.S.A.: Ground Spills
		AVIATION (AV)-GAS TANK FIELD		
01/30/88	5,000	Tank No. 1010	Toluene	Spill/Mixture/Leak Report (01/30/88)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		CHEMICAL PLANT AREA		
01/05/87	500	OCP at Tank No. 923	Exxon Formula No. 82899	Shift Super Spill Log
01/08/87	700	ATFR R/R	Exxon Formula No. 80831	Shift Super Spill Log
01/17/87	100	Tank No. 811	Exxon Formula No. 81348	Shift Super Spill Log
02/12/87	300	"A" Reactor	Exxon Formula No. 80682	Shift Super Spill Log
02/14/87	300	Tank No. 799	Shop Oil	Shift Super Spill Log
02/15/87	300	Tank No. 793	Exxon Formula No. 81744	Shift Super Spill Log
		NO. 3 TANK FIELD		
01/26/88	500	Tank No. 920	F540	Spill/Mixture/Leak Report (01/26/88)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		GENERAL TANK FIELD		
10/14/90	300	Tank No. 1058	Oil	Spill/Mixture/Leak Report (10/14/90)
10/30/90	1,000	Tank No. 1059	Oily Sludge	General Accident Report (10/30/90)
		SOLVENT TANK FIELD		
09/22/82	92,400	Tank No. 1033	Isopar L	Exxon Letter to New Jersey Department of Environmental Protection (11/16/82)
		LOW SULFUR TANK FIELD		
No documented spills greater than 100 gallons.				

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		PIERS AND EAST SIDE TREATMENT AREA		
08/12/71	4,200	Pier 6 Upper New York Bay	Gear Oil	Supervisor's Report Incident (8/12/71)
05/30/72	4,200	Pier 6 Upper New York Bay	Asphalt	Oil Spill Report (05/30/72)
08/22/72	21,000	Pier 6 Upper New York Bay	No. 6 Oil	Oil Spill Report Second Half (1972)
09/10/72	21,000	Pier 6 Upper New York Bay	Gas-Oil	Oil Spill Report Second Half (1972)
09/19/73	126	Pier 6 Upper New York Bay	Unknown	Oil Spill Report Second Half (1973)
10/21/73	210	Pier 7 Upper New York Bay	No. 2 Fuel Oil	Oil Spill Report Second Half (1973)
02/11/79	168	Pier 7 Upper New York Bay	No. 2 Fuel Oil	General Accident Report (02/11/79)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		PIERS AND EAST SIDE TREATMENT AREA (Continued)		
12/19/85	< 1,134	Pier 7 Upper New York Bay	No. 2 Fuel Oil	Spill Incident Report (1985)
11/23/87	100	Piers 6 and 7	Emulsion New York Bay	Oil Spill Summary (1987)
03/21/88	200	Upper New York Bay	Oil	Spill/Mixture/Leak Report (03/21/88)
05/01/88	200	Upper New York Bay	1941 ATF	Spill/Mixture/Leak Report (05/01/88)
10/24/89	100	Pier 7 Upper New York Bay	Diesel Fuel	Bayonne Terminal Incidents (1989)
11/03/89	100	Pier 7 Upper New York Bay	Diesel	Bayonne Terminal Incidents (1989)
05/22/91	350	Upper New York Bay	Xylene	Spill Incident Report (1991)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
PIERS AND EAST SIDE TREATMENT AREA (Continued)				
06/18/91	16,000	Upper New York Bay	No. 2 Heating	Oil Spill Incident Report (1991)
08/01/91	100	Line Near New Tank No. 1097	Blend Oil	Spill Incident Report (1991)
DOMESTIC TRADE AREA				
No documented spills greater than 100 gallons.				
MISCELLANEOUS AREAS				
11/23/76	147	Kill Van Kull Waterway or Upper New York Bay	No. 2 Fuel Oil	Oil Spill Data (1976)
07/13/78	168	Kill Van Kull Waterway or Upper New York Bay	Diesel	Oil Spill Data (1978)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		MISCELLANEOUS AREAS (Continued)		
10/10/78	630	Kill Van Kull Waterway or Upper New York Bay	Asphalt	Oil Spill Data (1978)
12/25/78	210	Kill Van Kull Waterway or Upper New York Bay	Bunker Fuel Oil	Oil Spill Data (1978)
03/28/88	200	Ground	EXXMARX 70-5720	Bayonne Plant 1988 Reportable Spills
01/18/89	6,000	Ground	Motor Oil Dispersant	Spill/Mixture/Leak Report (01/18/89)

See footnotes on last page.

Table P-1. Documented Spills at the Exxon Company Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		MISCELLANEOUS AREAS (Continued)		
01/21/92	2,500	Tank Transfer	Black Oil	Leaks, Discharges and AIINS Incidents (1992)
10/06/92	100	Tank Number	Unknown Product	Leaks, Discharges and AIINS Incidents (1992)

ATF Automatic transmission fluid.
HQ Headquarters.
OCP Olefin Co-Polymer.

p-1.tbl

ATTACHMENT P-I

SPILLS AND FIRES AT EXXON (1966 - 1992)
FROM THE CITY OF BAYONNE
HEALTH DEPARTMENT

SPILLS AND FIRES AT EXXON

INCIDENT NUMBER	DATE	TYPE OF INCIDENT
1619 -	11-28-66	FIRE PUT OUT BY PERSONNEL
1380 -	11-7-67	CHEMICAL LEAK USED JET FOAM
1483 -	11-30-67	FLASH FIRE OUT ON ARRIVAL
355 -	11-18-68	SLOP OIL
613 -	4-23-68	MAIN GATE GAS LEAK
1003 -	7-19-68	TANK
90 -	1-27-70	RUBBISH FIRE
978 -	6-22-70	SECOND ALARM
1009 -	6-28-70	STORAGE TANK
2493 -	10-17-73	OIL SPILL
3079 -	12-12-73	SURFACE FIRE
840 -	3-29-76	FIRE IN PUMP
1561 -	6-11-76	OIL FILLING BUILDING
1710 -	6-23-76	PAINT ON TANK AFIRE
3033 -	11-14-76	CHEMICAL REACTION
567 -	3-18-77	ASPHALT TANK
1039 -	5-6-77	TANK FIRE
33 -	1-5-78	NAPTHA SPILL
327 -	2-14-80	LEAK IN JET FUEL LINE
974 -	5-13-82	STRUCTURE FIRE
1334 -	7-14-84	FIRE IN REACTOR
2555 -	12-18-83	TANK FIELD 4 ALARM
102 -	1-17-84	ASPHALT TANK AFIRE
2138 -	9-4-85	INSULATOR FIRE
3024 -	12-19-85	FIRE INSULATION
1935 -	8-14-86	" "
69 -	1-25-87	" "
193 -	1-24-88	" "
354 -	2-16-88	FUEL OIL BURNING
504 -	3-4-88	FUEL OIL SPILL
1723 -	7-28-88	FUEL OIL SPILL
2329 -	10-6-88	DIESEL SPILL
2473 -	10-22-88	OIL RESIDUE FIRE
2537 -	10-30-88	OIL SPILL
2578 -	11-4-88	CHEMICAL LEAK
3069 -	12-28-88	FUEL OIL SPILL
0045 -	1-5-89	STRUCTURE FIRE
0141 -	1-18-89	OIL FIRE
0524 -	3-3-89	FUEL OIL SPILL
1079 -	5-18-89	OIL SPILL
4072 -	12-19-89	OIL SPILL
0113 -	1-15-90	TANK LEAKING
0227 -	2-1-90	OIL ADDITIVE SPILL
2864 -	8-25-89	INSULATION FIRE
3370 -	10-17-89	DIESEL OIL SPILL
3542 -	10-24-89	FUEL OIL SPILL
3545 -	10-24-89	LUBE OIL SPILL
4038 -	12-15-89	OIL SPILL
1645 -	7-29-87	INSULATION FIRE
2888 -	12-22-87	FIRE IN TANK
113 -	1-15-88	INSULATION FIRE
1921 -	8-19-88	" "
250 -	9-25-88	DIESEL SPILL
2294 -	10-1-88	AXFLUX SPILL
1019 -	5-12-89	OIL SPILL
1079 -	5-18-89	" "
0083	1-18-68	Elec. Pump Failure Oil on gr

EXXON CONTINUED

INCIDENT NUMBER	DATE	TYPE OF INCIDENT
3643 -	11-7-89	OIL SPILL
0240 -	2-2-90	BUNKER OIL LEAK
0379 -	2-22-90	OIL SPILL
0386 -	2-23-90	NAPTHA SPILL
0425 -	2-28-90	OIL SPILL
0426 -	2-28-90	" "
0449 -	3-2-90	HAZMAT INCIDENT
0662 -	4-2-90	HAZMAT LUBE SPILL
0693 -	4-6-90	FUEL OIL
0733 -	4-10-90	SPILL
0791 -	4-17-90	OIL SPILL
2333 -	10-27-90	" "
2357 -	10-30-90	" "
2361 -	10-31-90	" "
2527 -	11-20-90	HAZMAT INCIDENT
2590 -	11-28-90	LUBE OIL SPILL
2744 -	12-18-90	OIL SPILL
2835 -	12-28-90	INSULATION FIRE
0099 -	1-15-91	SPILL
0114 -	1-16-91	OIL SPILL
1353 -	6-28-90	SOLVENT SPILL
1793 -	8-14-90	OIL SPILL
1812 -	8-17-90	LUBE OIL SPILL
1911 -	8-28-90	CHEMICAL SPILL
1913 -	8-28-90	WATER AND OIL SPILL
2021 -	9-12-90	ELECTRICAL FIRE
2066 -	9-18-90	DIESEL SPILL
2246 -	10-15-90	OIL AND WATER SPILL
0175 -	1-22-91	SPILL
0282 -	2-8-91	HAZMAT OIL SPILL
0358 -	2-20-91	OIL ADDITIVE SPILL
535 -	3-20-91	OIL SPILL
1489 -	7-22-91	SPILL
1562 -	8-1-91	"
1670 -	8-15-91	"
1731 -	8-26-91	"
2458 -	12-5-91	"
2498 -	12-9-91	"
2519 -	12-13-91	"
0187	1-21-92	"
0200	1-23-92	Barge Fire
0211	1-24-92	SPILL

ATTACHMENT P-II

**FIRE INCIDENTS FROM 1955 TO 1992
FROM THE CITY OF BAYONNE
FIRE DEPARTMENT**

Humble oil Main gate

774 - 5-26-67 - Stood by on ...
1519 - 9/22/70 Second alarm (See Report)
1702 - 10/21/70 Compressed gas cylinder
70 - 1/15/71 Oil Leak (Truck)

Standard Oil East ... St. - Plant #3

TANK - 917

256 - 1955
14-14A - 1958
474 - 1959
614 - 1959
50 - 1962 - oil line
80-80-a - 1962 - tank - #161
1418 - 1962 - Crude oil Dis. unit
1461 - 1962 - Wood Staging on tank #961 + 960
1247 - 1963 - old Lube Drum Bldg.

ESSO - HUMBLE OIL EXXON
EAST 22ND ST.

1619½ - NOTIFIED 11/28/66 - PUT OUT BY PERSONNEL
1380 - 11/7/67 - HEXANE LEAK USED JET FOAM
1483 - 11/30/67 - CHEM. PRODUCT FLASH FIRE O.O.A.
83 - 1/18/68 - ELEC PUMP FAILURE - GATE #3 OIL IGNI- ON GROUND
1207 - 8/30/68 - STOOD BY FIRE ALERT
1208 - 8/30/68 - ACCIDENT ENJAY SUBSIDIARY OF HUMBLE
213 - 2/15/69 See Copy
90 - 1-27-70 CAN SHOP RUBBAGE FIRE
978 - 6/27/70 Second alarm.
1009 - 6/28/70 Storage Tank.

Humble Esso Oil Refinery East 22nd St.

1619½ - NOTIFIED 11/28/66 - PUT OUT BY PERSONNEL
1380 - 11/7/67 - CHEM. LEAK USED JET X FOAM
1483 - 11/30/67 - FLASH FIRE CHEM. PRODUCTS O.O.A.
355 - 1968 - SLOP OIL - SOUTH OF UNION TK. CO.
613 - 4/23/68 Main Gate Gas Leak (Natural)
1003 - 7/19/68 Tank
15 - 1/4/70 Smoke scare

55 - 1/9/72 - Minor fire (Note 3)
682 - 4/6/72 - Fire alert
2007 - 6/13/72 Fire alert
2377 11/11/72 2nd Alarm (M.E.K. Plt)
2606 - 12/11/72 - Burning Truck

406 - 1964
730 - 1964 - Slop oil Pit East of Domestic Sales.
~~#~~ 1505 - 1964 - SLOP OIL + OIL SLUDGE.
83 - 1965 - WAX PLANT.
1537 - 1965 - DOMESTIC SALES TANK TRUCK
1190 - 1966 - IMPROP. FUEL MIX - CAUSED SMOKE
REC'D FROM STD OIL Co. A. MR. O'CONNOR
FIRE IN WAX PRESSING PUT OUT BY PERSONNEL
(11/28/66) FILE # 1619½
~~1756 - 7/26/70 - Smoke Source~~

EXXON

5[illegible]1	3-[illegible]-77	[illegible]
571	3-12-77	[illegible]
1037	5-6-77	TANK FIRE
1075	5-14-77	[illegible]
1721	8-[illegible]-77	BOMB SCARE
1974	9-16-77	" "
33	1-5-78	[illegible] SPILL
2505	10/30/78	NO CAUSE
283	2-8-79	BOMB SCARE PIER # C HARTFORD BARGE
1630	7-30-79	TRAIN HIT TANK TRUCK

EXXON

1089	4-27-75	[illegible]
1827	8-1-75	Removed man from tank
2988	12-17-75	Chimney
840	3-29-76	Fire in pump
1531	6-9-76	Grass fire
1561	6-11-76	Oil filling bldg
1710	6-23-76	Paint on tank in fire
1793	7-1-76	Hornet mistake
3033	11-14-76	Chemical reaction

EXXON

1358	6-9-73	Wires arcing on pole.
2073	8-30-73	Did not operate.
2493	10-17-73	Oil spill gate 3
3079	12-12-73	Surface fire
3091	12-14-73	Insulation smoldering
1095	5/8/74	" "
1292	5/28/74	Pipe insulation
2349	9-18-74	Brush & logs
2359	9-20-74	Pier Catalyst [illegible]

Exxon

1122	5-13-85	Fire Drill
1622	7-[illegible]-85	Overheated [illegible]
2138	9-4-85	Insulator Fire
3024	12-19-85	Fire insulation
3037	12-19-85	Unintended Alarm
72	1-9-86	Rubbish Fire
202	1-23-86	Truck Fire
416	2-24-86	Bomb Scare
1235	8-10-86	Insulation Fire
169	1-25-87	Insulation Fire

EXXON

2415	12-6-82	TRAIN DERAILMENT
334	2-22-83	RAGS BURNING ON TUG
2115	10-26-83	Bomb Scare
2555	12-18-83	Tank Field - 4 alarm Fire Solvents products
102	1-17-84	Asphalt Tank Fire
106	1-18-84	Electrical Short
343	2-27-84	Trailer Fire
433	3-13-84	Tug Fire Berth #2
641	4-10-84	Bomb Scare

EXXON

2192	10-25-79	~~[illegible]~~ FIRE IN INSULATION AROUND
224	2-3-80	REPORT OF BRUSH FIRE
324	2-13-80	BOMB SCARE
327	2-14-80	LEAK IN JET FUEL LINE
1009	5-30-80	FAULTY GENERATOR ON BARGE
1103	6-13-80	SMOKE IN AREA
1420	7-31-80	SMOKE FROM PROCESSING FURNACE
1031	5-25-81	FIRE IN BOILER ROOM - EXXON BARGE
1116	6-11-81	FIRE IN ENGINE ROOM - EXXON TUG EMPIRE STATE
1866	10-13-81	BOMB SCARE

Exxon

193	1-24-88	Insulation Fire
218	1-23-88	Injured Man
354	2-16-88	Fuel Oil Burning
504	3-4-88	Fuel Oil Spill
1382	6-29-88	Unnecessary Alarm
1723	7-28-88	Oil Spill
1901	8-16-88	Electrical Problem
2329	10-6-88	Diesel Spill
2473	10-22-88	Oil Residue Fire
2537	10-30-88	Oil Spill

Exxon

1072	6-11-84	Smoke Condition
1334	7-14-84	Fire in Reactor
1410	7-26-84	Truck Fire
1553	8-16-84	Out on arrival
1895	10-2-84	Gate #2 Train Derailment
1946	10-5-84	Train Derailment Gate #3
3491	12-19-84	Siren Activated
4	1-1-85	Bomb Scare

Exxon

415	3-1-82	Fire in Insulation
419	3-1-82	Smoke Scare
707	4-10-82	Grass Fire
855	4-25-82	Grass Fire
974	5-13-82	Structure fire (insulation)
1423	7-15-82	Vapors in air
1647	8-17-82	Fire in yard
1703	8-24-82	Insulation fire (Pier #6)
1909	9-22-82	SOLVENT SPILL
1941	9-27-82	BOMB SCARE

TIERRA-B-000310

Exxon Area

280 -	2-10.87	Smoke Conditions
164 -	7 29.87	Insulation Fire
3527	11-6 87	Rubbish Fire
2?33	12 22 87	Fire in tank (storage)
113	1-15-88	Insulation Burning
887	5-1-88	Pipe Fire
1921	8-19-88	Insulation Fire
2250 (Pier 7)	9-25-88	Diesel Spill
2294	10-1-88	Aflux Spill

Exxon Substation Pier 6

2715 -	11-15-84	Elec Problem
~~#~~ No Number	6-7-88	Fire in Smokey Booth
		FD not Notified until 6-8-88

Exxon

1019	5-12-89	Oil Spill
1079	5-18-89	Oil Spill
3643	11-3-89	Oil Spill
3914	12-1-89	man down
0240	2-2-90	Bunker Oil Leak
0298	2-9-90	Oil sheen on water
0379	2-22-90	Oil Spill
0386	2-23-90	Naptha Spill

Exxon

2562	7-21-89	Truck Fire
2864	8-25-89	Insulation fire
3072	9-20-89	Oil on Surf
3327	10-13-89	Steam
3345	10-14-89	Fire in Box Car
3370	10-17-89	Diesle Spill
3542	10-24-89	fuel oil Spill
3545	10-24-89	lube oil Spill
4038	12 15 89	Oil Spill

Exxon

0425	2-28-90	Oil Spill
0426	2-28-90	" "
0429	"	Aircraft Stand by
0449	3-2-90	Haz Mat incident
0662	4-2-90	Haz Mat Lube Spill
0693	4-6-90	" " Fuel Oil Spill
0726	4-10-90	oil slick on water
0733-0791	4-10-90	Haz Mat spill
0882	4-17-90 4-28-90	OIL SPILL 7/A
1073	5-23-90	Car Fire

EXXON

4072		
0039	12-19-89	Oil Spill
0113	1/14/90	Helicopter Take off & landing
0178	1/15/90	Tank leaking
0193	1/24/90	Lacquer Odor
0216	1-26-90	Out on Arrival
0227	1-30-90	Bomb Scare
0228	2-1-90	Oil additive Spill
	2-1-90	Out on Arrival

Exxon

2578	11-4-88	Chemical Leak
3069	12-28-88	Fuel Oil Spill
0045	1-5-89	Structure Fire
0141	1-18-89	Oil Spill
0306	2-6-89	Elec. Short
0524	3-3-89	Fuel Oil Spill
0596	3-14-89	Dumpster Fire
0851	4-19-89	Bomb Scare
0961	5-5-89	Elec Fire
1079	5-18-89	Oil Spill

Exxon Ezzi

0317	2-13-92	Unnecessary Alarm
1061	5-28-92	Oil Spill
1235	6-19-92	Oil Sheen on Water
1497	7-21-92	Oil Sheen on Water
1761	8-26-92	Spill
1802	9-1-92	Oil Spill
1870	9-10-92	Spill
1879	9-11-92	Spill
1967	9-23-92	Standby Extinguisher Training
1993	9-26-92	Spill

Exxon

0175		
0282	1-22-91	Spill
0358	2-8-91	Hazmat Oil Spill
535	2-20-91	Oil Additive Spill
858	3-20-91	Oil Spill
904	5-7-91	Smoldering Insulation
975	5-13-91	Assist Police
1398	5-23-91	Wood on Fire
1489	7-11-91	Sheen on Water
	7-22-91	Spill

Exxon

1353	6/28/90	Solvent Spill
1793	8-14-90	Oil Spill Lube Oil
1812	8-17-90	Lube Oil Spill
1911	8-28-90	Chemical Spill
1913	8-28-90	Water Oil Spill
2021	9-12-90	Electrical Fire
2066	9-18-90	Diesel Spill
2246	10-15-90	Oil+Water Spill
2248	10-15-90	Injured Man

SITE HISTORY REPORT

BAYONNE PLANT
BAYONNE, NEW JERSEY

VOLUME 1 OF 3

NOVEMBER 1994

PREPARED FOR

EXXON

EXXON COMPANY, U.S.A.

PREPARED BY

GERAGHTY
& MILLER, INC.
Environmental Services

A Heidemij Company

135

SITE HISTORY REPORT
BAYONNE PLANT
BAYONNE, NEW JERSEY

VOLUME 1 OF 3

November 1994

Prepared for

Exxon Company, U.S.A.
1400 Park Avenue
Linden, New Jersey 07036

Prepared by

Geraghty & Miller, Inc.
201 West Passaic Street
Rochelle Park, New Jersey 07662
(201) 909-0700

SITE HISTORY REPORT
BAYONNE PLANT
BAYONNE, NEW JERSEY

November 21, 1994

Geraghty & Miller, Inc. is submitting this Site History Report to Exxon Company, U.S.A. as required for a remedial investigation at the Bayonne Plant in Bayonne, New Jersey. The report was prepared in conformance with Geraghty & Miller's strict quality assurance/quality control procedures to ensure that it meets industry standards in terms of the information presented. If you have any questions or comments concerning this report, please contact one of the individuals listed below.

Respectfully submitted,

GERAGHTY & MILLER, INC.

Marie F. McDonnell

Marie F. McDonnell
Project Scientist/Project Manager

Brian A. Blum

Brian A. Blum
~~Principal Scientist~~/Operations Manager

Daniel A. Nachman
Vice President/Project Officer

TABLE OF CONTENTS

VOLUME I

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

TABLES

VOLUME II

FIGURES

FIGURES (Continued)

VOLUME III

APPENDICES

APPENDICES (Continued)

I-4. Waste Disposal Site Inventory, Exxon Company, U.S.A., September 8, 1982.

I-5. Boring Log for the 1,400-Foot Well, Tide Water Oil Company, October 16, 1900.

J. Previous Soil Sampling Results for Chromium.

K. Historical Site Drawings Depicting NJDEP Areas of Special Interest.

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SECTION 1

SITE HISTORY REPORT
BAYONNE PLANT
BAYONNE, NEW JERSEY

1.0 INTRODUCTION

In September 1992, Geraghty & Miller, Inc. was retained by Exxon Company, U.S.A. (Exxon) to prepare a Site History Report and a Remedial Investigation (RI) Work Plan for the Exxon Company, U.S.A. Bayonne Plant, in Bayonne, New Jersey (Figure 1-1). A draft Site History Report (Geraghty & Miller, Inc. 1993a) was submitted to the New Jersey Department of Environmental Protection (NJDEP) in January 1993, pursuant to paragraph 23 of the Administrative Consent Order (ACO), effective November 27, 1991. Since the signing of the ACO and preparation of the draft Site History Report, Exxon has sold the Bayonne Plant, with the exception of the Lube Oil Area, the contiguous Pier No. 1 Area, and the Stockpile Area, to International Matex Tank Terminals (IMTT).

Following the receipt of formal comments from the NJDEP dated August 18, 1994, meetings were held on September 15 and 20, 1994 between the NJDEP, Exxon, and Geraghty & Miller to discuss the warranted modifications to the Site History Report. The Site History Report has been revised in accordance with the NJDEP comments and the September 1994 discussions. This report represents a comprehensive gathering of information related to site environmental conditions at the Bayonne Plant. The Site History Report is part of the RI scope of work and is essential to the development of the RI Work Plan (Geraghty & Miller, Inc. 1993b), which was submitted concurrently with the draft Site History Report. The scope of the RI Work Plan has also been modified based on the NJDEP comments. These changes were incorporated into the Memorandum Modification to the RI Work Plan, which was submitted in October 1994 to the NJDEP (Geraghty & Miller, Inc. 1994a). Throughout this Site History Report, the terms Site and Plant will be used interchangeably with Bayonne Plant.

1.1 PURPOSE AND SCOPE

The intent of this document is to fulfill the requests outlined in Appendix B, Section II.B, items 7 and 15, of the ACO and to provide the basis of information from which to proceed with the development of a logically organized RI field program. Additional site history information requested in Appendix B, Section II of the ACO was provided to the NJDEP under separate cover as part of the ACO deliverables (Geraghty & Miller, Inc. 1993a). A thorough analysis of existing data was required to accurately characterize site conditions and develop a conceptual model of the Bayonne Plant. The review of existing data was integral to the identification of data needs and potential areas of contamination, the selection of sampling locations, the grouping of areas to be investigated, and the sequencing of field tasks. The thorough search of existing information and data that is documented in this report will allow for a more efficient RI by focusing the investigation to fill the data needs.

The site history review included an extensive collection and evaluation of information and data found primarily in Exxon's files or in the files of their attorneys and other consultants. Additional data were collected by reviewing the files of state and local agencies such as the NJDEP, the City of Bayonne Health Department, and the Bayonne Fire Department. The site history review included the compilation of environmentally pertinent information associated with the Bayonne Plant into a manageable electronic database. This environmental database stores information in a retrievable format and has been used to help assess the current knowledge of site conditions.

1.2 LOCATION AND SETTING

The Bayonne Plant (referred to as the Bayonne Terminal in the ACO) is a 288-acre (250 land and 38 riparian waterfront acres) facility located in the City of Bayonne, Hudson County, New Jersey (Figure 1-2). The Plant is located in the southwestern part of the Jersey City, New Jersey, U.S. Geological Survey (USGS) (1981) topographic quadrangle (see Figure 1-1). The property is situated in the southeastern part of the City of Bayonne, referred to as Constable

Hook, which is an industrialized penninsula in Upper New York Bay. The following sections describe the surrounding land use and history of the Constable Hook Area.

1.2.1 Surrounding Land Use

The Bayonne Plant is surrounded by heavy and light industry, interconnected by a transportation network of roadways, railroads, and the navigable waters of the Kill Van Kull and Upper New York Bay.

Two industries (IMTT and ICI Americas, Inc.) and Platty Kill Creek are located to the west (see Figure 1-2); numerous industries, Lower Hook Road, 22nd Street, a spur of Conrail's Lehigh Valley Rail Road, and Upper New York Bay are to the north. Several neighboring industries (Gordon Terminal Service Company, Powell Duffryn Terminals, Inc., O Blue Circle Atlantic, Inc., Amerada Hess Corporation, P. D. Q. Plastics, Interglobal Forwarding Services, Inc., G & B Packaging Company, Inc., Rafaella, Wiesen Ocean Product Corporation, Grand Corrugated, and Constable Terminal Corporation) and the Kill Van Kull Waterway are located to the south.

The closest non-industrial (commercial or residential) establishments are about 0.4 mile to the south, across the Kill Van Kull Waterway, in Staten Island, New York, and about 0.65 mile to the west, along 22nd Street in Bayonne, New Jersey. The Plant is in close proximity to the center of the largest urbanized area (New York-Northeastern New Jersey Urbanized Area) in the United States (Forstall 1992). This area is noted by the U.S. Census Bureau as being the most populated area in the United States (approximately 16,044,000 inhabitants) and one of the most populated areas in the world (Forstall 1992). The region and vicinity are also extensively industrialized and contain a vast transportation network of highways, railways, airports, and shipping.

1.2.2 History of Constable Hook

The Constable Hook area has undergone many changes since it was first settled in the 1600s. Constable Hook was discovered by a Dutch navigator in the 1600s. The Council of the Netherlands rewarded Konstapel (Dutch for gunner) John Jacoben Roy with a grant of 300 acres on the "Hoeck" of land along the Kill Van Kull (Standard Oil Company 1936). In the late 1600s, all of the land in Bayonne west of Broadway and Avenue E was parcelled out in land grants by the Dutch governor to four families.

Much of the hook consists of reclaimed land that was filled beginning in the 1800s (NJDEP 1990). Residential dwellings and farming communities predominated in the area until 1812. From 1812 to 1850, the Hazard Powder Company operated a munitions factory on the southern extremity of the Hook to manufacture munitions for use in the War of 1812 (Standard Oil Company 1936). From 1862 to 1874, almost all property in the Constable Hook area was owned by Central Railroad of New Jersey (Fairchild 1994a).

Since the late 1800s, nearly all of Constable Hook has been occupied by the petrochemical industry (NJDEP 1990). The Prentice Refining Company established a small kerosene refinery in the Constable Hook area in 1875. The operation, which was primarily located in the areas currently occupied by the Lube Oil Area and portion of the "A"-Hill Tank Field (Figure 1-2), involved 20 employees producing 2,000 barrels (bbls) per day using 12 refining stills (Fairchild 1994a). In 1877, John D. Rockefeller, as Standard Oil Company (the predecessor company of Exxon), purchased the Prentice Oil Company refinery and several adjacent tracts of land totalling 176 acres (Fairchild 1994a).

From 1877 to approximately 1971, the Plant was operated as a refinery, and up to 1936, underwent significant growth and expansion. During this period, Exxon, under the name of its predecessors (Standard Oil Company [New Jersey] and Standard Oil Company of New Jersey), purchased numerous surrounding tracts of land on Constable Hook. Based on historical maps and aerial photographs, the Bayonne Plant occupied a large portion of the Hook area. At the peak of plant operations in 1936, Standard Oil Company owned and operated approximately 650 acres on Constable Hook (Exxon Company, U.S.A. 1988a). After 1936, economic factors and changes in the supply of crude oil caused the Bayonne Plant to downsize its refinery operations, focussing more on specialty and terminalling operations. From 1936 through 1947, Standard Oil Company sold numerous parcels of land to various industries.

Based on a review of aerial photographs dated 1940 and 1947, the Constable Hook area was extensively developed as a petrochemical area containing a network of railroad lines, roads, and piers for shipping. Hundreds of storage tanks were present at the Bayonne Plant, as well as at neighboring facilities. The northern portion of Constable Hook was undergoing extensive reclamation from Upper New York Bay. Filling was occurring by sinking boats and barges. In the 1940 aerial photograph, the areas to the south of the plant showed limited development and were being filled. By 1947, further development had occurred in the waterfront area in the northern part of Constable Hook, and additional filling had taken place north of the Plant area in Upper New York Bay. As shown in the 1947 photograph, additional railroad spurs, Lower Hook Road, and the Avenue J extension had been constructed by 1947. Aerial photographs dated 1951, 1959, and 1961 indicate that extensive filling continued into Upper New York Bay. Older storage tanks at the Plant had been replaced and larger storage tanks and additional product transfer lines had been added.

In 1963, as a result of a major modernization and dismantling program that had begun in 1955, approximately one-third of the 330-acre plant lay vacant (Humble Oil & Refining Company 1961). Under an industrial development program adopted by Humble Oil & Refining Company (the successor company created by the merger of Esso, Humble, Carter, Pate and Oklahoma Oil Companies), in cooperation with the City of Bayonne, to entice industrial firms to locate on Humble's Constable Hook property, numerous tracts of land were sold to various industries for immediate construction (Humble Oil & Refining Company 1961). The area to the north of Lower Hook Road and the Bayonne Plant was operated by the City of Bayonne from approximately 1952 through the 1960s as a municipal dump (NJDEP 1990). Aerial photographs dated 1966, 1968, and 1970, indicate that significant filling and grading activity took place in the northern portion of Constable Hook during this period. By 1968, many buildings had been constructed on previously filled-in land and many of the roads, particularly Avenue J, had been modernized to the present-day configuration. Downsizing of plant operations continued until 1971 to 1972 when all refining and manufacturing operations ceased, with the exception of operations in the Exxon Chemicals Plant Area. Aerial photographs dated 1974, 1977, and 1984 indicate that further development occurred in the area south of the Bayonne Plant. By 1984, the area north of the General Tank Field was overgrown with vegetation. By 1989, the Bayonne Plant and its environs on Constable Hook resembled its present-day configuration.

In 1991, when the ACO was executed, Exxon owned 288 acres on Constable Hook, as depicted on Figure 1-2. On April 1, 1993, Exxon sold the entire property in 1993 to IMTT, with the exception of the Lube Oil Area, Pier No. 1 Area, and Stockpile Area. Tax maps depicting the various block and lot numbers that comprise the Bayonne Plant, are provided in Appendix A. The history and operations of the 288-acre plant are discussed in greater detail in Sections 3.0 (Bayonne Plant History/Operations) and 5.0 (Operational Areas at the Bayonne Plant) of this report. Areas formerly owned and/or operated by Exxon that are not located within the 288-acre property boundaries defined by the ACO are not addressed in this Site History Report or the RI Work Plan (Geraghty & Miller, Inc. 1993b).

1.3 REPORT ORGANIZATION

This report is consistent with the ACO and the site history aspects of New Jersey Administrative Code (NJAC) 7:26E, Technical Requirements for Site Remediation, which became effective on July 1, 1993. A description of the current understanding of environmental conditions at the Bayonne Plant and pertinent environmental information known about the Site have been included in this document. Specific site history items requested in the ACO, such as aerial photographs, a list of raw materials used, and a summary of the environmental penalties incurred, were previously forwarded to the NJDEP in January 1993 as part of the ACO deliverables (Geraghty & Miller, Inc. 1993c). The RI Work Plan (Geraghty & Miller, Inc. 1993b) and the Memorandum Modification to the RI Work Plan (Geraghty & Miller, Inc. 1994a) describe the investigation that will be necessary to collect the additional information needed to properly evaluate potential remedial measures.

Subsequent sections of this report describe the physical setting of the Bayonne Plant and the current knowledge of operations and environmental conditions. Section 2.0 describes the physical characteristics of the Site, including topography and drainage, climate, soils and vegetation, geology, and hydrogeology. Section 3.0 describes the owner/operator history, presents an overview of plant operations, and discusses environmental permits and waste disposal practices. Section 4.0 provides a summary of previous site investigations conducted at the Bayonne Plant. Section 5.0 provides a description of the historical operations, areas of potential contamination, previous investigations, and interim remedial measure (IRM) activities performed in each operational area. Section 6.0 identifies remaining data needs that will be addressed in the RI Work Plan. Section 7.0 provides a list of references. To facilitate review of this document, a glossary of refinery terms is provided after the reference section in a section entitled "Glossary." Maps, reports, and documents that were compiled as part of the site history evaluation, but are not specifically referenced in this report, are provided as bibliographies in the appendices.

Because of the extensive operational history of the Site (more than 115 years), the data collected and compiled are voluminous and, therefore, have been reduced to what is perceived to be potentially useful from the perspective of future remedial decision making. However, to comply with the specific requests of the ACO, which require "raw" information pertinent to various report sections, documents sent under separate cover to the NJDEP will be referred to in this report.

SECTION 2

2.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

This section describes the regional and local physical setting at the Site. Discussed below are topography and drainage, climate, soils and vegetation, geology, and hydrogeology.

2.1 TOPOGRAPHY AND DRAINAGE

The Site is located in the portion of Bayonne known as Constable Hook, which can be described as a spit or peninsula protruding into Upper New York Bay. The topography in the Constable Hook area is gentle, with elevations ranging from 0 to about 25 feet above mean sea level (msl). Most of the Site is at an elevation of 10 to 15 feet above msl, with the exception of the shoreline, which has lower elevations, and the tops of the berms surrounding the tank fields, which have higher elevations (see Appendix B).

Under natural, undisturbed conditions, direct runoff from the Site would drain directly into Upper New York Bay or the Platty Kill Creek and Kill Van Kull Waterway. However, under current conditions at the Site, precipitation in the tank field areas does not run off directly because of the spill prevention berms. The diked tank fields are designed to drain at controlled rates into sewers and subsequently to treatment facilities. Most of the Site is graded to direct runoff into the sewer system, which ultimately discharges, under New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Surface Water (DSW) Permit No. NJ0002089, via the East Side Treatment Plant, to Upper New York Bay, at the confluence with the Kill Van Kull Waterway. Only precipitation falling at the extreme perimeter of the Site (e.g., the area immediately east of the General Tank Field), adjacent to the waterfront (riparian land), runs off directly into the adjacent waterways.

2.2 CLIMATE

Although greatly modified by the Atlantic Ocean, the climate of Hudson County is humid-continental. The climate is dominated by continental influences because air masses and weather systems affecting Hudson County have their origin principally over the land areas of

North America. A maritime influence is also significant. Such characteristics of the climate as an extended period of freeze-free temperatures, a reduced range in both diurnal and annual temperature, and heavy precipitation in winter relative to that in summer are a result of the county's maritime exposure.

Periods of extreme cold are, in most years, of short duration. The average annual rainfall in the area is about 42 inches, as measured at Newark International Airport (National Oceanic Atmospheric Administration [NOAA] 1991). The average annual temperature is 53.4 degrees Fahrenheit (°F). The highest average monthly temperature occurs in July (76.8°F) and the lowest average monthly temperature (31.3°F) occurs in January (NOAA 1991). The predominant wind direction on a regional scale is from the west-southwest; however, localized flow patterns (eddies) do exist.

2.3 SOILS AND VEGETATION

Because of the extensive urbanization in Hudson County, no recently published information describing the soils in the area is available. A study conducted by researchers at Rutgers University (Lueder et al. 1952) describes the soil at the site as "Reclaimed" because of the extensive amount of filling that took place on Constable Hook to bring it to its present configuration. Historic aerial photographs (previously described in Section 1.2.2 [History of Constable Hook]) depict a significant portion of the Site being filled and "reclaimed" from Upper New York Bay and the Kill Van Kull Waterway. The nature of the fill varies across the Site and is described in more detail in the following sections.

The area is sparsely vegetated due to the extensive industrial setting. Vegetation is limited to grasses and low-lying shrubs (native and ornamental), with occasional ornamental hardwood trees planted near the main building. More natural vegetation exists on the Site in limited undeveloped pockets adjacent to Upper New York Bay (e.g., area to the east of the General Tank Field).

2.4 GEOLOGY

This section provides a description of the regional and site-specific geology. Interpretation of the regional geology is based on information provided in regional or county-wide studies conducted by the USGS or other researchers as referenced below. Local geologic information has been interpreted by reviewing hundreds of historical boring logs drilled across the site for geotechnical purposes (e.g., foundation analysis for tanks and buildings) or monitoring and recovery well installation. The majority of the historical soil borings were drilled at the Site in the 1950s and 1960s. Historical borings for which there are verifiable horizontal and vertical reference data are shown on Figure 2-1. The borings and wells depicted on Figure 2-1 have been extensively evaluated by Geraghty & Miller and the corresponding lithologic information has been put into a geographic information system (GIS) database. Information from 512 soil borings, 40 monitoring wells, and ten recovery wells was compiled and is currently in the GIS database. In addition, lithologic information from 18 soil borings and 35 monitoring wells, recently installed in 1993 as part of ongoing Non-Aqueous Phase Liquid (NAPL) IRM investigations, will be compiled and entered into the database.

2.4.1 Regional Geology

The Site is located in the glaciated portion of the Piedmont physiographic province, which is underlain by mostly late Triassic-age rocks. The Piedmont is characterized in New Jersey by a long and narrow fault-blocked basin bordered on the west by uplifted fault-blocked mountains. The eastern border of the Piedmont lies near Bayonne and Staten Island (Schuberth 1968) and has been mapped by the Geological Survey of New York (1970) as running directly through Constable Hook. The Triassic rocks of the Piedmont include the sedimentary rocks of the Newark Basin Super Group plus intruded units of diabase and interbedded flows of basalt. The Triassic rocks comprise a sequence that attains a thickness on the order of 22,000 feet and dips generally northwestward; the sequence is locally faulted and folded. From northwest to southeast, or youngest to oldest, the sedimentary rocks include the Brunswick Formation, the Lockatong Formation, and the Stockton Formation (McGuinness 1963). More recent studies provide a more detailed stratigraphic sequence nomenclature within the Newark Basin Super Group. The Stockton Formation rests on the folded and extensively eroded metamorphic rock complex of the New York City Group. The sedimentary basin deposits are interlayered with extensive basaltic intrusive and extrusive rocks.

The Brunswick Formation has been reclassified as a group that is comprised of several sedimentary and volcanic formations (Olsen et al. 1989). The Passaic Formation (within the Brunswick Group) is the most abundantly exposed unit of the Newark Basin Super Group. It consists mostly of red shale but includes sandstone beds, which are thicker and more numerous in the northeast part of the Newark Basin. The Lockatong Formation consists mostly of dark shales or argillites, but may include some thin-bedded sandstone or conglomerate. The Stockton Formation is mostly an arkosic sandstone and conglomerate.

The igneous deposits consist of either extrusive lava flows of the Watchung Basalt that are interbedded with the sedimentary rocks of the Newark Super Group, or the intrusive diabase of the Palisades, which forms a ridge of massive bedrock with a dark gray, mottled appearance extending from Rockland County, New York, through Hudson County (west of the Site), and ending in Staten Island. Bordering the Triassic deposits in the vicinity of the Site to the east is either the Manhattan Formation, which is comprised principally of mica schist (Geological Survey of New York 1970) or a post-Ordovician serpentinite common to Staten Island (State of New Jersey Department of Conservation and Economic Development 1950). Geologic maps depicting bedrock for both New York and New Jersey show a geologic contact beneath the overlying unconsolidated deposits at the Site; however, the maps differ in their interpretation of the formation. Both interpretations are consistent in that part of Constable Hook is underlain by crystalline metamorphic bedrock. A review of the historical boring logs by Geraghty & Miller indicates that under the Site, glacial till deposits are underlain by the Triassic (Newark Super Group) Stockton Formation, which is comprised primarily of arkosic sandstone and conglomerate.

Unconsolidated sediments deposited by glaciers or by glacial meltwater during the Pleistocene mantle the bedrock surface in much of the vicinity of Constable Hook. These deposits consist of clay, silt, sand, gravel, and boulders. Recent age deposits, primarily marine and near marine sediments composed of silt and clay, and peat (where present), overlie the glacial sediments.

A bibliography of regional geological and hydrogeological reports is included in Appendix C.

2.4.2 Site-Specific Geology

The generalized geology of the Site, from the surface downward, consists of (1) a fill layer, (2) a layer of interbedded sand and clay lenses, (3) a glacial till layer, and (4) bedrock.

Previous soil investigations by various drilling or geotechnical engineering contractors provided hundreds of soil boring logs from much of the site (Table 2-1). Generalized hydrogeologic cross sections developed from these soil boring logs are illustrated on Figures 2-2, 2-3, and 2-4; the lines of cross section are shown on Figure 2-1. The borings selected for development of the generalized geologic cross sections are provided in Table 2-2, and the lithologic logs used to develop these cross sections are included in Appendix D. Appendix C includes a bibliography of previous site reports, soil borings, cross sections, grain-size analyses, well construction logs, and historical maps. Reports listed in this bibliography were used to develop a conceptual understanding of site geologic conditions. The generalized site geology described below is based on existing soil boring logs and stratigraphic cross sections.

A fill layer covers most of the site and forms the uppermost deposit. Fill material was used to modify site elevations, provide structural support for tanks and other structures, and reclaim parts of the Kill Van Kull Waterway and Upper New York Bay shoreline. The fill layer varies in thickness from 0 to approximately 30 feet and consists of a matrix of cinders and ash with construction debris, wood, gravel, sand, silt, and bricks.

Beneath the fill layer is a laterally variable sand and clay unit consisting of (1) a gray to brown clay and silt layer, which varies in thickness from 0 to approximately 10 feet; (2) peat and organic soils, which vary in thickness from 0 to approximately 7 feet; and (3) well to poorly sorted sand and silty/clayey sand layers, some with small amounts of gray gravel, which vary in thickness from 0 to approximately 15 feet. The thickest portion of the entire sand and clay sequence is approximately 15 feet. Because the laterally discontinuous clay layers may act as aquitards that can cause perched water-table conditions, they may act as barriers to vertical fluid movement in certain locations. A map of the areal extent of the clay units, as interpreted from historical boring logs, is presented on Figure 2-5.

Beneath the sand and clay layer is the glacial till layer, which is composed of a poorly sorted, stiff to very dense mixture of clay, sand, gravel, cobbles, and boulders; this layer varies in thickness from 0 to approximately 30 feet. Because the elevation of the top of bedrock is difficult to confirm from the existing boring logs in some areas of the Site, the maximum thickness of the glacial till is not known. Figure 2-6 shows the approximate thickness of unconsolidated deposits above the bedrock, where it is known.

Beneath the glacial till layer is bedrock of the Triassic Stockton Formation, which is composed of red to white arkosic sandstone and conglomerate. This is the only type of bedrock lithology that has been documented in the historical borings at the Site. The known depth to bedrock below grade ranges from approximately 20 feet in the western part of the Site to as great as 50 feet in the eastern part of the Site. Contouring of geologic data from historical borings indicates the presence of irregularities in the bedrock surface, which is depicted on Figure 2-7. These irregularities may be natural, due to varying degrees of erosion by glacial and fluvial processes, or may be partially due to the database interpretation. Historically, borings were drilled over many years by several contractors using different equipment and crews, resulting in a varied interpretation of the weathered bedrock contact with the overlying glacial till. Borings may have been terminated at "refusal," often interpreted to be bedrock. In some cases, however, "refusal" could have been created by a boulder, leading to an erroneous identification of the weathered bedrock surface. Examples of these anomalies and discrepancies in the stratigraphy of the Site include the boring log for the deep test well installed in 1959 by William Stothoff Drilling Company in the Chemicals Plant Area, which indicated a thickness of 98 feet of unconsolidated deposits overlying bedrock. Similarly, historical soil borings on the adjacent IMTT property indicate thicknesses of unconsolidated deposits in excess of 85 feet. The discrepancies in the depth to bedrock and the thickness of unconsolidated deposits at the Site will be addressed as part of the RI by drilling a series of stratigraphic borings across the Site. The configuration of the bedrock surface, as interpreted from historical boring logs, is shown on Figure 2-7. Anomalous bedrock elevations from certain borings, although shown on Figure 2-7, were not used to generate bedrock elevation contours.

2.5 HYDROGEOLOGY

This section provides a description of the regional and site-specific hydrogeology.

2.5.1 Regional Hydrogeology

Five major aquifer systems exist and are pumped for water supply in the northeast New Jersey metropolitan area. These aquifers (from youngest to oldest) are (1) till deposits, (2) stratified drift, (3) the Sayerville Sand Member, (4) the Farrington Sand Member, and (5) shales and sandstones of the Brunswick Group. Regional stratigraphy, along with geologic and hydrologic characteristics, is presented in Appendix E. The till deposits are only locally permeable; in most areas, they do not form a significant water-bearing sequence.

With the exception of the till, none of these units is at or within close proximity of the Site. The till deposits outcrop extensively. When grouped with the contemporaneous stratified drift deposits, they constitute a shallow aquifer suitable for domestic supplies. However, these types of deposits do not occur in the vicinity of the Site. Both units were deposited during the widespread glaciation that occurred throughout the area during the Pleistocene.

A computer survey of NJDEP Bureau of Water Allocation files, which document major groundwater withdrawals (greater than 100,000 gallons per day [gpd]), indicates that the closest major withdrawals are more than 4 miles from the Site (see Appendix F). As of November 1992, only two major groundwater supply sources existed within 5 miles of the Site. One of these, operated by the Spinnerin Yarn Co., Inc., is a well with a total depth of 230 feet below land surface (bls) and a capacity of 120,000 gpd. The geologic formation from which this well obtains water has not been determined. The other withdrawal consists of a surface-water pumping intake from the Passaic River and is located 4.7 miles from the Site. According to Mr. James Monkowski of the City of Bayonne Health Department, there are no industrial, domestic, or public water supply wells within a 1-mile radius of the Site (Monkowski 1994). The USGS (McGuinness 1963) has documented certain areas in New Jersey (Bayonne, Linden, Elizabeth) as having groundwater quality problems. As of November 1992, 242 Comprehensive Site List cases were located within a 5-mile radius of the Bayonne Plant. In addition, 48 known contaminated sites are listed in the City of Bayonne (NJDEP 1994). Known contaminated sites include Amerada Hess Terminal, Bayonne City Landfill, Bayonne Industries, Bayonne Terminals, Inc., ICI Americas, Inc., McGovern Trucking, Powell Duffryn, PSE&G, and White Chemical. Documented water-quality problems and potentially low specific capacities may be the reason for the lack of water supply development in the vicinity of Bayonne.

2.5.2 Site-Specific Hydrogeology

Limited quantitative information is available regarding the water-bearing properties of the unconsolidated deposits underlying Constable Hook. Soil boring logs suggest that hydraulic characteristics of the fill layer are variable due to its heterogeneous composition. The fill consists of loose, granular material, which is likely to have a generally high permeability if it is well sorted. The water table (usually about 5 to 10 feet below grade) may exist within the fill layer; therefore, shallow groundwater flow and potential NAPL migration will be influenced by the local character of the fill layer. Water-level elevations provided in Table 2-3 indicate that the water table ranges from 2 to 16 feet bls (Dan Raviv Associates, Inc. 1992a,b and 1993a). Floating NAPL has been observed on the groundwater in a number of areas at the Bayonne

Plant. These observations were made during the IRM investigations, which are discussed in greater detail in Section 5.0 (Operational Areas at the Bayonne Plant).

The silt and clay layer below the fill, where present, is a low permeability zone that impedes vertical groundwater flow. Where the silt and clay aquiclude is absent, the fill and sand layers are hydraulically connected. Available boring logs suggest that the till layer (located immediately above bedrock) has relatively poor water-bearing properties because it contains appreciable proportions of silt and clay, is heterogeneous, and is densely compacted.

Figure 2-8 shows the locations of existing site monitoring wells and recovery wells. The monitoring wells previously installed at the Site are insufficient to determine site-wide groundwater flow dynamics. Because historical water-level measurements at the Site were not collected synoptically, were obtained from locations where NAPL was present without applying a correction factor, and were not collected from a sufficient areal extent, the groundwater flow direction cannot be clearly shown. Geraghty & Miller assumes that natural groundwater flow is toward the surface-water bodies surrounding the Site. The site geologic information suggests that the fill layer is in hydraulic connection with the Kill Van Kull Waterway and Upper New York Bay. The hydraulic connection of groundwater and surface water can be demonstrated by the influence of tidal fluctuations on water-table elevations in several areas of the Site.

Underlying the unconsolidated deposits at the Site is the Stockton Formation. This formation is not used as a source of groundwater on Constable Hook. Because the Site is located on a spit in Upper New York Bay (a hydraulic groundwater discharge environment) and there is no groundwater pumpage on Constable Hook to modify the local flow regime, Geraghty & Miller assumes that groundwater in the Stockton Formation ultimately discharges into Upper New York Bay.

SECTION 3

3.0 BAYONNE PLANT HISTORY/OPERATIONS

This section describes the past and present operations at the Bayonne Plant, including the owner/operator history, the types of operations, environmental permits, and past and present waste disposal practices. This section focuses on site-wide history and operations, while Section 5.0 (Operational Areas at the Bayonne Plant) describes the history and operations in the individual operational areas of the Plant. Operational areas of the Bayonne Plant are shown on Figure 3-1. Details regarding historical facilities, structures, and potential areas of contamination (e.g., transformers, loading/unloading areas, oil/water separators, and former process areas) are provided in Section 5.0 and depicted on associated figures. The information provided below describes operations conducted by Exxon prior to the sale of the majority of the plant to IMTT. Changes in operations or operational areas that occurred or will occur after the property transfer, will not be discussed in this Site History Report. Throughout this section of the report, the Site will be referred to as the Bayonne Plant, or Plant, even though it was historically known by the names, "Bayonne Works," "Bayonne Refinery," and "Bayonne Terminal."

3.1 OWNER/OPERATOR HISTORY

As previously discussed in Section 1.2.2 (History of Constable Hook), the Constable Hook area, including the area on which the Bayonne Plant is currently situated, was owned and occupied by Dutch settlers in the late 1600s and early 1700s (Standard Oil Company 1936). In 1730, Peter Van Buskirk purchased the entire Constable Hook area, which then occupied approximately 500 acres, from Hartman Claasen (Fairchild 1994a). Until 1812, the Hook area was occupied by dwellings, farms, and a cemetery. In 1846, a portion of the the Van Buskirk farm was purchased by E. Montgomery Patterson (now the Lube Oil Area), Samuel Tracy (the former No. 2 and No. 3 Plant areas), and Peter C. Cornell (the lower Hook area) (Fairchild 1994a). The former No. 2 and No. 3 Plant areas at the Bayonne Plant are comprised of the following current operational areas: No. 2 Tank Field; AV-Gas Tank Field; Asphalt Plant, Exxon Chemicals Plant Area; No. 3 Tank Field; and a portion of the Main Building Area. These operational areas are shown on Figure 3-1. The Hazard Powder Company owned and operated a munitions plant in the former Pier No. 4 area from 1812 to 1850 (Standard Oil Company 1936). During the period of 1862 to 1874, almost all of Constable Hook was owned by Central Railroad of New Jersey (Fairchild 1994a). Prior to 1862, most of the uses of the various parcels that currently comprise the Site did not present serious environmental impacts.

The Bayonne Plant has an extensive owner/operator history as a petroleum refinery and storage terminal (more than 115 years). In 1875, the Prentice Refining Company established a small kerosene refinery in the area currently occupied by the Lube Oil Area, the Pier No. 1 Area, and a portion of the "A"-Hill Tank Field (Figure 3-1). In 1877, John D. Rockefeller, as Standard Oil Company (Ohio), purchased the Prentice Refining Company property from George Chester. Adjacent parcels of land were purchased from 1877 to 1881 by Standard Oil Company (Ohio) from Thomas White (eastern portion of the Lube Oil Area), Central Railroad of New Jersey (the Main Building Area), and Peter Cornell (Low Sulfur Tank Field, Solvent Tank Field, Pier No. 5 and 6 areas) (Fairchild 1994a). The original Bayonne Plant occupied approximately 176 acres (Standard Oil Company 1936). In 1882, Standard Oil Company (Ohio) transferred all New Jersey property to a new company, Standard Oil Company of New Jersey (Fairchild 1994a). The company name was subsequently changed to Standard Oil Company (New Jersey) in 1892. In 1927, all assets were transferred from Standard Oil Company (New Jersey) to Standard Oil of New Jersey, which was incorporated in Delaware as a manufacturing and marketing company (Fairchild 1994a).

During the period of 1882 to 1936, numerous surrounding tracts of land on Constable Hook were acquired to accommodate expanding refinery operations (Fairchild 1994a). Additional parcels of land purchased to comprise the current Bayonne Plant configuration include those from Warren Delano (portions of the AV-Gas Tank Field, No. 2 Tank Field, Asphalt Plant Area, Utilities Area, Exxon Chemicals Plant Area, and No. 3 Tank Field Area) Edward Clark (15 acres along Platty Kill Creek), Emmet Smith (portion of the Main Building Area), John Bowers (portion of the No. 3 Tank Field), New Jersey Storage Company (Metropolitan Distribution Center [MDC] Building Area), and John Andrus (Pier No. 7 area) (see Figure 3-1). In 1938, the Stockpile Area was acquired from the Tidewater Oil Company (Fairchild 1994a).

At the peak of refinery operations in 1936, Standard Oil Company of New Jersey owned approximately 650 acres on Constable Hook (Standard Oil Company 1936). From 1936 to 1947, Standard Oil Company of New Jersey sold numerous tracts of land. In 1948, Standard Oil Company of New Jersey became Esso Standard Oil Company. In 1959, Humble Oil & Refining Company was formed from the merger of Esso, Humble, Carter, Pate, and Oklahoma Oil Companies (Fairchild 1994a).

Beginning in 1955, the Bayonne Plant underwent a modernization program. In 1959, the present-day Domestic Trade Area was purchased from Harold Holding Company (Fairchild 1994a). By 1963, Humble Oil & Refining Company owned and operated 330 acres, of which approximately one-third was idle as a result of plant modernization and downsizing (Humble Oil & Refining Company 1961). During the 1960s, vacant parcels were sold to various neighboring industries. In 1968 and 1969, additional space was purchased from the City of Bayonne to accommodate additional tankage in the General Tank Field Area (Fairchild 1994a).

Plant operations continued to downsize until 1971. By 1971, all refining operations had been discontinued at the Bayonne Plant. Plant acreage essentially remained the same from 1971 to 1993. From 1972 to 1993, the plant was operated by Exxon (the successor company of Humble Oil & Refining Company) as a petroleum products storage terminal and specialties plant. Two Exxon divisions, Exxon Company, U.S.A. and Exxon Chemicals America, carried out operations at the Bayonne Plant. Exxon Company, U.S.A. operated a marketing terminal consisting of the storage, packaging, and distribution of petroleum products. Exxon Chemicals America operated a limited chemicals plant that manufactured lube oil additives; the Chemical Plant was partially dismantled during the period of 1991 through 1993. The entire plant area, with the exception of the Lube Oil Area and the contiguous Pier No. 1 and Stockpile Areas, was sold to IMTT in April 1993. Exxon still operates and maintains the Lube Oil Area as a lube oil and wax products storage, blending, and packaging terminal.

3.2 OVERVIEW OF PLANT OPERATIONS

This section describes the evolution and development of the Bayonne Plant and provides an overview of historical plant operations. Historical buildings, structures, and operations discussed in this section are described in detail in Section 5.0 (Operational Areas at the Bayonne Plant).

From 1877 to 1971, the primary activity at the Bayonne Plant was petroleum refining. When Standard Oil Company purchased the Prentice Refining Company operation in 1877, the plant consisted of 12 batch refining stills operated by 20 workers producing approximately 2,000 bbls a day (Standard Oil Company 1936). The original refining operation was concentrated in the areas currently occupied by portions of the Lube Oil Area and the "A"-Hill Tank Field, and included a few docks on the Kill Van Kull Waterway and limited steam and mechanical facilities (see Figure 3-1) (Fairchild 1994a). Crude oil was delivered to the refinery by barrel from the Pennsylvania oil fields. The crude was refined into kerosene, lubricating oils, and grease for wagon axles (Exxon Company, U.S.A. 1988a). In 1881, United Pipe Line (National Transit Company) completed the first pipeline, which was 6 inches in diameter, from the Pennsylvania oil fields to the Bayonne Refinery (Fairchild 1994a). In 1887, a compound building was added to the Lube Oil Area. During 1890 and 1891, the installation of 40 batch stills increased the distillation capacity of the refinery from 2,000 to 20,000 bbls a day. In 1891, a wooden barrel factory was built in the southern portion of the current Lube Oil Area; one year later, the wooden barrel factory was destroyed in a fire, and a new and partially mechanized factory was rebuilt in 1893 (Standard Oil Company 1936). The new barrel factory encompassed the Bottle Filling Building and eight stave sheds to the north and east with a kiln and boiler house. The barrel factory produced 10,000 to 15,000 bbls a day for shipping of lubricating oils and kerosene.

In 1893, the distribution of kerosene to consumers was simplified by the construction of a Case & Can Plant for the manufacture of 5- and 10-gallon cans, and wood cases for shipping metal containers (Standard Oil Company 1936). The Case & Can Plant was located to the west of the current MDC Building area and produced approximately 100,000 cans a day. In 1896, the Kline saltwater pump house was erected on the Kill Van Kull Waterway in the Lube Oil Area. The pump house consisted of a two-story building housing a 500-horsepower (hp) steam pump (Fairchild 1994a). The second floor was initially used for office space and later as a laboratory in 1928. Also in 1896, portions of the current No. 2 Tank Field and AV-Gas Tank Field were purchased for expansion of operations (Fairchild 1994a). In 1897, a portion of the current No. 3 Tank Field was purchased to expand the former No. 3 Plant. The former No. 3 Plant represents the area currently occupied by the Asphalt Plant, Exxon Chemicals Plant Area, and the No. 3 Tank Field. In 1898, new and larger equipment was installed for purifying oil by treatment with copper oxide, and another 24,000 gallon per minute (gpm) saltwater pump house was constructed in the lower Hook area (Fairchild 1994a).

In the early 1900s, the petroleum industry expanded rapidly as a result of the invention of automobiles and the development of roads. Experimentation associated with the development of the automobile converted gasoline from a waste product to a major petroleum commodity. The need for better roadways led to the derivation of asphalt from certain crude oils. The uses of wax also increased, necessitating improvements in the manufacture of the product, as well as changes in the size of equipment. These changes were reflected in the rapid expansion of the Bayonne Plant during the early 1900s. In 1902, additional land, consisting of the present-day Utilities Area, Exxon Chemicals Plant Area, and portions of the Asphalt Plant Area and No. 3 Tank Field, was purchased to complete the No. 3 Plant (Fairchild 1994a). In 1907, three batteries of 12 continuous stills were placed in operation, increasing the capacity of the plant to 44,000 bbls a day. Older batch stills were converted to pitch stills to handle oxidation and steaming of asphalt (Fairchild 1994a). The Main Office Building was constructed in 1908 (Fairchild 1994a); the location of the original Main Office Building was in the southeast portion of the Lube Oil Area. In 1909, 12 modern wax sweaters and wax filters, including the wax "hot house" or "cook" building, were installed for the separation of oil from the wax and removal of sediment. From 1912 to 1916, 12 additional wax sweaters were erected in the present-day Lube Oil Area (Fairchild 1994a).

From 1910 to 1915, docking facilities were established at the Bayonne Plant. In 1910, a wharf at Pier No. 1 was built (Fairchild 1994a), and sometime between 1910 and 1912, Pier No. 3 was constructed. In 1912, the tanker Dunhold exploded and destroyed Pier No. 3 (Fairchild 1994a). Pier Nos. 1, 6, and 5 were constructed in 1913, 1914, and 1915, respectively (Fairchild 1994a). In association with the construction of a box factory, the No. 3 Plant separator and pump house were constructed in 1914. The MDC Building was also built in 1914, and in 1915, a specialty plant was erected in the Lube Oil Area for the manufacture of commercial products known as Flit, Nujol, and Mistol (Standard Oil Company 1936). These operations were later transferred to the Bayway Refinery in Linden, New Jersey.

World War I and the ensuing period created a further increase in the need for gasoline and lubricating oils. Pier No. 7 was constructed in 1916 by Lehigh Valley Railroad for unloading coal, which was then the source of energy for the boiler houses. A pump house and agitators were added to the present-day Lube Oil Area for light gas oil and heavy naphtha processes (Fairchild 1994a). In 1918, the Domestic Trade Office was constructed in the vicinity of 22nd Street, and a light oil filling building was built. The Bayonne Plant undertook an equipment expansion program that culminated in 1920 with a total of 142 crude stills producing over 77,000 bbls a day (Fairchild 1994a). In 1924, a locomotive house was constructed, the No. 9 pump house was added in the General Tank Field, and acquisition of the acreage comprising the No. 3 Plant was completed (Fairchild 1994a).

The constantly increasing demand for gasoline began to present a problem in product balance in the post-World War I era. The quantity of gasoline produced was found to be insufficient. Since gasoline was derived from the primary distillation of crude oil, the result was an excess supply of other petroleum products. Technological developments introduced the cracking coil, which allowed an increased yield of gasoline per barrel of crude oil, to the refining industry. In 1925, 12 cracking coil units were installed at the Bayonne Plant in the present-day Domestic Trade Area (Standard Oil Company 1936). Cracking operations were later transferred to the Bayway Refinery in Linden, New Jersey, due to space restrictions. From 1928 through 1934, numerous additions were made to plant operations. Five pipe stills, labeled

"A" through "F," were erected (Fairchild 1994a); boiler houses switched from coal to oil in 1930; and a two-story cooperage building was constructed in the present-day AV-Gas Tank Field Area to oxidize and package asphalt (Fairchild 1994a). Also in 1930, additional property, consisting of the present-day Piers and the East Side Treatment Plant Area, and an area east of the General Tank Field, was purchased along the Kill Van Kull Waterway. A Phenol Lube Oil Treating Plant, located in the present-day Stockpile Area, was erected in 1934 to process a higher grade of premium lubricating oil through the use of phenol to remove the low-grade constituents (Standard Oil Company 1936).

In 1932, chemical manufacturing began at the Chemical Plant with the production of "Paraflow," a lube oil additive (Standard Oil Company 1936). The chemical plant operated under the trade name Paramins and was therefore called the Paramins Plant. The plant also used an on-site laboratory for product testing and research (Dan Raviv Associates, Inc. 1992a). Products manufactured included viscosity modifiers, pour depressants, and friction modifiers.

In 1936, the Bayonne Plant had reached peak operational capability. At this time, the Bayonne Plant employed over 5,000 workers and consisted of 650 acres, 13 docks, inter-refinery pipe lines (IRPLs), ten boiler houses, and electrical operations (Standard Oil Company 1936). The Case & Can Plant and the barrel factories were still in operation (Fairchild 1994a). Processes included distilling crude oil into various fractions or component parts, such as gasoline, naphtha, heating oil, and asphalt; blending and shipping of lubricating oils; manufacturing asphalt; and producing wax (Dan Raviv Associates, Inc. 1992a).

From 1936 to 1947, changes in the supply of crude oil caused the Bayonne Plant to specialize and led to downsizing of refining operations. In 1939, the barrel factory was shut down. A central wash and locker room was constructed in 1946 and a wax tank field (series 580 tanks) was erected in the present-day Lube Oil Area (Fairchild 1994a). In 1948, a Methyl Ethyl Ketone (MEK) Dewaxing Plant was constructed in the vicinity of the present-day stockpile area. The MEK Dewaxing Plant started up in 1950. The Central Boiler House was constructed in 1951 in the present-day Utilities Area. In 1954, the No. 3 pipe still was added for wax refining and the Greer wax molding machine began operating in the Lube Oil Area (Fairchild 1994a).

Beginning in 1955, the Bayonne Plant undertook a modernization program. Demolition progressed through 1961 to remove all old unused buildings and facilities. Numerous parcels of land were sold during this period (Humble Oil & Refining Company 1961). In 1955, the Necton Tank Field (Lube Oil Area) was modernized and the No. 2 Tank Field and AV-Gas Tank Fields were constructed (Fairchild 1994a). In 1957, three new tanks were erected in the General Tank Field, all of which were built on preloaded sites (Fairchild 1994a). Preload is defined as excess soils placed at a site for the purpose of compacting the soil below it (then removed upon tank installation) to prevent settling problems. In 1957, also, Pier No. 1 was upgraded to handle larger tankers. In 1958, the Lube Operations Building was constructed and various shops were moved to the Central Mechanical Building (Fairchild 1994a). In 1959, the No. 3 Tank Field was placed in service for the storage of crude oil, and the Marine Service Division of Esso Standard Oil (formerly Butterworth System) was transferred to the Bayonne Plant (Fairchild 1994a). Also in 1959, the present-day Domestic Trade Area was purchased, and the southwestern corner of the present-day General Tank Field was acquired from the City of Bayonne (Fairchild 1994a).

During the 1960s, modernization activities at the Bayonne Plant continued, particularly in the Lube Oil Area. A lube base stock tank field, a lube finished product tank field, and a wax tank field were erected in the area (Fairchild 1994a). In 1961, a new No. 1 Pipe Still was installed to replace the former "B" Pipe Still. The Lube Operations Building opened in 1960 and the Main Building opened in 1962. A modern Solvent Drum Filling Building (Solvent Tank Field) was constructed in 1963. Operation "Hookup" extended Avenue J to Lower Hook Road in 1964. In 1965, the MDC opened in the Butterworth/Marine Building, currently the MDC Building (Fairchild 1994a). The Domestic Trade Area commenced operation in 1966. The East Side and West Side Separators were constructed in 1963 and 1968, respectively (Fairchild 1994a). In 1968 and 1969, the acquisition of the area encompassing the General Tank Field was completed with the purchase of tracts from the City of Bayonne (Fairchild 1994a).

By 1971, all refining and wax manufacturing operations had ceased at the Bayonne Plant. Pier No. 7 was constructed in 1972 at the same time that the MEK Dewaxing Plant shut down. Since 1971, the Bayonne Plant has functioned primarily as a petroleum products storage facility, a wholesale distribution facility with various blending and packaging operations, and an oil additives manufacturing plant. In 1979 and 1980, the Pier No. 6 Foam Building and the Solvent Foam Building were constructed (Fairchild 1994a). Dismantling of the Chemical Plant began in 1991 and was completed in 1993. The main products that were handled at the Bayonne Plant were miscellaneous naphthas, aviation gasoline, aliphatic and aromatic solvents, distillate fuels, intermediate and heavy fuel oils, lube oils, process oils, waxes, asphalts, and petroleum additives (Exxon Company, U.S.A. and Exxon Chemical Americas 1990). Products were shipped in and out of the Bayonne Plant by trailer trucks (packaged products), tank trucks, railroad cars, barges, and tankers.

Products are transferred within the plant via pipelines and stored in aboveground storage tanks. A list of chemicals that are stored, blended, or transferred at the Site is provided in Appendix G. Since the purchase of the majority of the Bayonne Plant by IMTT in 1993, operations have essentially remained unchanged. Exxon retained and currently operates the Lube Oil Area for the storage, blending, and packaging of lubricating oils and specialty products.

3.3 ENVIRONMENTAL PERMITS

The following types of environmental permits have been issued to Exxon for the Site by the NJDEP: groundwater discharge, surface-water discharge, air discharge, and monitoring well construction.

3.3.1 Groundwater Discharge

Exxon was assigned a NJPDES Discharge to Groundwater (DGW) permit No. NJ0002089 for the site by the NJDEP Division of Water Resources, Bureau of Groundwater Discharge Control on June 8, 1989. Copies of the NJPDES-DGW Standard Application Forms for the Site were included in Appendix I of the ACO Site History Deliverable (Geraghty & Miller, Inc. 1993c). However, although a DGW permit number was assigned, the permit was not issued. Instead, Exxon and the NJDEP entered into the ACO for the Site.

3.3.2 Surface-Water Discharge

Exxon was issued a NJPDES DSW permit for the Site by the NJDEP. This permit went into effect on August 1, 1990 and expires on July 31, 1995. The permit authorizes discharge to the confluence of Upper New York Bay and the Kill Van Kull Waterway from the East Side Treatment Plant outfall. The permit authorizes discharge of commercial surface water, Group I storm-water runoff, and thermal surface water. A copy of the NJPDES-DSW was included in Appendix I of the ACO Site History Deliverables (Geraghty & Miller, Inc. 1993c).

3.3.3 Air Discharge

Exxon has been assigned more than 134 stack permits listed under the NJDEP, Division of Environmental Quality Plant ID No. 10074. Permitted air releases include reactors and condensers, and a majority of the stack permits are for the numerous bulk storage tanks at the Site (NJDEP 1990). A list of air permits issued prior to October 1992 was compiled by Exxon and was included in Appendix I of the ACO Site History Deliverables (Geraghty & Miller, Inc. 1993c).

3.3.4 Monitoring Wells

As a result of IRM and RI investigations conducted or currently ongoing at the Bayonne Plant, Exxon has been issued numerous monitoring well permits by the NJDEP Division of Water Resources. Copies of the monitoring well permits issued prior to October 1992 were included in Appendix I of the ACO Site History Deliverables (Geraghty & Miller, Inc. 1993c).

3.4 WASTE DISPOSAL PRACTICES

This section discusses recent and past disposal practices at the Bayonne Plant. Information pertaining to past disposal practices, which was collected and compiled by Dan Raviv Associates, Inc. (DRAI) and included in their draft IRM Work Plan (Dan Raviv Associates, Inc. 1992a), is included in Appendix H. Figures in Appendix H include storm-water sewer and process waste lines and a schematic diagram of the West Side Treatment Plant. The figure depicting storm-water sewer and process waste lines at the plant has been superceded as a result of sewer IRM investigations.

For the discussion of waste disposal practices presented in this section, recent practices are those that were in effect at the time the ACO was executed and past waste disposal practices are those employed at the plant prior to 1991.

3.4.1 Recent Disposal Practices

The Site generates several types of solid wastes that are collected, segregated, stored temporarily, and transported off-site for disposal by licensed contractors. Solid wastes disposed off-site are listed in Table 3-1. The garbage at the Site is collected in dumpsters stationed at various locations throughout the Site. The dumpsters are emptied routinely and their contents are transported off-site for disposal. Solid wastes (both hazardous and non-hazardous) generated by facility operations are segregated and collected in drums and roll-off containers (CH2M Hill, Inc. 1991). Roll-offs are temporarily stored on the paved area next to the MDC Building or inside the Greer Building near Pier No. 1. The other waste management activities at the Site include wastewater and recovered groundwater treatment by two on-site treatment plants (East Side and West Side Treatment Plants) (Dames & Moore 1979) and the collection of chemical process wastewater at the Chemical Waste Treatment Plant located at the Exxon Chemicals Plant Area. The chemical process wastewater was historically transported to the Bayway Refinery for off-site treatment (CH2M Hill, Inc. 1991; Exxon Company, U.S.A. and Exxon Chemical

Americas 1990). This practice has been discontinued. Sanitary wastewater discharges to on-site septic systems or to the Bayonne City Sewer System (Exxon Company, U.S.A. 1989a).

Storm-water runoff and minor amounts of process wastewaters are transported via a site-wide plant sewer system to either the East Side Treatment Plant or the West Side Treatment Plant. Treated wastewater from the West Side Treatment Plant is transferred to the East Side Treatment Plant for further treatment. The sewer system at the Site collects rainfall runoff, drained contact water, once-through cooling water, steam condensate, pumped groundwater, and general wash water (CH2M Hill, Inc. 1991; Exxon Company, U.S.A. and Exxon Chemical Americas 1990). In addition, non-contact cooling water, boiler blow-down, equipment wastewater, and wastewater from tank bottoms are received by the sewer systems at the Site (CH2M Hill, Inc. 1991). Drainage from tank fields consists almost entirely of direct runoff, with some limited tank water drawoffs and condensate from tank heater coils. In tankage areas, flow in the Site sewer system is intercepted by valves or isolated to impound material and release it under controlled conditions to the downstream treatment facilities. Floor drains in the blending and packaging warehouse lead to a product sump, the contents of which are pumped to the recycle oil system for eventual off-site disposal (Fairchild 1993).

The following summaries have been compiled from the Best Management Practices Plan (CH2M Hill, Inc. 1991) and the Spill Control and Counter Measure Plan; the Discharge Prevention, Containment and Counter Measure Plan; and the Discharge Cleanup and Removal Plan (Exxon Company, U.S.A. and Exxon Chemical Americas 1990).

3.4.1.1 Chemical Process Wastewater

Within the Exxon Chemicals Plant Area, selected process wastewater from the reactor building drains into a separate, independent Chemical Plant process wastewater sewer system and on-site treatment facilities that are part of the Chemical Plant operations. The chemical waste treatment plant is located in the south-central portion of the Chemical Plant. Treated water from this treatment plant is accumulated and periodically transported to Exxon's Bayway

Refinery in Linden, New Jersey, via tankwagon, for biological treatment and discharge under Bayway's NJPDES-DSW Permit (Exxon Company, U.S.A. and Exxon Chemical Americas 1990).

3.4.1.2 West Side Treatment Plant

The West Side Treatment Plant is located in the Lube Oil Area near the Pier No. 1 Area. Wastewater on the west side of the plant is treated in an American Petroleum Institute (API) gravity separator and a dissolved air flotation (DAF) unit (Appendix H). This wastewater is pumped to the inlet of the API separator by means of a vertical lift screw pump. Subsequent flow through the separator and DAF unit occurs by gravity. Effluent from the West Side Treatment Plant is then pumped to the East Side Treatment Plant through a former low-pressure salt-water line for further treatment (Dan Raviv Associates, Inc. 1992a). Sludge generated during the treatment processes is stored in closed tanks prior to contracted disposal (Dames & Moore 1979).

Tank storage for storm-water diversion is also provided to collect any excess flow to the separator that may occur during rain storms. When flow to the treatment plant decreases, the accumulated water is released back to the treatment plant at a controlled rate (Exxon Company, U.S.A. and Exxon Chemical Americas 1990).

3.4.1.3 East Side Treatment Plant

Wastewater that enters the East Side Treatment Plant is treated by an API gravity separator, a deep-bed sand filtration unit, and an activated carbon unit. The east side wastewater flows by gravity to the API separator; effluent from the separator then flows to a sump and is pumped to the deep-bed sand filters. After filtration, the treated water is discharged at the confluence of the Kill Van Kull Waterway and the Upper New York Bay between Piers No. 6 and No. 7 (Exxon Company, U.S.A. and Exxon Chemical Americas 1990). Skimmed oil is routed to the recycle (slop) oil system. Sludge generated during periodic cleaning is disposed off-site.

The East Side Treatment Plant receives drainage from the following areas: General Tank Field, Solvent Tank Field, Low Sulfur Tank Field, No. 2 Tank Field, Av-Gas Tank Field, No. 3 Tank Field, Asphalt Plant Area, Exxon Chemicals Plant (including steam water condensate), Plant Loading Areas, Domestic Trade Area, and MDC Building Area. Wastewaters collected by the West Side Treatment Plant also terminate in the East Side Treatment Plant (Exxon Company, U.S.A. and Exxon Chemical Americas 1990; CH2M Hill, Inc. 1991).

Storm-water diversion and storage facilities are provided upstream of the API separator for times when flow becomes excessive during heavy rain. When the water level in the API separator decreases, the accumulated water from the storage facilities is released back to the treatment plant at a controlled rate (Exxon Company, U.S.A. and Exxon Chemical Americas 1990).

3.4.1.4 Groundwater Collection Systems

Groundwater and NAPLs are recovered from the interceptor trench, the Avenue "J" Sump, and the recovery wells in the waterfront areas (CH2M Hill, Inc. 1991; Dan Raviv Associates, Inc. 1992c). The liquids are pumped to the plant sewer systems and treated at the wastewater treatment plants.

The location of the interceptor trench system is shown on Figure 2-8. The trench system consists of a western section and an eastern section that are pitched toward the center at Sump A. Liquids are pumped from Sump A or from Sump B (a back-up sump) directly to the main parking lot sewer system. The Avenue "J" sump, located near the northern end of the western section of the interceptor trench, independently collects liquids and discharges them to the plant sewer system in the Main Building parking lot. The sewer system in the Main Building parking lot then discharges to the West Side Treatment Plant.

Recovery wells are located along the waterfront in the Pier No. 1 Area near the helipad area and in the Piers and East Side Treatment Plant Area near Piers No. 6 and No. 7. Eight recovery wells are located in the Pier No. 1 Area, of which two are currently active (Figure 2-8). Eighteen recovery wells are near Pier Nos. 6 and No. 7, of which four are currently being pumped. The recovery wells were installed during the 1970s and 1980s. The liquids recovered from these wells are routed to the plant sewer system and treated at the East Side Treatment Plant (Dan Raviv Associates, Inc. 1992a; CH2M Hill, Inc. 1991).

3.4.2 Past Disposal Practices

A large portion of the Site along the shoreline consists of land that has been reclaimed from the Kill Van Kull Waterway and Upper New York Bay. This area is characterized by variable depths of fill overlying soft marine or estuarine deposits (Dames & Moore 1979). The fill consists of primarily cinders and ash, intermingled with construction debris, wood, gravel, sand, silt, and bricks. The cinders and ash were a by-product of historical coal burning activities at the Plant. In addition to cinders and ash, construction debris was noted on several historical boring logs. The thickness of fill material is shown in the geologic cross sections A-A', B-B', C-C', and D-D' (Figures 2-2, 2-3, and 2-4, respectively). Cross Section A-A', which runs west to east across the Site, shows that fill thickness varies from approximately 9 feet in the west to approximately 30 feet near Upper New York Bay. Cross Section B-B', which runs north to south in the western part of the Site, shows fill thickness varying from 0 feet on the north (near East 22nd Street), to approximately 25 feet on the south (near Tank No. 99). Cross Section C-C' shows fill thickness varying from approximately 13 feet on the north (near Lower Hook Road) to approximately 10 feet on the south. Cross Section D-D' shows fill thickness varying from approximately 15 feet in the northern part of the General Tank Field to approximately 48 feet near the Kill Van Kull Waterway to the south.

A Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)-registered, 1-acre, abandoned, open dump where lead-contaminated separator sludge was reportedly disposed has been documented by Exxon Company, U.S.A. (1980 and 1982). Waste disposal site inventory documents dated 1980 and 1982 are provided in Appendix I. The disposal site was located in the northwestern corner of the General Tank Field, north of Tank 1072, and was active from approximately 1956 to 1965 (Exxon Company, U.S.A. 1980).

A Hydrotechnic Corporation Engineers (Hydrotechnic) report (1958) describes a previous acid-disposal practice as follows: "The acid discharge from the HCL Scrubber Unit in the Chemical Products Plant is a one percent acid solution. The flow of about 75 gallons per minute passes through a bed of limestone, which serves as a neutralizing pit, and the effluent is discharged to the Kill Van Kull Waterway after dilution with other wastes." Little historical information exists regarding this disposal system. The system reportedly consisted of a concrete-lined pit to which lime was added to neutralize the waste. The wastewater was subsequently discharged to the sewer system (Fairchild 1994b).

During the late 1950s, chromium slag was imported into the Bayonne Plant for use in preloading tank sites (Esso Standard Oil Company 1957a). Chromium slag was used as preload for one tank site in the General Tank Field; to build berms and fire banks in the No. 2 Tank Field; and as grading material in the No. 3 Tank Field (Esso Standard Oil Company 1957a). Chromium slag was also reportedly used as fill material at the site of the present-day Main Building (Fairchild 1994c). Historical chromium slag depositional areas are discussed in greater detail in Section 5.0 (Operational Areas at the Bayonne Plant).

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SECTION 4

4.0 PREVIOUS SITE INVESTIGATIONS

Hydrogeologic and environmental investigations have been conducted at the Site since the 1950s. The earliest study identified was a water supply investigation conducted by Hydrotechnic in 1958. Environmental studies have been conducted by Leggette, Brashears and Graham, Inc. (LBG), Dames & Moore, Roy F. Weston, Inc. (Weston), ICF Kaiser Engineers, Inc. (ICF Kaiser), and DRAI. In 1986, Sandaq, Inc. P.C. (Sandaq) conducted a sewer investigation, and in 1988 CH2M Hill, Inc. prepared a site water budget. Other environmental studies conducted by Exxon Company, U.S.A., the NJDEP, and Environmental Resources Management, Inc. (ERM) are also discussed in this section. IRM investigations at the Bayonne Plant are currently being conducted by DRAI, ICF Kaiser, IT Corporation, and Geraghty & Miller. A chronologic summary of previous site investigations is provided in Table 4-1, and the above reports are summarized in the following sections. In addition, Geraghty & Miller reviewed environmental reports prepared by Malcom Pirnie, Inc. (1985) and the New Jersey Public Interest Group (NJPIRG) (Terris, Edgecombe, Hecker, and Wayne 1989). These two reports offered little information and are not discussed below; however, they are included in Appendix I.

4.1 HYDROTECHNIC CORPORATION ENGINEERS

In 1958, Hydrotechnic conducted a hydrogeologic investigation on behalf of Esso Standard Oil Company, Exxon's predecessor. The investigation involved exploring the potential to develop freshwater resources for refinery usage and the feasibility of disposing acid wastes by injection into the ground. Hydrotechnic also investigated the practicality of using sewage as an additional, non-brackish, industrial use water supply.

The Hydrotechnic study consisted of a comprehensive description of the unconsolidated deposits and bedrock. The study concluded, based on a review of well records in the Bayonne Area (including well records at the Site), that the sediments above the glacial till were the only potential source of freshwater in the area. However, because the sediments were not very thick and were surrounded on three sides by brackish water, they were not considered to be a feasible source of fresh groundwater supply on Constable Hook. The study also advised against acid-waste disposal by injection into the ground due to potential concerns arising from New Jersey regulations (Hydrotechnic Corporation Engineers 1958).

4.2 LEGGETTE, BRASHEARS AND GRAHAM, INC.

In 1974, LBG prepared three brief status reports on shallow groundwater hydrocarbon contamination at the Site (Leggette, Brashears and Graham, Inc. 1974 a,b,c). LBG installed 20 groundwater monitoring wells located north of the Lehigh Valley Railroad right-of-way in the vicinity of the present-day interceptor trench. Water levels and product thicknesses were measured in these wells; hydrocarbons were present as floating product in the monitoring wells located on the Lehigh Valley Railroad right-of-way. The direction of groundwater flow in the area of the right-of-way was to the northeast. LBG made recommendations to intercept hydrocarbon-contaminated groundwater by means of a linear sump or drain, and to pump the fluids to the treatment facility. This recommendation later resulted in the construction of the interceptor trench.

4.3 DAMES & MOORE

In 1979, Dames & Moore conducted a hydrogeologic investigation of the Bayonne Terminal and Chemical Plant. The study included a brief description of the facility and operations, a regional and local hydrogeologic overview, and a preliminary assessment of the permittability of the oil/water separators at the East Side and West Side Treatment Plants (Dames & Moore 1979).

The report included descriptions of the soils beneath the East Side and West Side Separators. These soil descriptions appear to have been derived from the geotechnical borings drilled in the 1950s. The overview of the local hydrogeologic conditions was very similar to Hydrotechnic's observations (Hydrotechnic Corporation Engineers 1958). Dames & Moore also reported that a 1,400-foot deep boring was drilled by the Tide Water Oil Company in 1892 in the Kill Van Kull west of the Pier No. 1 Area. The boring did not yield significant amounts of water. This boring log is included in Appendix I.

Coefficients of permeability were estimated (in centimeters per second [cm/sec]) for "sand" as 3.3×10^{-3} to 2×10^{-5} cm/sec and for "organic silt" and "organic silty clay" as 8.9×10^{-8} to 6.7×10^{-8} cm/sec. The hydrogeologic summary presented in the Dames & Moore (1979) report generally agrees with the hydrogeologic conceptualization developed and discussed in this report.

4.4 ROY F. WESTON, INC.

In 1980, Weston conducted subsurface soil investigations and oil recovery programs in the Pier No. 1 Area near the helipad (referred to by Weston as the Pier No. 3 area), the Piers No. 6 and No. 7 areas, and the Low Sulfur Tank Field. Weston also monitored product thicknesses in monitoring wells in the "A"-Hill Tank Field, replaced four recovery wells and three monitoring wells, and installed two monitoring wells in the Pier No. 6 area. In addition, Weston installed a recovery well and three monitoring wells in the Low Sulfur Tank Field (Roy F. Weston, Inc. 1980).

In 1981, Weston installed four additional monitoring wells in the area of the Low Sulfur Tank Field to further delineate the presence of a "solvent-like product" floating on the water table. A product recovery system was then set up in this area. In addition, water levels and product thicknesses were measured in wells in the Pier No. 3 area and the Pier No. 7 area (Roy F. Weston, Inc. 1981a,b).

In 1985, Weston reported that their subsurface oil recovery and monitoring program in the Pier 3 area consisted of 34 usable monitoring wells out of 60 known monitoring wells. Several of the wells contained floating product; however, a nearby recovery well did not contain any floating product (Roy F. Weston, Inc. 1985).

In 1986, Weston performed a well integrity overview and measured product thickness to evaluate hydrocarbon seepage from the Pier No. 7 area into New York Bay. They recommended that an additional monitoring well be installed (Roy F. Weston, Inc. 1986a,b,c).

In 1988 and 1989, Weston prepared five quarterly reports summarizing water-level elevation and product thickness measurements in the Low Sulfur Tank Field, the Pier No. 3 area, the Piers No. 6 and No. 7 areas, and the "A"-Hill Tank Field (Roy F. Weston, Inc. 1989a,b,c,d,e). The quarterly reports indicated that NAPL thickness in monitoring wells were relatively consistent, typically varying less than 1 foot.

These reports also document the effectiveness of the recovery wells and product thickness fluctuation at each of the areas where there was remedial pumping (Roy F. Weston, Inc. 1989a,b,c,d,e). These reports conclude that the periodic pumping of NAPL from wells in the Low Sulfur Tank Field, Pier No. 3 area, and Piers No. 6 and 7 areas, was effective, and recommended that further NAPL control and recovery strategies be implemented as part of an overall environmental management program.

4.5 SANDAQ, INC. P.C.

In 1986, Sandaq conducted a toxic substance investigation of the sewer system at the Site (Sandaq Inc. 1986). Sandaq investigated nine areas of the Site sewer system that ultimately discharge to the East Side Treatment Plant. A brief description of each location sampled was presented along with an overview of the products used or stored near that location. Samples were collected and analyzed for specific organic compounds (chlorobenzene, ethylbenzene, toluene, naphthalene, and 1,2-dichlorobenzene), pH, and total organic carbon (TOC). Sandaq reported that the sewers in the area of the Exxon Chemicals Plant Area, the No. 3 Tank Field, and southeast of what Sandaq refers to as the "Fuels" tank field (exact tank field unknown) had shown the "most significant levels" of the compounds analyzed (Sandaq Inc. 1986).

Based on their results, Sandaq recommended that efforts be made to reduce the discharge of these constituents to sewers, that the source(s) of certain constituents in the Site sewer system in the Exxon Chemicals Plant Area be located and eliminated, and that an extensive sewer system cleaning be performed on the east side of the Site. Sewer cleaning and inspection is currently in progress as part of the sewer IRM activities being conducted at the Bayonne Plant. The sewers on the west side of the Site were reported to be in good operational condition.

4.6 CH2M HILL, INC.

In August 1988, CH2M Hill prepared a site water budget for the Bayonne Plant. The water budget was developed to show the distribution of the water consumption at the Site as required by NJPDES permits. CH2M Hill did not conduct any flow measurements; they identified the locations of input and output wastewater streams and estimated average annual flows (CH2M Hill, Inc. 1988). A review of the performance and operation of the East Side and the West Side Treatment Plants was also conducted.

Input water streams were identified as the following: municipal water, high-pressure saltwater, stream condensate, rain water or surface runoff, tank draw-off, and pumped groundwater. The output water streams were identified as the following: off-site waste disposal, steam, evaporation/losses, city sewer, septic fields, and discharge to the Kill Van Kull Waterway. The CH2M Hill report included a discussion of the areas of the Site that received municipal water.

Oil and grease, total suspended solids, TOC, and percent dissolved organic carbon data from the discharges were reported for the period of January 1987 through March 1988. CH2M Hill was unable to sample the influent of the treatment plants, so the efficiencies of the treatment plants were not determined. The estimated quantity of pumped groundwater from product removal wells and sumps was approximately 57,600 gpd, which is equivalent to an average of 40 gpm. CH2M Hill made several recommendations on how to improve wastewater stream management in the Exxon Chemicals Plant Area and how to manage storm water.

4.7 NJDEP

In January 1990, the NJDEP conducted a site inspection and collected one soil sample from 11 separate locations for analysis of total chromium. Results ranged from 90 parts per million (ppm) adjacent to Tank No. 1067 in the Low Sulfur Tank Field to 5,385 ppm from a berm opposite Tank No. 1003 in the No. 2 Tank Field. The NJDEP Site Inspection report concluded that the primary environmental concerns at the Site were the "large area of petroleum hydrocarbon contaminated soil and groundwater, and the areas of the Site containing chromium waste slag" (NJDEP 1990).

4.8 EXXON COMPANY, U.S.A.

In conjunction with the NJDEP (1990) study, Exxon conducted their own soil sampling and analytical program in January 1990. Surficial grab samples of soil were collected and analyzed for total and hexavalent chromium.

Exxon collected ten soil samples from various locations within the Site. The total chromium concentrations ranged from 1,800 ppm in a sample from the No. 3 Tank Field to 7,700 ppm in a sample from the General Tank Field berm. The hexavalent chromium concentrations ranged from 2.2 ppm in a sample from the No. 2 Tank Field berm (total chromium of 6,000 ppm) to 16.9 ppm in the sample from the No. 3 Tank Field (total chromium of 1,800 ppm) (Dan Raviv Associates, Inc. 1992a).

4.9 ENVIRONMENTAL RESOURCES MANAGEMENT, INC.

On April 10, 1991, ERM collected seven soil (surficial grab) samples throughout the Site for total and hexavalent chromium analyses. The sample locations and chromium concentrations are included in Appendix J. One sample, No. 5 (east of No. 3 Tank Field), contained 10 ppm of total chromium and 0.3 ppm of hexavalent chromium. Concentrations of total chromium in the remaining samples ranged from 1,560 ppm (in sample No. 6) to 7,960 ppm (in sample

No. 1). The hexavalent chromium concentrations in the remaining samples ranged from 6.9 ppm in sample No. 6 to 190 ppm in sample No. 4 (Dan Raviv Associates, Inc. 1992a).

4.10 ICF KAISER ENGINEERS, INC.

In 1992, Pittsburgh Plate and Glass Industries, Inc. (PPG) issued a Final Investigation Work Plan, prepared by ICF Kaiser to Exxon Company, U.S.A. This investigation was conducted as part of litigation concerning the use of chromium-laden fill at the Site. The work plan was prepared for a preliminary investigation of soils in the No. 3 Tank Field (directly to the east of Tanks 921) and the General Tank Field (east of Tank 1071) for the presence of chromium (PPG Industries, Inc. 1992; ICF Kaiser Engineers, Inc. 1992). Data reported to PPG from ICF Kaiser indicate that chromium was present in the soil samples. Samples were taken at depths of up to 10 feet bls and analyzed for total and hexavalent chromium. Chromium results from 27 borings indicated a range in total chromium concentrations from less than 2.3 to 3,450 milligrams per kilogram (mg/kg). Hexavalent chromium concentrations ranged from 7.6 to 12.3 mg/kg.

In accordance with the proposed IRM Work Plan submitted by DRAI in January 1992 (Dan Raviv Associates, Inc. 1992a), ICF Kaiser conducted an IRM of chromium contamination at the Bayonne Plant (ICF Kaiser Engineers, Inc. 1993).

In November 1993, ICF Kaiser conducted a supplemental IRM investigation of the Conrail property to further characterize the extent of chromium contamination (ICF Kaiser Engineers, Inc. 1994).

4.11 DAN RAVIV ASSOCIATES, INC.

DRAI has been conducting NAPL IRM investigations in the Pier No. 1 Area near the helipad, in the vicinity of the Pier No. 6 and Pier No. 7 area, in the Low Sulfur and Solvent Tank Fields ("Tank 1066"), in the interceptor trench area, and in the Platty Kill Creek area.

In accordance with the IRM Work Plan submitted to the NJDEP in January 1993 (Dan Raviv Associates, Inc. 1993a), DRAI conducted an IRM investigation in the Low Sulfur and Solvent Tank Fields from May through August 1993. The field investigation included monitoring well installation, NAPL and groundwater sampling, tidal investigation, bail-down tests, recovery tests, short-term and long-term pumping tests, and emulsion tests (Dan Raviv Associates, Inc. 1993b). The results of the investigation indicated that floating NAPL was present on the groundwater in these tank fields. The NAPL consisted of gasoline components at thicknesses ranging from 0.1 to 15 feet. The report recommended that a NAPL recovery system be installed to recover floating NAPL in the area and prevent off-site migration.

In May and August 1993, DRAI conducted a well integrity survey of existing monitoring wells at the Bayonne Plant. At this time, 13 additional previously installed monitoring wells were identified in the interceptor trench area (Dan Raviv Associates, Inc. 1993c,d). Subsequently, in August 1994, DRAI installed six additional wells in the interceptor trench area (Figure 2-8). A performance evaluation of the entire system was conducted to evaluate the hydraulic gradient and flow into the trench. Twenty-four existing monitoring wells, nine manholes, and six newly installed wells were used as fluid level monitoring points during the evaluation. Cumulative and instantaneous flow of total fluids from the trench was measured with the aid of flow meters on the sewer discharge lines. IRM activities in the interceptor trench area are ongoing, and the results and findings have not yet been reported.

During February and March 1994, DRAI conducted a preliminary IRM investigation in the Pier No. 7 area (Dan Raviv Associates, Inc. 1994a). During January 1994, DRAI documented NAPL seeps in New York Bay along the Pier No. 7 bulkhead (Dan Raviv Associates, Inc. 1994a). The seeps were reported in three general areas along the bulkhead and were observed during very low spring tides. The pier construction consists of two, parallel, concrete (southern and northern) gantry walls that extend to a depth of 10 feet. A tidal investigation, short-term pumping tests, and NAPL sampling were conducted in the Pier No. 7 area. The preliminary conclusions of the investigation were that more than one type of NAPL was present in wells at the Pier No. 7 area; NAPL thicknesses ranged from 4 to 5 feet; the southern gantry wall may be acting as a partial hydraulic barrier during high tide; and NAPL can potentially migrate beneath the gantry wall during low tides, toward the north into the bay (Dan Raviv Associates, Inc. 1994a). Since many of the existing wells were too shallow to adequately monitor NAPL thicknesses across the gantry wall, additional IRM investigations were conducted by DRAI from September through October 1994. The supplemental investigations included the installation of two deep wells and two replacement wells, NAPL and water-level measurements, step drawdown tests, and pumping tests. IRM activities in the Pier No. 7 area are ongoing, and results are not available at this time.

In August 1993, DRAI conducted an IRM investigation in the Pier No. 1 Area near the helipad. NAPL thicknesses as great as 3.65 feet have been measured in this area (Dan Raviv Associates, Inc. 1994a). Three soil borings were drilled along the southern section of the helipad area. The investigation also included an evaluation of the construction of the southern and eastern bulkheads. As the IRM investigation in the helipad area is currently in progress, results are not available at this time.

DRAI conducted an IRM investigation "at peril" in the Platty Kill Creek area during early 1994. The investigation included the installation of monitoring wells and drilling of soil borings in the area (Figure 2-8). The results of the investigation are not yet available.

4.12 IT CORPORATION

In November 1992, IT Corporation commenced work on the sewer IRM. In February 1992, DRAI had prepared and submitted a proposed IRM Work Plan to the NJDEP (Dan Raviv Associates, Inc. 1992a). The work plan included provisions for the mapping, field verification, inspection, cleaning and videotaping, and integrity testing of approximately 40,640 linear feet of storm-sewer line and 1,500 feet of chemical process line at the Bayonne Plant. The purpose of the sewer IRM was to identify portions of the wastewater conveyance system that may present a potential for exfiltration or migration of liquid contents outside of the sewer system. In February 1993, a Phase I Sewer IRM Work Plan was submitted to the NJDEP (IT Corporation

1993). Following approval of the Phase I Sewer IRM Work Plan in June 1993, IT Corporation proceeded with the field verification phase of work, which included cleaning and videotaping. The sewer IRM investigation is currently ongoing.

4.13 GERAGHTY & MILLER, INC.

Subsequent to DRAI's IRM investigation in the Low Sulfur and Solvent Tank Fields ("Tank 1066"), Geraghty & Miller performed a technology evaluation of remedial alternatives for NAPL recovery in the "Tank 1066" area (Geraghty & Miller, Inc. 1994b). The results of the evaluation indicated that a vacuum enhanced recovery (VER) system would be the preferable remedial alternative in this area. Geraghty & Miller conducted a VER pilot test at the "Tank 1066" site in June 1994 (Geraghty & Miller, Inc. 1994c). The pilot test demonstrated the ability of VER to enhance NAPL recovery in the "Tank 1066" area. A VER system is currently being designed by Geraghty & Miller for use at the "Tank 1066" site.

On October 3, 1994, Geraghty & Miller mobilized at the site and commenced IRM investigations in the General Tank Field, No. 3 Tank Field, Lube Oil Area, Exxon Chemicals Plant Area, and the "A"-Hill Tank Field. The IRM investigations collectively involve the drilling of 33 soil borings at 200-foot spacing along the boundaries of the General Tank Field, No. 3 Tank Field, Lube Oil Area, and Exxon Chemicals Plant Area. A temporary "standpipe" (2-inch diameter, flush-threaded, continuously wound, stainless-steel well screen) will be emplaced in each borehole, where potentially saturated hydrocarbons are observed to evaluate the presence of mobile NAPL. Soil borings may be converted to monitoring wells if NAPL is encountered in the groundwater, as determined from this standpipe evaluation. IRM field activities are currently in progress; therefore, results are not yet available. In addition, quarterly NAPL and groundwater measurements will be collected for a 1-year period in the "A"-Hill Tank Field to monitor NAPL.

SECTION 5

5.0 OPERATIONAL AREAS AT THE BAYONNE PLANT

This section provides detailed descriptions of the individual operational and miscellaneous areas within the 288 acres covered by the ACO. Information for each operational area is divided into the following six categories: Description and boundaries; operations, raw materials, and products; aerial photograph interpretation; discharges, spills, and releases; areas of potential contamination; and IRM activities.

The operational areas and their boundaries are shown on Figure 3-1. These areas have been defined on the basis of the type of operation that occurred. For organizational purposes, 13 operational and four miscellaneous areas at the Site have been identified. Detailed maps of each area are shown on Figures 5-1 through 5-17. The descriptions of the operational areas and the information presented on the area-specific figures were derived from historical plant records and drawings, personal communications, and various reports. In addition, 14 aerial photographs spanning the time period from April 1940 to December 1991 were examined. The specific years of the photographs reviewed were 1940, 1947, 1951, 1959, 1961, 1963, 1966, 1968, 1970, 1974, 1977, 1984, 1989, and 1991. These photographs were previously submitted to the NJDEP under separate cover as part of the ACO deliverable items (Geraghty & Miller, Inc. 1993c).

The 13 operational areas are as follows: "A"-Hill Tank Field, Lube Oil Area, Pier No. 1 Area, No. 2 Tank Field, Asphalt Plant Area, AV-Gas Tank Field, Exxon Chemicals Plant Area (Chemical Plant Area), No. 3 Tank Field, General Tank Field, Solvent Tank Field, Low Sulfur Tank Field, Piers and East Side Treatment Plant Area, and Domestic Trade Area. Within the 13 operational areas are three active piers (Piers No. 1, No. 6, and No. 7), which are used for the loading and unloading of marine vessels at the Site.

The four miscellaneous areas consist of the Stockpile Area, the MDC Building Area, the Utilities (Power Plant) Area, and the Main Building Area.

A number of past or present facilities, structures, and operations have been identified at the Bayonne Plant as potential areas of contamination. These areas include aboveground storage tanks (ASTs), underground storage tanks (USTs), locations where chromium slag was historically placed, oil/water separators, drum storage areas, railroad car loading/unloading areas and truck loading racks, transformers, process areas, sumps, sewers and septic systems, and other miscellaneous features. The rationale for considering each of these facilities, structures, or operations as potential areas of contamination is described below; where possible, they are shown on the area-specific figures (Figures 5-1 through 5-17).

ASTs have been present at the Bayonne Plant since the 1800s and have stored a variety of materials. The number of ASTs apparently reached an early peak in the 1930s, and generally decreased from the 1940s to the 1950s. Although modern ASTs are provided with leak detection and overfill prevention equipment, earlier ASTs may have been subject to overfilling, tank leaks, pump failures, and line leaks. These discharges, spills, and releases were not documented in Plant records prior to 1970. An inventory of ASTs within each operational area is provided in Table 5-1; an inventory of spills greater than 100 gallons that have been documented since 1970 is provided in Table 5-2.

Most of the former USTs at the Bayonne Plant have been removed. Two USTs are still in service. An inventory of known former and existing USTs is provided in Table 5-3. Review of Table 5-3 shows that releases were confirmed at two USTs (Tank 001 [G-1] and Tank 002); these USTs were removed after they failed tank integrity tests in 1989.

Chromium slag was used at the Site for fill and grading material, to construct tank berms, and as tank preload. Chromium slag was used as preload prior to the construction of one known tank located in the General Tank Field (Esso Standard Oil Company 1957a). There is evidence that the slag was used in other locations of the Plant to construct berms and as general fill material. As previously explained in Section 4.0 (Previous Site Investigations), in 1989 Exxon retained ICF Kaiser to conduct an IRM investigation to address chromium contamination.

Oil/water separators have been used at the Site since 1921. As part of the separation process, separated oil is transferred to storage tanks, and water effluent is currently discharged to plant sewers for ultimate treatment at the East Side Treatment Plant. Historically, oil/water separators varied in construction from earthen basins to concrete structures.

Drum storage areas have been located in various areas throughout the Plant's operational history. Drums have been stored on bases of either soil or concrete, with brick or concrete containment walls.

Railroad car and truck loading/unloading areas are locations where spills may have occurred as a result of routine product transfer operations. Three main tank truck loading racks and loading/unloading areas currently exist at the Bayonne Plant in the Piers and East Side Treatment Plant Area, in the Solvent Tank Field, and in the Lube Oil Area. Other historical loading/unloading areas and truck loading racks have existed and are depicted on Figures 5-1 through 5-17, where applicable.

Prior to 1979, transformers were commonly filled with oils containing polychlorinated biphenyls (PCBs) as dielectric insulators. Because of the design and age of the transformers, it was not unusual for this PCB-containing oil to leak during operation or to be released due to an explosion. Exxon implemented a program in the early 1980s to sample the contents of existing plant transformers and to dechlorinate those units found to contain PCB oils. As a result of this program, many transformers containing PCBs were removed from the Site by 1986. Table 5-4 identifies those transformers known to have contained PCBs, but there were other transformers for which historical information is unavailable. Existing and previous transformer locations are shown on the area-specific figures.

Although the Bayonne Plant is currently a bulk storage terminal that handles, blends, and packages petroleum products, it was formerly a refinery that had numerous process areas. The different process areas that existed at the Bayonne Plant included various stills (cracking, reducing, sweetening, and pipe stills), condensers, furnaces, sweaters, pre-heaters, and plants (including the MEK Dewaxing Plant, Phenol Lube Oil Treating Plant, Asphalt Plant, and Chemical Plant).

Sumps at the Bayonne Plant are largely associated with the sewer network and the piers. The sewer network system at the Bayonne Plant varies in construction. The sewers route liquids, including storm-water, process wastewater, and spilled materials, to the on-site treatment facilities. Historical sewers are not shown on the area-specific figures, due to the limited available information. IT Corporation has been retained by Exxon to conduct IRM activities associated with the sewers. The sanitary septic systems consist of septic tanks. Some of the septic tanks are pumped out periodically while others discharge to the subsurface through associated leaching fields. Currently, 17 septic systems are located throughout the Site, as depicted on the area-specific figures.

Miscellaneous areas of potential contamination at the Bayonne Plant include the former acid neutralization pit, a portion of the former Bayonne Municipal Dump, the former lead contaminated sludge dump, and the former Cesium Vault.

NAPL, consisting of a variety of products, has been detected in soil and groundwater at the Plant. Product thickness measurements collected by DRAI from December 1991 through March 1993 are provided in Table 5-5. The presence of NAPLs is discussed under each operational area.

5.1 OPERATIONAL AREAS

A description of the history and operations of the 13 operational areas at the Bayonne Plant is provided in the following sections. Plant history and operations have been ascertained through the use of historical maps, aerial photographs, and information received from Exxon. Discharges, spills and releases, areas of potential contamination, and IRM activities in each area are also discussed.

5.1.1 The "A"-Hill Tank Field

A description of the "A"-Hill Tank Field and details of its history and operations are provided below.

5.1.1.1 Description and Boundaries

The "A"-Hill Tank Field is located in the northwestern part of the plant and comprises 16 acres bounded by East 22nd Street and ICI Americas, Inc. to the north, Avenue J and the Main Building area to the east, railroad tracks and the Lube Oil Area to the south, and additional property owned by IMTT to the west (Figure 5-1). The "A"-Hill Tank Field lot area is a parking lot, located in the extreme northwest corner of the Site, adjacent to the "A"-Hill Tank Field.

5.1.1.2 Operations, Raw Materials, and Products

Currently, the "A"-Hill Tank Field consists of ten ASTs in three bermed areas. These tanks range in capacity from 14,703 to 76,900 barrels (1 barrel is equal to 42 gallons), and contain recycled oil and storm-water. Two ASTs, Tanks 507 and 508, were constructed in 1923; they are both 50 feet in diameter, contain recycled oil, and have an individual capacity of 14,703 barrels. Tanks 513, 514, and 516 contain stormwater overflow; these tanks are 90 feet, 75 feet, and 100 feet, respectively, in diameter, and were built in 1928, 1940, and 1953, respectively. These stormwater tanks are drained intermittently, and their contents are discharged to the East Side Treatment Plant. The remaining five tanks (Tanks 501, 502, and 504 through 506) are out of service. The western edge of this area is used for parking trailers; there are no buildings in this area.

The "A"-Hill Tank Field has retained the same general configuration since at least 1940. In 1940, the tanks were enclosed by a greater number of fire banks and at least one sealed catch basin was located within each fire bank enclosure. The catch basin was a concrete or brick belowground catchment for storm-water. A sealed catch basin had a box, positioned over the outlet to the sewer, which prevented gas from escaping from the sewer system.

5.1.1.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes at the Site. In the 1940 aerial photograph, the "A"-Hill Tank Field contained 22 large storage tanks, including eight that currently exist. The 12 largest tanks in the "A"-Hill Tank Field were each 90 to 115 feet in diameter and 40 to 42 feet in height. The other ASTs were each 35 to 75 feet in diameter and 36 to 42 feet in height. The contents of the tanks in 1940 are unknown, but their size and location suggest that they may have been used for bulk storage of raw materials. Each large tank and each group of two or three smaller tanks were enclosed by earthen fire banks or by brick or concrete walls. Twenty smaller tanks, each 20 to 30 feet in diameter, were located between the southern edge of the tank field and the railroad tracks bordering the area to the south. The tanks in the "A"-Hill Tank Field appeared to have conical roofs at this time, except for one tank with a floating roof. The "A"-Hill Tank Field lot area was occupied by two small buildings of unknown use.

In the 1947 aerial photograph, the area had the same configuration as in 1940; the "A"-Hill Tank Field lot area contained only one small building in the northeast corner, and several cars were parked along the western edge. In the 1951 aerial photograph, the area exhibited the same configuration as in 1947.

In the 1959 aerial photograph, the tank field had the same configuration as in 1951. Fifteen tanks had been recently painted, and one tank in the southwestern corner had been removed. Three small tanks and a shed had been removed from the area south of the tank field. The "A"-Hill Tank Field lot area was vacant.

In the 1961 aerial photograph, the area exhibited the same configuration as in 1959. One large storage tank in the southeastern corner of the area had been removed, and the "A"-Hill

Tank Field lot area was vacant. By 1963, the area exhibited the same configuration as in 1961, with the exception of the removal of one small AST along the southern edge of the area. The "A"-Hill Tank Field lot area remained vacant.

In the 1966 aerial photograph, the area was modified; the six ASTs on the western side of the area had been removed. Five other tanks had been eliminated, and one tank had been added in the southeastern corner. The 16 small tanks in the southern part of this area had been eliminated. A park near the plant entrance was located in the northeastern corner of the area. The "A"-Hill Tank Field lot area was vacant, but appeared graded and leveled.

In the 1968 aerial photograph, the area exhibited the same configuration as in 1966. From 1966 through 1970, a body of standing water, approximately 100 feet in diameter, was located in the southwestern corner of the area. In 1970 and 1974, cars were parked along the western edge of the tank field. The configuration of the "A"-Hill Tank Field has not changed since 1974.

5.1.1.4 Discharges, Spills, and Releases

Two historical spills are reported in the "A"-Hill Tank Field (Table 5-2). The largest spill, which constituted a release of approximately 6,000 bbls (252,000 gallons) of heating oil, occurred in the vicinity of Tank No. 514. A separate spill incident in 1983 resulted in the release of approximately 1,000 bbls (42,000 gallons) of process gas oil from Tank No. 508 (Table 5-2).

5.1.1.5 Areas of Potential Contamination

Areas of potential contamination have been identified in the "A"-Hill Tank Field. These areas include ASTs, former chromium slag depositional areas, a former wax separator, and storm sewers (Figure 5-1).

5.1.1.5.1 Aboveground Storage Tanks

The "A"-Hill Tank Field currently contains ten ASTs that were built from the 1920s through the 1950s (Table 5-1). Two documented spills greater than 100 gallons occurred in the "A"-Hill Tank Field in 1978 and 1983, respectively (Table 5-2). Both spills were the result of leakage from ASTs. The five tanks in the northern part of this area contained heating oil, but are presently out of service; the two tanks in the western part of this area contain recycled oil; and the three tanks in the southern part of this area contain storm-water overflow from the West Side Treatment Plant (Figure 5-1).

5.1.1.5.2 Former Chromium Slag Depositional Areas

During IRM investigations and soil sampling for chromium, four areas exhibiting a low to high density of chromium slag nodules were observed in the "A"-Hill Tank Field (ICF Kaiser Engineers, Inc. 1993). A high density of chromium slag nodules was observed in the vicinity of Tank 514 and along the fire banks just west of Tank 513 (Figure 5-1). The area in the vicinity of Tank 514 was subsequently reevaluated by ICF Kaiser and found not to have visible chromium slag.

5.1.1.5.3 Wax Separator

Discussions with Plant personnel indicate that a wax separator existed in the "A"-Hill Tank Field (Exxon Company, U.S.A. 1978a). The construction details and dates of operation of this separator are unknown. The separator was inactive in 1978. Although the wax separator could not be conclusively identified on the aerial photographs, a rectangular structure adjacent to Tank 508 was observed in the 1950 aerial photograph; this structure appeared to coincide with the location of the wax separator. In the 1970 aerial photograph, this area is occupied by a body of standing water.

5.1.1.5.4 Sewers and Septic Systems

Historical maps indicate that no sewers were present in the "A"-Hill Tank Field prior to 1945 (Esso Standard Oil Company 1945) (Appendix J). The existing storm sewers in the "A"-Hill Tank Field drain to the West Side Treatment Plant and are shown on Figure 5-1. There are no known septic systems in the "A"-Hill Tank Field.

5.1.1.6 IRM Activities

IRM activities have been or are currently being conducted to address chromium and NAPL in the "A"-Hill Tank Field. ICF Kaiser conducted soil sampling and inspections to evaluate the extent of impact from chromium slag (ICF Kaiser Engineers, Inc. 1993). Fifteen soil samples and duplicates were collected for analysis of chromium. Of the 15 soil samples analyzed, only one had a total chromium concentration greater than 500 mg/kg. The range of total chromium concentrations in the 14 other soil samples was 13.4 to 363 mg/kg.

NAPL IRM activities are currently being conducted by Geraghty & Miller in the "A"-Hill Tank Field. NAPL IRM activities consist of the quarterly collection of NAPL and water-level measurements from existing monitoring wells. Previous rounds of NAPL and water-level measurements made by DRAI (Table 5-5) indicate that NAPL thicknesses of less than 0.2 foot were measured in Monitoring Wells EB-25 and EB-26 (Dan Raviv Associates, Inc. 1993d). Quarterly monitoring will be conducted for a period of one year as the "A"-Hill Tank Field does not currently present a potential for off-site migration of NAPL.

5.1.2 Lube Oil Area

A description of the Lube Oil Area and details of its history and operations are provided below. Because the Lube Oil Area is so large and the history of activities is so extensive, the area has been depicted on two figures: the northern half is on Figure 5-2a and the southern half is on Figure 5-2b.

5.1.2.1 Description and Boundaries

The Lube Oil Area is located in the west-central part of the plant and comprises 54 acres. It is bounded by railroad tracks and the "A"-Hill Tank Field to the north; the Utilities Area and property owned by Gordon Terminal Service Company to the east; the Pier No. 1 Area to the south; and the Stockpile Area, the Platty Kill Creek, and additional property owned by IMTT to the west (Figures 5-2a and 5-2b).

5.1.2.2 Operations, Raw Materials, and Products

At present, the Lube Oil Area contains five tank fields, as follows: Finished Products, Lube Base Stock, Necton, Wax, and Former Bulk Wax Shipping Tank Fields. Approximately 236 ASTs, ranging in capacity from 60 to 45,600 barrels, are located in the Lube Oil Area (Table 5-1). Approximately 200 tanks in the 0 to 200 series, 400 series, and 500 series are in use at the northern end of the Lube Oil Area. The tanks store various petroleum products, such as transmission fluid, lubricating oils, oil additives, and waxes. The Lube Oil Area also contains ten ASTs in the 600 series; these tanks are located near Pier No. 1 and range in capacity from 3,500 to 4,223 barrels. Tanks 612 and 616 are used for 90-day hazardous waste oil storage. Tanks 611, 613, 614, and 615 are inactive. The four other ASTs in this group are associated with processes at the West Side Treatment Plant.

Surface-water runoff from the macadam and concrete that cover most of the Lube Oil Area enters a network of shallow drains and sewers that discharge to the West Side Treatment Plant. The effluent from the West Side Treatment Plant, which includes an oil/water separator and DAF unit, is pumped underground to the East Side Treatment Plant. The Hazardous Waste Drum Storage area is located within the Greer Wax Building (Figure 5-2b).

The Lube Oil tank car transfer area is located adjacent to the blending and packaging warehouse (Figure 5-2a). The transfer area consists of three railroad spurs that terminate on a completely paved concrete area covered by a metal roof. There is one major tank truck loading/unloading area located south of the Finished Products Tank Field. The loading area is paved with concrete and is covered by a metal roof. Trucks also load and unload from numerous tanks in the Base Stock (south) and Finished Products (north) Tank Fields on a paved surface.

In 1940, the Lube Oil Area included several operational areas in a different and more dense configuration than exists today. These former areas included a refining area, a mixing and blending area, a wax production area, a bulk wax shipping tank field, the main office building, various shop buildings, a barrel factory, and refrigeration buildings. Four to five reducing stills and one pipe still were located on the western side of the Lube Oil Area, midway between the northern and southern extent of the area (Figure 5-2a). The stills were accompanied by other facilities, such as small-to-medium storage tanks, condensers, furnaces, cooler boxes, and pump houses. Distillates produced in these stills may have been used in the other process areas within the Lube Oil Area. The stills were probably constructed prior to the 1930s, and one reducing still was removed by 1940. The areas where the stills were located in 1940 are currently unoccupied.

In the south-central portion of the Lube Oil Area, several buildings and tanks were part of a barrel handling area that extended into the Pier No. 1 Area to the south. Barrels were constructed in the barrel factory located in the easternmost part of the Lube Oil Area. The barrels were then conveyed by a barrel runway to the barrel handling and shipping area. The barrel runway extended diagonally across the southeastern part of the Lube Oil Area.

In the southwestern part of the Lube Oil Area, along the Platty Kill Creek, approximately 25 sweaters comprised the Wax Production Area. Sweaters were probably heated tanks or basins used for separating oil from the wax. The former Wax Production Area is currently occupied by the Wax Tank Field; the former Wax Shipping Tank Field is currently occupied by the West Side Treatment Plant.

In the northwestern part of the Lube Oil Area were a filter press building, a chilling building, refrigerating engines and pumps, coils, a press plate building, an open cooler, and a treating pump house. It is not known how these facilities were used in the wax refining or mixing processes. A total of 13 oil/water separators may have been in use in the Lube Oil Area in 1940. A review of the historical site layout drawings indicates that many smaller structures existed in the Lube Oil Area in 1940, including transformer buildings, truck and tank car loading racks, pump houses, and pits and trenches containing pipe lines (Appendix J).

As of 1947, the reducing stills, condensers, and pipe still were removed from the western side of the Lube Oil Area. Several smaller structures were in place, including the new "F" pipe still furnace, a slack wax (SW) and dewaxed oil (DO) heater with stack, a pump house, and the wax hydrogenation plant in the former reducing stills location. An oil/water separator was located at the western end of a row of six domed-roof agitator tanks in the northern central part of the area.

The Lube Oil Area was significantly modified between 1951 and 1959. The Base Stock Tank Field, consisting of approximately 50 tanks, was constructed in the south-central part of the area (Figure 5-2b). The boiler shop, the supply building, and several other smaller buildings were removed along the eastern side of the area, and construction of the blending and packaging building was begun. Overhead pipelines that connected the tank groups, mixing areas, and buildings, were constructed. The cooling facility buildings in the northwest corner of the area had been removed and several small sheds and trucks occupied this area.

Between 1959 and 1961, the Finished Products Tank Field was constructed in the northern part of the Lube Oil Area (Figure 5-2a). Between 1961 and 1966, many tanks were removed from the northern part of the Lube Oil Area as operations were modified. Some time between 1968 and 1970, the West Side Treatment Plant was constructed. All other operations remained generally the same.

From 1970 to about 1989, no major changes occurred in operations. The Lube Drum Building was built some time between 1984 and 1989. After 1989, the tanks from the Bulk Wax Shipping Tank Field in the southern part of the area were removed.

5.1.2.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes throughout the Lube Oil Area. As seen on the 1940 aerial photograph, the central portion of the Lube Oil Area contained a dense array of storage tanks aligned differently from the present-day configuration of tanks. The northern part contained rows of tanks and kettles. These tanks were approximately 30 to 50 feet in diameter.

In the 1940 aerial photograph, large storage tanks, each 60 to 90 feet in diameter, were located in the middle and south-central portion of the area. Agitator tanks located in this area appeared to have domed roofs, unlike the coned roofs principally found on storage tanks. Rectangular shop buildings were located along the eastern edge of the Lube Oil Area. Railroad tracks also ran along the eastern edge, providing access to the shops and piers. The main office building and the experimental laboratory were located in the southeastern corner of the area. A barrel runway, that transported barrels to and from barrel-handling facilities, was located to the east and south of the Lube Oil Area.

Also visible in the 1940 aerial photograph were light-colored rectangular structures, rectangular buildings, and cone-roofed tanks identified as sweaters. These structures comprised the Wax Production Area in the southwestern part of the Lube Oil Area. Four large storage tanks, each 90 feet in diameter, and several other smaller tanks were located to the east of the sweater structures and comprised the Bulk Wax Shipping Tank Field.

Three oil/water separators were visible in the 1940 aerial photograph. These separators included a 500- by 35-foot oil/water separator oriented north-south in the southwestern part of the area; another separator, approximately 140 by 70 feet, adjacent to the larger separator; and a third, smaller oil/water separator in the southeastern part of this area, adjacent to a storage tank.

In the 1947 photograph, the area had the same general configuration as in the 1940 photograph, except that several structures had been removed. The barrel runway that transected the southwestern part of the area had been removed. Several storage tanks and agitator tanks in the central part of the area had also been removed, including a large storage tank that had been adjacent to an oil/water separator in the southeastern corner. The oil/water separator that was oriented northeast-southwest in the southwestern part of the area appeared to have been filled in and to be non-operational.

In the 1951 aerial photograph, one domed-roof agitator tank in the south-central part of the area had been removed, and a stack had been added to the pipe still furnace on the northeast corner of the Platty Kill Creek. An overhead pipeline led from the central western tanks in the Lube Oil Area into the Stockpile Area to the west (where a new process facility had been constructed). The Wax Hydrogenation Plant, located near this pipeline on the west side, had been expanded. Buildings in the northwest corner had been modified and were possibly being dismantled.

As shown on the 1959 aerial photographs, 91 ASTs, ranging from 15 to 60 feet in diameter, had been built in the Lube Oil Area between 1951 and 1959, and many of the older tanks had been removed. These new tanks were aligned perpendicular to the shoreline. Many previously existing tanks in the northern central part of the area had been painted, and an oil/water separator was located within the group of recently painted tanks. Many of the structures adjacent to Platty Kill Creek had been removed. The Greer Wax Building had been constructed in the southwestern corner of this area adjacent to the Platty Kill Creek, and the sweaters and stills in this area had been removed. The oil/water separator unit that had existed in the southeastern part of this area was no longer present, and the Wax Hydrogenation Plant and pipelines in this area connecting the MEK Dewaxing Plant to the Lube Oil Area were no longer present. Buildings on the eastern side of the area had been removed and a new building, the Blending and Packaging Building, had been built.

The northern part of the Lube Oil Area was modified in the 1961 aerial photograph. The 47 new ASTs in this tank area were in rows aligned north to south. The separation between the north (Lube Product) and south (Lube Stock) tank areas was apparent by the light-colored overhead transport lines connecting the Pier No. 1 Area to the rest of the Plant. A large warehouse (oil blending and packaging warehouse) had been constructed in the northeastern part of the Lube Oil Area. The northwestern part of the Lube Oil Area was vacant. In the 1963 aerial photograph, most of this area remained the same; however, many tanks had been removed in the northeastern part of the area.

As seen on the 1966 aerial photograph, the appearance of the Lube Oil Area had changed significantly after 1963; many structures had been removed and open areas were leveled and possibly paved. Approximately 30 tanks and two buildings had been removed from the northern part of the area; the ground was filled and leveled. All of the tanks and buildings in the southern part of the area, including the former main building and the barrel shipping areas, had been removed. A line of five tanks in the southwestern part of the area had been removed, and the area had a configuration very similar to its present one.

In the 1968 aerial photograph, the area appeared the same as in 1966. By 1970, as seen on the aerial photograph, four small tanks had been removed and replaced with two small tanks in the central western part of the area. Drums were stored adjacent to the Greer Wax Building in the southwestern corner of the area. The West Side Treatment Plant had been constructed.

In the 1974 aerial photograph, the large oil/water separator in the southwestern part of this area had been removed. The area exhibited the same configuration in 1977. By 1984, as shown on the aerial photograph, the overhead pipelines leading to the former MEK Dewaxing Plant Area had been removed.

The large warehouse called the Lube Drum Building appeared on the 1984 aerial photograph; this building had been constructed in the eastern part of the area between 1984 and 1989. In the 1991 aerial photograph, 14 small tanks (Bulk Wax Shipping Tank Field) had been removed from the southern part of the Lube Oil Area.

5.1.2.4 Discharges, Spills, and Releases

Eighteen spills greater than 100 gallons have been documented in the Lube Oil Area (Figure 5-2a, Figure 5-2b, and Table 5-2). The materials spilled consisted of a variety of oils, waxes, and some solvents (Table 5-2).

5.1.2.5 Areas of Potential Contamination

Areas of potential contamination identified in the Lube Oil Area include ASTs, USTs, former chromium slag depositional areas, oil/water separators, drum storage areas, loading/unloading areas, transformers, the West Side Treatment Plant, and sewers and septic systems (Figures 5-2a and 5-2b).

5.1.2.5.1 Aboveground Storage Tanks

The Lube Oil Area currently contains approximately 200 ASTs (Table 5-1). The majority of these ASTs were constructed during and after the 1950s, although several date back to the 1920s. The tanks have primarily stored lube oils and waxes. Between 1972 and 1992, 19 spills greater than 100 gallons were documented, many originating from the ASTs (Table 5-2). The Lube Oil Area was one of the original properties where the Bayonne Plant operations began. Hundreds of ASTs were built and subsequently removed as operations in this area changed over the years from wax and oil refining to blending and packaging.

5.1.2.5.2 Underground Storage Tanks

Three USTs were historically located in the Lube Oil Area (Figures 5-2a and 5-2b); each of the three USTs stored gasoline. These USTs were installed sometime before 1986 and have since been removed (Table 5-3). Their integrity is undetermined.

5.1.2.5.3 Former Chromium Slag Depositional Areas

Based on the results of IRM soil sampling and visual inspections for chromium, several isolated patches of chromium slag have been observed in the Lube Oil Area (ICF Kaiser Engineers, Inc. 1993). A high-density area of chromium slag nodules was observed in the vicinity of the solvent drum shed and along the western boundary with Platty Kill Creek (ICF Kaiser Engineers, Inc. 1993) (Figure 5-2b).

5.1.2.5.4 Oil/Water Separators

Several oil/water separators have historically been located in the Lube Oil Area. These separators ranged in size from a 500-foot long separator in the southeastern corner that was present until 1959 to smaller 20-foot long separators that serviced clusters of 10 to 20 ASTs or process units such as former stills (Figures 5-2a and 5-2b). Aerial photographs indicate that the separators in the Lube Oil Area were constructed with concrete walls. By 1974, the only operating separator in this area was the one associated with the current West Side Treatment Plant.

5.1.2.5.5 Drum Storage Areas

Drums or barrels have been used since production began in the Lube Oil Area in the late 1800s. Today, a major part of operations in the Lube Oil Area involves the packaging of specialty lube oils into drums or other containers for distribution. These operations are conducted in the Lube Drum Blending and Packaging Warehouse and the "1 and 5" Quart Filling

Building located in the central northeastern part of the Lube Oil Area (Figure 5-2a). Drums are stored on pallets on the concrete floors of these warehouses. A solvents drum shed is located adjacent to the warehouse.

Historical site information indicates that drum filling was a major part of operations as early as the 1940s, when several large drum-handling buildings were located in the eastern part of the area (Esso Standard Oil Company 1945). These buildings comprised the Barrel Factory and included the Lube Oil Can Filling Building, the Lube Oil Filled Can Storage Building, several small storage buildings, several shop buildings, and a boiler house. Wax products were also shipped in drums, and the Pier No. 1 Area and the southern part of the Lube Oil Area contained wax shipping and storage buildings. Numerous other sheds that may have stored drums were located throughout the Lube Oil Area in the 1940s. During the 1970s, as indicated by aerial photographs, drums were stored adjacent to the Greer Wax Building in the southwestern corner of the area. Currently, some drums are stored in and around this building.

5.1.2.5.6 Loading/Unloading Areas

The Lube Oil Area currently contains a railroad car transfer area and a central tank truck loading rack where various blends of lube oil are loaded into several trucks at one time. Trucks are often loaded in stages with different oil grades to create a certain blend for shipment. Trucks also load at two smaller racks adjacent to the Base Stock and Finished Products Tank Fields. At the Lube Oil warehouses, container trucks are loaded with drums using forklifts. All of the loading areas are currently paved with concrete or macadam, and the railroad car loading spurs are surrounded by concrete walls. The railroad car loading spurs enter the Lube Oil Area from the north.

Prior to the major demolition and reconstruction of this area in the 1950s, truck and railroad tank car movement throughout the area was much more extensive (Esso Standard Oil Company 1945). Railroad spurs extended along both the eastern and western edges of the area, and a spur ran from the southeastern corner near the piers into the central part of the area.

Tracks along the northern edge of the area were also present. Each of these four track areas were serviced by a railroad car loading area for as many as ten railroad cars. Two smaller railroad car loading spurs serviced wax production areas. Four truck loading racks, each one much smaller than the current central truck rack, were located in the area. The specific design of the truck and tank car loading racks is not known.

5.1.2.5.7 Transformers

Two transformers (Substations F-1 and G-3) containing PCB liquid were formerly located at the Lube Oil Area (Figures 5-2a and 5-2b). One transformer had approximately 425 gallons of liquid removed in December 1986 as part of Exxon's in-house dechlorination program (Table 5-4). Both transformers were removed from the area at some time after 1986. At least four other transformers are or were present in the Lube Oil Area. Their PCB content is unknown. Existing transformers are currently free of PCB oils.

5.1.2.5.8 West Side Treatment Plant

The West Side Treatment Plant is located in the south-central part of the Lube Oil Area. The West Side Treatment Plant is the smaller of the two on-site treatment plants; it accepts runoff from the Main Building Area, the "A"-Hill Tank Field, and the Lube Oil Area. It also receives steam condensate and spilled materials from the Lube Oil Area.

Wastewater generated on the western side of the plant is initially treated at the West Side Treatment Plant by an API gravity separator (constructed in 1958) and a DAF unit. Effluent from this facility is then pumped via a subsurface transfer line, formerly known as the Low Pressure Salt Water Line, to the East Side Treatment Plant.

Both treatment plants are capable of pumping excess water, generated following heavy rainfall events, to holding tanks for temporary storage to prevent untreated overflow. The West Side Treatment Plant diverts the overflow to tanks located in the "A"-Hill Tank Field.

Associated with the West Side Treatment Plant are three ASTs that store oil skimmed from the separator, four ASTs that store storm-water, two ASTs that store slop oil and miscellaneous liquid waste, and one small AST that stores chemicals that are injected into the separator as pre-treatment.

5.1.2.5.9 Sewers and Septic Systems

Historical maps indicate that sewers were present in the Lube Oil Area prior to 1945 (Esso Standard Oil Company 1945) (Appendix J). The existing storm sewers drain to the West Side Treatment Plant and are shown on Figures 5-2a and 5-2b.

Five sanitary septic systems are present at the Lube Oil Area. The septic tanks range in capacity from 900 to 5,100 gallons (Figures 5-2a and 5-2b).

5.1.2.6 IRM Activities

IRM investigations to address chromium, NAPL, and sewers were conducted and/or are currently being conducted in the Lube Oil Area. In 1993, ICF Kaiser collected 28 soil samples and duplicates from the Lube Oil Area to evaluate the impact from chromium slag (ICF Kaiser Engineers, Inc. 1993). Five of the 28 samples had total chromium concentrations greater than 500 mg/kg (between 615 and 1,380 mg/kg). In the other 23 soil samples, total chromium concentrations ranged between 9.6 and 479 mg/kg.

Geraghty & Miller has recently drilled seven soil borings along the southeastern perimeter of the Lube Oil Area (one of which was drilled in the Pier No. 1 Area) to evaluate whether NAPL is present and, if present, whether it has the potential to migrate off-site. One boring, which encountered floating NAPL on the groundwater, as determined using temporary standpipes, was converted into a monitoring well. Additional NAPL IRM field activities (such as bail-down tests, tidal studies, slug tests, and NAPL recovery tests) may be conducted in the Lube Oil Area, if deemed appropriate, following a review of the results from the soil boring program. Previous rounds of NAPL thickness measurements collected between December 1991 and March 1993 by DRAI (Table 5-5) indicate NAPL thickness ranging from 0.11 to 7.58 feet (Monitoring Well EB-22).

IT Corporation is currently conducting an evaluation of the sewer system at the Bayonne Plant in accordance with NJDEP-approved work plans (Dan Raviv Associates, Inc. 1992a and IT Corporation, 1993). The sewer evaluation program involves cleaning and inspecting (via videotaping) the interior of the sewer piping. The results of this evaluation are not yet available.

5.1.3 Pier No. 1

A description of the Pier No. 1 Area and details of its history and operations are provided below.

5.1.3.1 Description and Boundaries

The Pier No. 1 Area is located in the southwestern part of the plant and comprises 4 acres of land and additional riparian acreage bounded by the Lube Oil Area to the north, land owned by Gordon Terminal Service Company to the east, the Kill Van Kull Waterway to the south, and IMTT and Platty Kill Creek to the west (Figure 5-3). The southern boundary of the Pier No. 1 Area coincides with the pier line.

5.1.3.2 Operations, Raw Materials, and Products

Pier No. 1 is one of three active piers utilized for the loading and unloading of the contents of marine vessels at the Plant. Several large in-facility pipes run in elevated pipe racks from the marine loading tower on Pier No. 1 to the Lube Oil Area.

In 1940, four large active piers were located in this area, as well as three operational areas including the Compounding Plant (which was also the Glue Factory at some time in the past), the shipping warehouse, and a barrel handling area. The Compounding Plant consisted of approximately 27 small tanks and a rectangular building. Operations at the Pier No. 1 Area are unknown. Other features in this area were a small barrel storage area, a super heater, and a coal bin. The shipping warehouse was a long rectangular building that was oriented east to west along the shore, adjacent to the piers. North of the warehouse, and extending into the Lube Oil Area, was a barrel handling area, consisting of several buildings, a storage area, loading racks, and railroad tracks. Barrels were likely delivered to this area from the barrel factory located in the Lube Oil Area, via the barrel runway, which was an overhead conveyor line. Barrels were prepared by steam cleaning, drying, and painting. The barrels were probably then filled with products such as waxes or specialty lube oils manufactured in the Lube Oil Area. The barrels may have been taken away from the area via rail car and ships.

An unidentified wooden structure was present in the area of the present-day shoreline between 1940 and 1947 (Figure 5-3). The use and purpose of this structure is not known. This structure was removed some time before 1951. Between 1951 and the present day, operations remained essentially the same, except that Pier No. 1 remained active. The helipad was constructed some time around 1970. The approximate extent of the former shoreline, which existed until 1970, is shown on Figure 5-3.

5.1.3.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes in the Pier No. 1 Area. In the 1940 aerial photograph, there were four large active piers extending from the Pier No. 1 Area into the Kill Van Kull Waterway. The shape of the shoreline of the Pier No. 1 Area varied from the present-day shoreline (Figure 5-3). On the western side was the longest pier (which is called Pier No. 1 today, but was called Pier No. 5 in 1940), where two large tanker ships were docked. On the eastern side was a large unnamed pier with railroad tracks, where two smaller ships and one rectangular barge were docked. The white-roofed launch house and the saltwater pump house (a small building constructed in 1898) were located on shore at this pier. In the center were two shorter piers, one of which was very wide, where smaller ships were docked. Inland from the two central piers was the only land area within the Pier No. 1 Area. This land area was occupied by warehouses, a group of tanks, and a railroad car and drum storage and handling area. To the west were approximately 27 small ASTs, 15 to 35 feet in diameter, and a rectangular building.

The area exhibited the same appearance on the 1947 aerial photograph as it did in 1940. An unidentified wooden structure was located at the shoreline between the two westernmost piers. The barrel storage area on shore between the buildings was densely packed with barrels and railroad cars.

In the 1951 aerial photograph, the oil/water separator seen in the 1947 photograph had been removed, and the barrel storage area on the shore was empty. In the 1959 aerial photograph, the saltwater pump house in the northeastern part of this area had been removed and its former location had been filled with light-colored material. Many trucks were parked in this part of the Pier No. 1 Area. The pier on the eastern side of the area appeared inactive. Several barges were docked at the other piers. A tall structure was present on the pier on the western side of the area (currently Pier No. 1). Several small tanks had been added to the group of tanks in the barrel handling area.

In the 1961 aerial photograph, the area exhibited the same configuration as in 1959, with the exception of additional aboveground transfer lines. By the time the 1966 aerial photograph was taken, the area had undergone significant changes. All of the buildings, warehouses, and tanks located in the Pier No. 1 Area had been eliminated and the land had been graded level.

From 1966 to 1984, the area appeared essentially the same, with the exception of the construction of the platform for the helipad, which had occurred some time between 1968 and 1970. As seen on the 1984 aerial photograph, the area had undergone significant modifications to bolster the bulkhead on the eastern side of the pier and widen the berth. Pier No. 1 was the only remaining operational pier. An old pier on the eastern side of the area was disintegrating. In the 1989 photograph, some modifications to the heliport were observed, and the landing area was more visible from the air. The area exhibited the same features in the 1991 photograph as in 1989.

5.1.3.4 Discharges, Spills, and Releases

Six spills greater than 100 gallons have been documented in the Pier No. 1 Area. The materials spilled consisted of a variety of waste oil, heavy fuel oils, and waxes (Table 5-2). Historical spills have occurred on the pier and in the Kill Van Kull Waterway. The documented volumes of material spilled range from 670 to 2,100 gallons per incident.

5.1.3.5 Areas of Potential Contamination

Identified areas of potential contamination at the Pier No. 1 Area include ASTs, drum storage areas, loading/unloading areas, transformers, process areas, and sewer systems.

5.1.3.5.1 Aboveground Storage Tanks

There are currently no ASTs located in the Pier No. 1 Area. From 1932 to 1963, 19 to 58 small tanks were located in the western central part of this area. Two pump houses, one present from 1932 to 1963, and the other, Warehouse Pump House No. 21, present from 1921 to 1963, were also located in this area.

5.1.3.5.2 Drum Storage Areas

A drum storage area formerly occupied the north-central part of the Pier No. 1 Area and extended into the Lube Oil Area to the north. This storage area was associated with the Barrel Painting Facility and Cooperage Shop located in the east-central part of the area from 1921 to 1963.

5.1.3.5.3 Loading/Unloading Areas

A railroad car filling rack was located in the north-central part of the Pier No. 1 Area from 1932 to 1963. It was probably associated with the barrel handling shops located in this area.

5.1.3.5.4 Transformers

Two substations (Substation No. 9 and No. G-1) are located along the northern border of the Pier No.1 Area (Figure 5-3). There is no information available regarding the operational history and possible PCB content of transformers located at these substations. However, according to Plant personnel, transformers that were found to contain PCB oils at the Bayonne Plant have been removed.

5.1.3.5.5 Process Areas

A Compounding Plant was located in the west-central part of the Pier No. 1 Area from 1887 to 1963. It included a Glue Factory from about 1913 through 1921. Little information is available concerning the raw materials, operations, and products associated with the former Compounding Plant and former Glue Factory.

5.1.3.5.6 Sewers and Septic Systems

Historical maps indicate that there were sewers in the Pier No. 1 Area prior to 1945 (Esso Standard Oil Company 1945) (Appendix J). The existing storm sewers drain to the West Side Treatment Plant and are shown on Figure 5-3. No septic systems are currently present in the Pier No. 1 Area.

5.1.3.6 IRM Activities

IRM activities were conducted or are currently being conducted in the Pier No. 1 Area to address chromium, NAPL, and sewers. In 1993, ICF Kaiser collected two samples from the Pier No. 1 Area to evaluate the impact from chromium slag. The total chromium concentrations in these two samples were 1.8 and 31.2 mg/kg.

A NAPL IRM investigation was conducted in the Pier No. 1 (Helipad) area by DRAI during August and September 1994 (Dan Raviv Associates, Inc. 1994a). Eight recovery wells existed in this area prior to initiating IRM activities. Historically, Recovery Wells EBR4, EBR6, and EBR8 were pumped periodically to recover NAPL. However, since June 1993, only Recovery Well EBR8 is regularly pumped as part of on-going NAPL recovery.

The NAPL IRM investigation included the drilling of three soil borings (Soil Borings HB1 through HB3) near the helipad in the Pier No. 1 Area (Figure 2-8). Previous rounds of NAPL thickness measurements collected between December 1991 and March 1993 by DRAI (Table 5-5) indicate NAPL thicknesses ranging from 0.01 to 4.13 feet. In addition, the bulkhead construction along the Kill Van Kull is currently being evaluated by DRAI, and the several "tar-like" seeps observed in this area will be sampled. The eastern and southern bulkheads are being further evaluated to determine if the bases of the bulkheads extend below low tide. As previously described in Section 5.1.2.6, Geraghty & Miller has recently drilled seven soil borings along the southeastern boundary of the Lube Oil Area as part of the Lube Oil Area NAPL IRM. One of the seven borings was drilled in the Pier No. 1 Area.

IT Corporation is conducting a sewer system evaluation that includes cleaning and videotaping the interior of the sewer lines. The results of the sewer IRM investigation are not yet available.

5.1.4 No. 2 Tank Field

A description of the No. 2 Tank Field and details of its history and operations are provided below.

5.1.4.1 Description and Boundaries

The No. 2 Tank Field is located in the northwestern part of the Plant and comprises 11 acres bounded by railroad tracks and the Main Building Area to the north, the AV-Gas Tank Field to the east, the Asphalt Plant Area and Utilities Area to the south, and Avenue J and the "A"-Hill Tank Field to the west (Figure 5-5).

5.1.4.2 Operations, Raw Materials, and Products

The No. 2 Tank Field consists of eight tanks in one bermed area. Each tank has a capacity of approximately 157,400 barrels and stores No. 2 fuel oil. The dikes are intact and in good repair.

Prior to 1940, this area had sweetening stills and an oil/water separator associated with the stills. In addition, the entire northeastern perimeter of the No. 2 Tank Field Area was occupied by a line of crude stills and condensers. The raw materials and products used in this area in 1940 are not known. In 1940, there were numerous ASTs, a gas compression plant, a boiler house, a water purification plant, an oil/water separator, furnaces, and stills at the No. 2 Tank Field. The gas compression plant was previously occupied by a second line of sweetening stills.

Between 1940 and 1951, operations did not change appreciably at the No. 2 Tank Field. Between 1951 and 1959, all previous ASTs and structures were removed, and eight ASTs were added, in a configuration similar to the present. Since the installation of these tanks in the 1950s, the area has remained essentially the same.

5.1.4.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes in activities at the No. 2 Tank Field. In the 1940 aerial photograph, railroad tracks ran through the western section of the area. To the west of the tracks were several small buildings and tanks, probably the remaining parts of a line of sweetening stills and other process units that were being dismantled. On the east side of the tracks, to the north, was a Gas Compression Plant consisting of a small square building and various tanks and lines. To the south was the boiler house, consisting of a large building with two stacks, a freshwater tank (95 feet in diameter), and another building containing a water purification plant. Two sumps had been located in this area. In the southeast corner of the area were two small buildings. In the center of the eastern part of the No. 2 Tank Field was a group of nine ASTs, each 44 feet in diameter and 10 to 12 feet in height; the contents of these tanks is unknown. To the north of these ASTs was a light-colored, rectangular building identified as the No. 37 Pump House and manifold. On the eastern side of the area was a group of ten storage tanks, each 50 to 60 feet in diameter and approximately 12 feet in height, that extended eastward into the area of the present-day AV-Gas Tank Field. These tanks were adjacent to a process area consisting of a vacuum furnace, an atmospheric furnace, two pre-heaters, a tall stack, a still (type unknown), a scrubber, and a light-colored, high-roofed, rectangular blower house. This area was the site of the former "C" and "D" pipe stills. An oil/water separator connected to this process facility was located in the northeastern corner of the No. 2 Tank Field.

In the 1947 aerial photograph, the process areas in the northern parts of the area were still in place although six of the storage tanks in the No. 2 Tank Field had been removed. In the 1951 aerial photograph, the stacks and smaller buildings at the boiler house on the south side had been removed, and four tanks in the center of the area had also been removed. The oil/water separator in the northeastern corner was partially or entirely filled and was probably being dismantled.

As seen in the 1959 aerial photograph, the No. 2 Tank Field had significantly changed since 1951. The area had its present-day configuration of eight large storage tanks, each 150 feet in diameter and 50 feet in height. The group of tanks was enclosed by one continuous berm around the perimeter. The railroad tracks that had cut through the western section of this area and all other structures were no longer present.

From 1959 through 1991, the No. 2 Tank Field had the same configuration. The only observed difference in the photographs was that several tanks had been painted (1970 aerial photograph).

5.1.4.4 Discharges, Spills and Releases

Only one spill of greater than 100 gallons has been documented at the No. 2 Tank Field (Figure 5-5). This spill occurred in the vicinity of Tank 1005 in 1989 and was reported to consist of No. 2 fuel oil (Table 5-2). The volume of the spill is not known.

5.1.4.5 Areas of Potential Contamination

Areas of potential contamination at the No. 2 Tank Field include the ASTs, former chromium slag depositional areas, oil/water separators, process areas, sumps, and sewers (Figure 5-5).

5.1.4.5.1 Aboveground Storage Tanks

There are currently eight large ASTs located in the No. 2 Tank Field. Each AST was constructed in 1955, has a capacity of 6.6 million gallons, and contains No. 2 fuel oil. One documented spill of an unknown quantity of No. 2 fuel oil occurred in 1989 at Tank 1005 in the southwestern corner of the area (Figure 5-5). Before its configuration as a tank field, the area contained process units and several clusters of smaller ASTs. Five to ten tanks were located in the central part of the area from 1921 to 1951; three to five tanks were located in the eastern part of the area from 1932 to 1951; and twelve tanks were located in the western part of the area in 1940. Four former pump houses were located in the area.

5.1.4.5.2 Former Chromium Slag Depositional Areas

Chromium slag is reported to have been used to construct berms and as general fill in the No. 2 Tank Field (Esso Standard Oil Company 1957a). As depicted on Figure 5-5, the entire area was identified by ICF Kaiser as having a high density of chromium slag (ICF Kaiser Engineers, Inc. 1993).

5.1.4.5.3 Oil/Water Separators

A 60 foot long oil/water separator was located in the northeastern corner of the No. 2 Tank Field in 1945. It was probably associated with the former process areas located in that area.

5.1.4.5.4 Process Areas

Prior to construction of the large ASTs in the 1950s, the No. 2 Tank Field was occupied by several process areas and clusters of small ASTs. Before 1920, two lines of sweetening stills, that were probably constructed in 1907, extended from the south-central part of the area northward into the Main Building Area (Figure 5-5). After 1920, a boiler house occupied the south-central part of the No. 2 Tank Field until 1951. A water purification plant was located to the east of the boiler house from 1921 to 1951. A laboratory was located in the southeastern corner of the area in 1945. In the northeastern corner of the area, a line of crude stills was situated adjacent to the railroad tracks and continued into other operational areas to the east and west.

5.1.4.5.5 Sumps

Two sumps were located in the south-central portion of the No. 2 Tank Field in 1945. One sump appears to have been used in conjunction with the Boiler House that was located in the south-central section of the No. 2 Tank Field in 1945. The other appears to have been used in conjunction with the Water Purification Plant that existed east of the Boiler House. It is not known when or if these sumps were decommissioned.

5.1.4.5.6 Sewers and Septic Systems

Historical maps indicate that there were sewers in the No. 2 Tank Field prior to 1945 (Appendix J) (Esso Standard Oil Company 1945). The existing storm sewers drain to the East Side Treatment Plant (Figure 5-5). There are no septic systems at the No. 2 Tank Field.

5.1.4.6 IRM Activities

IRM activities at the No. 2 Tank Field include investigations of chromium slag and of the sewer system. In 1993, ICF Kaiser collected 12 soil and sediment samples for total chromium analysis (ICF Kaiser Engineers, Inc. 1993). Seven samples had total chromium concentrations ranging from 570 to 4,590 mg/kg; five samples had concentrations of less than 500 mg/kg, ranging from 53 to 256 mg/kg.

IT Corporation is conducting a field evaluation of the sewer system, including cleaning and videotaping of sewer lines. The results of the field evaluation are not yet available.

5.1.5 Asphalt Plant Area

A description of the Asphalt Plant Area and details of its history and operations are provided below.

5.1.5.1 Description and Boundaries

The Asphalt Plant Area is located in the central part of the Plant and comprises 17 acres bounded by the No. 2 Tank Field and the AV-Gas Tank Field to the north, railroad tracks and the Low Sulfur Tank Field to the east, the No. 3 Tank Field and the Exxon Chemicals Plant Area to the south, and the Utilities Area to the west (Figure 5-5).

5.1.5.2 Operations, Raw Materials, and Products

The Asphalt Plant Area consists of approximately 41 ASTs in four concrete-curbed areas and two soil-bermed areas. The tanks range in capacity from 440 to 38,254 barrels. Most of the tanks contain cutback asphalt and other asphalt grades, which are not liquid at ambient temperatures. Three tanks in the earthen-bermed area of the Asphalt Plant contain kerosene and Varsol (a petroleum-based solvent), which are liquid at ambient temperatures. A railroad car transfer area is located in the north portion of the Asphalt Plant Area; this transfer area consists of two railroad spurs that terminate at a concrete-paved area.

In 1940, the Asphalt Plant Area processed and handled asphalt, pitch, and related products. At this time, there were six small oil/water separators, storage sheds, a pump house, and an oxidizing plant. The oxidizing plant consisted of a compressor building, a furnace, and six tanks, each 30 to 50 feet in diameter. Approximately 25 small agitators and mixing tanks, each 15 to 35 feet in diameter, were located between and among the buildings. A line of tanks, each 35 to 60 feet in diameter and 30 feet in height, was located along the southwestern edge of the Asphalt Plant Area. In the southeast corner of this area was a group of stills; near the stills were pump houses, exchangers, a vacuum tower, an evaporation tower, bottom exchanger tanks, and an oil/water separator.

Between 1940 and 1951, activities at the Asphalt Plant Area remained relatively unchanged. Some time after 1951 and before 1959, the pitch drum filling and storage shed areas (located in the central eastern part of the area) were dismantled, and three storage tanks were added. In addition, two of the three large ASTs in the eastern portion of the area were removed, and a large diameter tank was constructed in the southeastern corner of the Asphalt Plant Area.

From 1959 to 1970, activities at the Asphalt Plant Area remained essentially unchanged, other than the addition or removal of some tanks and buildings. Between 1970 and 1974, most structures in the eastern end were being dismantled. Since 1970, minor modifications were made in the Asphalt Plant Area that culminated with the present-day configuration.

5.1.5.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes in operations and structures at the Asphalt Plant Area. In the 1940 aerial photograph, a large, light-colored, rectangular building was located in the central eastern part of the area; this building contained the pitch drum filling and storage shed areas. To its north were railroad spurs and the pitch plant filling rack that was oriented along the length of the building. Six small oil/water separators were associated with this rack. To the west of the pitch filling and storage shed areas were several other buildings, including the Oxidizing Plant. A row of 15 to 20 small ASTs was located along the southern edge of the pitch filling area. Three large storage tanks, each 90 to 93 feet in diameter and 31 to 35 feet in height, and two small tanks, each 35 feet in diameter and 30 feet in height, were located in the northwestern corner of the Asphalt Plant Area and were enclosed by earthen fire banks. To the south of these ASTs were 11 tanks, each 25 to 35 feet in diameter and 30 to 36 feet in height. A pipeline extended from this area (between the two groups of tanks) eastward across the railroad tracks into the Low Sulfur Tank Field. Two lines of condenser stills, a pipe still, and an oil/water separator were located in the southernmost corner of the Asphalt Plant Area.

The Asphalt Plant Area exhibited the same configuration in the 1947 photographs as in the 1940 photograph; however, three tanks in the southwestern part of this area had been removed. One of the tanks had been replaced by a rectangular foundation that was the beginning of a group of asphalt loading tanks. Trucks were parked along the eastern edge of this area along Lower Hook Road. The oil/water separator on the south side of the stills in the southeast corner had a light-colored surface. The only change seen in the 1951 aerial photograph was that one tank had been removed along the southern edge of the Asphalt Plant Area.

This area underwent significant change from 1951 to 1959. A review of the 1959 photograph shows that the large building in the central eastern portion of the area (pitch drum filling and storage shed areas) had been dismantled and in its place were three small storage tanks. In the northwestern part of the area were 30 asphalt tanks in rows. Two of the three large storage tanks in the eastern part of the area had been removed, and Tank 904 (which was 75 feet in diameter) had been constructed in the southeastern corner of the area. An air hut, which was an inflatable temporary storage building, was located in the southeastern corner of the area.

In the 1961 photograph, most of the area exhibited the same configuration as in 1959. Several small tanks had been removed from the central eastern part of the area; however, much of that area was shrouded in smoke from stacks. The building along the railroad tracks to the north had been removed. Four small tanks, including Tanks 987 and 988, which are currently situated in this location, had been constructed in the eastern part of the area.

In the 1963 photograph, several sheds and small ASTs had been removed from the northeastern part of the area. The area exhibited the same configuration from 1966 through 1970. As seen in the 1974 aerial photograph, one large and four small tanks in the eastern part of the area had been removed, leaving the eastern part of the area vacant except for two small tanks. Based on the aerial photographs, the Asphalt Plant Area has remained essentially unchanged since 1974.

5.1.5.4 Discharges, Spills, and Releases

As presented in Table 5-2, 28 spills have been documented in the Asphalt Plant Area. These spills have all consisted of asphalt, except for the spill of "Exxon Formula No. 82899" at Tank 923 in 1987. The 27 asphalt spills ranged from 100 to 1,500 gallons and generally occurred in the roadway.

5.1.5.5 Areas of Potential Contamination

Areas of potential contamination at the Asphalt Plant Area include ASTs, former chromium slag depositional areas, oil/water separators, drum storage areas, loading/unloading areas, transformers, a Hot Oil Transfer System, process areas, sewers, and septic systems (Figure 5-4).

5.1.5.5.1 Aboveground Storage Tanks

There are currently 41 ASTs at the Asphalt Plant Area. A Hot Oil Transfer System and attendant tankage are located in the southwestern central part of the area. Only one documented spill has occurred at the existing ASTs; a 500-gallon spill of "Exxon Formula No. 82899," which is probably a lube oil additive, occurred in 1987 at Tank 923.

Up to 85 ASTs and agitators were located in an area encompassing the southern half of the western half of the Asphalt Plant Area from 1921 to 1959. Many ASTs were located throughout the rest of the area. Three pump houses were located in the eastern half of the area from 1932 to 1947.

5.1.5.5.2 Former Chromium Slag Depositional Areas

Based on historical information reviewed, there are no known reports indicating the deposition of chromium slag in the Asphalt Plant Area. However, the results of IRM soil sampling and site inspections for chromium indicated a high density of chromium slag in large areas in the eastern portion of the Asphalt Plant (ICF Kaiser Engineers, Inc. 1993).

5.1.5.5.3 Oil/Water Separators

A 120 foot long oil/water separator was located in the southern part of the Asphalt Plant Area from 1932 to 1951. Along the northern side of the area, between 1932 and 1951, a series of six small oil/water separators were located beneath the Pitch Filling Plant Rack. It is likely that the separators were filled in and abandoned in place.

5.1.5.5.4 Drum Storage Areas

The Pitch Drum Filling Shed was located in the central part of the Asphalt Plant Area from 1921 to 1951. The Carton Filling and Storage Area was also located in the central part of this area from 1940 to 1951. Both drum storage areas were probably used in the packaging of asphalt for shipment and distribution.

5.1.5.5.5 Loading/Unloading Areas

There are currently four truck loading and unloading areas in the Asphalt Plant Area. The truck loading areas serve small groups of tanks. One railroad car loading area is located along the northern side of the area. From 1932 to 1951, this railroad car loading area was larger and encompassed the Pitch Plant Filling Rack. Another rail car loading area was located in the southeastern part of the area from 1921 to 1945. Several of the tanks in the Asphalt Plant Area serve as individual loading areas.

5.1.5.5.6 Transformers

Eleven transformers are or were present at the Asphalt Plant Area. Their operational history and PCB content are unknown. According to plant personnel, existing transformers at the Plant do not currently contain PCB oils.

5.1.5.5.7 Hot Oil Transfer System

The Hot Oil Transfer System is located in the central southern edge of the Asphalt Plant Area. It consists of a furnace and transfer pumps that control the flow of hot oil within the adjacent AST heating coils. The intent of the system is to render the asphalt mobile and promote the flow of fluids, which are normally viscous under ambient temperatures, through the piping network in this area. No documentation is available concerning the PCB content, if any, of the hot oils in the system.

5.1.5.5.8 Process Areas

Prior to 1966, several process areas existed in the Asphalt Plant Area. This area was known in the early 1900s as the No. 3 Plant. Condensers and pipe stills were located in the southeastern part of the area from 1921 to 1959. The No. 2 Power Plant was located in the western part of the area from 1921 to 1957. The Pitch Plant was located in the central western part of this area from 1932 to 1951. The Oxidizing Plant was located in the central eastern part of this area from 1940 through 1966. An off-gas incinerator, oxidizer, and ferric chloride tank were formerly present along the southern boundary of the Asphalt Plant Area.

5.1.5.5.9 Sumps

A concrete sump (E3), which has a capacity of 6,800 gallons and is registered as a UST, is currently located in the central part of the Asphalt Plant Area and is used for collection of lube oil additives (Table 5-2). The sump is used to collect de-minimis spills of lube oil additives from the disconnecting hose(s). From 1932 to 1945, a sump was located in the southwestern part of the area adjacent to the present Hot Oil Transfer System.

5.1.5.5.10 Sewers and Septic Systems

The sewer system in the Asphalt Plant Area, which varies in construction, is part of the sewer system that serves the entire plant and drains by gravity to the East Side Treatment Plant.

There are currently two septic systems in this area. The Furino Mechanical Shop in the southeastern part of the area utilizes a 1,000-gallon holding tank. The Asphalt Control House in the central part of the area also has a 1,000-gallon holding tank.

5.1.5.6 IRM Activities

IRM activities in the Asphalt Plant Area include investigations of the chromium slag and the sewer system. In 1993, ICF Kaiser collected seven surface soil samples for total chromium analysis (ICF Kaiser Engineers, Inc. 1993). Three soil samples were detected above 500 mg/kg (986 to 1,960 mg/kg); concentrations in the other four samples ranged between 57.5 and 236 mg/kg. Berms and tanks in the asphalt tank area had the highest density of chromium slag (Figure 5-4).

IT Corporation is conducting a field evaluation of the sewer system at the Bayonne Plant. The evaluation includes the cleaning and videotaping of sewer lines. The sewer IRM evaluation is ongoing, and results of the evaluation are not yet available.

5.1.6 <u>AV-Gas Tank Field</u>

A description of the AV-Gas Tank Field and details of its history and operations are provided below.

5.1.6.1 Description and Boundaries

The AV-Gas Tank Field is located in the north-central part of the Site and comprises 6 acres bounded by railroad tracks and the Domestic Trade Area to the north and east, the Asphalt Plant Area to the south, and the No. 2 Tank Field to the west (Figure 5-6).

5.1.6.2 Operations, Raw Materials, and Products

The AV-Gas Tank Field consists of ten tanks in two bermed areas. The tanks range in capacity from 12,592 to 96,324 barrels. The tanks contain kerosene, aviation gasoline, toluene, hexane, heptane, and cutback naphtha (Table 5-1). The catch basins and drains inside the secondary containment area route storm-water runoff to the East Side Wastewater Treatment Plant.

From 1932 through 1947, a pitch filling plant was located in the eastern portion of the AV-Gas Tank Field. Between 1940 and 1947, the AV-Gas Tank Field contained tanks and a process area that extended westward into the No. 2 Tank Field. This process area contained a vacuum furnace, an atmospheric furnace, heaters, a stack, a still, a scrubber, and a blower (see Section 5.1.4 [No. 2 Tank Field]). After 1947, the pitch filling plant was dismantled. From 1957 through 1961, a tetraethyl lead (TEL) building was located just east of the pitch filling plant. The TEL Building was occupied by equipment that placed the lead additive into the fuels. By 1959, all other structures had been removed and the AV-Gas Tank Field assumed its present-day configuration.

5.1.6.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes in operations and structures in the AV-Gas Tank Field. In the 1940 aerial photograph, the western part of the AV-Gas Tank Field contained tanks and a process area that extended westward into the No. 2 Tank Field. The southwestern corner of the area was occupied by four storage tanks, each 50 to 60 feet in diameter and 30 to 42 feet in height. The central southern portion of the area contained "Colprovia Asphalt Pans," the structure and function of which cannot be determined from the aerial photograph. The eastern corner of the area was occupied by a large building (Pitch Filling Plant). A large oil/water separator was located in the north-central part of the area, and a structure that appeared to be a small oil/water separator was located in the center of the area. Pipelines extended from the AV-Gas Tank Field Area over the railroad tracks to the Domestic Trade Area.

The area exhibited the same configuration in the 1947 photograph as in the 1940 photograph, with a few modifications. The large oil/water separator in the north-central part of the area had been removed. The upper stories of the Pitch Filling Plant in the eastern corner of the AV-Gas Tank Field had been removed. The Asphalt Pans along the southern edge of the area were clearly visible, though their function is still unknown.

As seen on the 1951 photograph, one small tank in the southeastern corner had been removed. The Asphalt Pans may have been filled or covered. The Pitch Filling Plant in the eastern corner of the area was further dismantled.

The AV-Gas Tank Field was significantly changed between 1951 and 1959. The 1959 aerial photograph shows the AV-Gas Tank Field in its present-day configuration with ten floating-roof storage tanks. All other structures had been removed. No changes in configuration were observed in the photographs since 1959, except that geodesic domed roofs covered the floating roofs on the tanks between 1989 and 1991.

5.1.6.4 Discharges, Spills, and Releases

Three spills greater than 100 gallons have been documented at the AV-Gas Tank Field (Figure 5-6). A 5,000-gallon spill of toluene occurred in 1988 in the vicinity of Tank 1010 (Table 5-2). Also, approximately 100 gallons of heavy fuel oil were spilled in the AV-Gas Tank Field Area in 1992. The exact location of the heavy fuel spill was not identified. A diesel spill of unknown volume occurred at the northern boundary of the AV-Gas Tank Field immediately west of the overhead piping rack, in 1992.

5.1.6.5 Areas of Potential Contamination

Areas of potential contamination at the AV-Gas Tank Field include ASTs, former chromium slag depositional areas, former asphalt pans, oil/water separators, transformers, process areas, and sewers (Figure 5-6).

5.1.6.5.1 Aboveground Storage Tanks

The AV-Gas Tank Field contains ten ASTs that were all constructed in 1957. They range in capacity from 12,592 to 96,324 barrels and contain kerosene, aviation gasoline, toluene, hexane, heptane, and cutback naphtha (Table 5-1). Between five and eight ASTs were located in the southwestern portion of the area from 1932 to 1951, and two tanks were located in the northeastern portion of the area from 1925 to 1940.

5.1.6.5.2 Former Chromium Slag Depositional Areas

Based on historical information, chromium slag is not known to have been deposited in the AV-Gas Tank Field. However, based on the results of IRM sampling and field inspections for chromium, evidence of chromium slag deposition has been observed throughout the majority of the area (ICF Kaiser Engineers, Inc. 1993).

5.1.6.5.3 Former Asphalt Pans

A 1945 site map identified a series of rectangular tanks or troughs located adjacent to the Pitch Plant in the AV-Gas Tank Field as the Colprovia Asphalt Pans (Esso Standard Oil Company 1945). These pans are visible in aerial photographs from 1940 to 1951. The function of the pans in the asphalt production process is not known.

5.1.6.5.4 Oil/Water Separators

A 113 foot long oil/water separator was present in 1940 in the northwestern portion of the AV-Gas Tank Field. A small separator built into the sewer lines was present in the central part of the area in 1945. These separators may have serviced the nearby ASTs and process units; the construction details and discharge areas are not known. It is likely that the separators were filled in and abandoned, similar to other historical separators at the Plant.

5.1.6.5.5 Transformers

Substation No. 2, also known as the No. 2 Tank Field substation, is located in the northwestern corner of the AV-Gas Tank Field (Figure 5-6). There is no information available regarding the operational history and possible PCB content in the transformers at this substation. However, according to Plant personnel, transformers that were found to contain PCB oils at the Bayonne Plant have been removed.

5.1.6.5.6 Process Areas

Crude stills existed from before 1920 until 1932 along the northern edge of the AV-Gas Tank Field. Crude stills were typically large heated tanks in series that distilled crude oil into lighter grades.

A Pitch Filling Plant was located in the eastern portion of the AV-Gas Tank Field from 1932 to 1947. It consisted of a large building in which asphalt-related products may have been packaged. The TEL Building was located in the eastern corner of the area from 1957 to 1961. TEL is a gasoline additive.

5.1.6.5.7 Sewers and Septic Systems

Historical maps indicate that there were sewers at the AV-Gas Tank Field prior to 1945 (Esso Standard Oil Company 1945). The existing storm sewers in the AV-Gas Tank Field drain to the East Side Treatment Plant. There are no septic systems in this area.

5.1.6.6 IRM Activities

IRM activities at the AV-Gas Tank Field include a chromium slag investigation and a sewer investigation. In 1993, ICF Kaiser collected approximately four soil samples to evaluate the impact from chromium slag (ICF Kaiser Engineers, Inc. 1993). All four soil samples had total chromium concentrations greater than 500 mg/kg (637 to 2,480 mg/kg). The majority of the AV-Gas Tank Field was identified by ICF Kaiser as having a high density of chromium slag (Figure 5-6).

IT Corporation is conducting an IRM investigation of the sewer system at the Plant. This investigation involves the cleaning and videotaping of the sewer pipelines. The results of this investigation are not yet available.

5.1.7 Exxon Chemicals Plant Area

A description of the Exxon Chemicals Plant Area and details of its history and operations are provided below.

5.1.7.1 Description and Boundaries

The Exxon Chemicals Plant Area is located in the central part of the Site and comprises 11 acres (Figure 5-7). The Asphalt Plant Area borders the Exxon Chemicals Plant Area to the north and east and the No. 3 Tank Field is located to the south. The Utilities Area is located to the west. The Exxon Chemicals Plant Area, which was dismantled prior to the sale to IMTT, manufactured additives for lubricants, fuels, and automatic transmission fluids as a batch-type operation in small reactor vessels. In addition to making additives, the plant batch-blended additives for fuel and automatic transmission fluids.

5.1.7.2 Operations, Raw Materials, and Products

In 1991, the Exxon Chemicals Plant Area contained approximately 14 small tank fields, with a total of 90 tanks ranging in capacity from 57 to 3,964 barrels, a hazardous waste drum storage area, a chemical wastewater separator, and a building that housed the process reactor vessels. The chemical wastewater separator was used to store process wastewater before it was trucked to Exxon's Bayway Chemicals Plant Area wastewater treatment facility. During the period of 1991 through 1993, many structures in the Exxon Chemicals Plant Area were dismantled.

Two sewer systems serve the Exxon Chemicals Plant Area. Some of the sewers in the Exxon Chemicals Plant Area were recently separated from the wastewater treatment system at the Bayonne Plant, and their contents drain to the wastewater separator in the Exxon Chemicals Plant Area.

The Exxon Chemicals Plant Area railroad car transfer areas are located south of the tank farm areas. The larger transfer area consists of four railroad spurs that terminate on a bermed and paved concrete area. A smaller transfer area, which is next to the former Exxon Chemicals Plant Area warehouse, consists of one railroad spur that terminates on a paved area. There are 12 tank truck loading/unloading areas in the Exxon Chemicals Plant Area. These areas are all paved with concrete.

In the 1920s and 1930s, the entire Exxon Chemicals Plant Area was occupied by rows of crude stills. The crude stills were replaced by more modern pipe stills located in other parts of the Site, and by 1940, a large portion of the Exxon Chemicals Plant Area was vacant. Process operations in 1940 included lube oil additive manufacturing at the Paraflow and Parapoid

Plants. Tanks, a cooling tower, and a pump house were associated with these plants. By 1947, a series of ASTs, which may have been associated with the inert gas plant, were located in the southern part of the area. Between 1951 and 1959, a group of tanks used for blending was constructed in the southwestern part of the Exxon Chemicals Plant Area. Between 1959 and 1970, operations did not change appreciably. Before 1970 and after 1974, many of the process area structures in the eastern portion of the Exxon Chemicals Plant Area were dismantled. Operations continued throughout the remainder of the Plant's existence.

5.1.7.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes at the Exxon Chemicals Plant Area. As seen in the 1940 photograph, the northern edge of the area contained a row of storage tanks, 40 to 60 feet in diameter and 10 feet in height. The tanks were enclosed by earthen fire banks; their contents are unknown. The central part of the area was occupied by the Paraflow Plant and the Parapoid Plant. The southern part of the area was vacant, except for several railroad spurs. Light-colored rectangular patterns in the fill-like soil in this area were the remnants of rows of crude stills that operated in the 1920s and 1930s.

In the 1947 aerial photograph, four tanks in the northwestern part of the Exxon Chemicals Plant Area had been removed and replaced by two light-colored rectangular racks. South of the racks, six or twelve asphalt stills were in place. The railroad tracks and roadways in this area had been modified. Approximately 13 small ASTs, several sheds, and a mason building were located in the southern part of the area. Railroad cars were parked on the spurs in this area; one spur was called the Chlorine Car Yard. The area did not appear to have changed appreciably in the 1951 photograph.

Modifications to the Exxon Chemicals Plant Area were observed in the 1959 aerial photograph. The line of tanks along the northern edge of the area had been removed and a group of 14 small tanks had been constructed in the southwestern part of the area. In the northwestern end of the area, a light-colored building had been constructed. A smaller building adjacent to this large building may have been used for hazardous materials storage. Both of these buildings still exist.

A review of the 1961, 1963, 1966, 1968, and 1970 aerial photographs shows that the area exhibited the same configuration as in 1959. A rectangular, light-colored reactor building had been constructed in the northwestern part of the area (1961 photograph), and the storage building at the western end of the area had been enlarged (1968 photograph).

In the 1974 aerial photograph, the Exxon Chemicals Plant Area had been modified. The process area structures in the eastern portion of this area had been dismantled. The Exxon Chemicals Plant Area appeared unchanged in 1979 and 1984, but in 1989, the Exxon Chemicals Plant Area had undergone some modifications in the central western portion of the area. A boiler house complex, consisting of six buildings, had been constructed. The area exhibited the same features in the 1991 photograph as in the 1989 photograph. Since 1991, many of the structures in the Exxon Chemicals Plant Area have been dismantled.

5.1.7.4 Discharges, Spills, and Releases

Seven spills greater than 100 gallons have been documented at the Exxon Chemicals Plant Area. The materials spilled have been a variety of Exxon formulas, cyclohexane, and slop oil (Table 5-2). The volume of spills ranged from 100 to 6,000 gallons and occurred at various locations within the Exxon Chemicals Plant Area (Figure 5-7). The volume of napthalene released as a result of an explosion that occurred at Tank 727 is not known.

5.1.7.5 Areas of Potential Contamination

Areas of potential contamination at the Exxon Chemicals Plant Area include ASTs, USTs, former chromium slag depositional areas, drum storage areas, loading/unloading areas, process areas, sumps, a former acid neutralization pit, a former cesium vault, and sewers and septic systems.

5.1.7.5.1 Aboveground Storage Tanks

Many of the ASTs in the Exxon Chemical Plant Area were dismantled between 1991 and 1993. In 1991, as many as 95 ASTs were located in this area. Most of the tanks ranged in size from 10 to 20 feet in diameter and from 20 to 30 feet in height. The tanks generally contained oils and solvents used for blending specialty products. Five spills greater than 100 gallons have been documented from tanks in this area (Table 5-2). The largest spill occurred in 1988 when 6,000 gallons of cyclohexane spilled from Tank 736. A naphthalene explosion also occurred at the former Tank 727 location. Four groups of small tanks located in this area were removed in the 1950s. One large storage tank was located in the northwestern part of the area from 1921 to 1959. Three former pump houses were located in this area. The Plant Pump House No. 31 associated with the No. 3 Plant was located in the northwestern part of this area from 1945 to 1951. From 1932 to 1951, Pump House No. 31A was located in the southern part of the area and another pump house was located in the northwestern part of the area.

5.1.7.5.2 Underground Storage Tanks

Two collection sumps were located at the Exxon Chemicals Plant Area (Figure 5-7). One of the sumps (E2) was approximately 4,210 gallons in capacity and was used to collect de-minimis spillage of lube oil additives from disconnecting hoses. The other sump (E4) was approximately 6,824 gallons in capacity and was used to contain de-minimis spills of transmission fluid from disconnecting hoses. The sumps were registered with the NJDEP Bureau of Underground Storage Tanks (BUST) in 1992 when it was discovered that they met the regulatory definition of USTs. Their date of installation, status, and condition are not known (Table 5-3).

5.1.7.5.3 Former Chromium Slag Depositional Areas

Based on review of aerial photographs and discussions with site personnel, chromium slag is not known to have been deposited in the Exxon Chemicals Plant Area. Based on the results of the IRM investigations to address chromium contamination, chromium slag was observed along the eastern edge of the Exxon Chemicals Plant Area and on a small portion of the railroad tracks in the southwest corner (ICF Kaiser Engineers, Inc. 1993).

5.1.7.5.4 Drum Storage Areas

The Occipular Co-Polymer (OCP) Warehouse, located in the western part of the Exxon Chemicals Plant Area, is used for drum storage (Figure 5-7). A toxic materials storage area was located adjacent to this warehouse in 1959 and may have also contained drums. The Paramins Store House in the northwestern corner of the area was recently converted to truck storage but was formerly a chemical storage area.

5.1.7.5.5 Loading/Unloading Areas

Six past or present truck loading/unloading areas and four railroad tank car loading/unloading areas have been identified in the Exxon Chemicals Plant Area (Figure 5-7). Railroad car loading areas are located along the southern edge of the Exxon Chemicals Plant Area, and in 1989 included a chlorine tank car rack and an ATF tank car rack. A 40-car rack was also located in this area in 1945. The current truck and tank car racks in this area probably load and unload products from the Blending and Products Tanks located in the center of the Exxon Chemicals Plant. Another truck rack services the Exxon Chemical Waste Treatment Plant in the southwestern corner of the area. Two other truck racks are located along the northeastern boundary of this area.

5.1.7.5.6 Process Areas

Blending of specialty products is the main process conducted at the Exxon Chemicals Plant Area. In addition to several densely grouped AST areas in which most blending operations take place, the only distinct process area is the Reactor Building, which was recently dismantled. Historically, several major process areas at the Bayonne Plant were located in the Chemical Plant Area (Figure 5-7).

In 1921, the area was occupied by crude stills that consisted of rows of heated tanks, each tank drawing lighter fractions of oil off of the previous tank. Asphalt stills were located in the central part of the area from 1945 to 1959. Several pipe stills, including the "B" Pipe Still from 1928 to 1960 and the No. 1 Pipe Still from 1960 to 1970, were located in the eastern part of the area. The Paraflow Plant from 1940 to 1961, the Parapoid Plant from 1931 to 1959, and the Paraflow Stills in 1960, were all located in the central southern part of the Chemical Plant. The No. 2 Power Plant was located in the northwestern part of the area from 1921 to 1951. A filling shed was located in the central part of the area in 1945, and an automatic transmission fluid blending shed was located in the eastern part of the area in 1989. Chlorination facilities and a hydrochloric acid (HCl) recovery unit were located in the central part of the area from 1960 to 1970. The Reactor Building in the central part of the area was recently dismantled.

5.1.7.5.7 Sumps

Two concrete sumps were located in the Exxon Chemicals Plant Area; as described earlier, these sumps met the regulatory definition of USTs (Figure 5-7). The sumps had individual capacities of approximately 4,210 gallons and 6,824 gallons, and were used to contain de-minimis spills of lube oil additives and transmission fluids, respectively, from disconnecting hoses. The status and condition of the sumps are not known.

5.1.7.5.8 Former Acid Neutralization Pit

An acid neutralization pit was located in the southern portion of the Exxon Chemicals Plant Area from 1945 to 1958 (Figure 5-7). The neutralization pit reportedly consisted of a concrete-lined pit to which acid effluent from the HCl scrubber unit was discharged. The wastewater was neutralized with lime and subsequently discharged to the sewer system.

5.1.7.5.9 Former Cesium Vault

In the 1960s, the Exxon Chemicals Plant Area developed a process for making highly biodegradable detergent in which the petroleum feed stock used for the detergent was first exposed to gamma rays from a Cobalt 60 source. The cobalt source was stored in a lead encasement housed in a concrete-walled aboveground vault located in the central part of the area (Figure 5-7). The vault and the cobalt, which decayed to cesium, are no longer in use and have been removed from the Plant. The vault is often referred to as the cesium vault.

5.1.7.5.10 Sewers and Septic Systems

The only subsurface process wastewater sewer lines at the Bayonne Plant are located within the Exxon Chemical Americas Paramins Plant, which is a section of the Exxon Chemicals Plant Area. While the Exxon Chemicals Plant Area was in operation, process waste was collected via a system of catch basins and was routed to a small treatment plant in the Exxon Chemicals Plant Area. This system is entirely separate from the storm-water treatment system within the Bayonne Plant. The treatment plant consists of an oil/water separator. The effluent generated at the treatment plant was trucked to the Exxon Bayway Refinery in Linden for treatment in the Bayway Refinery's secondary wastewater treatment plant prior to being discharged to the Arthur Kill under a NJPDES-DSW Permit. Although the Exxon Chemicals Plant Area operates as a separate entity from the rest of the Bayonne Plant, the storm-water drainage system in this area is part of the site-wide storm-water system.

Three septic systems are located within the Exxon Chemicals Plant (Figure 5-2). The septic systems are associated with the Paramins Store House in the northwestern corner of the area, the No. 2 Field Office in the northwestern part of the area, and the Reactor Building (now dismantled) in the central northern part of the area.

5.1.7.6 IRM Activities

IRM investigations that were conducted or that are currently being conducted in the Exxon Chemicals Plant Area are associated with chromium slag, NAPL, and the sewer system. In 1993, ICF Kaiser collected four soil samples to evaluate the potential environmental impact from chromium slag (ICF Kaiser Engineers, Inc. 1993). Total chromium concentrations in these four samples were below 500 mg/kg (9.7 to 218 mg/kg).

Two existing monitoring wells are located in the Exxon Chemicals Plant Area (Table 5-5). NAPL thicknesses measured in these wells were generally less than 2 feet (Dan Raviv Associates, Inc. 1993d). Geraghty & Miller recently conducted an IRM investigation in the Exxon Chemicals Plant Area; this investigation was called the Exxon Chemical Plant IRM, although the field work was actually conducted in the adjacent Utilities Area. The investigation involved the drilling of three soil borings along the southern boundary of the area to evaluate the presence and potential for off-site migration of NAPL. One soil boring that exhibited floating NAPL was converted to a monitoring well. Additional IRM activities, such as a tidal study, bail-down tests, NAPL recovery tests, step-drawdown tests, and NAPL sampling may be conducted, if warranted, following the completion of the drilling program.

The IRM investigations of the sewer system are being completed by IT Corporation at the Bayonne Plant. The sewer system evaluation involves the cleaning and videotaping of the Plant sewer lines.

5.1.8 No. 3 Tank Field

A description of the No. 3 Tank Field and details of its history and operations are presented below.

5.1.8.1 Description and Boundaries

The No. 3 Tank Field is located in the south-central part of the Plant and comprises 21 acres bounded by the Exxon Chemicals Plant Area and the Asphalt Plant Area to the north; Amerada Hess Corporation and Lower Hook Road to the east; Powell Duffryn Terminal, G&B Packaging Company, Inc. and Rafaella to the south; and P.D.Q. Plastic to the west (Figure 5-8).

5.1.8.2 Operations, Raw Materials, and Products

The No. 3 Tank Field consists of nine tanks in three bermed areas. The tanks range in capacity from 24,447 to 114,680 barrels and contain gasoline, hydrotreated light naphtha, light naphtha, asphalt, and residual fuel oil.

Since 1940, the No. 3 Tank Field has been used for storage of various liquid products. Other than the addition and removal of various tanks, operations have not changed appreciably. An oil/water separator existed in the southeastern portion of the No. 3 Tank Field prior to 1940 and was used until approximately 1970. It was removed from the area between 1970 and 1974.

5.1.8.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes at the No. 3 Tank Field. In the 1940 aerial photograph, the No. 3 Tank Field contained ten large storage tanks, each 91 to 115 feet in diameter and 30 to 40 feet in height, enclosed by earthen fire banks. A large, concrete, multi-channel oil/water separator was located on the eastern side of the area with three adjacent small tanks. Two tanks, one 50 feet in diameter and 42 feet in height, and the other 35 feet in diameter and 4 feet in height and containing slop oil, were located in the southeastern corner of the area. A small building and small tank were located in the northeastern part of the area, which was otherwise unoccupied. A row of 13 storage tanks, each 40 to 60 feet in diameter and 11 to 42 feet in height, was located along the northwestern edge of the area. An oil/water separator was located just outside the area, adjacent to the westernmost tank. South of this row of tanks, and north of the large storage tanks, was a storage area possibly used for trucks.

The No. 3 Tank Field exhibited the same configuration in the 1947 photograph as in the 1940 photograph. However, five of the thirteen tanks along the northwestern edge of the area had been removed, and two small tanks in this group had been replaced with one slightly larger tank. The small building and tank in the northeastern corner of the area had been removed. The storage area between the two groups of tanks was still in use and was full of materials, possibly drums.

The No. 3 Tank Field did not change appreciably in the 1951 photograph. One large floating top tank had been built; ten tanks had been painted; and one tank in the line of tanks along the northern side of the area had been removed.

A review of the 1959 photograph shows that the area had been significantly modified since 1951. The group of eight storage tanks in the southwestern part of the area had been replaced by five larger and more modern tanks, each 120 feet in diameter. At least four of these five tanks had floating roofs. Three of the smaller tanks in the northern part of this area had been removed. Tanks 901, 902, and 903, each 60 feet in diameter, had been constructed in the northeastern corner of the area.

The 1961, 1963, 1966, 1968, and 1970 aerial photographs showed essentially the same configuration as in 1959 with a few modifications. Three of the five small storage tanks along the northwestern edge of this area had been removed (1963 photograph). Some filling had occurred south of the separator (1966 photograph). The small tanks adjacent to the oil/water separator, located in the southeastern part of this area, had been removed (1970 photograph).

In the 1974 aerial photograph, two tanks in the southeastern part of the No. 3 Tank Field had been eliminated and the oil/water separator was no longer present. In 1977, preload material had been placed in the southeastern part of the tank field.

The area exhibited the same configuration in the 1984 photograph as in the 1977 photograph. The preloading in the southeastern portion of this area had subsided, but it was still in place. In the 1989 photograph, the preload area had been leveled. The area exhibited the same features in the 1991 aerial photograph as in 1989.

5.1.8.4 Discharges, Spills, and Releases

Two spills greater than 100 gallons has been reported at the No. 3 Tank Field (Figure 5-8). One spill occurred in 1988. This spill originated at Tank 920 and consisted of 500 gallons of "F540" powerformer feed (Table 5-2). In 1978, during an inspection of Tank 916, several holes were noted in the bottom of the tank, indicating that a release of product had occurred in this area. Currently there are no monitoring wells in this area; however, oil-saturated soil was observed in a boring in the southeastern portion of the area (ICF Kaiser Engineers, Inc. 1992).

5.1.8.5 Areas of Potential Contamination

Areas of potential contamination at the No. 3 Tank Field include ASTs, former chromium slag depositional areas, oil/water separators, and the sewers and septic systems.

5.1.8.5.1 Aboveground Storage Tanks

Nine ASTs are currently located in the No. 3 Tank Field. Six large tanks, each 120 feet in diameter, occupy the western and southern portion of the area. Three smaller tanks, each 60 feet in diameter, occupy the northeastern corner of the area called the Steam Gas and Energy Management (SGEM) Tank Field. The tanks currently contain, or have recently contained, the following materials: asphalt, powerformer feed, methyl tertiary butyl ether (MTBE), gasoline, heating oil, and water.

The one documented spill in this area occurred in 1988 when 500 gallons of "F540," powerformer feed spilled from Tank 920. Tank 920 is known to have contained MTBE in 1991

(Table 5-1). From 1921 to 1951, the former Klondike Tank Field was located in the southern portion of the No. 3 Tank Field and contained eight ASTs with unknown contents. Two other ASTs were located along the southeastern edge of the area from 1921 to 1970, and a third AST was present there from 1932 to 1968. Three lines of small ASTs were historically located within the No. 3 Tank Field. In 1921, a line of six tanks was located southwest of and adjacent to the present-day SGEM Tank Field in the northeastern part of the area. Four tanks were located next to a large oil/water separator in the central eastern part of the area from 1921 to 1968. Three to fourteen tanks were located in the northwestern part of the area from 1921 to 1961 and may have been associated with the lines of crude stills located at that time in the Exxon Chemicals Plant Area to the north. The only known pump house in this area is the IRPL pump pad located along the northern side of the area.

5.1.8.5.2 Former Chromium Slag Depositional Areas

Chromium slag was used in the No. 3 Tank Field for berms, general grading, and site preparation (Esso Standard Oil Company, 1957a). As shown on Figure 5-8, ICF Kaiser classified the entire area as having a high density of visible chromium slag (ICF Kaiser Engineers, Inc. 1993).

5.1.8.5.3 Oil/Water Separators

A 210 foot long oil/water separator was located in the eastern part of the No. 3 Tank Field from 1915 to 1970. It was called the No. 3 Plant Separator and was probably constructed of concrete. This separator had several small tanks for storing waste oil and discharged effluent to the Kill Van Kull Waterway to the south.

5.1.8.5.4 Sewers and Septic Systems

A network of gravity-driven sewers drain storm-water from the No. 3 Tank Field collected by tank berm catch basins. The sewers vary in construction. Storm-water from this area drains to the East Side Treatment Plant.

5.1.8.6 IRM Activities

IRM activities that were conducted or are currently being conducted in the No. 3 Tank Field are related to the delineation of chromium slag and NAPL and to investigation of the sewer system. In 1993, ICF Kaiser collected 18 soil samples to evaluate the extent of chromium slag in the No. 3 Tank Field. Half of the soil samples had total chromium concentrations above 500 mg/kg (619 to 9,220 mg/kg) and half had concentrations below 500 mg/kg (48.2 to 469 mg/kg).

Geraghty & Miller recently conducted a NAPL IRM investigation in the No. 3 Tank Field. The investigation involved the drilling of four soil borings along the southern boundary of the area. Two soil borings that encountered floating NAPL were converted into monitoring wells. Additional studies, including a tidal study, bail-down tests, NAPL recovery tests, and step-drawdown tests, may be conducted, if warranted, based on the results of the drilling program.

IT Corporation is currently conducting a sewer IRM investigation that involves the cleaning and inspection of sewer lines at the Bayonne Plant. The results of the sewer system evaluation are not yet available.

5.1.9 General Tank Field

A description of the General Tank Field and details of its history and operations are provided below.

5.1.9.1 Description and Boundaries

The General Tank Field is located in the northeastern part of the Site and comprises 37 acres bounded by Public Service Electric and Gas (PSE&G) to the north, the Upper New York Bay and the Piers and East Side Treatment Plant Area to the east, the railroad tracks and the Solvent Tank Field to the south, and Lower Hook Road and the Domestic Trade Area to the west (Figure 5-9).

5.1.9.2 Operations, Raw Materials, and Products

The General Tank Field consists of 13 tanks in two secondary containment areas. The tanks range in capacity from 85,159 to 170,000 barrels and currently contain No. 2 heating oil and storm-water. Because the dikes between the two bermed areas have been lowered, a single containment area has effectively been formed. This area has been used as a tank field since at least 1925. In 1940, the only buildings located in this area were in the south-central part and included a utilities office store room and a general pump house. A valve pit and manifold pit, both large and rectangular, were also in this area; the function of these pits is not known. In addition, the northwestern portion of the General Tank Field was part of the Bayonne Municipal Dump from the 1940s to 1968.

5.1.9.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes at the General Tank Field. In the 1940 aerial photograph, eight large ASTs, each 120 feet in diameter and 42 feet in height, were located in the central and western part of the General Tank Field. The tanks were constructed in 1925. Six of the tanks, Tanks 1053 through 1058, still exist today. Their contents in 1940 are unknown. Other features in the 1940 photograph included a pipeline that extended east to west across the southern part of the area. Two smaller tanks, each approximately 40 feet in diameter, were also in the General Tank Field. The eastern side of the General Tank Field was unoccupied in 1940; the soil within the tank field was medium colored and covered with light vegetation, resembling other areas near the shore line, east of the tank field. One distinct area on the western edge of the General Tank Field was light-colored to white and may have been recently filled. The filled area is located at, and extends north of, the present-day location of Tank 1072 (Figure 5-9). A former lead-contaminated separator sludge dump is suspected to be located in this approximate area, and later aerial photographs indicated filling activity and the presence of ponded liquid in this location. It is not known what fill materials were used throughout the General Tank Field prior to the construction of the tanks present in 1940.

In the 1947 aerial photograph, the General Tank Field exhibited the same configuration as in 1940. The eight large tanks had coned roofs. Two small tanks had been removed. A parking area was in place in the southwestern corner. Roadways had been constructed around the perimeter of the General Tank Field, and a major roadway, Lower Hook Road, had been constructed along the southwestern border. This road provided access to the fill area in the northwestern part of the General Tank Field. Filling activity at this time was increased compared to 1940. The area exhibited the same configuration in the 1951 photograph as in the 1947 photograph. Filling activity continued in the northern outskirts of the area.

In the 1959 photograph, the General Tank Field was significantly modified since 1951. The eight existing tanks had been painted. Five large storage tanks, each 150 feet in diameter and 50 feet in height, had been constructed along the southern edge of the area and were in the process of being painted. Some filling activity had occurred on the eastern side of the General Tank Field. The area being filled on the western side of the operational area had a dark area that may represent ponded liquid. An overhead pipeline/rack ran along the southern edge of the area (the pipeline had existed earlier, but was less visible).

A review of aerial photographs from 1961, 1963, 1966, and 1968 showed that the General Tank Field exhibited the same configuration as in 1961. Filling activity had continued on the eastern and western boundaries of the area. Trucks and sheds occupied the southeastern part of the area (1966 photograph). The filling area in the northwestern part of the area was somewhat graded, and filling may have ceased (1968 photograph).

The 1970 aerial photograph showed that the General Tank Field had been modified since 1968; the current boundaries of the northwestern part were visible. One large storage tank was in the process of being constructed in the northwestern part of this area, and other tank foundations were being built.

In the 1974 photograph, the General Tank Field exhibited the same configuration as in 1970; however, the tank that was being constructed in the 1970 photograph had been completed and one additional tank had been built. A large pile of soil was located near the tanks; this soil was the preload material for building another tank. In the 1977 aerial photograph, one tank in the southwestern part of the area had been removed and a large pile of soil was in its place (preload for future tank construction).

In the 1984 photograph, the large pile of preload material that had been in place in the southwestern part of the General Tank Field had subsided significantly and had been leveled off. A small area was being filled to the north of Tanks 1072 and 1073 in the northwestern corner of the area. Significant vegetation was present in the surrounding areas. Review of the 1989 and 1991 aerial photographs showed that the area did not change appreciably since 1984.

5.1.9.4 Discharges, Spills, and Releases

Two spills, one of oil and the other of oily sludge, in excess of 100 gallons have been documented in the General Tank Field. Both spills occurred in 1990. The spills consisted of approximately 300 gallons of oil, which was released from Tank 1058, and approximately 1,000 gallons of oily sludge spilled in the vicinity of Tank 1059 (Table 5-2).

5.1.9.5 Areas of Potential Contamination

Areas of potential contamination at the General Tank Field include ASTs, former chromium slag depositional areas, transformers, oil/water separators, a portion of the former Bayonne Municipal Dump, a former lead-contaminated separator sludge dump, and sewers and septic systems.

5.1.9.5.1 Aboveground Storage Tanks

The General Tank Field currently contains 14 ASTs that range in capacity from 85,159 to 170,000 barrels. The tanks in the central and northeastern portion of the tank field were constructed in 1925; the tanks along the southern edge were constructed in 1958; and the tanks in the western part were constructed in 1967. The No. 9 Pump House, constructed in 1925, was located in the southern central part of the tank field until 1951. The ASTs have stored products such as diesel fuel, residual fuel oil, No. 2 heating oil, and turbo fuel A. In recent years, the tanks have stored only No. 2 fuel oil and storm-water. Two documented spills occurred in 1990 in the General Tank Field. Three hundred gallons of oil were spilled from Tank 1058, and 1,000 gallons of oily sludge were spilled from Tank 1059 (Table 5-2). Tank 1059 was removed in 1991.

5.1.9.5.2 Former Chromium Slag Depositional Areas

Based on aerial photograph interpretation and discussions with Plant personnel, chromium slag was used as preload for one known tank site (Tank 1060) in the General Tank Field (Esso Standard Oil Company 1957a). Based on the results of chromium IRM investigations, the highest density of chromium slag was found along the berms (ICF Kaiser Engineers, Inc. 1993). The results suggest that the slag was used to construct the berms in the General Tank Field.

5.1.9.5.3 Transformers

One transformer (Substation A-2) is currently in use at the General Tank Field (Figure 5-9). A second transformer (Substation No. 8) was located at the southeast end of the area. This transformer was removed in 1989. The operational history and PCB content of these transformers is unknown.

5.1.9.5.4 Former Lead-Contaminated Separator Sludge Dump and Bayonne Municipal Dump

Parcels of land in the northwestern portion of the General Tank Field were purchased in 1968 and 1969 from the City of Bayonne. The city operated a municipal dump on Constable Hook in the areas to the north and northwest of the General Tank Field from the 1940s to 1968. Aerial photographs from the 1940s and 1950s indicate that this area was being filled and that ponded liquids existed within the fill area. The lead-contaminated separator sludge dump is a CERCLA registered, 1-acre, abandoned open dump and lead-contaminated sludge residue disposal site that has been documented by Exxon Company, U.S.A. (1980 and 1982) (see Appendix I). The sludge was derived from oil/water separator bottoms contaminated with lead. The disposal site was located in the northwestern corner of the General Tank Field, north of Tank 1072, and was reportedly active from approximately 1956 to 1965 (Figure 5-9) (Exxon Company, U.S.A. 1980). A portion of the northwestern quarter of the tank field was also used at one time as a fire training field. Fire training exercises probably involved staging tank fires with burning oil.

5.1.9.5.5 Sewers and Septic Systems

A review of historical information indicates that storm-water sewers were present in the General Tank Field in 1945 (Esso Standard Oil Company 1945). Existing storm sewers in the General Tank Field transmit surface-water runoff collected in catch basins within the bermed areas to the East Side Treatment Plant (Figure 5-9). There are no septic systems at the General Tank Field.

5.1.9.6 IRM Activities

IRM investigations were conducted or are currently being performed in the General Tank Field. The intent of the IRMs is to address chromium contamination, NAPL, and the sewer system, to prevent and mitigate off-site migration of any associated contamination. In 1993, ICF Kaiser collected 38 soil samples for evaluation of potential environmental impact from the historical deposition of chromium slag in this area. Eight samples had total chromium concentrations above 500 mg/kg (625 to 5,620 mg/kg). Concentrations of the other samples ranged from 4.4 to 197 mg/kg.

Geraghty & Miller recently conducted a NAPL IRM investigation in the General Tank Field. The investigation involved the drilling of 18 soil borings along the perimeter of the tank field. At one location where a soil boring encountered residual hydrocarbon, a monitoring well was installed. A tidal study, bail-down tests, NAPL recovery tests, step-drawdown tests, and NAPL sampling may also be conducted, if warranted, based on the results of the drilling and monitoring well installation program.

IT Corporation is currently in the process of conducting a field evaluation of the sewers at the Bayonne Plant. The sewer IRM includes cleaning, inspection, and videotaping of sewer piping. The results of the field evaluation are not yet available.

5.1.10 Solvent Tank Field

A description of the Solvent Tank Field and details of its history and operations are provided below.

5.1.10.1 Description and Boundaries

The Solvent Tank Field (currently inactive) is located in the eastern part of the Site and comprises 14 acres bounded by railroad tracks and the General Tank Field to the north; the Piers and East Side Treatment Plant Area to the east; the Low Sulfur Tank Field to the south; and the Domestic Trade Area, railroad tracks, and Gate F to the west (Figure 5-10).

5.1.10.2 Operations, Raw Materials, and Products

The Solvent Tank Field consists of 18 tanks in two bermed areas. The tanks have capacities ranging from 170 to 33,281 barrels and contain various blends of aliphatic and aromatic solvents.

The solvent railroad car transfer area is located immediately north of the Solvent Tank Field. The transfer area consists of three railroad spurs that terminate on a gravel area. There are two railroad car loading/unloading areas on these railroad spurs, one to the east and one to the west. The western transfer area has not been active for several years. The transfer area is currently used as a railroad car storage area.

Since 1923, Solvent Tank Field operations have remained essentially unchanged. Some tanks and structures have been added or removed.

5.1.10.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate the history and development of the Solvent Tank Field. In the 1940 photograph, the western part of the Solvent Tank Field contained a line of four storage tanks, each 73 feet in diameter and 42 feet in height, that were built in 1923. The central and eastern part of the Solvent Tank Field contained 26 smaller tanks, each 15 to 35 feet in diameter, configured in four groups. These smaller tanks were tall, with heights greater than or equaling the diameter. The group of tanks in the southeastern corner of the Solvent Tank Field was called the Lower Hook NAP (Naphthenic) Acid Tank Field. Several pump houses and manifold pits had been located in the southern central part of the area.

The area exhibited the same configuration in the 1947, 1951, and 1959 aerial photographs; however, several tanks appeared to have been recently painted. Three small tanks in the central part of the area had been removed (1947 photograph). In the 1961 aerial photograph, four small tanks were present along the northern boundary and eight small to medium tanks had been removed in the central eastern part of the area.

As observed in the 1963 aerial photograph, the tank field had been significantly modified. Nine small tanks in the central part of the area had been removed and replaced by ten tanks that still exist in 1994. Most of these new tanks were 40 feet in diameter and 48 feet in height. The truck loading rack and control house buildings had been constructed in the eastern part of the area.

In the 1966 aerial photograph, three small tanks in the western end of the tank field had been removed. In the 1968 photograph, Tank 1037 was added to the central portion and the drum building had been built in the southeastern portion of the area. Aerial photographs from 1970, 1974, 1977, 1984, 1989, and 1991 showed no appreciable changes in the Solvent Tank Field.

5.1.10.4 Discharges, Spills, and Releases

Three spills greater than 100 gallons have been documented in the Solvent Tank Field Area (Table 5-2). In 1982, approximately 92,400 gallons of Isopar L, a heavy naphtha, was reported to have been released in the vicinity of Tank 1033. In 1990, a 1,114-gallon spill of xylene occurred at the trucking loading rack in the vicinity of the Control House. In 1992, a release of heavy fuel oil and diesel was reported to have occurred in an area to the north of the Low Sulfur Tank Field; however, the exact location of this spill could not be ascertained. The material was identified as Isopar L, a heavy naphtha.

5.1.10.5 Areas of Potential Contamination

Areas of potential contamination at the Solvent Tank Field include ASTs, USTs, former chromium slag depositional areas, drum storage areas, loading/unloading areas, transformers, former process areas, and sewers and septic systems.

5.1.10.5.1 Aboveground Storage Tanks

Eighteen ASTs are located in the central and western sections of the Solvent Tank Field; all are currently inactive. These tanks contained various proprietary solvents and other volatile products. The ASTs can be divided into two groups based on size and orientation, although their use and contents were probably the same. Five tanks, 70 to 75 feet in diameter, are orientated in a row located in the western part of the area. Four of these tanks were constructed in 1923. Thirteen smaller tanks, ranging in size from 15 to 60 feet in diameter, are located in the central part of the area. All of the tanks are enclosed by a single earthen firebank. The western and central parts of the Solvent Tank Field have been occupied by ASTs since the 1920s. From 1923 to 1963, three to four small tanks were located in the western corner of the area in addition to the larger tanks that are currently located in that area. From 1921 to 1959, eight to 13 tanks, each approximately 10 to 35 feet in diameter, were located in the southern central part of the Solvent Tank Field. The Varnish Makers and Painters (VM&P) Pump House (No. 8) was located within this group of tanks in the Solvent Tank Field from 1932 to 1951, and another pump house was situated near these tanks from 1932 to 1959. Five to nine small ASTS, each approximately 35 feet in diameter, were located in the northern central part of the area from 1921 to 1961. The Lower Hook Nap Acid Tank Field, which consisted of ten small tanks, was located in the eastern part of the area from 1921 to 1992. A pump house was located within this group of tanks from 1932 to 1961. Two other pump houses were located in the southeastern part of the area, the Constable Hook Pump House (No. 7) from 1940 to 1961 and the Case & Can Pump House (No. 10) from 1893 to 1961.

5.1.10.5.2 Underground Storage Tanks

One 2,000-gallon UST was known to have been located at the Solvent Filling Building. This tank was referred to as the "light oil sump" or Tank 002. The tank was installed in 1973 and collected a variety of solvents from drum filling operations (Table 5-3). Integrity testing was performed on the UST in 1989; the UST failed the test, and it was excavated in 1992. During excavation, contamination was observed. Investigation of the residual contamination associated with the former UST was deferred pending the issuance of the ACO. Residual contamination will be addressed as part of site-wide RI activities.

5.1.10.5.3 Former Chromium Slag Depositional Areas

Based on a review of aerial photographs and discussions with Plant personnel, chromium slag is not specifically known to have been deposited in the area of the Solvent Tank Field. Based on the results of IRM soil sampling and visual inspections, several berms in the center of the Solvent Tank Field, near Tanks 1025 and 1026, and near Tanks 1033, 1034, 1048, and 1049 indicate the presence of chromium slag (Figure 5-10) (ICF Kaiser Engineers, Inc. 1993).

5.1.10.5.4 Drum Storage Areas

The Solvent Drum Filling Building, constructed in 1963, is located in the southern corner of the Solvent Tank Field. This facility is used for packaging solvents for distribution.

5.1.10.5.5. Loading/Unloading Areas

Several loading/unloading areas have been located in the Solvent Tank Field. Between 1945 and 1981, up to three railroad car loading/unloading areas were located along the railroad spur that borders the northern perimeter of the area. A solvents truck rack was located in the southern central part of the area in 1961.

5.1.10.5.6 Transformers

Three substations (A-3, A-4, and A-5) are present in the Solvent Tank Field (Figure 5-10). One of the transformers located at Substation A-3 was found to contain PCB oils. The unit was dechlorinated in December 1986 and was removed at some undetermined date after 1986 (Table 5-4). Existing transformers at the Plant are not known to contain PCB oils.

5.1.10.5.7 Former Process Areas

The Former Lower Hook NAP Acid Tank Field, which contained eight ASTs, each approximately 30 feet in diameter, was located in the eastern part of the Solvent Tank Field from 1921 to 1992. These tanks were used to store recovered oil and heavy naphtha.

5.1.10.5.8 Sewers and Septic Systems

Review of a historical sewer map shows that sewers were present at the Solvent Tank Field in 1945 (Appendix J) (Esso Standard Oil Company 1945). The existing storm sewers in the Tank Field are routed to the East Side Treatment Plant. Two septic systems are present in the northeastern corner of the Solvent Tank Field. Each system has a septic tank with a 1,500-gallon capacity.

5.1.10.6 IRM Activities

IRM activities at the Solvent Tank Field include the evaluation of chromium slag, delineation of NAPL, and investigation of the sewers. In 1993, ICF Kaiser collected ten soil samples to assess the potential impact from chromium slag (ICF Kaiser Engineers, Inc. 1993). All samples had total chromium concentrations below 500 mg/kg (26.3 to 253 mg/kg). ICF Kaiser (1993) identified several areas (mainly berms) where there was a high density of chromium slag (Figure 5-10).

From May through August 1993, DRAI conducted a NAPL IRM investigation of the Low Sulfur and Solvent Tank Field Areas (Tank 1066) (Dan Raviv Associates, Inc. 1993b). The investigation included the installation of 12 monitoring wells, NAPL sampling, bail-down tests, NAPL recovery tests, and pumping tests. The results of the investigation indicated that most of the Low Sulfur Tank Field and a portion of the Solvent Tank Field were underlain by a NAPL plume. Two types of NAPL were encountered in the area, gasoline components and a more viscous brown NAPL. Nineteen monitoring wells exist in the area. Apparent NAPL thicknesses measured in these monitoring wells during the period of December 1991 through March 1993 ranged from 0.01 to 17.75 feet in the area (Dan Raviv Associates, Inc. 1993b). Geraghty & Miller subsequently conducted a technology evaluation that concluded that VER is the most feasible and preferable remedial option for the Tank 1066 area (Geraghty & Miller, Inc. 1994b). A pilot test of the VER system was conducted in June 1994 (Geraghty & Miller, Inc. 1994c).

IT Corporation is currently conducting an IRM field evaluation of the Plant sewer system. The results of the field evaluation are not yet available.

5.1.11 Low Sulfur Tank Field

A description of the Low Sulfur Tank Field and details of its history and operations are provided below.

5.1.11.1 Description and Boundaries

The Low Sulfur Tank Field is located in the east-central part of the Site and comprises 11 acres bounded by the Solvent Tank Fields to the north and east; the railroad tracks, the Constable Terminal Corporation and Grand Corrugated to the south; and the Gate "F" Area, railroad tracks, and Asphalt Plant Area to the west (Figure 5-11).

5.1.11.2 Operations, Raw Materials, and Products

The Low Sulfur Tank Field consists of six tanks in a single bermed area. Each tank contains residual fuel oil, has a capacity of approximately 170,000 barrels, and was constructed between 1967 and 1969. The Low Sulfur Tank Field has always been used as a tank field. More ASTs were present in 1940 than currently exist.

5.1.11.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate the changes in operations at the Low Sulfur Tank Field. As observed on the 1940 aerial photograph, there were many more tanks at the Low Sulfur Tank Field than there are today. There were 15 large ASTs, each 90 to 93 feet in diameter and 30 to 40 feet in height; one even larger tank, 115 feet in diameter and 40 feet in height; and 22 other tanks, each 20 to 60 feet in diameter. The tanks were enclosed in earthen fire banks and covered an area extending further to the east and to the west than the present-day tank field. Several tanks had floating roofs.

In the 1940 photograph, the group of large storage tanks in the Low Sulfur Tank Field extended westward and northward into the Solvent Tank Field. One large tank, 90 feet in diameter, and nine smaller tanks, each 15 to 25 feet in diameter, were located near the present-day Gate "F" area. A pump house and shed were located in the southern part of the Low Sulfur Tank Field. A small rectangular structure (possibly a truck rack) and an area of white fill (possibly a foundation) were located in the central part of this area. The northern half of this area was covered by railroad spurs running east to west, with several lines of parked tank cars. Pipelines connecting the Asphalt Plant Area, the Low Sulfur Tank Field, and the General Tank Field traversed the area.

The area exhibited the same configuration in the 1947 photograph as in the 1940 photograph. A 5,000-barrel Norton Spheroid had been constructed at the western end of this tank field in the Gate "F" area. The Gate "F" area appeared to be mostly paved and was intersected by several roadways. One small tank had been removed; one medium tank had also been removed, but its foundation was visible as a light-colored circle.

In the 1951 photograph, a small storage tank with a floating roof had been removed from the southeastern portion of the Site; the area was otherwise unchanged. In the 1959 photograph, the spheroid in the Gate "F" area to the west had been removed and replaced by a rectangular building, possibly a garage.

In the 1961 photograph, the only observed change was that six large storage tanks had been removed from the northern part of the tank field. In the 1963 photograph, the Low Sulfur Tank Field exhibited the same configuration as in 1961. Fill material was being placed in areas where tanks had been removed in 1961. The building at the Gate "F" area observed in the 1959 and 1961 aerial photographs had been removed.

In the 1966 aerial photograph, the area was substantially modified. All of the tanks except one had been removed and all structures at the Gate "F" area had been removed; land area, including the Gate "F" area, had been cleared and graded. By 1968, four large storage tanks, each 150 feet in diameter and 56 feet in height, had been constructed in the tank field and the last of the older tanks had been removed.

The only observed change in the 1970 photograph was that two additional tanks had been constructed. The area appeared essentially unchanged in the 1974, 1977, and 1984 photographs. The 1984 photograph showed that all the tanks were insulated with white Thermacon panels. In both the 1989 and 1991 photographs, the area exhibited the same configuration as in 1984; many cars were parked in the Gate "F" area.

5.1.11.4 Discharges, Spills, and Releases

One spill greater than 100 gallons has been documented in the Low Sulfur Tank Field (Table 5-2). The spill occurred in 1976, and consisted of approximately 142,800 gallons of No. 6 oil. The spill occurred in the vicinity of Tank 1069.

5.1.11.5 Areas of Potential Contamination

Areas of potential contamination include the ASTs, transformers, loading/unloading areas, and the sewers and septic systems. A description of these areas is provided below.

5.1.11.5.1 Aboveground Storage Tanks

Six large ASTs, each 150 feet in diameter, are located in the Low Sulfur Tank Field. These tanks were constructed between 1967 and 1969 and contain various fuel oils. From 1932 to 1966, up to 38 tanks were located in the area now occupied by the six large tanks. The Gasoline Car Rack Pump House (No. 6) was present in the area between at least 1932 through 1947. An Ethyl Mixing Pump House (No. 4) was located in the area from at least 1932 through 1959. A 5,000-gallon capacity Norton Spheroid was located in the northwestern corner of the area from at least 1947 through 1951.

5.1.11.5.2 Transformers

Substation C-2 is located at the south-central edge of the Low Sulfur Tank Field. One transformer (Substation No. 17) was found to contain PCBs. The transformer was dechlorinated in December 1986; approximately 110 gallons of PCB-containing oil were removed. According to information provided by Site personnel, the transformer is still in service (Table 5-4). No PCB-containing transformers are known to currently exist at the Bayonne Plant.

5.1.11.5.3 Loading/Unloading Areas

In 1932, a truck loading rack was located along the southern edge of the Low Sulfur Tank Field. A second truck loading rack was located in the northwestern corner of the area from at least 1959 through 1961.

5.1.11.5.4 Sewers and Septic Systems

Based on a review of historic information, sewers were present at the Low Sulfur Tank Field in 1945 (Esso Standard Oil Company 1945). Existing sewers discharge to the East Side Treatment Plant (Figure 5-11). There are no septic systems at the Low Sulfur Tank Field.

5.1.11.6 IRM Activities

IRM activities in the Low Sulfur Tank Field include the evaluation of chromium slag, the delineation of NAPL, and assessment of the sewer system. In 1993, ICF Kaiser collected five shallow soil samples to delineate the potential environmental impact of chromium slag (ICF Kaiser Engineers, Inc. 1993). Total chromium concentrations in the soil samples were below 500 mg/kg (15.4 to 104 mg/kg). Chromium slag nodules were not observed in the Low Sulfur Tank Field (ICF Kaiser Engineers, Inc. 1993).

In November 1992, a small, shallow interceptor trench was installed on the southwest side of Tank 1066 to intercept NAPL along the foundations of the tank. From May through August 1993, DRAI conducted an IRM investigation in the Low Sulfur and Solvent Tank Fields (Tank 1066). As previously described in Section 5.1.10 (Solvent Tank Field), the results of the investigation indicated that a NAPL plume of predominantly gasoline components is present on the groundwater in this area (Dan Raviv Associates, Inc. 1993b). The maximum apparent NAPL thickness measured in monitoring wells in the Tank 1066 area was approximately 12.50 feet (Table 5-5). In June 1994, Geraghty & Miller conducted a VER pilot test in the Tank 1066 area (Geraghty & Miller, Inc. 1994c). Geraghty & Miller is currently designing an IRM that will consist of a VER remedial system to recover the floating NAPL plume in the Tank 1066 area.

IT Corporation is in the process of conducting a field evaluation of plant sewers. The IRM field evaluation includes the cleaning and inspection of sewer piping. The results of the field evaluation are not yet available.

5.1.12 Piers and East Side Treatment Plant Area

A description of the Piers and East Side Treatment Plant Area and details of its history and operations are provided below.

5.1.12.1 Description and Boundaries

The Piers and East Side Treatment Plant Area is located in the eastern part of the Site and comprises 8 acres of land and additional riparian acreage. The area is bounded by Upper New York Bay on the north, east, and south; and the Solvent Tank Field to the west. The eastern boundary of the area coincides approximately with the pier line. This area includes Piers No. 6 and No. 7 (Figure 5-12).

5.1.12.2 Operations, Raw Materials, and Products

The Piers and East Side Treatment Plant Area contains eight small tanks in three bermed areas. The dates of construction of these tanks range from 1947 to 1991. Three of the tanks contain recycled oil. The East Side Treatment Plant, which receives wastewater from storm and process sewers throughout the Site, is also located in this area.

The solvent tank truck loading and unloading area consists of eight loading bays located east of the Solvent Tank Field. All loading rack activities are directed from the central control house, and products are transferred to or from the Solvent Tank Field and the AV-Gas Tank

Field via pipelines. A solvent drum filling and storage facility, which is currently idle, is also located in this area. Several large in-facility pipes run from Pier No. 6 and Pier No. 7 to various tank fields. There is a separate rack for emptying tank trucks near the railroad tracks. Operations have not changed appreciably since the 1940s. In the 1920s, a barrel operation was also present in the Pier No. 6 area.

5.1.12.3 Aerial Photograph Interpretation

Fourteen aerial photographs, spanning the time period from 1940 to 1991, were reviewed to evaluate changes in operations and structures at the Piers and East Side Treatment Plant Area. In the 1940 photograph, Pier No. 6 and Pier No. 7 were situated in their present locations. Pier No. 7 appeared to be a wider wooden structure. Several small ships were docked at Pier No. 7; this pier was serviced by railroad spurs. A large oil/water separator with an adjacent outfall basin was located on the northeastern point of land. Four small tanks, each 25 feet in diameter and 25 to 30 feet in height, stood in a line adjacent to the separator. Two small areas of white fill material were located adjacent to the separator and tanks. A large, light-colored barrel filling building was located partially in this area to the southwest. Although the shape of the shoreline has been slightly altered and large overhead pipelines were later added, the Piers and East Side Treatment Plant Area is similar today to its 1940 layout.

Part of this area was not shown in the 1947 photograph; however, most of this area exhibited the same configuration as in 1940. Pier No. 8, on the north side of the area, had been partially destroyed. In the 1951 photograph, the area was only slightly modified. The barrel filling building was partly dismantled and smaller. A large ship was docked at Pier No. 6.

Most of the area was not visible in the 1959 aerial photograph. Expanded overhead pipelines linked the piers in this area to the General and AV-Gas Tank Fields and the Asphalt Plant and Exxon Chemicals Plant Areas. The area had not changed appreciably in the 1961 and 1963 photographs. A large ship was docked at Pier No. 6 and a white plume, possibly steam, was visible near the shore on this pier (1963 photograph).

In the 1966 aerial photograph, the basin between the separator and Pier No. 7 had been removed and filled. A new basin or separator had been constructed to the south of the existing oil/water separator. No discharge lines from the separator and basin to the shore were visible. The pipelines leading to Pier No. 6 were covered by a light-colored roof structure. The Piers and East Side Treatment Plant were not visible in the 1968 photograph, but the area appeared unchanged in 1970.

In the 1974 aerial photograph, the area appeared to have been modified since 1970. The northernmost oil/water separator had been removed and only the oil/water separator that is presently in service was evident. Pier No. 7 had been modified and consisted of a narrow dock with block-like supports.

In the 1977 photograph, the Piers and East Side Treatment Plant were not visible. The 1984, 1989, and 1991 photographs showed that the area exhibited the same configuration as in 1974.

5.1.12.4 Discharges, Spills, and Releases

Seventeen spills greater than 100 gallons have been documented at the Piers and East Side Treatment Plant Area (Table 5-2). The spills have consisted of a variety of oils, fuels, and solvents. Many of these spills have occurred in the waterway.

5.1.12.5 Areas of Potential Contamination

The areas of potential contamination include the ASTs, former chromium slag depositional areas, oil/water separators, drum storage areas, loading/unloading areas, transformers, sumps, the East Side Treatment Plant, and sewers and septic systems.

5.1.12.5.1 Aboveground Storage Tanks

Eight small ASTs, each 20 feet or less in diameter, are currently located in the Piers and East Side Treatment Plant Area (Figure 5-12). Most of the ASTs contain recycle oil. A 100-gallon spill of blend oil occurred at Tank 1097 in the northern part of this area in 1991 (Table 5-2). A slop oil pump house was located in the northern central part of the area from 1932 to 1959.

5.1.12.5.2 Former Chromium Slag Depositional Areas

Based on aerial photograph interpretations, review of plant records, and discussions with Site personnel, there is no record of chromium slag deposition in the Piers and East Side Treatment Plant Area (Fairchild 1994c). However, based on the results of the IRM investigation of chromium contamination (ICF Kaiser Engineers, Inc. 1993), several areas in the Piers and East Side Treatment Plant Area exhibit evidence of chromium slag deposition (Figure 5-12).

5.1.12.5.3 Oil/Water Separators

A 180 foot long oil/water separator was located in the northeastern corner of the Piers and East Side Treatment Plant Area from at least 1932 through 1970. This separator was probably constructed with concrete walls. Directly to the east of the separator was the Lower Hook Separator Outfall Basin, which existed from 1931 to 1963 and consisted of an earthen basin that likely received the separator effluent and discharged into Upper New York Bay. A 100 foot long oil/water separator, located in the eastern part of the area, is operated in conjunction with the East Side Treatment Plant. The separator, which was constructed in 1963, accepts storm-water runoff directly from most of the plant, and indirectly from the entire plant because it accepts the effluent from the West Side Treatment Plant. Effluent from the East Side Treatment Plant separator undergoes further treatment by sand filtration and activated carbon filtration prior to being discharged to Upper New York Bay.

5.1.12.5.4 Drum Storage Areas

The Cooperage and Light-Oil Filling Building was located in the southern corner of the Piers and East Side Treatment Plant Area from at least 1918 through 1963. Sections of this building and surrounding areas were used for barrel storage and filling. A barrel staging area was located on the eastern shore adjacent to Pier No. 6 from at least 1921 through 1963. The contents of the barrels during this period are not known.

5.1.12.5.5 Loading/Unloading Areas

A truck loading/unloading area is currently located in the central part of the area, adjacent to the East Side Treatment Plant. Vacuum trucks unload in this area.

Pier No. 6 and Pier No. 7 are active docks located on the eastern extremity of the Piers and East Side Treatment Plant Area. Pier No. 7 is a steel finger pier that was constructed in 1972 to replace part of the original pier purchased by Standard Oil Company (New Jersey) in 1930. Part of Pier No. 7 consists of two parallel concrete (northern and southern) gantry walls that extend to a depth of 10 feet.

5.1.12.5.6 Transformers

Substation No. 4 is located to the south of the East Side Treatment Plant. The operational history and PCB content of transformers in this substation are unknown. According to Plant personnel, currently existing transformers at the Bayonne Plant are not known to contain PCB oils.

5.1.12.5.7 Sumps

Six sumps are located in the Piers and East Side Treatment Plant Area. Three pumped and gravity sumps are located on the northern shoreline; these sumps discharge to the East Side

Treatment Plant's oil/water separator. A fourth pumped sump, located in the northwestern corner of the area, discharges to Tank 1097 in the central eastern part of the area. Two other pumped sumps are located on the piers. The sumps collect incidental spills that may occur during product transfer operations at the piers.

5.1.12.5.8 East Side Treatment Plant

The East Side Treatment Plant receives storm-water via sewers from the No. 2 Tank Field, AV-Gas Tank Field, Asphalt Plant Area, No. 3 Tank Field, General Tank Field, Solvent Tank Field, Low Sulfur Tank Field, and the West Side Treatment Plant. Wastewater is treated at the East Side Treatment Plant with an API oil/water gravity separator, deep bed sand filtration units, and activated carbon filtration prior to being discharged into the Upper New York Bay.

The treatment plant is capable of pumping excess water, generated following heavy rainfall events, to holding tanks for temporary storage to prevent untreated overflow. The East Side Treatment Plant uses overflow tanks located in the General Tank Field.

5.1.12.5.9 Sewers and Septic Systems

Although one sewer system supports the operations of the entire facility, it is geographically separated into two sewer networks: the east side and the west side. All of the flow in the sewer lines is gravity driven. The primary wastewater influent is storm-water runoff; however, the system also receives tank-bottom water, steam condensate, and pumped groundwater. All wastewater is ultimately treated at the East Side Treatment Plant and discharged into the Upper New York Bay at the surface-water outfall (DSN001) under NJPDES-DSW Permit No. NJ0002089. Wastewater collected on the west side of the Bayonne Plant is pre-treated prior to being transferred to the east side sewer system. The only exception is a separate chemical process sewer system that is totally contained within the Exxon Chemicals Plant Area.

The pre-treated wastewater transfer line transports water from the West Side Treatment Plant to the East Side Treatment Plant using a former Low Pressure Salt Water Line. The line is separate from the sewer system and the process waste lines of the Exxon Chemicals Plant. A second clean water transfer line, that extends eastward from the Chemicals Plant to the East Side Treatment Plant, has been sealed and is no longer used (Dan Raviv Associates, Inc. 1992a).

A review of historical information indicates that storm sewers were present in the Piers and East Side Treatment Plant in 1945 (Esso Standard Oil Company 1945). Existing sewers are shown on Figure 5-12. Sanitary facilities located at Pier No. 6 and Pier No. 7 each have 2,000-gallon holding tanks.

5.1.12.6 IRM Activities

IRM investigations were conducted or are currently being conducted at the Piers and East Side Treatment Plant Area to address chromium contamination, NAPL, and the Plant sewer system. In 1993, ICF Kaiser collected three soil samples to delineate surficial chromium contamination (ICF Kaiser Engineers, Inc. 1993). Two surface soil samples had total chromium concentrations below 500 mg/kg (189 and 306 mg/kg). One soil sample collected from a berm had a chromium concentration of 3,940 mg/kg. This area was identified by ICF Kaiser as a visible area of chromium slag deposition (Figure 5-12).

A preliminary NAPL IRM investigation was conducted in the Pier No. 7 area by DRAI during the period from January through March 1994 (Dan Raviv Associates, Inc. 1994a). Prior to conducting the preliminary investigation, 15 previously existing recovery wells were located on the Pier No. 6 and Pier No. 7 areas, of which four were being pumped. These wells were installed in the 1970s and 1980s (Roy F. Weston, Inc. 1980; 1981a,b; 1986a,b,c). Historical NAPL measurements taken between December 1991 and March 1993 by DRAI from existing wells indicated floating NAPL was present in this area. NAPL thickness measurements ranged from 0.01 to 3.27 feet (Table 5-5). The preliminary IRM investigation conducted by DRAI consisted of a tidal investigation, short-term pumping tests, and NAPL sampling. During

January 1994, seeps of NAPL were observed in Upper New York Bay along the bulkhead of Pier No. 7; these seeps appeared to coincide with very low spring tides.

The preliminary NAPL IRM investigation concluded that more than one type of NAPL was present in the Pier No. 7 area; NAPL thicknesses as measured in February 1994 in the Pier No. 7 area ranged from 4 to 5 feet; the southern gantry wall may be acting as a partial hydraulic barrier during high tide; and NAPL can potentially migrate beneath the gantry wall during low tides into Upper New York Bay. Since many of the existing monitoring wells were too shallow to adequately monitor NAPL thicknesses across the gantry wall, DRAI conducted a supplemental IRM investigation during September and October 1994. The supplemental IRM investigation includes the installation of two deep monitoring wells and two replacement wells, NAPL and water-level measurement, step-drawdown tests, and pumping tests. The results of the supplemental IRM investigation are not yet available. Exxon is currently planning to install a containment curtain and boom system along the Pier No. 7 bulkhead to contain NAPL and prevent it from migrating into the bay.

IT Corporation is in the process of completing the IRM evaluation of the sewer system at the Bayonne Plant. The field evaluation involves the cleaning and video inspection of the sewer lines. The results of the sewer evaluation are not yet available.

5.1.13 Domestic Trade Area

A description of the Domestic Trade Area and details of its history and operations are provided below.

5.1.13.1 Description and Boundaries

The Domestic Trade Area is located in the north-central part of the Site and comprises 6 acres bounded by the Lower Hook Road and the General Tank Field to the north and east, by railroad tracks and the AV-Gas Tank Field to the south, and by the City of Bayonne Municipal Garage to the west (Figure 5-13).

5.1.13.2 Operations, Raw Materials, and Products

Retail distribution of fuels occurred in the Domestic Trade Area, which contains one "miscellaneous" AST (Tank No. 1051, which is idle) and a multiple truck loading rack.

From at least 1925 through 1940, the northern part of the Domestic Trade Area was part of the refinery; a series of cracking coils were present in the area. The Domestic Trade Area has been essentially unchanged since 1966.

5.1.13.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate the changes in activities at the Domestic Trade Area. In the 1940 photograph, the Domestic Trade Area was less developed and its use at that time is not known. In 1940, the southern part of this area was covered by railroad tracks. The central part of the area contained several small buildings, including an auxiliary pump house and four small tanks. The northern half of the area was unoccupied, except for a series of dark trenches that may have comprised an earthen oil/water separator. Light-colored, fill-like soil covered this northern part of the Domestic Trade Area, which was called the Old Cracking Coil Area (Esso Standard Oil Company of New Jersey 1945). It is not known what fill materials were used or what historical structures existed.

The area exhibited the same configuration in the 1947 and 1951 photographs as in 1940; however, Lower Hook Road in its present-day configuration bounded the area to the north. A flare was present in this area near the four small tanks in the western corner (1947 photograph).

In the 1959 aerial photograph, the small brick buildings and small tanks had been removed and some filling had occurred in this area. Trucks were parked in this area along Lower Hook Road. The pipeline rack originating in the Piers area to the east traversed the Domestic Trade Area.

In the 1961 photograph, trucks were parked in the Domestic Trade Area and filling activity continued. No changes were observed in the 1963 photograph.

In the 1966 photograph, the area was in the process of being developed north of the pipeline rack that extended to the AV-Gas Tank Field, to the General Tank Field, and to Piers No. 6 and No. 7. Much of this area was paved. The three buildings that currently exist in this area had been constructed, including a garage and a covered truck rack. A small storage tank had been built in the southeastern corner of the area. A review of all photographs since 1966 shows that the Domestic Trade Area did not change.

5.1.13.4 Discharges, Spills, and Releases

As indicated in Table 5-2, no spills greater than 100 gallons have been documented at the Domestic Trade Area.

5.1.13.5 Areas of Potential Contamination

Areas of potential contamination at the Domestic Trade Area include the ASTs, USTs, oil/water separators, loading/unloading areas, process areas, and sewers.

5.1.13.5.1 Aboveground Storage Tanks

There is currently one AST in the Domestic Trade Area; it is out of service. Four ASTs and an auxiliary pump house were located in the western corner of this area from at least 1932 through 1951; they may have been associated with former process areas to the west (Figure 5-13).

5.1.13.5.2 Underground Storage Tanks

Three USTs were or are currently located in the Domestic Trade Area (Figure 5-13). Two of the USTs were removed some time after 1986, and no information is available regarding their construction (Table 5-3). One UST contained waste oil and one contained diesel oil. The third UST contains heating oil and remains in service. No information is available regarding its construction.

5.1.13.5.3 Oil/Water Separators

A possible earthen separator was located in the northern part of the Domestic Trade Area in 1940. However, the existence of a separator at this location could not be verified.

5.1.13.5.4 Loading/Unloading Areas

There is currently one truck loading rack in the Domestic Trade Area. It was probably built in 1966, when this area was first used for domestic trade activities.

5.1.13.5.5 Process Areas

Historical maps indicate that the northern part of the Domestic Trade Area contained 12 cracking coil units from at least 1925 through 1940. The cracking coil units converted heavy oil fractions into gasoline.

5.1.13.5.6 Sewers and Septic Systems

Review of historical maps indicates that sewers were present in the Domestic Trade Area in 1945 (Esso Standard Oil Company 1945). The existing sewers in the area are routed to the East Side Treatment Plant and are shown on Figure 5-13. There are no septic systems in this area.

5.1.13.6 IRM Activities

IRM activities in this area include the evaluation of the chromium slag and assessment of the plant sewer system. In 1993, ICF Kaiser collected one surface soil sample in the Domestic Trade Area to evaluate the impact of historical slag deposition at the Bayonne Plant (ICF Kaiser Engineers, Inc. 1993). This sample had a total chromium concentration of 82.7 mg/kg. No visible areas of chromium slag were identified by ICF Kaiser (Figure 5-13).

The IRM investigation of the sewer system at the Bayonne Plant is currently ongoing. The investigation, which is being performed by IT Corporation, involves the cleaning and inspection of sewer lines. The results of the investigation are not yet available.

5.2 MISCELLANEOUS AREAS

The four miscellaneous areas at the Bayonne Plant, the Stockpile Area, the MDC Building Area, the Utilities Area, and the Main Building Area, are described below.

5.2.1 Stockpile Area

A description of the Stockpile Area and details of its history and operations are presented below.

5.2.1.1 Description and Boundaries

The Stockpile Area (also referred to as the bone yard) is located at the westernmost boundary of the Bayonne Plant and comprises 7 acres. It is bordered to the east by the Lube Oil Area, to the south by IMTT property and Platty Kill Creek, and to the west and north by IMTT. The Stockpile Area is currently vacant (Figure 5-14).

5.2.1.2 Operations, Raw Materials, and Products

Since about 1984, the Stockpile Area has been a vacant, unpaved lot used for the temporary storage of scrap metal and other construction debris from former structures and buildings.

Prior to the mid 1970s, the Stockpile Area was an active process area. It contained a Wax Plant Building, a Phenol Lube Oil Treating Plant, and a MEK Dewaxing Plant, all of which were integral parts of wax production and lube oil manufacturing.

In about 1921, the "F" pipe still, which was located primarily in the Lube Oil Area, existed in the southeastern tip of the Stockpile Area. In the 1930s, a Wax Plant building was constructed in the south-central portion of the area.

In 1934, the Phenol Lube Oil Treating Plant was constructed in the northeastern corner of the area; the Phenol Lube Oil Treating Plant was used for phenol extraction of impurities from lube oil to produce high quality lubricants. In approximately 1940, a transformer house, which was probably ancillary to the Phenol Lube Oil Treating Plant, was built in the north-central portion of the Stockpile Area. The Phenol Lube Oil Treating Plant was shut down about 1947 and was dismantled around 1951.

In 1950, the MEK Dewaxing Plant, which was in the center of the Stockpile Area, began operation. The MEK Dewaxing Plant was built to replace the wax sweaters that existed along the western boundary of the Lube Oil Area. MEK was used as a solvent to extract wax from petroleum distillate. Three additional filters were added to the MEK Dewaxing Plant in 1956, increasing its size. In 1972, the MEK Dewaxing Plant was shut down, concurrent with the end of wax production at the Bayonne Plant.

5.2.1.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate the changes in activities at the Stockpile Area. In the 1940 photograph, the Stockpile Area contained tanks and process areas on the eastern side. On the northeastern section of the area, 12 tanks, each approximately 20 to 30 feet in diameter, and several buildings and other structures comprised a process area that was probably the former Phenol Lube Oil Treating Plant. In the southeastern section of the area, approximately 30 tanks, each 20 to 50 feet in diameter, were located adjacent to condenser stills. Several pipe stills and reducing stills were located immediately to the east of these tanks in the Lube Oil Area. An octagonal-shaped building, the Wax Plant Building, was located on the south side of this area along the Platty Kill Creek. The western half of the Stockpile Area was unoccupied.

In the 1947 photograph, the still in the southeastern part of the area and the Wax Plant Building had been removed. Modifications had been made to the southern border of the area along the Platty Kill Creek.

As seen in the 1951 photograph, the MEK Dewaxing Plant had been constructed in the central part of the Stockpile Area. This process area included a flare stack, two furnaces, a high-walled square building, several small tanks, and ancillary piping. A pipeline connected this process area to the Lube Oil Area to the east. The area formerly occupied by the Wax Plant Building was unoccupied. A water discharge into the Platty Kill Creek was visible. The northwestern part of the area remained unoccupied, except for several small buildings and sheds.

In the 1959 aerial photograph, the central building in the Phenol Lube Oil Treating Plant in the northeastern part of the area had been removed. Several sheds were located in the previously unoccupied northwestern corner of the area. The MEK Dewaxing Plant in the southern part of the area was mostly unchanged, with the main building slightly expanded. The discharge into the Platty Kill Creek was still visible.

As observed in the 1961 aerial photograph, most of the sheds in the northern part of this area had been removed and only four small tanks existed where the Phenol Lube Oil Treating Plant was once located. In the southern part of the area, the MEK Dewaxing Plant appeared unchanged since 1959. The cooling water discharge into the Platty Kill Creek was visible. A review of the 1963 photograph indicated that the Stockpile Area appeared unchanged since 1961.

In the 1966 aerial photograph, four tanks on the eastern side of the MEK Dewaxing Plant had been removed, but the Plant was otherwise unchanged. The sheds and tanks north of the MEK Dewaxing Plant had been removed and this part of the Stockpile Area was vacant. The discharge from the MEK Dewaxing Plant into the Platty Kill Creek was visible.

In the 1974 aerial photograph, the MEK Dewaxing Plant had been dismantled. Four small tanks and a short pipeline remained in the area. The 1984 photograph showed that the pipelines and all the tanks, except one, had been removed.

5.2.1.4 Discharges, Spills, and Releases

No spills greater than 100 gallons have been documented in the Stockpile Area (Table 5-2).

5.2.1.5 Areas of Potential Contamination

The areas of potential contamination in the Stockpile Area are the ASTs, former chromium slag depositional areas, oil/water separators, transformers, and process units.

5.2.1.5.1 Aboveground Storage Tanks

Two to ten large ASTs were located along the eastern edge of the Stockpile Area from at least 1921 through 1963 (Figure 5-14). Ten to 12 ASTs were located in the southeastern part of the area from at least 1921 through 1947. Both of these groups of tanks may have serviced the pipe stills located in the southeastern corner of the Stockpile Area and in the Lube Oil Area. The tanks were 20 to 50 feet in diameter. The contents of the former tanks are unknown. A group of three ASTs was located in the central portion of the Stockpile Area from at least 1940 through 1977. Another group of three ASTs was located in the southwestern corner of the area from at least 1950 through 1977.

5.2.1.5.2 Chromium Slag Depositional Areas

Based on a review of historical aerial photographs, plant records, and discussions with Plant personnel, chromium slag was not specifically known to have been deposited in the Stockpile Area. Based on the results of the chromium IRM investigation, the southern third and western edge of the area were observed to have a high density of visible chromium slag (ICF Kaiser Engineers, Inc. 1993).

5.2.1.5.3 Oil/Water Separators

Two oil/water separator basins existed in the Stockpile Area. A 30 foot long separator was located in the southwestern corner of the area from at least 1932 through 1947. Two separators (in series) collectively comprising a 100 foot long basin were located in the central-southern part of the area from 1940 to 1951 (Figure 5-5). Aerial photographs indicate that these separators were constructed with concrete walls, and their location suggests that they may have discharged to Platty Kill Creek.

5.2.1.5.4 Transformers

A transformer house was located in the northern part of the Stockpile Area from at least 1940 through 1953. The number and PCB content of the former transformers in this area are not known.

5.2.1.5.5 Process Units

The Phenol Lube Oil Treating Plant was located in the northeastern portion of the Stockpile Area and was in operation from 1934 to 1951. Several ASTs associated with the Phenol Lube Oil Treating Plant were also located in this area from 1932 to 1963. The methods of transfer of raw materials and finished products to and from the Phenol Lube Oil Treating Plant and other process units in this area are not known.

Pipe stills were located in the southeastern corner of the Stockpile Area from at least 1921 through 1947. The pipe stills incorporated several towers or stacks, several high-walled buildings, and ancillary piping.

The largest process unit located in the Stockpile Area was the MEK Dewaxing Plant. This plant was reconstructed in the central portion of the area between 1947 and 1951, where it existed until it was dismantled in 1972.

5.2.1.6 IRM Activities

IRM activities conducted in the Stockpile Area include an evaluation of the potential impact from chromium slag and the potential for NAPL to enter Platty Kill Creek. In 1993, ICF Kaiser collected 11 soil samples at the Stockpile Area (ICF Kaiser Engineers, Inc. 1993). Two samples had total chromium concentrations above 500 mg/kg (636 and 1,690 mg/kg); concentrations in the other soil samples ranged between 38.8 and 216 mg/kg. As shown on

Figure 5-14, the southern part of the Stockpile Area was observed to have a high density of chromium slag (ICF Kaiser Engineers, Inc. 1993).

During 1994, DRAI conducted an "at peril" IRM investigation in the vicinity of Platty Kill Creek. The investigation included the drilling of approximately 14 soil borings (PKB1 through PKB14) along the western and southern boundary of the Stockpile Area and in the creek bed (Figure 2-8). Fifteen monitoring wells (Monitoring Wells PKMW1 through PKMW15) were installed in the vicinity of the Platty Kill Creek area. Other investigative activities included water-level and NAPL measurements and NAPL sampling. NAPL thickness measurements collected between December 1991 and March 1993, indicated NAPL thicknesses up to 3.9 feet in Monitoring Well EB-19. The results of the "at peril" IRM investigation in the Platty Kill Creek area are not yet available.

5.2.2 MDC Building Area

A description of the MDC Building Area and details of its history and operations are provided below.

5.2.2.1 Description and Boundaries

The MDC Building Area is located in the southeastern part of the Site and comprises 5 acres of land and associated riparian acreage. It is bordered to the north by the Solvent and Low Sulfur Tank Fields; to the west by the Constable Terminal Corporation property, to the south by the confluence of the Kill Van Kull Waterway with Upper New York Bay, and to the east by the Piers and East Side Treatment Plant Area. The MDC Building Area is currently occupied by a large multi-story building, parking areas, and docking facilities (see Figure 5-15).

5.2.2.2 Operations, Raw Materials, and Products

The MDC Building Area consists of the MDC Building and a small garage (the former Butterworth Systems Building) in the southern corner. Covered rolloffs and covered soil piles were temporarily stored in the parking area in the MDC Building Area. The MDC Building Area was leased to Apple Freight Company from 1989 to 1990. A small rectangular parcel in the western portion of the MDC Building Area has been leased by Exxon to Constable Terminal Corporation since approximately 1960. This area is currently occupied by six aboveground storage tanks.

The present MDC Building was constructed in 1914 for use as a box factory. From 1918 through 1963, the cooperage and light-oil filling building in the Piers and East Side Treatment Plant Area extended into the eastern portion of the area. In 1921, a naphtha filling building existed at the location of the present garage.

In 1959, the Marine Service Division of Esso Marine was transferred to the existing MDC Building. After the MDC was established in 1965, a small building was erected in the northern corner of the area. In 1972, a fuel station was located to the northeast of the Main Building. The fuel station was used to refuel trucks that were used to distribute finished products from the MDC Building. Three USTs that contained diesel were located just south of the fuel station. The fuel station was removed in approximately 1984.

During the time that the MDC was in operation, drums were stored in the MDC Building and in the surrounding yard.

5.2.2.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate changes in activities at the MDC Building Area. A review of the 1940 photograph shows that several large buildings were located in this area. A garage was located partially in the southwestern corner of the area. A large, dark-roofed rectangular building, occupied by Butterworth Systems, Inc., was also located in the southwestern part of the area. Railroad spurs and a loading platform were located on the east and west sides of this building. A light, checkered-roof building in the center of the area was a Cooperage Building; it had an associated shed and filling room. To the south of the Cooperage Building were two other buildings; these buildings are labeled as the Saltwater Pump House and the Cook House on historical plant drawings. A light-colored building in the northwest corner of the area, which had two adjacent tanks, each 20 feet in diameter, was a barrel filling building. In the northern corner of the area were several small buildings that included a pump house, manifold pits, and the Case & Can Pump House. A transformer building was also located near these buildings. Along the shore were Piers No. 4 and No. 5, which are made of concrete.

In the 1947 and 1951 photographs, the area appeared unchanged, except that the large, light-colored building in the northeastern corner of the area was partially dismantled (1951 photograph).

In the 1959 aerial photograph, the building with the checkered roof (the Cooperage Building) and the Saltwater Pump House and Cook House had been dismantled. As observed in the 1961 photograph, a car parking lot was located to the east of the MDC Building.

In the 1963 photograph, the pump house and manifold building in the northern part of this area had been removed. In the 1966 photograph, the former barrel filling building and two adjacent tanks in the northeastern part of this area had been removed.

The only observable change to the MDC Building Area in the 1974 photograph was that a small drum or other materials storage area existed in the southeastern corner of the MDC Building parking lot. The 1977, 1984, 1989, and 1991 aerial photographs show that no changes had occurred at the MDC Building Area, except that by 1984 the storage area in the southeastern corner of the parking lot was no longer present.

5.2.2.4 Discharges, Spills, and Releases

No spills greater than 100 gallons have been documented at the MDC Building Area.

5.2.2.5 Areas of Potential Contamination

Areas of potential contamination at the MDC Building Area include the USTs and the sewers and septic systems.

5.2.2.5.1 Underground Storage Tanks

Three USTs formerly existed at the MDC Building Area. The USTs were historically used to store diesel and were removed some time after 1986. Details of their capacity, installation and removal dates, and integrity are not known (Table 5-2).

5.2.2.5.2 Drum Storage Areas

During the period of operations at the MDC Building Area, two drum storage areas are known to have existed. The MDC Building and the area to the west (yard), and the area adjacent to the garage were used to store barrels and drums for distribution and shipment.

5.2.2.5.3 Sewers and Septic Systems

Existing storm sewers in the MDC Building Area transmit surface-water runoff collected in catch basins to the East Side Treatment Plant. A former discharge pipe is located along the bulkhead to the southeast of the MDC Building. Storm-water was formerly discharged through this outfall to Upper New York Bay in accordance with NJPDES-DSW Permit No. NJ00289.024. One septic system, which includes a 2,000-gallon septic tank, is located to the northeast of the MDC Building.

5.2.2.6 IRM Activities

No IRM activities have been performed or are planned for the MDC Building Area.

5.2.3 Utilities Area

A description of the Utilities Area and details of its history and operations are provided below.

5.2.3.1 Description and Boundaries

The Utilities Area is located in the west-central part of the Bayonne Plant and comprises 5 acres. It is bordered to the west by the Lube Oil Area, to the north by the No. 2 Tank Field, to the south by P.D.Q. Plastics and Gordon Terminal Service Company, and to the east by the Exxon Chemicals Plant and Asphalt Plant Areas. The Utilities Area currently contains buildings, structures, and a parking lot (Figure 5-16).

5.2.3.2 Operations, Raw Materials, and Products

The Utilities Area is an irregular-shaped parcel occupied by the Plant's Main Substation and one AST. Several railroad spurs diagonally transect the parcel. The AST, Tank 998, is 90 feet in diameter and 48 feet in height, and contains storm-water. Two smaller ASTs, Tanks 994 and 995, were formerly located in the Utilities Area and were used to store fuel oil; these ASTs were dismantled in 1993.

Prior to the 1920s, the Utilities Area was occupied by a Barrel Factory, a stave kiln, stave sheds, and a small boiler house. In 1940, the area was occupied by several buildings, ASTs, and railroad tracks; at this time, the No. 2 Power Plant Building was located in the eastern portion of the area and warehouses occupied the southwestern corner of the area. In 1951, the Central Boiler House was constructed, and by 1959, the power plant buildings in the northeastern part of the area had been dismantled. The Main Substation had been constructed and the Boiler House had been demolished by 1989.

5.2.3.3 Aerial Photograph Interpretation

Fourteen aerial photographs spanning the time period from 1940 to 1991 were reviewed to evaluate the changes in activities at the Utilities Area. In the 1940 photograph, this area was occupied by several buildings and tanks, and railroad tracks ran north to south. A large storage tank, 90 feet in diameter and 27 feet in height, was located in the north-central part of this area. In the northeast corner were two light-colored buildings. In the eastern part of the area was the No. 2 Power Plant building. To the east of the Power Plant were several other buildings and four small tanks. Two banks of transformers were located on the north side of the Power Plant, and to the south of the Power Plant was another building that was probably a pump house. In the southeast corner was a tank that was part of a group of tanks in the No. 3 Tank Field to the east. Also in the southeast was a light-colored circular area, which was likely the foundation of a future tank. In the southwest corner, two light-colored, rectangular foundation areas may represent the site of the future boiler house. To the west, was a storage and reclamation building.

In the 1947 photograph, much of the area was filled with light-colored material and a roadway had been constructed northwest to southeast across the area. The railroad tracks that crossed the area north to south had been removed. The southeastern corner of the area was unoccupied, except for the one tank that was part of the No. 3 Tank Field. Warehouses in the southwestern corner of the area had been modified and a large parking area had been built. A railroad spur extended into this area. One warehouse located in this area was labeled on historical plant drawings as the future boiler house.

In the 1951 aerial photograph, the northern part of this area appeared unchanged from 1947. In the southern part of this area, the warehouse was replaced by a high-walled building with a tall stack that was the boiler house. A large storage tank, Tank 998, 90 feet in diameter and 48 feet in height, was constructed in 1949 in the southeastern corner of the Main Building Area, adjacent to the boiler house. This tank was for boiler feed water and currently contains storm-water. Two small tanks, Tanks 994 and 995, each 25 feet in diameter and 40 feet in height, were also constructed in 1949 to the north of and adjacent to Tank 998. These tanks were used to store storm-water. The initial Main Substation structure was constructed in this area in 1948.

In the 1959 photograph, the Power Plant buildings in the northeastern part of the area were dismantled, and trucks, sheds, and foundation structures occupied this location. In the southern part of the area, the four large stacks at the boiler house were visible. In the 1961 photograph, construction activity continued at this site where the Power Plant buildings had been located. The boiler house in the southern part of the area appeared operational and unchanged.

In the 1963 photograph, much of the area was graded and possibly paved. Construction had been completed on a small building that is currently labeled Exxon Chemical No. 2. The Main Substation facilities were clearly visible and consisted of three electrical structures. The boiler house in the southern part of the area was operational.

As seen in the 1966 and 1974 photographs, the Utilities Area was unchanged from 1963, except that two tanks had been removed from the southeastern corner of the area (1974 photograph). These tanks were originally part of a line of tanks in the No. 3 Tank Field.

The Utilities Area appeared unchanged in the 1984 photograph. In the 1989 photograph, the Boiler House in the southern part of the Utilities Area had been dismantled and the ground had been leveled. The area was unchanged in the 1991 aerial photograph. Two smaller ASTs, Tanks 994 and 995, were dismantled in 1993.

5.2.3.4 Discharges, Spills, and Releases

No spills greater than 100 gallons have been documented in the Utilities Area.

5.2.3.5 Areas of Potential Contamination

Areas of potential contamination in the Utilities Area include ASTs, transformers, and sewers and septic systems.

5.2.3.5.1 Aboveground Storage Tanks

Approximately ten aboveground tanks were historically located in the Utilities Area. Five tanks were situated in the south-central portion of the area from at least 1951 through 1984. These tanks were associated with the Central Boiler House. Two tanks in the southeastern portion of the Utilities Area existed from approximately 1951 through 1992 and stored fuel oil.

5.2.3.5.2 Transformers

Two transformers containing PCBs were removed from Substation E-1 at the Utilities Area (Table 5-4). No information is available regarding the operational history and integrity of these transformers. According to plant personnel, no PCB-containing transformers currently exist at the site.

5.2.3.5.3 Sewers and Septic Systems

The existing storm sewer system in the Utilities Area collects runoff and drains to the West Side Treatment Plant. There are no septic systems in the Utilities Area.

5.2.3.6 IRM Activities

The "Chemical Plant Area NAPL IRM" activities, which involved the drilling of three soil borings and installation of one monitoring well by Geraghty & Miller, were actually conducted in the Utilities Area along the property boundary.

5.2.4 Main Building Area

A description of the Main Building Area and details of its history and operations are provided below.

5.2.4.1 Description and Boundaries

The Main Building Area is located in the northwestern part of the Bayonne Plant and is comprised of 14 acres. It is bordered to the southeast by the No. 2 Tank Field, to the northeast by the Lehigh Valley Railroad, and to the west by the "A"-Hill Tank Field. The area contains the Main Building and adjacent parking lots (Figure 5-17).

5.2.4.2 Operations, Raw Materials, and Products

The Main Building Area is a triangular parcel that is currently occupied by the Main Building and adjacent parking lots, the Gate A entrance to the plant, a substation, and the IRPL metering station. The Main Building consists of administrative offices currently occupied by IMTT. A guard house and weighing station are located at the Gate A entrance. The IRPL metering station remains out of service as a result of a rupture in the pipeline that occurred on January 1, 1990.

Although the Main Building Area currently serves as an administrative station and entrance to the Bayonne Plant, the area has historically been an active process area. Prior to the 1920s, the area was occupied by several buildings, process units, and ASTs. The process units included reducing stills, condensers, sweetening stills, and stirring tanks. Several ASTs were located in the northern portion of the area, and a Paraffine Boiler House and several pump stations were located in the southwestern and central portions of the area. By 1921, refining processes had been reduced. With the exception of the sweetening stills, that infringed onto the Main Building Area from the present-day No. 2 Tank Field, refining units were eliminated, and the area was primarily occupied by ASTs. By 1951, the sweetening stills and buildings in the eastern portion of the area were dismantled. In 1959, most of the ASTs had been removed and replaced by the Main Building and parking areas. A Welfare Building was located in the southwestern portion of the area. By 1961, two remaining ASTs had been removed in the northwestern corner of the area. By 1966, Avenue J had been expanded, and the Gate A guard house and truck scale had been constructed. The Welfare Building had been removed and converted to a parking area.

5.2.4.3 Aerial Photograph Interpretation

Fourteen aerial photographs, spanning the time period from 1940 to 1991, were reviewed to evaluate the changes in activities at the Main Building Area. As observed on the 1940 photograph, the northern part of the Main Building Area was occupied by several ASTs, each 60 to 115 feet in diameter, enclosed in earthen fire banks. In the southwestern corner were several buildings, including the Welfare Office and the bus station. Before 1940, this area was occupied by a Paraffine Boiler House, two reducing stills, a condenser, and a compound building. Also in 1940, a group of eight ASTs, each 40 feet in diameter and 40 feet in height, was located in the southern part of the area. In the eastern part of the area were three small tanks and several small buildings that were probably remnants of a line of pre-1940 sweetening stills. A spur of the Lehigh Valley Railroad traversed the western corner of the area, and three or four small unknown storage tanks were located in the extreme western corner.

As observed in the 1947 photograph, a parking lot had replaced a group of small tanks in the southern part of this area. In the 1951 photograph, the storage tanks and buildings in the western portion of this area remained unchanged. Light-colored fill material was placed along the northern border of the tank berms adjacent to the Lehigh Valley Railroad. The buildings and process area in the eastern part of the Main Building Area had been dismantled.

In the 1959 photograph, two large ASTs remained in the northwestern corner of this area. All other tanks (four large, two medium, and eight small) had been removed and replaced by the Main Building and adjacent parking lots in the central part of the area. The northern part of the area had been covered with a light-colored, graded material. The northeastern section of the area was being used for storage, possibly for drums.

The 1961 aerial photograph shows that two ASTs had been removed from the northwestern corner of this area. Light-colored fill material was still visible to the northeast of the Main Building. The two small buildings adjacent to the Welfare Building in the southern part of the area had been removed.

Filling activity was observed in the northwestern corner of the Main Building Area in the 1963 photograph. A light-colored building or garage had been constructed to the east of the Main Building. The northeastern part of the area was used for parking trucks. In 1966, Avenue J had been expanded and the gate entrance and truck scale had been constructed. The Welfare Building in the southern part of the area had been removed and the area had been converted to parking. The Main Building Area appeared unchanged in the 1970 and 1974 aerial photographs.

In the 1984 photograph, the area north of the main building had new vegetation. A small building, possibly a pump house, was located east of the Main Building, and storage activity had ceased. The area appeared unchanged in the 1989 and 1991 aerial photographs.

5.2.4.4 Discharges, Spills, and Releases

No known spills above 100 gallons have been documented in the Main Building Area.

5.2.4.5 Areas of Potential Contamination

The areas of potential contamination at the Main Building Area include the ASTs, USTs, former chromium slag depositional areas, oil/water separators, transformers, process areas, sumps, and the sewers and septic systems.

5.2.4.5.1 Aboveground Storage Tanks

The northern half of the Main Building Area contained 15 large ASTs in 1940; they had all been removed by 1959 when the Main Building was constructed. A cluster of smaller tanks in the southern part of the area and a line of small tanks in the eastern part of the area were associated with the pre-1920 Paraffine Boiler House and sweetening stills, respectively. All ASTs had been removed by 1961, and there were no documented spills from tanks in this area. A pump house was located in the eastern part of this area until 1945, and another pump house, called the Former Avenue J Pump House, was located in the western part of this area for an unknown time period. In addition, the IRPL metering station was located in the eastern corner of this area until the IRPL connecting Bayonne to Bayway was shut down in 1990.

5.2.4.5.2 Underground Storage Tanks

One 2,000-gallon UST containing unleaded gasoline was known to have existed in the Main Building Area (Table 5-3). The UST was installed in 1979. Leak testing was performed in 1982 and 1989. The UST passed the first leak test, but failed the test performed in 1989. A notification of the release was provided to the NJDEP in August 1989 and the UST was subsequently removed. A 2,000-gallon replacement UST was installed in 1989 for the storage of unleaded gasoline. This UST is currently in service and is located to the south of the Main Building.

5.2.4.5.3 Former Chromium Slag Depositional Areas

Based on historical information, chromium slag was used as fill material beneath the Main Building (Fairchild 1994c). However, as seen on Figure 5-17, chromium slag is generally not present in other parts of the Main Building Area, except for a very small section in the eastern corner, which was identified as having a high density of chromium slag nodules (ICF Kaiser Engineers, Inc. 1993).

5.2.4.5.4 Oil/Water Separators

Two oil/water separators were located along the northeastern edge of the Main Building Area and were probably associated with former process areas. One of the separators was present in 1940; the other was present in 1945. The exact dates of operation and construction of these separators are not known.

5.2.4.5.5 Transformers

One transformer at Substation F-2 was known to have contained PCB oils (Table 5-2). This transformer was reportedly removed some time after 1986. According to Plant personnel, there are currently no known transformers that contain PCB oils at the Bayonne Plant.

5.4.2.5.6 Process Areas

The Main Building Area was primarily a process area in the early 1900s through the 1940s. The Compound Building and stirring tanks were erected in the southern corner of the Main Building Area. Kerosene was the main product, possibly as early as 1887. In 1915, two reducing stills and a boiler house, which was referred to as the Paraffine Plant, were constructed in the southern-central part of this area. The process areas described above had been removed by the early 1920s. A line of sweetening stills was located in the eastern part of this area prior to the 1920s until at least 1945.

The Main Building, in the central part of the Main Building Area, was constructed in the early 1950s and operations were expanded from shops and store houses to "all service" facilities in the early 1960s. The Office Lab was relocated to this building.

5.2.4.5.7 Sumps

Four sumps are located in the Main Building Area. One sump (Gate A) is associated with the storm sewer system and is located in the parking lot area adjacent to Gate A in the southeastern part of the area. The other three sumps (Avenue J, Sump A, and Sump B) are associated within a groundwater and NAPL recovery system known as the interceptor trench. Details on the location and operations of the interceptor trench system are provided in Section 5.2.4.6 (IRM Activities).

5.2.4.5.8 Sewers and Septic Systems

Historical maps indicate that there were sewers at the Main Building Area prior to 1945 (Esso Standard Oil Company 1945). The existing storm sewers drain to the West Side Treatment Plant. There are no septic systems in this area. Present buildings connect to the City of Bayonne sanitary sewer system on Lower Hook Road.

5.2.4.6 IRM Activities

IRM activities in the Main Building Area are related to chromium and NAPL. In 1993, ICF Kaiser collected three soil samples at the Main Building Area to evaluate the extent of chromium slag (ICF Kaiser Engineers, Inc. 1993). Two soil samples had total chromium concentration below 500 mg/kg (58.4 and 107 mg/kg), and one soil sample had a total chromium concentration of 4,610 mg/kg. As shown on Figure 5-17, the area underneath the Main Building Area was reported to have been filled with chromium slag (Fairchild 1994c).

DRAI has been conducting an IRM in the Main Building Area. The NAPL IRM focuses on the interceptor trench. NAPL sampling events conducted between December 1991 and March 1993 indicate NAPL thicknesses of generally less than 0.6 foot. The interceptor trench is located adjacent to the central portion of the northern property line. The 2,038 foot long interceptor trench was installed to prevent off-site NAPL migration across the property line.

The trench has been in operation since the early part of 1977. The source of the NAPL in the area is not known but, based on anecdotal communications, appears to have been related to historical spills.

Two sumps (Sump A and Sump B) are associated with the 2,038 foot long interceptor trench. Sump A, which is a pumped sump, is located along the northeastern side of the Main Building Area. Sump A collects effluent from the interceptor trench, and discharges to the West Side Treatment System. Sump B, which is located near Sump A, serves as a backup in case Sump A fails. A 200 foot long interceptor trench is located within the adjacent ICI Americas, Inc. property to the west of the 2,038 foot long trench. A separate pumped sump (the Avenue J Sump) is located within 30 feet north of the northwestern end of the 2,038 foot long interceptor. The effluent from the 200 foot long trench may discharge to the Avenue J Sump. Liquids collected in the Avenue J Sump are pumped to the West Side Treatment Plant.

Prior to the initiation of IRM activities by DRAI in the area of the interceptor trench, a network of 11 monitoring wells existed in the area adjacent to the interceptor trench. Additional monitoring wells were found in this area as a result of DRAI's well integrity survey conducted in August 1993 (Dan Raviv Associates, Inc. 1993d). In August 1994, DRAI installed six additional wells in the interceptor trench area. A performance evaluation of the entire system was conducted to evaluate the hydraulic gradient and flow to the trench. IRM activities in the Interceptor Trench Area are ongoing and the results and findings have not yet been reported.

SECTION 6

6.0 DATA NEEDS

Geraghty & Miller's review of site history information has resulted in the identification of the following data needs related to the evaluation of the potential environmental impacts of past or present Plant activities. Due to the extensive operational history (more than 115 years) and limited plant historical records for the period of the early 1900s, it is difficult to identify all potential sources of contamination that existed at the Bayonne Plant. However, the data needs identified as a result of the site history review are being adequately addressed in Phase IA of the RI.

1. Discrepancies and anomalies exist in the available stratigraphic data for the Site. The stratigraphic units, distribution and thickness of unconsolidated deposits, and depth to bedrock across the entire site area require further delineation. This data need is being addressed as part of the Phase IA RI.

2. There are insufficient sample collection points (groundwater monitoring wells) in many areas of the Site. Existing monitoring wells will provide groundwater flow data for the Lube Oil Area, "A"-Hill Tank Field, Pier No. 1, Low Sulfur and Solvent Tank Fields, Interceptor Trench Area, and Piers No. 6 and 7. Data needs exist within the central area of the Plant and within the areal coverage of the existing well network in the previously mentioned operational areas. Consequently, insufficient site-wide data exist to develop a groundwater flow model that can identify (1) the interaction of groundwater flow between the unconsolidated zone and the surface-water bodies bordering the Site, (2) the flow direction of floating NAPL and of dissolved-phase groundwater contaminants, (3) the tidal effects exerted by Upper New York Bay and the Kill Van Kull Waterway on the groundwater, and (4) the vertical flow gradients between the various hydrogeologic units at the Site.

3. Quantitative hydrogeologic data currently exist only for areas of the Site in which IRM investigations have been conducted (i.e., the Low Sulfur and Solvent Tank

Fields, the Pier No. 7 area, and the Pier No. 1 area [helipad area]). Insufficient quantitative hydrogeologic data (i.e., hydraulic conductivity, transmissivity, storativity, and vertical gradients) are available on a site-wide basis for the various hydrogeologic units underlying the Bayonne Plant.

4. Groundwater quality data for the Site are limited to physical measurements of NAPL thickness in existing monitoring wells and recovery wells. Groundwater quality data do not currently exist for potential dissolved hydrocarbon, chemical, and refinery-related contaminants that may potentially be present under the Bayonne Plant as a result of historical operations. Insufficient groundwater quality data exist for total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/PCBs, and metals.

5. Soil quality data at the Bayonne Plant are limited to the results of the surficial sampling (0 to 2 feet) for total and hexavalent chromium and of selected TPH sampling associated with previous excavation and construction activities (e.g., the construction of a containment system in the Lube Oil Area). Insufficient soil quality data exist to characterize the surficial and subsurface soil quality at the Bayonne Plant.

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SECTION 7

7.0 REFERENCES

Bayonne Health Department and Bayonne Fire Department. 1992. Copy of files on spills and fires at Bayonne Plant.

CH2M Hill, Inc. 1988. Water Balance, Exxon, Bayonne, New Jersey Facility, August 1988.

CH2M Hill, Inc. 1991. Best Management Plan for the Exxon Bayonne Facility, January 31, 1991.

City of Bayonne. 1986. Tax Maps, City of Bayonne, Hudson County, New Jersey.

Dames & Moore. 1979. Bayonne Terminal and Chemical Plant Hydrogeologic Studies for Exxon Company, U.S.A., July 16, 1979.

Dan Raviv Associates, Inc. 1992a. Proposed Interim Remedial Measures Work Plan for the Exxon Company, U.S.A., Bayonne Plant, Bayonne, New Jersey, February 25, 1992.

Dan Raviv Associates, Inc. 1992b. Floating Product Thickness Investigation, Report to Exxon Company, U.S.A., Bayonne, New Jersey, August 1992.

Dan Raviv Associates, Inc. 1992c. Memorandum from D.W. Davis to C. Zwingle. Re: Summary of Interceptor Trench Information, Exxon Bayonne Plant, August 31, 1992.

Dan Raviv Associates, Inc. 1992d. Maps of Sewer System, Trunk Lines and Laterals, 10 Sheets. September 1992.

Dan Raviv Associates, Inc. 1993a. Non-Aqueous Phase Liquids Interim Remedial Measures Work Plan, Exxon Company, U.S.A., Exxon Bayonne Plant, Bayonne, New Jersey, January 29, 1993.

Dan Raviv Associates, Inc. 1993b. Interim Remedial Measures Investigation and Conceptual Remedial Design Parameters for NAPL Recovery, Low Sulfur and Solvent Tank Fields, Former Exxon Bayonne Plant, Bayonne, New Jersey, November 1993.

Dan Raviv Assoicates, Inc. 1993c. Letter to C. Zwingle, P.E. Re: On-Site Well Integrity Evaluation, Site Wide Groundwater/NAPL Measurements, Bayonne Terminal, Bayonne, New Jersey, May 28, 1993.

Dan Raviv Associates, Inc. 1993d. Letter to C. Zwingle, P.E. Re: On-Site Well Integrity Evaluation, Site Wide Groundwater/NAPL Measurements, Bayonne Terminal, Bayonne, New Jersey, August 12, 1993.

Dan Raviv Associates, Inc. 1994a. Addendum to Non-Aqueous Phase Liquid Interim Remedial Measures Work Plan, Exxon Company, U.S.A., Exxon Bayonne Plant, Bayonne, New Jersey, June 28, 1994.

Dan Raviv Associates, Inc. 1994b. Well and Soil Boring Locations, IRM Work Plan Addendum, October 1994.

Esso Standard Division of Humble Oil & Refining Company. 1960a. Refinery Map. Work Map 5. Drawing Number WM-1-6. December 7, 1960.

Esso Standard Division of Humble Oil & Refining Company. 1960b. Refinery Work Map. Drawing Number WM-1-2. December 14, 1960.

Esso Standard Division of Humble Oil & Refining Company. 1960c. Refinery Work Map. Drawing Number WM-1-5. December 23,1960.

Esso Standard Division of Humble Oil & Refining Company. 1960d. Refinery Work Map. Drawing Number WM-1-3. November 25, 1960.

Esso Standard Division of Humble Oil & Refining Company. 1961a. Refinery Work Map. Drawing Number WM-1-10, February 16, 1961.

Esso Standard Division of Humble Oil & Refining Company. 1961b. Refinery Work Map. Drawing Number WM-1-54, January 6, 1961.

Esso Standard Division of Humble Oil & Refining Company. 1961c. Refinery Work Map. Drawing Number WM-1-20. January 19, 1961.

Esso Standard Division of Humble Oil & Refining Company. 1962. Refinery Work Map. Drawing Number WM-1-19. January 23, 1962.

Esso Standard Oil Company. 1945. Map of Bayonne Refinery Sewer Layout. Drawing Numbers WM-19-2 to WM-19-7, Sewer Sheet Numbers 1 to 6, December 1945.

Esso Standard Oil Company. 1957a. "New Way to Build Tank Foundations Set in 'Hook' Area," Article in Esso Bayonne News, April 26, 1957.

Esso Standard Oil Company. 1957b. Plot Plan for the Wax Shipping and Lube Oil Area. Drawing Number WM-1-8, December 6, 1957.

Esso Standard Oil Company 1959a. Refinery Work Map Number 3. Drawing Number WM-1-12. November 6, 1959.

Esso Standard Oil Company 1959b. Refinery Work Map Number 1. Drawing Number WM-1-4. November 13, 1959.

Exxon Chemical Americas. 1992. Master Plot Plan. Drawing Nomber CPP-1-61, Revision 11. November 14, 1992.

Exxon Company, U.S.A. No Date a. Bayonne Plant. Drawing Number WM-1-84. Estimated c. 1980.

Exxon Company, U.S.A. No Date b. Area Locations and Drawing Files Designations. Drawing Number WM-1-85. Estimated c. 1990.

Exxon Company, U.S.A. No Date c. Area Classification and General Plot Plan. Drawing AC-6-2.

Exxon Company U.S.A. No Date d. Drawing Number WM-1-64. Estimated c. 1980.

Exxon Company, U.S.A. No Date e. Drawing Number WM-1-58.

Exxon Company, U.S.A. 1978a. List of Inactive Solid Waste Sites, December 27, 1978.

Exxon Company, U.S.A. 1978b. Lower Hook Collection System Plot Plan. Drawing Number LHG-9-71, August 1978.

Exxon Company, U.S.A. 1980. Letter to J. M. Johnson, HQ-Refining. Re: Waste Disposal Site Inventory, March 6, 1980.

Exxon Company, U.S.A. 1982. Letter from S. C. Brown, Environmental Planner to S.M. D'Orsie, HQ-Refining. Re: Waste Disposal Site Inventory, September 8, 1982.

Exxon Company, U.S.A. 1983. Plan Area Designations. Drawing Number WM-1-86. July 1993.

Exxon Company, U.S.A. 1986. Memorandum from S. Webb to J. Tacokmoto, BW Law, Re: PCB information for the Bayonne Plant requested for the N.Y. City Landfill deposition. December 29, 1986.

Exxon Company, U.S.A. 1988a. Pride and Bayonne. Copyright 1988, Exxon Corporation.

Exxon Company, U.S.A. 1988b. Letter from L.B. McGrath to R. Nugent, New Jersey Department of Environmental Protection, Division of Water Resources, Re: Resubmission of Underground Storage Tank Registration. February 19, 1988.

Exxon Company, U.S.A. 1989a. Letter from C. J. Hess to T. Hayes, New Jersey Department of Environmental Protection, Division of Water Resources. Re: Exxon Bayonne Plant, N.J. 0002089, August 11, 1989.

Exxon Company, U.S.A. 1989b. Drainage Areas, Bayonne Plant. Drawing Number WM-1-83. July 27, 1989.

Exxon Company, U.S.A. 1990. Letter from C.J. Hess to New Jersey Department of Environmental Protection, Re: Annual Fee for Two Underground Storage Tank Registrations at Exxon Company, U.S.A. March 9, 1990.

Exxon Company, U.S.A. and Exxon Chemical Americas. 1990. Spill Prevention Control and Countermeasure Plan, Discharge Preventions, Containment and Countermeasure Plan and Discharge Clean-up and Removal Plan, Bayonne Plant, Bayonne, New Jersey. Revised August 1, 1990.

Exxon Company, U.S.A. 1992a. Letter from W. Pohl, Environmental Technician to New Jersey Department of Environmental Protection and Energy, Bureau of Revenue, Manifest Section -- Annual Reports. Re: Generator Annual Report. February 28, 1992.

Exxon Company, U.S.A. 1992b. File on Spill Reports from 1970s through 1980s, collected in December 1992.

Exxon Company, U.S.A. 1994. Memorandum from R. Scerbo to L. Caramichael, Concerning past PCB transformers and past PCB annual documents. August 16, 1994.

Exxon Chemicals Plant Personnel. 1994. Personal Communication with M. McDonnell, Geraghty & Miller, Inc., Re: Naphthalene Explosion, November 8, 1994.

Fairchild, R.E. 1993. Personal communication with B. Blum, Geraghty & Miller, Inc., January 15, 1993.

Fairchild, R.E. 1994a. Chronological History of Constable Hook and Background on Standard Oils Coming to Bayonne, October 20, 1994.

Fairchild, R.E. 1994b. Personal Communication with M. McDonnell, Geraghty & Miller, Inc., Re: Acid Neutralization Pit, August 25, 1994.

Fairchild, R.E. 1994c. Personal Communication with M. McDonnell, Geraghty & Miller, Inc., Re: Chromium Slag deposited in the Main Building Area, October 13, 1994.

Fairchild, R.E. 1994d. Personal Communication with M. McDonnell, Geraghty & Miller, Inc., Re: Extent of Bayonne Municipal Dump within General Tank Field. October 20, 1994.

Forstall, R. 1992. Staff Member of United States Census Bureau, Division of Population. Telephone conversation with B. Blum, Geraghty & Miller, Inc., November 19, 1992.

Geological Survey of New York. 1970. Geologic Map of New York, Lower Hudson Sheet, March 1970.

Geraghty & Miller, Inc. 1993a. Site History Report, Exxon Company, U.S.A., Bayonne Plant, Bayonne, New Jersey, January 1993.

Geraghty & Miller, Inc. 1993b. Remedial Investigation Work Plan, Exxon Company, U.S.A., Bayonne Plant, Bayonne, New Jersey, January 1993.

Geraghty & Miller, Inc. 1993c. Administrative Consent Order, Site History Deliverable Items, Exxon Company, U.S.A. Bayonne Plant, Bayonne, New Jersey, January 1993.

Geraghty & Miller, Inc. 1994a. Memorandum Modification to the Remedial Investigation Work Plan, Bayonne Plant, Bayonne, New Jersey, October 1994.

Geraghty & Miller, Inc. 1994b. Draft Remedial Technology Evaluation, Low Sulfur Fuel Oil and Solvent Tank Fields, "Tank 1066" NAPL IRM, Exxon Company, U.S.A., Bayonne Plant, Bayonne, New Jersey, February 1994.

Geraghty & Miller, Inc. 1994c. Vacuum Enhanced Recovery Pilot Study, Bayonne Plant, Bayonne, New Jersey, Draft Report, September 1994.

Humble Oil & Refining Company. No Date. Location Plan for Minor Products at OFP Gas Facilities. Drawing Number CPP-1-38.

Humble Oil & Refining Company. 1961. Article for Special Centennial Issue of the Bayonne Facts, June 1, 1961.

Humble Oil & Refining Company. 1965. Number 3 Gate Area Track Modifications and Tank Identifications in the West General Tank Field. Drawing Number WM-1-21, March 4, 1965.

Hydrotechnic Corporation Engineers. 1958. Report on Groundwater Conditions, May 1958.

ICF Kaiser Engineers, Inc. 1992. Additional Preliminary Results from Bayonne Terminal Sampling, General Tank Farm and Tank Farm #3, July 29, 1992.

ICF Kaiser Engineers, Inc. 1993. Interim Remedial Measures Investigation Report for Chromium Contamination at the Bayonne Plant, Bayonne, New Jersey, July 7, 1993.

ICF Kaiser Engineers, Inc. 1994. Interim Remedial Measures Investigation Report for Chromium Contamination at the Bayonne Plant, Bayonne, New Jersey, Supplement 1, Conrail Right-of-Way Investigation, February 25, 1994.

IT Corporation. 1993. Phase I Interim Remedial Measure Work Plan Proposed Sewer System Evaluation, February 10, 1993.

Leggette, Brashears and Graham, Inc. 1974a. Status Report of Shallow Ground-Water Contamination Investigation, Exxon Company, U.S.A., Bayonne Plant, New Jersey, September 20, 1974.

Leggette, Brashears and Graham, Inc. 1974b. Letter from M. Schultz to D. Petrow, Exxon Company, U.S.A., May 21, 1974.

Leggette, Brashears and Graham, Inc. 1974c. Status Report for October 1974 Shallow Groundwater Contamination Investigation, Exxon Company, U.S.A., Bayonne Plant, New Jersey, November 6, 1974.

Lueder, D. R., G. H. Obear, W. W. Holman, and F. C. Rogers. 1952. Engineering Soil Survey of New Jersey, Report No. 4. Engineering Research Bulletin No. 18. New Jersey State Highway Department and Rutgers University, in Cooperation with the Bureau of Public Roads, U.S. Department of Commerce, September 1952.

Malcolm Pirnie, Inc. 1985. Potential Hazardous Waste Site Preliminary Assessment at Exxon Bayonne Plant, February 28, 1985.

McGuinness, C. L. 1963. The Role of Ground Water in the National Water Situation. U.S. Geological Survey Water-Supply Paper 1800. United States Government Printing Office, Washington, 1120 pp.

Monkowsky, J. 1994. City of Bayonne Department of Health. Telephone Conversation with J. Karn, Geraghty & Miller, Inc., October 20, 1994.

National Oceanographic Atmospheric Administration (NOAA). 1991. Climatology Data Annual Summary, New Jersey, 1991, vol. 96, no. 13.

New Jersey Department of Environmental Protection (NJDEP). 1990. Division of Hazardous Waste Management, Bureau of Planning and Assessment. Site Inspection, Exxon Bayonne Plant, Bayonne, Hudson County, EPA ID No.: NJD045435807. [sic], December 27, 1990.

New Jersey Department of Environmental Protection (NJDEP). 1994. Known Contaminated Sites in New Jersey, July 1994.

Olsen et al. 1989. Tectonic, Depositional, and Paleoecological History of the Early Mesozoic Rift Basins, Eastern North America. Washington, D.C., American Geophysical Union Field Trip Guide Book T351, 174 pp.

PPG Industries, Inc. 1992. Letter to C. Hess, Exxon Company, U.S.A. from L. Bryant. Re: Final Investigation Work Plan, Tank Farm #3 and General Tank Farm, Bayonne Terminal, July 9, 1992.

Roy F. Weston, Inc. 1980. Letter from A. Thomas to M. Kenney, Exxon Company, U.S.A. Re: Subsurface Oil Recovery Program, Bayonne Plant - Meeting on June 1980, June 13, 1980.

Roy F. Weston, Inc. 1981a. Letter. Re: New Wells for the Low Sulphur Area, March 4, 1981.

Roy F. Weston, Inc. 1981b. Letter from A. Thomas to J. B. Wells, Exxon Company, U.S.A. Re: Maintenance of Oil Recovery Wells, March 9, 1981.

Roy F. Weston, Inc. 1985. Subsurface Oil Recovery and Monitoring Program Pier 3, Exxon Company U.S.A., June 4, 1985.

Roy F. Weston, Inc. 1986a. Letter from A. Thomas to D. Petro, Exxon Company, U.S.A., Concerning the Potential for Hydrocarbon Seepage from Pier 7 to the Bay and Site Inspection of Pier 6 and Pier 3 Area, July 15, 1986.

Roy F. Weston, Inc. 1986b. Letter to D. Petro, Exxon Company, U.S.A. Re: Letter Dated August 15, 1986 on Piers 6 and 7 Area, August 19, 1986.

Roy F. Weston, Inc. 1986c. Letter from A. Thomas to D. Petro, Exxon Company, U.S.A., Concerning Additional Monitoring Wells, September 23, 1986.

Roy F. Weston, Inc. 1989a. Letter from H. A. Anwar to D. Petrow, Exxon Company, U.S.A. Re: Meeting Summary, Discussion of Well Monitoring Results and Overall Environmental Strategy, Exxon Bayonne Refinery, Bayonne, New Jersey, January 6, 1989.

Roy F. Weston, Inc. 1989b. Fourth Quarter Monitoring Report (1989), Exxon U.S.A., Bayonne Facility, Bayonne, New Jersey, March 27, 1989.

Roy F. Weston, Inc. 1989c. First Quarter Monitoring Report (1989), Exxon U.S.A., Bayonne Facility, Bayonne, New Jersey, May 1, 1989.

Roy F. Weston, Inc. 1989d. Second Quarter Monitoring Report (1989), Exxon U.S.A., Bayonne Facility, Bayonne, New Jersey, August 21, 1989.

Roy F. Weston, Inc. 1989e. Letter from H. A. Anwar to D. Petrow, Exxon Company, U.S.A. Re: Third Quarterly 1989 Monitoring Data for the Exxon Bayonne Facility, October 27, 1989.

Sandaq, Inc., P.C. 1986. Sewer Investigation Report for Toxic Substances, April 27, 1986.

Scerbo, R. 1992. Personal Communication with D. Vines, Geraghty & Miller, Inc., Re: Aboveground Storage Tanks, December 1992.

Scerbo, R. 1994a. Personal Communication with M. McDonnell, Geraghty & Miller, Inc., Re: Spills at Bayonne Plant, November 1994.

Scerbo, R. 1994b. Personal Communication with M. McDonnell, Geraghty & Miller, Inc., Re: Transformer Status, October 13, 1994.

Scerbo, R. 1994c. Personal Communication with M. McDonnell, Geraghty & Miller, Inc., Re: Drum Storage Areas, October 13, 1994.

Standard Oil Company of New Jersey. No Date. Drawing estimated pre-1920.

Standard Oil Company (New Jersey). 1921. Fresh Water Lines, General plan, Drawing number WM-1-104. January 14, 1921.

Standard Oil Company of New Jersey. 1932. Map of Bayonne Works. Map Number WM-1-88. June 4, 1932.

Standard Oil Company. 1936. Brief History of the Bayonne Works, Article for Bayonne Works, 1936.

Schuberth, C. J. 1968. The Geology of New York City and Environs. Natural History Press, New York, 304 pp.

State of New Jersey Department of Conservation and Economic Development. 1950. Geologic Map of New Jersey, Revised in 1950.

Terris, Edgecombe, Hecker, and Wayne. 1989. Letter from B. J. Terris to D. D. Esch, March 29, 1989.

United States Geological Survey (USGS). 1981. Jersey City Quadrangle, New Jersey-New York, 7.5 Minute Topographic Map, Photo Revised 1981.

GLOSSARY

GLOSSARY OF REFINERY TERMS RELATING TO THE OIL REFINING PROCESS AND THE RESULTING PRODUCTS AT THE BAYONNE PLANT, BAYONNE, NEW JERSEY

Aboveground Storage Tank (AST)
Vessel used to contain liquids. Typically cylindrical and constructed of carbon steel and occasionally of fiberglass-reinforced plastic. Built on foundations. Some have multiple internal compartments. Roof design is related to the volatility of the liquid being stored and includes fixed, fixed cone, floating, and internal floating types. All are filled by pipeline with pumps and valves; all have some type of secondary containment system such as concrete walls or earthen berms or fire banks that use a drainage system for storm water runoff and potential spillage that incorporates an oil/water separator.

Acto
Sodium sulfonate soap produced in the specialties section of the Exxon Chemicals Plant.

API Separator
An American Petroleum Institute (API) separator is an oil/water separator that is constructed and operated according to API protocols and typically consists of a concrete-walled basin.

Asphalt Oxidation Unit
A process unit that injects air into a base grade asphalt to alter its physical properties.

Asphalt
Black to brown bituminous material obtained as a residue of petroleum refining; consists chiefly of hydrocarbons.

Colprovia Asphalt Pans
Small tanks that stored processed crude from refining stills. Colprovia probably refers to the type or origin of the crude oil.

Atmospheric Unit
A process unit attached to a pipe still to produce liquid hydrocarbons. The atmospheric unit drew off fractions of product. This is also a unit of measurement.

AV-Gas
Aviation gasoline.

Boiler House	Coal-fired (pre-1930) and oil-fired steam-generating plants.
Bulk Wax Gravity Tank	An elevated shipping tank for filling tank trucks by gravity.
Cesium Vault	A concrete-walled building in the Exxon Chemicals Plant Area that housed a lead cylinder containing a bar of Cobalt 60. Because Cobalt 60 decays to cesium, the vault is called the cesium vault.
Chromium Slag	Pellets, pebbles, and nodules of chromium and chromium oxide generated by chromium smelting operations, probably from the scum that floats on top of molten chromium. Chromium slag was used at the Bayonne Plant and other industrial facilities as an inexpensive fill material, especially for preloading the ground surface before construction of large tanks and buildings.
Cinder	Fragments of ash, or partially burned coal, and other miscellaneous materials that may have been placed in an incinerator. Used as a fill material.
Clay Filter Burners	Used to regenerate the clay or bauxite utilized for filtering wax products. Burners removed impurities from the clay.
Condenser	A process unit that cooled distilled vapor phase hydrocarbons to the liquid phase.
Cooperage Building	A structure within which asphalt was oxidized and packaged.
Cracking Coil Units	Process units that convert heavy fractions to gasoline.

Crude Still

The earliest mechanism used for petroleum distillation. Crude stills (also termed batch stills) consisted of furnaces and a row of heated tanks that contained progressively lighter distillates drawn from preceding tanks. They were capable of refining crude oil into kerosene. Crude stills were a type of continuous still: horizontal drums heated from below by coal or oil into which crude or other petroleum products were continuously fed.

Cutback

Any end product from a process unit that is fed back into the unit for reprocessing. Also used to describe a substandard product that may be in storage awaiting reprocessing, disposal or blending. Cutback asphalt was asphalt that was thinned using kerosene or other rapid cure solvents. The process was used to make different grades of asphalt.

Diesel

A blend of petroleum hydrocarbons used as motor fuel.

Fire Bank

An earthen, brick, or concrete wall surrounding tanks used to contain spills, fires, or explosions.

Fire Fighting Training Field

An open area that existed in the northwestern corner of the General Tank Field from 1981 to 1982.

Flit

The brand name of a white oil insecticide produced in the specialties section of the Lube Oil Area. Flit is an acronym for fleas, lice, insects, and ticks.

Foam Building

A fire control pump house capable of producing foam from a protein-based concentrate that were used to fight oil fires.

Gasoline

A fuel used in internal-combustion engines, consisting of a blend of several products of natural gas and petroleum.

Glue Factory

An old portion of the Barrel Plant in which wooden barrels were fabricated.

Heating Oil
A distillate fuel generally used for residential heating.

Hivisfuel Furnace
A furnace moved in 1958 from the Central Boiler House, where it heated high viscosity fuel, stored the Asphalt Plant Area. Associated with the furnace was a closed loop piping system that circulated oil. The hivisfuel furnace is integrated with the current Asphalt Plant hot oil transfer system and is referred to as the Hot Oil Furnace.

Hydraulic Oil
An oil used in hydraulic cylinders and lines; high quality lubrication oil capable of withstanding high heat and pressure.

Inter-Refinery Pipeline (IRPL)
One 12-inch and two 8-inch pipelines that connected the Bayway Refinery to the Bayonne Plant from the 1930s (estimated) until January 1990 when a rupture occurred near the Bayway pier. The IRPL carried powerformer feed, jet fuel, kerosene, heating oil, diesel, and low sulfur fuel oil.

Kerosene
A fuel, solvent, and thinner, very similar to heating oil.

Lube Oil
A lubrication or lubricating oil.

Methyl Ethyl Ketone (MEK)
A substance used as a solvent to filter wax; the MEK Plant replaced the sweaters.

Mistol
The brand name of medicated nose drops made from products manufactured in the specialties section of the Lube Oil Area.

NAP Acid Tank Field
Constructed in 1921; tanks contained napthenic (NAP) acid used in the Case & Can Plant.

Necton
A base grade of lubricating oil.

No. 2 Plant
A general name given to the former process areas located north of the railroad tracks that divide the Bayonne Plant.

No. 2 Fuel Oil
A grade of heating oil.

No. 3 Plant	A general name given to the former process areas located south of the railroad tracks that divide the Bayonne Plant.
Nujol	A mineral oil laxative produced in the specialties section of the Lube Oil Area.
Occipular Co-Polymer (OCP) Warehouse	Formerly located in the Exxon Chemicals Plant, the building housed operations related to viscosity improvement additives.
Paraffine	A waxy, crystalline, flammable substance obtained from distillates of petroleum that is a complex mixture of hydrocarbons and is used chiefly in coating and sealing, in candles, in rubber compounding, and in pharmaceuticals and cosmetics; any of various mixtures of similar hydrocarbons including mixtures that are semi-solid or oily; alkane; kerosene.
Paraflow Plant	A process area that manufactured a "pour depressant" lube oil additive.
Paramins	Referred to as the trade name of Exxon Chemical Company.
Parapoid Plant	A process area that manufactured a "viscosity improver" lube oil additive.
Phenol Plant	A process area that processed ordinary grades of lube oil to a high-grade premium product by removing undesirable low-grade constituents using phenol as a medium.
Pipe Still	A fractionating tower, furnace pumps, and control equipment used to produce petroleum products.
Pitch Still	A process unit that reduced crude oil to an asphalt component.
Pitch	Similar to asphalt; a black or dark viscous substance obtained as a residue in the distillation of organic materials and especially tars.
Porocel Plant	A trade name for a plant that filtered wax through bauxite.

Powerformer Feed

The powerforming process was a proprietary name for the petroleum reforming process in which catalytically promoted chemical reactions converted low octane feed components into high octane products called reformate. Powerformer feed is liquid naphtha, a light grade oil generated in the atmospheric pipe stills. Powerformer feed for operations at the Bayway Refinery was stored in several ASTs at Bayonne. No powerformer operations were conducted at the Bayonne Plant.

Preload

Any type of fill material placed in bulk at the site of a large storage tank or building prior to foundation construction in order to prepare the ground for the weight of the tank by compressing organic or miscellaneous fill on the site. The use of preload material that contained chromium slag was documented for one tank foundation at the Bayonne Plant and was also used for grading and for tank berm construction.

Process Gas Oil (PGO)

The fraction of crude oil that is heavier than middle distillates and lighter than asphalt/pitch. The process gas oil is sent from the pipe stills to the catalytic cracking unit for further refining. "Bayway PGO" has been stored in several ASTs at Bayonne.

Pump House

A building or structure that housed process pumps handling various liquids.

Recycled Oil

A waste oil generated from various petroleum storage and blending operations.

Reducing Still

An old 1900 process unit that further reduced fractions of hydrocarbons to lighter components.

Refined Wax

A pure and highest grade of wax used for food products, crayons, etc.

Separator Outfall

A pipe or open flume into which the water effluent from an oil/water separator drains; historically many separator outfalls discharged directly to water bodies or settling basins.

Separator Bottoms

A sludge residue that sinks to the bottom of oil/water separators.

SGEM Tank Field	Steam generation energy management (SGEM) complex that included a city water tank and two fuel storage tanks; associated with the new boiler house complex.
Shell Stills	Same as crude stills.
Solvent Drum Filling Building	A building housing filling and conveyor equipment to fill 55-gallon steel drums.
Stave Still	Possibly a stave kiln.
Substation	A subsidiary station in which electric current is transformed; contains one or more transformers.
Sump	A pit at the lowest point in a drainage system that often has a fixed pump used to remove collected liquids.
Superflo	A highly refined lubricating oil containing various additives and used as a premium motor oil.
Sweater or Wax Sweater	A process unit that separates oil from wax by heating and cooling the material in trays containing coils.
Sweetening Still	Sweetening is the process in which desulfurization occurs; desulfurization removes unwanted sulfurs that normally exist in crude oils.
Tank Bottoms	The material that accumulates in the bottom of storage tanks, consisting of oil, water, and the solids that settle out of petroleum products.
Teresstic	A blended grade of lubricating oils.
Tetra Ethyl Lead	The additive used to make leaded gasoline; also called organic lead.
Transformer	A unit that converts high voltage electricity into lower voltage electricity.
Truck Loading Rack	An area where tank trucks are filled, usually from an overhead pipeline.

Twenty-Five Cycle Power	An old former electrical generator in use before 60-cycle power came into use.
Underground Storage Tank (UST)	A carbon steel or fiberglass vessel buried below ground surface used for storing liquids such as waste oils, heating oils, or gasoline.
Vacuum Still	A process unit that reran pressed oil; pressed oil has been squeezed from wax.
Varsol	A petroleum-based naphtha solvent.
Wax	A solid substance of mineral origin consisting of higher hydrocarbons.
Wax Hot House and Cook Building	A building used to heat wax for processing with steam.
Wax Hydrogenation	A process to further refine wax with hydrogen to further remove impurities.
Wax Filter	A unit that separates oil from wax.
Wax Separator/Paraffine Separator	A compartmented concrete separator in which floating hydrocarbons that were skimmed off as liquids flowed from one compartment to the next for further treatment.
White Oil	A mineral oil produced by treating base oil feedstock with sulfuric acid and caustic soda to remove sulfides.

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TABLES

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B001	B-1	9,783	10,700
B002	B-2	9,878	10,700
B003	B-3	9,971	10,700
B004	B-4	9,972	10,809
B005	B-4A	9,972	10,811
B006	B-5	10,005	10,936
B007	B-6A	10,013	11,096
B008	B-7	9,880	10,860
B009	B-8	9,816	11,086
B010	B-9C	9,777	10,937
B011	B-10A	9,880	10,973
B012	B-A	12,221	11,390
B013	3	9,220	9,940
B014	B-B	12,221	11,223
B015	B-1	10,872	11,073
B016	B-2	10,956	11,088
B017	B-3	11,048	11,082
B018	B-4	11,147	11,082
B019	B-5	11,249	11,091
B020	B-6	10,857	10,952
B021	B-7	10,963	10,944
B022	B-8	11,017	10,984
B023	B-9	11,147	10,952
B024	B-10J	11,234	10,986
B025	B-11	10,854	10,883
B026	B-12	10,964	10,883
B027	B-13	11,058	10,883
B028	B-14	11,153	10,883
B029	B-15C	11,255	10,888
B030	B-4	12,763	11,886
B031	B-5	12,970	11,862
B032	B-6	13,398	11,910
B033	B-7	13,422	11,991
B034	B-8	13,345	11,910
B035	B-9	12,593	11,902
B036	B-1	12,516	11,902
B037	B-2	12,507	11,827
B038	B-3	12,439	11,910
B039	1	9,152	10,426
B040	2	9,132	10,420
B053	1	9,204	9,820
B054	2	9,340	9,820
B055	4	9,340	9,940
B056	5	9,220	10,060
B057	6	9,340	10,060
B058	7	9,220	10,180
B059	8	9,340	10,180
B060	9	9,460	10,180

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B061	10	9,220	10,300
B062	11	9,332	10,300
B063	12F	9,488	10,247
B064	13	9,232	10,420
B065	14	9,340	10,420
B066	15	9,460	10,420
B067	16	9,340	10,540
B068	17	9,460	10,540
B069	18	9,340	10,660
B070	19	9,316	10,790
B071	20	9,340	10,900
B072	21	9,460	10,900
B073	22H	9,092	11,040
B074	23	9,220	11,020
B075	24	9,100	11,140
B076	25	9,220	11,140
B077	27	9,340	11,260
B078	CB-3	9,027	9,835
B079	CB-4	9,011	9,835
B080	CB-5	9,028	9,975
B081	CB-6	9,012	9,975
B082	CB-7	9,039	10,113
B083	CB-8	9,014	10,113
B084	CB-9	9,047	10,165
B085	CB-10	9,100	10,177
B086	CB-11	9,047	10,230
B087	CB-12	9,100	10,243
B088	CB-13	9,047	10,293
B089	CB-14	9,100	10,293
B090	CBA	9,069	10,250
B091	CBB	9,073	10,205
B092	CBC	9,075	10,143
B093	CB-1	9,579	11,090
B094	CB-2	9,554	11,071
B095	CB-15	9,705	10,320
B096	CB-16	9,675	10,285
B097	CB-32	9,438	9,897
B098	CB-33	9,530	9,980
B099	CB-34	9,515	9,883
B100	CB-35	9,559	9,917
B101	CB-36	9,627	9,918
B102	CB-37	9,610	9,853
B103	CB-38	9,560	9,788
B104	B-1	9,468	9,849
B105	B-2	9,468	9,791
B106	B-3	9,429	9,762
B107	B-4	9,499	9,697
B108	B-5	9,517	9,787

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B109	B-6	9,550	9,840
B110	B-7	9,600	9,732
B111	B-8	9,634	9,767
B112	B-9	9,674	9,830
B113	B-1	9,767	11,335
B114	B-2	9,449	11,255
B115	B-3	9,502	11,213
B116	B-4	9,460	11,145
B117	B-5	9,803	10,768
B118	B-6A	9,500	10,792
B119	B-7	9,762	10,641
B120	B-8	9,486	10,648
B121	B-9	9,517	10,430
B122	B-10	9,971	10,278
B123	B-11	9,844	10,238
B124	B-12	9,664	10,203
B125	B-13	9,552	10,252
B126	B-15A	9,546	9,387
B127	B-16A	9,347	9,616
B128	B-17	9,196	9,648
B129	B-18	9,448	11,277
B130	B-19	9,476	10,992
B131	CB-37 (g)	9,684	10,655
B132	CB-38 (g)	9,729	10,632
B133	CB-39 (g)	9,626	10,573
B134	CB-40 (g)	9,607	10,524
B135	1	9,669	9,523
B136	2	9,627	9,540
B137	3	9,633	9,446
B138	4	9,555	9,444
B150	1	14,868	11,649
B151	2	15,024	11,599
B152	3	15,200	11,541
B153	4	15,390	11,479
B154	5	15,490	11,447
B155	6	15,665	11,390
B156	B-1	13,731	12,370
B157	B-2	13,684	12,415
B158	B-3	13,760	12,220
B159	B-4	13,674	12,220
B160	B-5	13,760	12,043
B161	B-6	13,671	12,036
B162	B-7	13,811	11,899
B163	B-8	13,813	11,813
B164	B-9	13,628	11,900
B165	B-10	13,634	11,817
B166	B-11	13,464	11,912
B167	B-12	13,464	11,821

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B168	B-13	13,274	11,913
B169	B-14	13,274	11,822
B170	B-15	13,094	11,912
B171	B-16	13,094	11,823
B172	B-17	12,779	12,274
B173	B-18	12,725	12,245
B174	B-19	12,859	11,756
B175	B-20	12,874	11,828
B176	B-21	12,797	11,825
B177	H-1	13,575	11,193
B178	H-2	13,649	11,120
B179	H-3	13,626	11,069
B180	H-4	13,524	11,069
B181	H-5	13,502	11,122
B182	H-6	13,576	11,121
B183	H-7	13,354	11,231
B184	H-8	13,428	11,151
B185	H-9	13,354	11,079
B186	H-10	13,354	11,151
B187	H-11	13,131	11,256
B188	H-12	13,205	11,183
B189	H-13	13,131	11,108
B190	H-13A	13,130	11,093
B191	H-13B	13,095	11,102
B192	H-13C	13,192	11,117
B193	H-14	13,057	11,184
B194	H-15	13,131	11,183
B195	H-16	13,280	11,445
B196	H-17	13,353	11,371
B197	H-18	13,280	11,298
B198	H-19	13,204	11,371
B199	H-20	13,280	11,371
B200	H-21	13,013	11,445
B201	H-22	13,086	11,369
B202	H-23	13,013	11,298
B203	H-24	12,937	11,369
B204	H-25	12,844	11,186
B205	A	12,357	12,795
B206	B	13,500	12,795
B207	A	11,583	10,981
B208	B	11,670	10,966
B209	C	11,648	11,023
B210	B-8	10,985	9,427
B211	B-9	11,005	9,595
B212	B-10	11,003	9,700
B213	B-11	10,998	9,815
B214	B-12	10,998	9,940
B215	B-13	11,000	10,043

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B216	B-14	11,086	9,370
B217	B-15	11,077	9,797
B218	B-16	11,097	9,931
B219	B-17	11,090	10,043
B220	B-18	11,143	9,616
B221	B-19	11,216	9,530
B222	B-20	11,236	9,638
B223	B-21	11,211	9,769
B224	B-22	11,183	9,930
B225	B-23	11,192	10,043
B226	1	11,000	12,388
B227	6	11,125	13,000
B228	B-2	9,745	10,790
B229	B-3	9,719	10,903
B230	101	13,275	10,450
B231	102	13,580	10,350
B232	103	13,740	10,350
B233	104	13,410	10,365
B234	B-4	11,406	11,102
B235	B-5	11,447	11,102
B236	68-1	9,396	10,155
B237	68-2	9,397	10,225
B238	1A	8,868	11,138
B239	2A	8,800	11,006
B240	3A	8,906	10,903
B241	4A	8,842	10,771
B242	5A	8,942	10,696
B243	6A	8,860	10,611
B244	W-1	13,576	11,039
B245	W-2	12,884	11,290
B246	W-3	12,920	11,228
B247	W-4	12,844	11,164
B248	W-6	12,726	11,345
B249	W-7	12,576	11,345
B250	W-8	12,546	12,080
B251	W-9	12,506	12,148
B252	W-10	12,482	12,216
B253	W-11	12,662	12,380
B254	W-12	12,658	12,450
B255	W-13	12,772	12,480
B256	W-14	12,728	12,420
B257	W-15	12,724	12,576
B258	W-16	12,776	12,708
B259	W-17	12,430	12,150
B260	W-18	12,532	12,214
B261	B-6	14,429	11,599
B262	B-7	14,393	11,481
B263	B-10	14,341	11,559

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B264	B-8	14,250	11,520
B265	B-9	14,281	11,638
B266	B-11	14,144	11,666
B267	B-12	14,047	11,713
B268	B-1	14,479	11,341
B269	B-2	14,497	11,429
B270	B-3	14,440	11,395
B271	B-1	11,925	10,477
B272	B-2	12,098	10,444
B273	B-3	12,020	10,467
B274	B-4	12,086	10,521
B275	B-5	11,951	10,417
B276	B-6	12,141	10,636
B277	B-7	12,138	10,533
B278	B-8	12,301	10,575
B279	B-9	12,265	10,684
B280	B-10	12,230	10,593
B281	W-21	12,654	12,206
B282	W-22	12,760	12,211
B283	W-23	12,762	12,098
B284	W-32	12,659	12,163
B285	BAY 74-1	14,426	11,607
B286	BAY 74-2	14,375	11,407
B287	BAY 74-3	14,347	11,407
B288	T1	12,497	12,426
B289	T2	12,502	12,346
B290	T3	12,437	12,455
B291	T4	12,500	12,498
B292	T5	12,302	12,289
B293	T6	12,353	12,340
B294	T7	12,353	12,235
B295	T8	12,246	12,235
B296	T9	12,250	12,345
B297	B-1	9,986	9,419
B298	B-2	9,996	9,398
B299	B-3	9,984	9,457
B300	B-4	9,975	9,469
B301	B-5	9,959	9,504
B302	22	12,435	12,077
B303	23	12,585	12,170
B304	24	12,546	12,482
B305	25	12,550	12,307
B306	26	12,834	12,390
B307	27	12,663	12,310
B308	28	12,451	11,792
B309	29	12,532	11,927
B310	30	12,677	11,827
B311	31	12,732	11,895

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B312	32	12,852	11,909
B313	33	13,009	11,846
B314	34	13,178	11,915
B315	35	12,674	12,510
B316	36	12,678	11,975
B317	37	12,769	11,979
B318	38	12,902	11,982
B319	39	13,009	11,981
B320	CB-62	11,798	11,641
B321	CB-63	11,765	11,515
B322	CB-64	11,860	11,512
B323	CB-65	11,970	11,513
B324	CB-66	11,940	11,602
B325	CB-67	11,615	11,556
B326	CB-68	11,521	11,554
B327	CB-69	11,436	11,560
B328	CB-70	11,298	11,574
B329	CB-71	11,215	11,580
B330	CB-72	11,223	11,655
B331	B-1	11,689	11,536
B332	B-2	11,770	11,667
B333	B-3	11,984	11,797
B334	B-4	11,451	11,725
B335	B-5	11,703	11,727
B336	No. 1	11,168	11,585
B337	No. 2	11,172	11,645
B338	No. 3	11,173	11,740
B339	No. 4	11,284	11,832
B340	No. 6	11,171	11,957
B341	No. 8	10,860	12,007
B342	No. 9	10,616	12,024
B343	No. 10	10,558	12,050
B344	No. 11	10,502	12,076
B345	No. 12	10,436	11,963
B346	No. 13	10,850	11,780
B347	No. 14	10,844	11,724
B348	No. 15	10,951	11,796
B349	No. 16	10,946	11,719
B350	CB-40	10,562	12,175
B351	CB-41	10,706	12,200
B352	CB-42	10,575	12,015
B353	CB-43	10,725	12,055
B354	CB-44	10,871	12,087
B355	CB-45	10,740	11,905
B356	CB-46	10,906	11,940
B357	CB-47	11,058	11,957
B358	CB-48	10,908	11,760
B359	CB-49	11,060	11,843

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B360	CB-50	11,215	11,885
B361	CB-51	11,116	11,708
B362	CB-52	11,245	11,774
B363	CB-53	11,383	11,791
B364	CB-54	11,300	11,689
B365	CB-55	11,410	11,666
B366	CB-56	11,531	11,713
B367	CB-57	11,593	11,615
B368	CB-58	11,730	11,649
B369	CB-59	10,643	11,730
B370	CB-60	10,743	11,760
B371	CB-61	10,987	11,656
B372	B-40	12,455	11,919
B373	B-6	9,500	10,804
B374	B-15	9,564	9,387
B375	B-16	9,347	9,654
B376	CB-A	11,758	10,704
B377	CB-1	11,753	10,765
B378	CB-2	11,714	10,657
B379	CB-3	11,814	10,677
B380	CB-4	11,965	10,803
B381	CB-5	11,943	10,690
B382	CB-6	12,039	10,729
B383	CB-7	12,173	10,835
B384	CB-8	12,165	10,726
B385	CB-9	12,259	10,760
B386	CB-10	12,368	10,853
B387	CB-11	12,400	10,755
B388	CB-12	12,478	10,833
B389	CB-21	11,198	10,426
B390	CB-22	11,292	10,362
B391	CB-23	11,393	10,469
B392	CB-24	11,488	10,402
B393	CB-25	11,582	10,501
B394	CB-26	11,676	10,435
B395	CB-27	11,766	10,532
B396	CB-28	11,859	10,466
B397	CB-29	11,247	10,154
B398	CB-30	11,312	10,252
B399	CB-31	11,440	10,190
B400	CB-32	11,506	10,286
B401	CB-33	11,627	10,225
B402	CB-34	11,692	10,319
B403	CB-35	11,812	10,254
B404	CB-36	11,878	10,351
B405	74-1	15,131	11,012
B406	B-1	11,904	10,480
B407	B-2	11,876	10,432

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B408	B-1	14,669	11,409
B409	B-2	14,829	11,381
B410	B-3	15,002	11,353
B411	B-4	15,189	11,322
B412	B-4A	15,203	11,309
B413	B-5A	15,374	11,278
B414	B-6	14,905	11,308
B415	B-1	10,512	11,155
B416	B-2	10,686	11,082
B417	B-3	10,862	11,007
B418	B-4	10,620	11,600
B419	B-5	10,770	11,566
B420	B-6	10,962	11,518
B421	B-7	11,119	11,495
B422	B-7A	11,119	11,495
B423	B-8	11,070	11,365
B424	B-9	10,960	11,396
B425	B-10	11,050	11,199
B426	B-11	11,011	11,444
B427	B-12	10,776	11,427
B428	B-13	10,614	11,478
B429	B-14	10,580	11,376
B430	B-15	10,782	11,296
B431	B-15A	10,742	11,292
B432	B-16	10,903	11,289
B433	B-29	10,320	11,695
B434	B-17	11,005	11,089
B435	B-18	10,877	11,137
B436	B-19	10,702	11,190
B437	B-20	10,562	11,259
B438	B-21	10,584	11,170
B439	B-22	10,659	11,296
B440	B-23	10,902	11,476
B441	B-24	10,722	11,508
B442	B-25	10,767	11,541
B443	B-26	10,842	11,517
B444	B-27	10,635	11,139
B445	B-28	10,602	11,307
B446	CB-41	9,325	10,976
B447	CB-42	9,326	11,010
B448	CB-43	9,326	11,040
B449	CB-17	9,712	11,681
B450	CB-18	9,673	11,676
B451	CB-19	9,638	11,672
B452	CB-20	9,582	11,628
B453	CB-21	9,469	11,657
B454	CB-22	9,362	11,593
B455	CB-23	9,241	11,680

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B456	CB-24	9,211	11,685
B457	CB-25	9,241	11,660
B458	CB-26	9,211	11,655
B459	CB-27	9,241	11,630
B460	CB-28	9,211	11,625
B461	CB-29	9,241	11,593
B462	CB-30	9,211	11,594
B463	CB-31	9,241	11,567
B464	CB-44	9,703	11,438
B465	CB-45	9,704	11,487
B466	CB-46	9,681	11,540
B467	CB-47	9,659	11,490
B468	CB-48	9,612	11,541
B469	CB-49	9,612	11,492
B470	CB-50	9,612	11,442
B471	CB-51	9,568	11,492
B472	CB-52	9,525	11,544
B473	CB-53	9,525	11,492
B474	CB-54	9,525	11,444
B475	B-101	14,570	11,125
B476	B-102	14,825	11,075
B477	B-103	14,940	11,008
B478	B-103A	14,954	11,004
B479	B-104	15,104	10,964
B480	B-105	14,682	11,034
B481	B-106	14,431	11,098
B482	B-107	14,351	11,110
B483	B-1	11,895	11,009
B484	B-2	11,890	11,058
B485	B-3	11,804	11,058
B486	B-4	11,625	11,213
B487	B-5	11,498	11,213
B488	B-6	11,347	11,212
B489	B-7	11,270	11,215
B490	B-8	11,617	11,294
B491	B-9	11,548	11,302
B492	B-10	11,500	11,300
B493	B-11	11,425	11,290
B494	B-12	11,311	11,284
B495	B-13	11,174	11,214
B496	B-14	11,094	11,238
B497	B-15	11,013	11,202
B498	B-16	10,972	11,235
B499	B-17	10,978	11,300
B500	B-18	11,043	11,416
B501	B-19	10,928	11,354
B502	B-20	10,856	11,357
B503	B-21	10,793	11,353

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
B504	CB-1	8,958	12,952
B505	CB-2	9,113	13,162
B506	CB-4	9,226	13,009
B507	CB-5	9,280	12,952
B508	CB-6	9,225	12,775
B509	CB-7	9,333	12,560
B510	CB-9	9,386	13,065
B511	CB-10	9,484	12,842
B512	CB-11	9,384	12,705
B513	CB-12	9,489	12,505
B514	CB-13	9,580	13,010
B515	CB-14	9,567	12,842
B516	CB-15	9,680	12,680
B517	CB-16	9,577	12,525
B518	CB-17	9,855	12,825
B519	CB-18	10,020	12,775
B520	CB-19	9,810	12,645
B521	CB-20	10,156	12,625
B522	CB-21	10,005	12,329
B523	CB-22	10,343	12,484
B524	CB-23	10,000	12,162
B525	CB-24	10,343	12,144
B526	CB-25	10,402	12,395
B527	CB-26	10,402	12,282
B528	B-1	14,465	11,667
B529	B-1	13,665	11,694
B530	B-2	13,497	11,672
B531	B-1	9,676	10,110
B532	B-2	9,763	10,211
B533	B-3	9,955	10,376
B534	B-4	9,678	10,162
B535	B-5	9,763	10,162
B536	B-1	14,227	11,615
B537	B-2	13,885	11,417
B538	B-3	14,260	11,605
B539	B-1	10,253	10,646
B540	B-2	10,401	10,661
B541	B-3	10,327	10,646
MW01	MW1	10,862	10,967
MW02	MW2	10,863	10,988
EB1	L-27	9,818	9,364
EB2	L-49	9,901	9,364
EB3	L-50	9,912	9,385
EB4	L-51	9,920	9,405
EB5	L-52	9,928	9,426
EB6	L-53	9,936	9,448
EB7	L-54	9,942	9,470
EB8	L-56	9,985	9,477

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
EB9	L-55	9,943	9,496
EB10	L-22	9,801	9,506
EB11	L-25	9,852	9,681
EB12	L-24	9,758	9,770
EB13	L-20	9,537	9,481
EB14	L-30	9,285	9,770
EB15	L-7	9,038	9,775
EB16	L-46	9,276	10,228
EB17	L-40	9,869	10,363
EB19	L-1A	8,925	10,496
EB21		9,348	11,464
EB22	L-43	9,712	11,451
EB23	L-45	9,554	11,546
EB24	L-44	9,801	11,555
EB25	AH-1	9,768	11,707
EB26	AH-5	9,761	11,742
EB27	AH-3	9,507	11,824
EB28	AH-4	9,796	12,045
EB29	OW-23	9,546	12,409
EB30	OW-22	9,777	12,412
EB31	AH-7	10,183	12,014
EB33	T2	10,022	12,782
EB34	T1	10,006	12,778
EB35	T3	10,020	12,799
EB36	T4	10,033	12,816
EB40	T9	10,073	12,742
EB41	T10	10,146	12,678
EB42	T11	10,220	12,613
EB44	T13	10,384	12,495
EB45	T14	10,480	12,290
EB46	OW-4AW	11,314	11,851
EB47	P7-2-87	13,829	11,958
EB48	P7-3-87	13,917	11,952
EB49	P7-4-87	13,973	11,860
EB50	P7-5-87	13,744	11,800
EB51	P7-6-87	13,847	11,798
EB52	P7-7-87	13,919	11,793
EB53	P7-13	13,709	11,700
EB54	9	13,749	11,529
EB56	6C	13,886	11,645
EB57	P7-9-87	13,929	11,668
EB58	P7-8-87	14,013	11,723
EB59	P7-10-87	14,145	11,701
EB60R	P7-12-87	14,264	11,701
EB61	P7-14-87	14,345	11,704
EB62	P7-16-87	14,476	11,704
EB63	P7-18-87	14,592	11,704
EB64	P7-17	14,010	11,700

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
EB65	P7-11-87	14,150	11,690
EB66R	P7-13-87	14,268	11,691
EB67	P7-15-87	14,350	11,685
EB68	P7-17-87	14,474	11,686
EB69	P7-19-87	14,550	11,686
EB71	P6-21-87	14,238	11,282
EB72	P6-23-87	14,257	11,130
EB73	P6-24-87	14,203	11,006
EB74	P6-22-87	14,340	11,127
EB75	LS-13	13,663	11,056
EB76	LS-9	13,668	11,185
EB77	LS-7	13,254	11,249
EB78	LS-11	13,331	11,295
EB79	LS-10	13,415	11,322
EB80	LS-1	13,335	11,454
EB81	LS-2	13,302	11,446
EB82	6	14,198	11,566
EB83	Not known.	10,040	12,779
EB84	Not known.	13,858	11,725
EB85	Not known.	14,279	11,419
EB86	Not known.	14,369	11,188
EB87	Not known.	11,623	11,892
EB88	Not known.	11,591	11,818
EB89	Not known.	11,495	11,848
EB90	Not known.	17,565	21,234
EB91	Not known.	11,336	11,916
EB92	Not known.	11,221	11,971
EB93	Not known.	11,128	12,008
EB94	Not known.	10,772	12,186
EB95	Not known.	10,703	12,245
EB96	Not known.	10,629	12,318
EB97	Not known.	10,557	12,393
EB98	Not known.	10,453	12,434
EB99	Not known.	11,409	11,893
EBR1	RW-7	9,623	9,296
EBR2	RW-2	9,862	9,342
EBR3	RW-10	9,883	9,424
EBR4	RW-3	9,917	9,506
EBR5	RW-9	9,903	9,515
EBR6	RW-6	9,539	9,463
EBR7	RW-4	9,728	9,704
EBR8	RW-5	9,657	9,528
EBR9	11-W	13,961	11,854
EBR10	9-W	13,966	11,805
EBR11	8-W	13,969	11,729
EBR12	1-W	14,398	11,344
EBR13	2-W	14,378	11,318
EBR14	3-W	14,373	11,271

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
EBR15	4-W	14,343	11,221
EBR16	5-W	14,384	11,190
EBR17	6-W	14,335	11,136
EBR18	13-W	14,323	11,126
EBR19	12-W	14,301	11,007
EBR20	10-W	14,244	10,956
EBR21	7-W	14,116	11,072
EBR22	RW-8	9,116	10,358
EBR23	Not known.	14,179	10,980
HB1*	HB1	9,590	9,387
HB2*	HB2	9,713	9,302
HB3*	HB3	9,851	9,381
PKB1*	B1	8,991	10,554
PKB2*	B2	8,900	10,566
PKB3*	B3	8,960	10,639
PKB4*	B4	8,760	10,848
PKB5*	B5	8,785	10,680
PKB6*	B6	9,036	10,411
PKB7*	B7	8,758	10,936
PKB8*	B8	8,788	10,838
PKB9*	B9	8,925	10,446
PKB10*	B10	8,944	10,409
PKB11*	B11	9,002	10,383
PKB12*	B12	8,776	10,508
PKB13*	B13	8,698	10,502
PKB14*	B14	8,700	10,537
PKB15*	B15	8,737	10,537
PKMW-1*	PKMW-1	8,936	10,504
PKMW-2*	PKMW-2	8,785	10,565
PKMW-3*	PKMW-3	8,955	10,555
PKMW-4*	PKMW-4	9,030	10,402
PKMW-5*	PKMW-5	9,033	10,144
PKMW-6*	PKMW-6	9,039	10,016
PKMW-7*	PKMW-7	9,070	9,880
PKMW-8*	PKMW-8	8,760	10,840
PKMW-9*	PKMW-9	8,932	10,680
PKMW-10*	PKMW-10	8,933	10,662
PKMW-11*	PKMW-11	9,002	10,546
PKMW-12*	PKMW-12	8,929	10,560
PKMW-13*	PKMW-13	9,026	10,413
PKMW-14*	PKMW-14	9,203	10,712
PKMW-15*	PKMW-15	9,061	10,879
ITMW-1*	ITMW-1	11,734	11,700
ITMW-2*	ITMW-2	10,874	12,066
ITMW-3*	ITMW-3	10,868	12,045
ITMW-4*	ITMW-4	10,123	12,647
ITMW-5*	ITMW-5	10,167	12,714
ITMW-6*	ITMW-6	10,000	12,793

Footnotes are on page 15 of this table.

Table 2-1. Soil Boring Identification Numbers, Exxon Company Plant, Bayonne, New Jersey.

New Boring Number	Original Boring Number	East Coordinate	North Coordinate
MW-3*	MW-3	13,476	11,102
MW-4*	MW-4	13,095	11,022
MW-5*	MW-5	13,358	11,031
MW-6*	MW-6	13,509	10,973
MW-7*	MW-7	12,891	11,598
MW-8*	MW-8	13,495	11,449
MW-9*	MW-9	12,852	11,034
MW-10*	MW-10	13,324	11,697
MW-11*	MW-11	13,543	11,656
MW-12*	MW-12	13,175	11,372
MW-13*	MW-13	13,262	11,174
MW-14*	MW-14	13,346	11,306
P7MW-1*	P7MW-1	14,319	11,703
P7MW-2*	P7MW-2	14,196	11,687
SHERI-1	SHERI-1	14,282	11,288
SHERI-2	SHERI-2	14,298	11,146
SHERI-3	SHERI-3	13,903	11,796

* Non-Aqueous Phase Liquid (NAPL) Interim Remedial Measure (IRM) soil boring or monitoring well recently installed by Dan Raviv Associates, Inc. (1994b). Lithologic information from these borings has not yet been compiled and entered into the database and was not utilized in the development of Figures 2-2 through 2-7.

Table 2-2. Summary of Borings Selected for Development of Generalized Hydrogeologic Cross Sections, Bayonne Plant, Bayonne, New Jersey.

Boring	Report	Date
Cross Section A-A'		
B242	Raymond Concrete Pile Company	1948
B070	Warren George, Inc.	March 19, 1957
B373	Greer Engineering Associates, Inc.	February 8, 1956
B228	Leonard Yie Associates, Inc.	September 5, 1980
B005	Warren George, Inc.	June 21, 1958
B020	Warren George, Inc.	April 30, 1957
B021	Warren George, Inc.	April 30, 1957
B023	Warren George, Inc.	April 30, 1957
B024	Warren George, Inc.	April 30, 1957
B485	Greer & McClelland	September 27, 1954
B014	Burmister, Donald M.	December 27, 1957
B247	Woodward-Clyde Consultants	July 12, 1968
B246	Woodward-Clyde Consultants	July 12, 1968
B187	Warren George, Inc.	March 22, 1967
B197	Warren George, Inc.	March 22, 1967
B183	Warren George, Inc.	March 22, 1967
B357	Greer & McClelland	July 15, 1953
B287	Woodward-Moorhouse & Associates, Inc.	July 2, 1974
B286	Woodward-Moorhouse & Associates, Inc.	July 2, 1974
B269	Woodward-Clyde Consultants	September 25, 1969
B152	Warren George, Inc.	April 28, 1971

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Table 2-2. Summary of Borings Selected for Development of Generalized Hydrogeologic Cross Sections, Exxon Company Plant, Bayonne, New Jersey.

Boring	Report	Date
Cross Section B-B'		
B510	Greer & McClelland	August 10, 1953
B512	Greer & McClelland	August 10, 1953
B509	Greer & McClelland	August 10, 1953
B453	Greer & McClelland	July 15, 1953
B468	Greer & McClelland	April 17, 1953
B129	Greer Engineering Associates, Inc.	February 8, 1956
B114	Greer Engineering Associates, Inc.	February 8, 1956
B116	Greer Engineering Associates, Inc.	February 8, 1956
B130	Greer Engineering Associates, Inc.	February 8, 1956
B072	Warren George, Inc.	March 19, 1957
B373	Greer Engineering Associates, Inc.	February 8, 1956
B120	Greer Engineering Associates, Inc.	February 8, 1956
B068	Warren George, Inc.	March 19, 1957
B121	Greer Engineering Associates, Inc.	February 8, 1956
B063	Warren George, Inc.	March 19, 1957
B098	Greer & McClelland	July 15, 1953
B100	Greer & McClelland	July 15, 1953
B099	Greer & McClelland	July 15, 1953
B109	Greer Engineering Associates, Inc.	February 10, 1956
B103	Greer & McClelland	July 15, 1953
B107	Greer Engineering Associates, Inc.	February 10, 1956
B138	Greer & McClelland	September 9, 1954
B374	Greer Engineering Associates, Inc.	February 8, 1956

Table 2-2. Summary of Borings Selected for Development of Generalized Hydrogeologic Cross Sections, Exxon Company Plant, Bayonne, New Jersey.

Boring	Report	Date
Cross Section C-C'		
B227	Goodkind & O'Dea	1965
B226	Goodkind & O'Dea	1965
B340	Greer & McClelland	February 1, 1955
B356	Greer & McClelland	July 15, 1953
B338	Greer & McClelland	February 1, 1955
B337	Greer & McClelland	February 1, 1955
B336	Greer & McClelland	February 1, 1955
B500	Greer & McClelland	September 27, 1954
B495	Greer & McClelland	September 27, 1954
B018	Warren George, Inc.	April 30, 1957
B023	Warren George, Inc.	April 30, 1957
B028	Warren George, Inc.	April 30, 1957
B389	Greer & McClelland	April 17, 1953
B225	Dames & Moore	April 15, 1970
B224	Dames & Moore	April 15, 1970
B223	Dames & Moore	April 15, 1970
B222	Dames & Moore	April 15, 1970
B221	Dames & Moore	April 15, 1970

Table 2-2. Summary of Borings Selected for Development of Generalized Hydrogeologic Cross Sections, Exxon Company Plant, Bayonne, New Jersey.

Boring	Report	Date
Cross Section D-D'		
B258	Woodward-Clyde Consultants	July 12, 1968
B315	Greer Engineering Associates, Inc.	February 28, 1956
B254	Woodward-Clyde Consultants	July 12, 1968
B256	Woodward-Clyde Consultants	July 12, 1968
B172	Greer & McClelland	July 29, 1954
B282	Woodward-Moorhouse & Associates, Inc.	August 20, 1973
B283	Woodward-Moorhouse & Associates, Inc.	August 20, 1973
B318	Greer Engineering Associates, Inc.	February 28, 1956
B175	Greer Engineering Associates, Inc	January 29, 1954
B200	Warren George, Inc.	March 22, 1967
B201	Warren George, Inc.	March 22, 1967
B187	Warren George, Inc.	March 22, 1967
B194	Warren George, Inc.	March 22, 1967
B192	Warren George, Inc.	March 22, 1967
B233	Warren George, Inc.	December 26, 1973

Table 2-3. Water-Level and Product Thickness Measurements Taken by Dan Raviv Associates, Inc., December 1991 Through January 1992 at the Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Depth to Product (feet below measuring point)	Water-Level Elevation (feet relative to mean sea level)	Product-Level Elevation (feet relative to mean sea level)	Product Thickness (feet)
EB-1	8.92	5.36	ND	3.56	NA	NA
EB-2	8.93	7.47	7.14	1.46	1.79	0.33
EB-3	8.96	7.90	7.20	1.06	1.76	0.70
EB-4	9.01	7.22	7.05	1.79	1.96	0.17
EB-5	9.09	7.35	7.24	1.74	1.85	0.11
EB-6	9.20	7.52	7.51	1.68	1.69	0.01
EB-7	8.87	7.58	7.40	1.29	1.47	0.18
EB-8	8.12	5.90	ND	2.22	NA	NA
EB-9	8.81	8.14	7.23	0.67	1.58	0.91
EB-10	8.78	6.04	4.92	2.74	3.86	1.12
EB-11	9.30	5.22	4.61	4.08	4.69	0.61
EB-12	9.53	2.01	0.64	7.52	8.89	1.37
EB-13	10.04	8.25	4.60	1.79	5.44	3.65
EB-14	11.01	8.67	8.67	2.34	2.34	<0.01
EB-15	9.74	6.91	ND	2.83	NA	NA
EB-16	12.56	12.63	11.09	-0.07	1.47	1.54
EB-17	12.36	2.76	2.43	9.60	9.93	0.33
EB-18	10.09	6.24	ND	3.85	NA	NA
EB-19	9.67	5.73	5.04	3.94	4.63	0.69
EB-20	10.73	2.47	ND	8.26	NA	NA
EB-21	12.71	1.65	1.65	11.06	11.06	<0.01
EB-22	13.31	11.79	4.21	1.52	9.10	7.58
EB-23	14.73	4.16	3.98	10.57	10.75	0.18
EB-24	15.82	6.49	6.16	9.33	9.66	0.33
EB-25	13.76	4.42	4.27	9.34	9.49	0.15
EB-26	15.99	6.53	6.53	9.46	9.46	<0.01
EB-27	16.23	5.47	ND	10.76	NA	NA
EB-28	16.06	5.06	ND	11.00	NA	NA
EB-29	17.74	2.68	ND	15.06	NA	NA
EB-30	13.05	2.75	ND	10.30	NA	NA
EB-31	16.76	7.38	ND	9.38	NA	NA
EB-32	8.91	9.13	7.33	-0.22	1.58	1.80
EB-33	11.05	7.76	ND	3.29	NA	NA
EB-34	12.84	9.23	8.65	3.61	4.19	0.58
EB-35	10.62	6.56	ND	4.06	NA	NA
EB-36	8.09	3.30	3.29	4.79	4.80	0.01

See footnotes on last page.

Table 2-3. Water-Level and Product Thickness Measurements Taken by Dan Raviv Associates, Inc., December 1991 Through January 1992 at the Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Depth to Product (feet below measuring point)	Water-Level Elevation (feet relative to mean sea level)	Product-Level Elevation (feet relative to mean sea level)	Product Thickness (feet)
EB-37	9.19	7.84	7.83	1.35	1.36	0.01
EB-38	8.89	7.30	ND	1.59	NA	NA
EB-39	8.70	7.30	ND	1.40	NA	NA
EB-40	11.41	8.16	8.16	3.25	3.25	<0.01
EB-41	9.96	7.12	7.10	2.84	2.86	0.02
EB-42	12.01	9.78	9.68	2.23	2.33	0.10
EB-43	11.04	--	--	--	--	--
EB-44	11.18	8.63	8.62	2.55	2.56	0.01
EB-45	14.33	10.49	ND	3.84	NA	NA
EB-46	17.82	5.98	5.98	11.84	11.84	<0.01
EB-47	9.83	6.37	ND	3.46	NA	NA
EB-48	9.06	6.50	ND	2.56	NA	NA
EB-49	10.67	8.71	ND	1.96	NA	NA
EB-50	10.91	7.21	ND	3.70	NA	NA
EB-51	10.21	5.83	ND	4.38	NA	NA
EB-52	10.53	8.11	8.10	2.42	2.43	0.01
EB-53	8.73	3.57	3.56	5.16	5.17	0.01
EB-54	8.48	2.70	ND	5.78	NA	NA
EB-55	--	--	--	--	--	--
EB-56	9.16	4.90	4.88	4.26	4.28	0.02
EB-57	11.28	7.11	ND	4.17	NA	NA
EB-58	8.94	6.76	6.76	2.18	2.18	<0.01
EB-59	10.82	8.92	8.82	1.90	2.00	0.10
EB-60	11.30	8.90	8.90	2.40	2.40	<0.01
EB-61	10.48	9.03	9.02	1.45	1.46	0.01
EB-62	10.78	8.02	8.01	2.76	2.77	0.01
EB-63	9.68	7.13	ND	2.55	NA	NA
EB-64	9.25	8.59	7.86	0.66	1.39	0.73
EB-65	11.03	8.61	8.61	2.42	2.42	<0.01
EB-66	11.60	11.05	11.03	0.55	0.57	0.02
EB-67	10.54	9.02	8.22	1.52	2.32	0.80
EB-68	11.48	8.94	ND	2.54	NA	NA
EB-69	11.47	8.81	8.80	2.66	2.67	0.01
EB-70	--	--	--	--	--	--
EB-71	12.15	10.28	ND	1.87	NA	NA
EB-72	12.27	10.51	10.51	1.76	1.76	<0.01

See footnotes on last page.

Table 2-3. Water-Level and Product Thickness Measurements Taken by Dan Raviv Associates, Inc., December 1991 Through January 1992 at the Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring Point Elevation (feet above mean sea level)	Depth to Water (feet below measuring point)	Depth to Product (feet below measuring point)	Water-Level Elevation (feet relative to mean sea level)	Product-Level Elevation (feet relative to mean sea level)	Product Thickness (feet)
EB-73	11.51	9.60	9.60	1.91	1.91	<0.01
EB-74	12.01	11.01	11.01	1.00	1.00	<0.01
EB-75	13.47	8.06	8.06	5.41	5.41	<0.01
EB-76	11.88	8.42	7.82	3.46	4.06	0.60
EB-77	10.94	16.22	8.20	-5.28	2.74	8.02
EB-78	11.50	13.40	8.25	-1.90	3.25	5.15
EB-79	12.34	15.16	9.13	-2.82	3.21	6.03
EB-80	13.21	16.94	9.81	-3.73	3.40	7.13
EB-81	13.04	3.83	3.09	9.21	9.95	0.74
EB-82	10.70	8.41	ND	2.29	NA	NA
EBR-1	12.83	12.51	12.50	0.32	0.33	0.01
EBR-2	8.93	7.44	7.33	1.49	1.60	0.11
EBR-3	8.73	7.25	7.25	1.48	1.48	<0.01
EBR-4	8.58	7.98	6.99	0.60	1.59	0.99
EBR-5	8.60	8.38	6.88	0.22	1.72	1.50
EBR-6	10.38	5.24	5.08	5.14	5.30	0.16
EBR-7	9.64	3.55	ND	6.09	NA	NA
EBR-8	9.46	5.79	5.04	3.67	4.42	0.75
EBR-9	8.69	6.48	ND	2.21	NA	NA
EBR-10	9.30	6.94	ND	2.36	NA	NA
EBR-11	9.24	7.80	7.59	1.44	1.65	0.21
EBR-12	10.04	8.13	8.12	1.91	1.92	0.01
EBR-13	10.06	8.25	ND	1.81	NA	NA
EBR-14	10.05	8.19	ND	1.86	NA	NA
EBR-15	9.52	7.83	ND	1.69	NA	NA
EBR-16	10.29	8.97	8.97	1.32	1.32	<0.01
EBR-17	9.68	7.50	7.50	2.18	2.18	<0.01
EBR-18	11.44	10.55	10.55	0.89	0.89	<0.01
EBR-19	9.54	6.65	ND	2.89	NA	NA
EBR-20	9.50	--	--	--	--	--
EBR-21	10.12	--	--	--	--	--
EBR-22	10.10	5.63	ND	4.47	NA	NA
MW-1	15.57	7.70	6.70	7.87	8.87	1.00
MW-2	15.65	7.85	6.65	7.80	9.00	1.20

ND Not detected.
NA Not applicable.
-- Not measured.

Table 3-1. Wastes Recently Generated at the Exxon Company Plant and Disposed Off-Site, Bayonne Plant, Bayonne, New Jersey.

Contaminated soils and residues and/or absorbents from spills
Filtration cartridges from fuel filtering
Materials used to clean up marine oil spills
Sludges from tank bottoms
Process waste materials (e.g., oily wastes)
Cleaning solvents for parts
Sandblast abrasives from paint removal operations
Skimmed oils from oil-water separators
Stabilized sludges from wastewater treatment plant
Phase separation and carbon adsorbtion materials from wastewater treatment plants
PCB wastes from transformers

Compiled from Exxon Company, U.S.A. (1992a).

PCB Polychlorinated biphenyl.

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Table 4-1. Chronological Summary of Previous Site Investigations Conducted at the Bayonne Plant, Bayonne, New Jersey.

Date	Investigative Event
1958	Hydrogeologic investigation conducted by Hydrotechnic Corporation Engineers to develop fresh water resources for refinery usage and examine the feasibility of disposing of acid wastes by underground injection (Hydrotechnic Corporation Engineers 1958).
1974	Leggette, Brashears and Graham (LBG) investigated shallow groundwater hydrocarbon contamination in the area of the interceptor trench and Conrail (formerly Lehigh Valley Railroad) Right-of-Way (Legette, Brashears and Graham, Inc. 1974a,b,c).
1979	Dames & Moore conducted a hydrogeologic investigation of the Bayonne Plant (Dames & Moore 1979).
1980	Weston conducted subsurface soil investigations and oil recovery programs in the Pier No. 1 (helipad area), Pier No. 6, and Pier No. 7 Areas, and in the Low Sulfur Tank Field. Weston monitored product in the "A"-Hill Tank Field and installed recovery wells in the Pier areas and Low Sulfur Tank Field (Roy F. Weston, Inc. 1980).
1981	Weston installed additional wells in the Low Sulfur Tank Field to delineate NAPL. A product recovery system was installed. Water-level and NAPL measurements were made in monitoring wells in the helipad area and Pier No. 7 Area (Roy F. Weston, Inc. 1981a,b).
1985	A Potential Hazardous Waste Site Preliminary Assessment was conducted by USEPA subcontractor, Malcolm Pirnie, Inc.(Malcolm Pirnie, Inc. 1985).
	Weston evaluated well conditions in the helipad area and reported that 34 of the 60 known wells were useable. Several wells contained NAPL (Roy F. Weston, Inc. 1985).
1986	Sandaq conducted a toxic subsurface investigation of the Bayonne Plant sewer system (Sandaq, Inc. 1986).
	Weston conducted a well integrity evaluation and measured NAPL thickness in monitoring wells (Roy F. Weston, Inc. 1986a,b,c).
1988	CH2M Hill, Inc. prepared a site water budget for the Bayonne Plant (CH2M Hill, Inc. 1988).
	Weston prepared quarterly reports summarizing water-level and NAPL measurements in the Low Sulfur Tank Field, the helipad area, the Pier No. 6 and No. 7 Areas, and the "A"-Hill Tank Field (Roy F. Weston, Inc. 1989a,b, c,d,e).

See last page for footnotes.

Table 4-1. Chronological Summary of Previous Site Investigations Conducted at the Bayonne Plant, Bayonne, New Jersey.

Date	Investigative Event
1989	Weston prepared additional quarterly monitoring reports for the above areas (Roy F. Weston, Inc. 1989a,b,c,d,e).
1990	Exxon conducted a soil sampling program for chromium (Dan Raviv Associates, Inc. 1992a).
	The NJDEP completed a site inspection of the Bayonne Plant (NJDEP 1990).
1991	The ACO was signed and executed. The ACO required Exxon to conduct an RI and implement IRMs to address chromium, NAPL, and sewers at the Bayonne Plant.
	Environmental Resource Management collected soil samples throughout the plant for chromium analyses on April 10, 1991 (Dan Raviv Associates, Inc. 1992a).
1992	ICF Kaiser conducted a chromium investigation, as part of litigation activity concerning the use of chromium-laden fill at the Site. Soil sampling was conducted on behalf of PPG Industries, Inc. in the No. 3 Tank Field and the General Tank Field (PPG Industries, Inc. 1992; ICF Kaiser Engineers, Inc. 1992).
	Dan Raviv Associates, Inc. (DRAI) conducted a NAPL IRM investigation in the Low Sulfur and Solvent Tank Fields ("Tank 1066") from May through August 1993. A final report was issued in November 1993 (Dan Raviv Associates, Inc. 1993b).
	IT Corporation commenced the sewer IRM in November 1992 in accordance with the proposed IRM Work Plan (Dan Raviv Associates, Inc. 1992a).
1993	Geraghty & Miller prepared a draft Site History Report and RI Work Plan for the Bayonne Plant (Geraghty & Miller, Inc. 1993a,b). The reports were submitted in January 1993.
	DRAI prepared an IRM Work Plan that was submitted to the NJDEP in January 1993 (Dan Raviv Associates, Inc. 1993a). The work plan addressed chromium slag, NAPL, and sewer IRMs.
	IT Corporation prepared a Phase I IRM Work Plan for the proposed sewer system evaluation. The work plan was submitted to the NJDEP in February 1993 (IT Corporation 1993).
	ICF Kaiser conducted the chromium IRM investigation in March, April, and June 1993. The report was submitted to the NJDEP in July 1993 (ICF Kaiser Engineers, Inc. 1993).

See last page for footnotes.

Table 4-1. Chronological Summary of Previous Site Investigations Conducted at the Bayonne Plant, Bayonne, New Jersey.

Date	Investigative Event
1993 (Cont'd)	DRAI prepared well integrity evaluation reports in May 1993 and August 1993 (Dan Raviv Associates, Inc. 1993c,d).
	DRAI conducted the NAPL IRM investigation in the interceptor trench area during August 1994. Investigations are ongoing.
	ICF Kaiser conducted a supplemental Field Sampling and Analysis Plan in November 1993 as part of the chromium IRM. The report was submitted to the NJDEP in February 1994 (ICF Kaiser Engineers, Inc. 1994).
1994	DRAI conducted the NAPL IRM investigations in the Pier No. 7 Area, helipad area, and Platty Kill Creek during the period of February and March 1994 (Dan Raviv Associates, Inc. 1994a).
	DRAI prepared and submitted a NAPL IRM work plan addendum to the NJDEP in June 1994 (Dan Raviv Associates, Inc. 1994a).
	DRAI completed IRM investigations in the Platty Kill Creek, interceptor trench area, helipad area, and Pier No. 7 Area from August through October 1994. Investigations are ongoing in the Pier No. 7 Area.
	Geraghty & Miller conducted a field evaluation of the removal of petroleum hydrocarbon from the subsurface by means of conventional pumping from recovery wells versus vacuum-enhanced recovery, in the vicinity of Tank 1066 (Geraghty & Miller, Inc. 1994b). A vacuum-enhanced pilot test was conducted in June 1994 (Geraghty & Miller, Inc. 1994c).

NJDEP	New Jersey Department of Environmental Protection.
ACO	Administrative consent order.
RI	Remedial investigation.
IRM	Interim remedial measure.
NAPL	Non-aqueous phase liquid.
USEPA	U.S. Environmental Protection Agency.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	Approximate Capacity (Gallons)	Tank Content	CAS Number
"A" - HILL TANK FIELD							
501	Carbon steel AST	1924	115x42	76980	3233160	Out of service	68476-30-2
502	Carbon steel AST	1920	115x42	73895	3103590	Out of service	68476-30-2
504	Carbon steel AST	1927	90x42	47263	1985046	Out of service	68476-30-2
505	Carbon steel AST	1929	90x42	47263	1985046	Out of service	68476-30-2
506	Carbon steel AST	1951	100x48	67184	2821728	Out of service	68476-30-2
507	Carbon steel AST	1923	50x42	14753	619626	Recycled oil	
508	Carbon steel AST	1923	50x42	14703	617526	Recycled oil	
513	Carbon steel AST	1928	90x42	47472	1993824	Storm water	
514	Carbon steel AST	1940	75x42	33284	1397928	Storm water	
516	Carbon steel AST	1953	100x48	67438	2832396	Storm water	
LUBE OIL AREA							
1	Carbon steel AST	1959	30x48	6079	255318	Univolt 60	
2	Carbon steel AST	1959	30x48	6079	255318	Out of service	
3	Carbon steel AST	1959	30x48	6079	255318	M.O. Disp.	
4	Carbon steel AST	1959	30x48	6079	255318	Coray 150/750 Coastal	
5	Carbon steel AST	1959	30x48	6079	255318	ATF	
6	Carbon steel AST	1959	25x42	3696	155232	150 Vis. Solv Neutral	
7	Carbon steel AST	1958	25x42	3695	155190	Motor oil 15W-40	
8	Carbon steel AST	1958	25x42	3696	155232	1364	
9	Carbon steel AST	1958	25x42	3697	155274	200 S0L Ext. Coast Pal	
10	Carbon steel AST	1959	25x42	3694	155148	Out of service	
11	Carbon steel AST	1959	25x42	3694	155148	Canthus 1000	
12-1	Multi-compartment AST	1959	15x9*	322	13524	5380	
12-2	Multi-compartment AST	1959	15x9**	322	13524	5382	
12-3	Multi-compartment AST	1959	15x9***	322	13524	5386	
13	Carbon steel AST	1957	30x48	6080	255360	1391 Base Oil	
14	Carbon steel AST	1957	30x48	6078	255276	Coray 46/225 Coastal	
15	Carbon steel AST	1959	30x48	6080	255360	CA 5W30	
16	Carbon steel AST	1959	30x48	6082	255444	Univolt 60	
17	Carbon steel AST	1968	25x42	3600	151200	75 Solvent Neutral	
18	Carbon steel AST	1968	25x42	3600	151200	1960	
19	Carbon steel AST	1958	25x42	3600	151200	GM ATF	
20	Carbon steel AST	1958	25x42	3695	155190	Telura 619D	
21	Carbon steel AST	1958	25x42	3695	155190	Out of service	
22	Carbon steel AST	1958	25x42	3695	155190	Diol 2213	
23	Carbon steel AST	1958	25x42	3695	155190	200 Naphthenic STK	
24-1	Multi-compartment AST	1959	15x9*	322	13524	5383	
24-2	Multi-compartment AST	1959	15x9**	322	13524	5385	
24-3	Multi-compartment AST	1959	15x9***	322	13524	5386	
25	Carbon steel AST	1981	30x48	5800	243600	Hydraulic Oil Base	
26	Carbon steel AST	1981	30x48	5800	243600	Univolt N-61	
27	Carbon steel AST	1958	40x48	10823	454566	75 Solv. Ext. Coast Pl.	
28	Carbon steel AST	1959	40x48	10823	454566	Telura 619	
29	Carbon steel AST	1958	40x48	10827	454734	Low V.I. 150 Neutral	
30	Carbon steel AST	1959	40x48	10824	454608	Necton 78/900 Coastal	

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	(Gallons)	Tank Content	CAS Number
LUBE OIL AREA (CONT.)							
31	Carbon steel AST	1959	40x48	10828	454776	Coray 220	
32	Carbon steel AST	1967	30x48	6000	252000	M.O. Disp.	
33	Carbon steel AST	1958	30x48	6022	252924	Diol 2213	
35	Carbon steel AST	1981	30x48	5800	243600	1364	
36	Carbon steel AST	1981	30x48	5800	243600	600 Neutral	
37	Carbon steel AST	1959	40x48	10824	454608	370 Solvent Neutral	
38	Carbon steel AST	1959	40x48	10825	454650	150 LP Solvent Neutral	
39	Carbon steel AST	1959	40x48	10825	454650	150 S.E. Bright Stock	
40	Carbon steel AST	1959	40x48	10824	454608	150 S.E. Bright Stock	
41	Carbon steel AST	1959	40x42	9500	399000	325 Neutral	
43	Carbon steel AST	1959	60x48	24409	1025178	130 Solvent Neutral	
44	Carbon steel AST	1956	60x48	24265	1019130	L.P. 100 Neutral	
45	Carbon steel AST	1956	60x48	24306	1020852	100 Pale Paraffin	
46	Carbon steel AST	1956	60x48	24282	1019844	330 Solvent Neutral	
47	Carbon steel AST	1959	20x42	2363	99246	ECA 13112 Slurry-P.C. 382549	64742650
48	Carbon steel AST	1959	20x42	2363	99246	150 Solvent Neutral	
49	Carbon steel AST	1959	20x42	2363	99246	0049	
50	Carbon steel AST	1959	20x42	2363	99246	Castrol DOCP	NCN
51	Carbon steel AST	1959	20x42	2363	99246	Out of service	
52	Carbon steel AST	1959	20x42	2363	99246	Slurry-TLA 347A	
53	Carbon steel AST	1959	20x42	2363	99246	Exxmar X70	
54	Carbon steel AST	1959	20x42	2363	99246	Out of service	
55	Carbon steel AST	1959	20x42	2363	99246	3147 Hydraulic Oil Base	
56	Carbon steel AST	1959	20x42	2363	99246	Paratone 856 Slurry P.C. 382656	
57	Carbon steel AST	1958	60x48	24373	1023666	L.P. 150 Neutral	
58	Carbon steel AST	1951	55x48	20321	853482	600 Neutral	
59	Carbon steel AST	1959	50x48	16931	711102	105 Coastal Pale	
60	Carbon steel AST	1959	50x48	16933	711186	ATF 1975	
61	Carbon steel AST	1981	30x48	5800	243600	Out of service	
63-1	Multi-compartment AST	1959	15x15*	288	12096	Idle	
63-2	Multi-compartment AST	1959	15x15**	288	12096	Idle	
64-1	Multi-compartment AST	1959	15x15***	288	12096	Idle	
64-2	Multi-compartment AST	1959	15x15*	288	12096	Idle	
65-1	Multi-compartment AST	1959	15x15**	288	12096	ECA 11785-P.C.225384	NCN
65-2	Multi-compartment AST	1959	15x15***	288	12096	ECA 13610	64741884
66-1	Multi-compartment AST	1960	12x11'3*	244	10248	ECA-12823-P.C.225118	64741884
66-2	Multi-compartment AST	1960	12x11'3**	244	10248	Paraflow 385-50/50 Slurry	
66-3	Multi-compartment AST	1960	12x11'3***	244	10248	ECA 9349-P.C.225273	64741884
70	Carbon steel AST	1959	15x30	953	40026	ECA 15400	NCN
71	Carbon steel AST	1959	15x30	953	40026	Unvis J-13	
72-1	Multi-compartment AST	1960	12x11'4*	244	10248	Unvis J-13	
72-2	Multi-compartment AST	1960	12x11'4**	244	10248	Unvis J-13	
72-3	Multi-compartment AST	1960	12x11'4***	244	10248	Acryloid HF833 50/50-P.C.382672	
79	Multi-compartment AST	1955	12x12'1***	247	10374	1774	
80	Multi-compartment AST	1955	12x12'1**	247	10374	Exmar 12TP40	
81	Multi-compartment AST	1955	12x12'1*	247	10374	Exmar 30TP30	
82	Multi-compartment AST	1955	12x12'1***	247	10374	Flexon 767	

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	(Gallons)	Tank Content	CAS Number
LUBE OIL AREA (CONT.)							
83	Multi-compartment AST	1955	12x12'1**	247	10374	Canthus 680	
84	Multi-compartment AST	1955	12x12'1*	247	10374	Enmist EP460	
85	Multi-compartment AST	1955	12x12'1**	247	10374	5803	
86	Multi-compartment AST	1955	12x12'1**	247	10374	Gear Oil GX 80W-90	
87	Multi-compartment AST	1955	12x12'1*	247	10374	Exxmar X60	
88	Multi-compartment AST	1955	12x12'1**	247	10374	100 LP Slovent Neutral	
89	Multi-compartment AST	1955	12x12'1**	247	10374	1358	
90	Multi-compartment AST	1955	12x12'1*	247	10374	Zerice 68	
91	Multi-compartment AST	1955	12x12'1**	247	10374	Univis N32	
92	Multi-compartment AST	1955	12x12'1**	247	10374	1774	
93	Multi-compartment AST	1955	12x12'1*	247	10374	Teresstic 77	
94	Multi-compartment AST	1955	12x12'1**	247	10374	1446	
95	Multi-compartment AST	1955	12x12'1**	247	10374	Instrument Oil	
96	Multi-compartment AST	1955	12x12'1*	247	10374	Teresstic N-150	
97	Carbon steel AST	1953	25x40	3500	147000	150 SN-LS	
98	Carbon steel AST	1953	25x40	3511	147462	Idle	
99	Carbon steel AST	1941	30x42	5312	223104	Idle	
101	Carbon steel AST	1960	20x30	1689	70938	Tromar TEP	
102	Carbon steel AST	1960	20x30	1689	70938	Nuto H-68	
103	Carbon steel AST	1960	20x30	1689	70938	Nuto H-32	
104	Carbon steel AST	1960	20x30	1688	70896	Torque Fluid 56	
105	Carbon steel AST	1960	20x30	1688	70896	Exxmar X70	
106	Carbon steel AST	1960	20x30	1688	70896	Superflo 5W30	
107	Carbon steel AST	1960	20x30	1688	70896	Nuto H-46	
108	Carbon steel AST	1949	30x42	5289	222138	Superflo 10W40	
109	Carbon steel AST	1949	30x42	5287	222054	Superflo S/P 10W30	
110	Carbon steel AST	1925+	30x42	5316	223272	ATF 1941	
111	Carbon steel AST	1925+	30x42	5323	223566	ATF 1973	
112	Carbon steel AST	1925+	30x42	5351	224742	Superflo 10W-30	
113	Carbon steel AST	1960	25x48	4222	177324	Superflo ATF	
116	Carbon steel AST	1960	20x30	1689	70938	Out of service	
117	Carbon steel AST	1960	20x30	1689	70938	ATF 1938	
118	Carbon steel AST	1960	20x30	1689	70938	100 Sol. Ext. Cos. PL. NCN	
119	Carbon steel AST	1960	20x30	1689	70938	300 Sol. Ext. Cos. PL. NCN	
120	Carbon steel AST	1960	20x30	1689	70938	Exmar XP	
121	Carbon steel AST	1960	20x30	1689	70938	Teresstic 32	
122	Carbon steel AST	1960	20x30	1689	70938	Diol 2212	
123	Carbon steel AST	1960	25x30	2649	111258	1767 Motor Oil 15W-40	
124	Carbon steel AST	1960	25x30	2643	111006	XD-3 15W40	
125	Carbon steel AST	1960	25x30	2643	111006	CA 5W30	
126	Carbon steel AST	1960	25x30	2643	111006	Superflo Supreme Perform 10W-40	
127	Carbon steel AST	1960	25x48	4224	177408	CA 5W30	
128	Carbon steel AST	1960	25x48	4223	177366	Diol 2211	
131-1	Multi-compartment AST	1961	12x10'11*	244	10248	Teresstic 77	
131-2	Multi-compartment AST	1961	12x10'3**	244	10248	Teresstic 150	
131-3	Multi-compartment AST	1961	12x10'3***	244	10248	5806	

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	Approximate Capacity (Gallons)	Tank Content	CAS Number
LUBE OIL AREA (CONT.)							
132-1	Multi-compartment AST	1961	12x10'11*	260	10920	3099 Process Oil	
132-2	Multi-compartment AST	1961	12x10'3**	237	9954	Teresstic 220	
132-3	Multi-compartment AST	1961	12x10'3***	237	9954	1995	
133-1	Multi-compartment AST	1961	12x10'11*	260	10920	Idle	
133-2	Multi-compartment AST	1961	12x10'3**	237	9954	Idle	
133-3	Multi-compartment AST	1961	12x10'3***	237	9954	Idle	
134-1	Multi-compartment AST	1961	15x12'8*	434	18228	Exmar 12TP30	
134-2	Multi-compartment AST	1961	15x12'7***	434	18228	Exmar 24TP30	
135-1	Multi-compartment AST	1961	15x12'8*	434	18228	Aviation Oil 100 NCN	
135-2	Multi-compartment AST	1961	15x11'8***	434	18228	Caloria HT43	
136-1	Multi-compartment AST	1961	15x12'8*	434	18228	1748 Heavy Duty Eng. Oil 30	
136-2	Multi-compartment AST	1961	15x12'8***	434	18228	Exmar XA	
137	Carbon steel AST	1961	15x30	949	39858	150 Coastal	
138	Carbon steel AST	1961	15x30	949	39858	Teresstic 33	
139	Carbon steel AST	1961	15x30	949	39858	Teresstic 68	
140	Carbon steel AST	1961	15x30	949	39858	Superflo 20W50	
141	Carbon steel AST	1961	15x30	949	39858	1643/1718 Motor Oil 30	
142	Carbon steel AST	1961	15x30	949	39858	2576 Cylesstic 1500	
143	Carbon steel AST	1961	15x30	949	39858	XD 3-30	
144	Carbon steel AST	1961	15x30	949	39858	XD-3 Extra 15W40	
145	Carbon steel AST	1968	15x18	550	23100	1938 ATF	
146-1	Multi-compartment AST	1961	12x10'11*	260	10920	PX-52 P.C. 225046	
146-2	Multi-compartment AST	1961	12x10'3**	237	9954	Cylesstic TK460	
146-3	Multi-compartment AST	1961	12x10'3***	237	9954	G.O. GX85W140	
147-1	Multi-compartment AST	1961	12x10'11*	260	10920	XD-3 Extra 30	
147-2	Multi-compartment AST	1961	12x10'3**	238	9996	Canthus 680	
147-3	Multi-compartment AST	1961	12x10'3***	238	9996	5830 Cycle Oil 22	
148-1	Multi-compartment AST	1961	12x10'11*	260	10920	Ethyl Flow 74	
148-2	Multi-compartment AST	1961	12x10'3**	238	9996	Ethyl Flow 74	
148-3	Multi-compartment AST	1961	12x10'3***	238	9996	5806	
149-1	Multi-compartment AST	1961	12x10'3*	359	15078	XD-3 Extra 40	
149-2	Multi-compartment AST	1961	15x12'7***	509	21378	5805	
150-1	Multi-compartment AST	1961	15x12'8*	434	18228	Unvis J26	
150-2	Multi-compartment AST	1961	15x12'7***	434	18228	240 Pale Paraffin	
151-1	Multi-compartment AST	1961	15x12'7*	434	18228	500 Coastal Pale NCN	
151-2	Multi-compartment AST	1961	15x12'8***	434	18228	Exxmar 24TP40	
153	Multi-compartment AST	1961	15x30'	949	39858	Busgard HD 30	
154	Carbon steel AST	1961	15x30'	949	39858	Busgard HD 40	
155	Carbon steel AST	1961	15x30'	949	39858	XD3-10W	
156	Carbon steel AST	1961	15x30'	949	39858	Teresstic N220	
157	Carbon steel AST	1961	15x30'	949	39858	Exxmar 30TP40	
158	Carbon steel AST	1961	15x30'	949	39858	2329	
159	Carbon steel AST	1961	15x30'	949	39858	Teresstic 100	
160	Carbon steel AST	1968	15x18	560	23520	Process Oil	
161	Carbon steel AST	1968	15x18	560	23520	Humble Hydraulic H-68	
170	Carbon steel AST	1968	15x18	560	23520	1915	
171	Carbon steel AST	1968	15x18	560	23520	Necton 60	

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	(Gallons)	Tank Content	CAS Number
LUBE OIL AREA (CONT.)							
237	Carbon steel AST	1935	40x42	9306	390852	Disp. STK	
238	Carbon steel AST	1908	40x30	6669	280098	Skimmed Oil/West Side Separator	
402	Carbon steel AST	1899	32x22	3192	134064	Out of service	
403	Carbon steel AST	1899	30x20'	2535	106470	Out of service	
404	Carbon steel AST	1899	45x25	7156	300552	Out of service	
405	Carbon steel AST	1918	25x30	2601	109242	Out of service	
406	Carbon steel AST	1908	30x23	2982	125244	Out of service	
407	Carbon steel AST	1922	25x25	2206	92652	Out of service	
408	Carbon steel AST	1920	25x25	2160	90720	Out of service	
410	Carbon steel AST	1920	25x25	2177	91434	Out of service	
411	Carbon steel AST	1908	50x35	12034	505428	Out of service	
412	Carbon steel AST	1899	40x30	6764	284088	Hydraulic oil	
413	Carbon steel AST	1899	40x30	6734	282828	Out of service	
414	Carbon steel AST	1908	45x25	7030	295260	Out of service	
415	Carbon steel AST	1920	25x25	2147	90174	Out of service	
416	Carbon steel AST	1953	25x42	3685	154770	Out of service	
417	Carbon steel AST	1953	25x42	3665	153930	Out of service	
448	Carbon steel AST	1953	25x42	3676	154392	Out of service	
541	Carbon steel AST	1962	40x48	10811	454062	Storm water	
543	Carbon steel AST	1913	25x30	2643	111006	Out of service	
545	Carbon steel AST	1960	60x48	24365	1023330	Storm water	
547	Carbon steel AST	1920	35x36	5973	250866	Out of service	
548	Carbon steel AST	1930	35x42	7216	303072	Storm water	
549	Carbon steel AST	1930	50x42	14758	619836	Storm water	
550	Carbon steel AST	1930	50x42	14757	619794	Storm water	
552	Carbon steel AST	1930	50x42	14921	626682	Out of service	
553	Carbon steel AST	1930	50x42	14871	624582	Out of service	
554	Carbon steel AST	1935	50x42	14729	618618	Out of service	
556	Carbon steel AST	1922	35x40	6935	291270	Out of service	
557	Carbon steel AST	1922	35x40	6935	291270	Out of service	
565	Carbon steel AST	1939	50x42	14757	619794	Out of service	
569	Carbon steel AST	1945	60x42	21284	893928	130 VIS. LPSN	
571	Carbon steel AST	1951	20x30	1672	70224	Out of service	
572	Carbon steel AST	1951	20x30	1672	70224	Out of service	
573	Carbon steel AST	1951	20x30	1672	70224	Idle	
576	Carbon steel AST	1969	30x32	4000	168000	West Side Separator	
577	Carbon steel AST	1969	80x50	45600	1915200	West Side Separator	
578	Carbon steel AST	1957	(a)	60	2520	West Side Sep. Chem. Inj.	
580	Carbon steel AST	1950	20x42	2332	97944	Out of service	
581	Carbon steel AST	1950	25x42	3670	154140	Refined Wax	
582	Carbon steel AST	1950	25x42	3670	154140	Refined Wax	
583	Carbon steel AST	1945	40x42	9425	395850	Refined Wax	
584	Carbon steel AST	1945	24x42	3704	155568	Refined Wax	
585	Carbon steel AST	1945	40x42	9425	395850	Out of service	
586	Carbon steel AST	1945	25x42	3704	155568	Out of service	
588	Carbon steel AST	1945	25x42	3704	155568	Refined Wax	
591	Carbon steel AST	1963	40x48	10800	453600	Refined Wax	

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	Approximate Capacity (Gallons)	Tank Content	CAS Number
LUBE OIL AREA (CONT.)							
592	Carbon steel AST	1963	30x48	6100	256200	Refined Wax	
593	Carbon steel AST	1963	40x48	10800	453600	Refined Wax	
594	Carbon steel AST	1963	30x48	6100	256200	Refined Wax	
595	Carbon steel AST	1961	25x48	4199	176358	Out of service	
596	Carbon steel AST	1961	25x48	4205	176610	Out of service	
597	Carbon steel AST	1961	25x48	4200	176400	Out of service	
598	Carbon steel AST	1961	25x42	4197	176274	Out of service	
599	Carbon steel AST	1961	25x48	4198	176316	Out of service	
611	Carbon steel AST	1961	25x48	4219	177198	Out of service	
612	Carbon steel AST	1961	25x48	4217	177114	Slop Oil and Miscellaneous Liquid Waste	
613	Carbon steel AST	1961	25x48	4223	177366	Out of service	
614	Carbon steel AST	1961	25x48	4217	177114	Out of service	
615	Carbon steel AST	1961	25x48	4221	177282	Out of service	
616	Carbon steel AST	1961	25x48	4220	177240	Slop Oil and Miscellaneous Liquid Waste	
617	Carbon steel AST	1951	25x48	4220	177240	Out of service	
PIER NO. 1 AREA							
No tanks.							
NO. 2 TANK FIELD							
1001	Carbon steel AST	1955	150x50	157449	6612858	#2 Fuel	68476-30-2
1002	Carbon steel AST	1955	150x50	157449	6612858	#2 Fuel	68476-30-2
1003	Carbon steel AST	1955	150x50	157441	6612522	#2 Fuel	68476-30-2
1004	Carbon steel AST	1955	150x50	157437	6612354	#2 Fuel	68476-30-2
1005	Carbon steel AST	1955	150x50	157447	6612774	#2 Fuel	68476-30-2
1006	Carbon steel AST	1955	150x50	157455	6613110	Out of service	68476-30-2
1007	Carbon steel AST	1955	150x50	157410	6611220	#2 Fuel	68476-30-2
1008	Carbon steel AST	1955	150x50	157397	6610674	#2 Fuel	68476-30-2
ASPHALT PLANT AREA							
904	Carbon steel AST	1957	75x48	38254	1606668	AC-20	8052-42-4
927	Carbon steel AST	1957	20x40	2251	94542	MC-30	8052-42-4
928	Carbon steel AST	1957	25x40	3517	147714	MC-250	8052-42-4
929	Carbon steel AST	1957	20x40	2251	94542	MC-70	8052-42-4
930	Carbon steel AST	1957	20x40	2251	94542	7052 QD Asphalt	64742-93-4
931	Carbon steel AST	1957	25x40	3517	147714	RC-250	8052-42-4
932	Carbon steel AST	1957	25x40	3517	147714	7057 QD Asphalt	64742-93-4
933	Carbon steel AST	1957	20x40	2251	94542	7037 QD Asphalt	64742-93-4
934	Carbon steel AST	1957	25x40	3517	147714	RC-70	8052-42-4
935	Carbon steel AST	1957	10x32	440	18480	7060	
936	Carbon steel AST	1957	10x32	440	18480	7060	
937	Carbon steel AST	1957	10x32	440	18480	7060	
938	Carbon steel AST	1957	10x32	440	18480	MC-30	8052-42-4
941	Carbon steel AST	1957	25x40	3517	147714	7057 QD Asphalt	8052-42-4

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	Approximate Capacity (Gallons)	Tank Content	CAS Number
CHEMICAL PLANT AREA (CONT.)							
734	Carbon steel AST	1959	10x24	329	13818	Out of service	
735	Carbon steel AST	1959	10x24	329	13818	Aromatic 150	
736	Carbon steel AST	1959	10x24	329	13818	Oil Flush	
737	Carbon steel AST	1959	10x24	329	13818	Out of service	
738	Carbon steel AST	1959	10x24	329	13818	Vinyl Acetate	
739	Carbon steel AST	1961	10x24	329	13818	Out of service	
740	Multi-compartment AST	1955	12x12*	238	9996	FRX Rundown	
740	Multi-compartment AST	1955	12x12**	238	9996	FRX Rundown	
740	Multi-compartment AST	1955	12x12***	238	9996	FRX Rundown	
741	Carbon steel AST	1953	10x24	329	13818	ODSA (82759)	
742	Carbon steel AST	1967	10x32	438	18396	83555	
743	Carbon steel AST	1967	15x32	990	41580	PIBSA	
744	Fiberglass Reinforced Plastic	(a)	12x18	333	14000	(a)	
745	Fiberglass Reinforced Plastic	(a)	12x18	333	14000	(a)	
846	HAUEG 41	(a)	12x18	333	14000	(a)	
748B	Carbon steel AST	1960	12x20	479	20118	Out of service	
749	Carbon steel AST	1961	10x30	440	18480	Out of service	
750	Carbon steel AST	1962	15x30	902	37884	81418	
751	Carbon steel AST	1962	15x30	924	38808	ATF VI	
752	Carbon steel AST	1962	15x30	924	38808	ATF VI	
753	Carbon steel AST	1962	15x30	924	38808	ATF VI	
760	Carbon steel AST	1947	12x24	471	19782	ATF	
761	Carbon steel AST	1947	10x26	381	16002	ATF	
762	Carbon steel AST	1949	15x19	579	24318	80831	
764	Carbon steel AST	1943	12x24	471	19782	ATF	
765	Carbon steel AST	1949	10x24	381	16002	ATF	
766	Carbon steel AST	1949	15x19	579	24318	ATF	
768	Carbon steel AST	1946	7x12	79	3318	Cleaning Fluid	
769	Carbon steel AST	1946	7x12	79	3318	Cleaning Fluid	
770	Carbon steel AST	1965	10x24	326	13692	Out of service	
771	Carbon steel AST	1965	10x24	329	13818	Out of service	
773	Carbon steel AST	1949	24x20	1562	65604	ECA4360	
776	Carbon steel AST	1949	10x24	379	15918	Necton	
777	Carbon steel AST	1966	20x30	1648	69216	Mercon Dextron	
778	Carbon steel AST	1940	20x15	867	36414	Finished CuO	
779	Carbon steel AST	1922	10x24	288	12096	ATF	
781	Carbon steel AST	1940	20x15	869	36498	N37 Flushes	
783	Multi-compartment AST	1966	15x(a)*	221	9282	Mark 5072	
783	Multi-compartment AST	1966	15x(a)**	224	9408	Same as 80039	
783	Multi-compartment AST	1966	15x(a)***	221	9282	OLDA 269R	
784	Carbon steel AST	1947	12x18	355	14910	Hitec E611	
785	Carbon steel AST	1949	12x18	357	14994	Necton	
786	Carbon steel AST	1938	12x24	474	19908	ATF	
787	Carbon steel AST	1959	12x18	336	14112	ATF	
788	Carbon steel AST	1928	15x24	783	32886	DHP (91730)	
789	Carbon steel AST	1950	15x24	743	31206	Slop Oil	

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	(Gallons)	Tank Content	CAS Number
CHEMICAL PLANT AREA (CONT.)							
795	Fiberglass Reinforced Plastic	1975	8x12	107	4512	Slop Oil	
796	(a)	(a)	(a)	(a)	(a)		
797	Carbon steel AST	1977	10x40	360	23500	Effluent	
798	Carbon steel AST	1955	15x42	1322	55520	Effluent	
799	Carbon steel AST	1955	15x42	1322	55520	Effluent	
800	Carbon steel AST	1959	12x36	719	30198	LOFI	
801	Carbon steel AST	1959	12x36	719	30198	LOFI	
802	Carbon steel AST	1959	12x36	719	30198	LOFI	
803	Carbon steel AST	1959	12x36	719	30198	DWA Work-Off	
804	Carbon steel AST	1959	10x24	331	13902	Out of service	
805	Carbon steel AST	1959	10x24	331	13902	Out of service	
806	Carbon steel AST	1959	10x24	331	13902	Necton	
807	Carbon steel AST	1959	10x24	331	13902	HFFI (83623)	
809	Carbon steel AST	1959	10x24	331	13902	HFFI (83612)	
810	Carbon steel AST	1966	10x18	245	10290	Heating Oil	
811	Carbon steel AST	1959	24x30	2329	97818	Out of service	
812	Carbon steel AST	1958	20x30	1662	69804	150 Solvent Neutral	
813	Carbon steel AST	1958	20x30	1662	69804	Dewaxing Aid	
814	Carbon steel AST	1959	20x30	1662	69804	Dewaxing Aid	
815	Carbon steel AST	1959	20x30	1662	69804	LOFI (80136)	
816	Carbon steel AST	1969	20x30	1662	69804	ECA 9587 LOFI	
840	Carbon steel AST	1968	24x24	1879	78918	Mercon Dextron	
841	Carbon steel AST	1968	24x24	1879	78918	Mercon Dextron	
842	Carbon steel AST	1968	15x24	736	30912	ATF	
843	Carbon steel AST	1968	15x24	736	30912	Mercon Dextron	
844	Carbon steel AST	1974	25x32	2536	106512	Mercon Dextron	
845	Carbon steel AST	1974	25x32	2536	106512	Mercon Dextron	
850	Carbon steel AST	1968	18x24	1057	44394	Necton	
851	Carbon steel AST	1968	15x24	738	30996	ATF	
852	Carbon steel AST	1968	10x24	324	13608	ATF	
853	Carbon steel AST	1968	10x24	324	13608	Necton	
854	Carbon steel AST	1968	10x24	324	13608	ATF	
855	Carbon steel AST	1971	12x18	340	14280	Amoco 6811	
856	(a)	(a)	(a)	290	12180	ATF	
861	Carbon steel AST	1974	12x24	476	19992	ECA 8864/DHP	
862	Carbon steel AST	1951	10x24	333	13986	Tomah Amine	
863	Carbon steel AST	1950	5x15	57	2394	Plexol 305	
870	Carbon steel AST	1968	10x18	238	9996	Van Lube/FN31664	
871	Carbon steel AST	1964	8x18	157	6594	E4814	
872	Stainless Steel AST	1964	8x18	157	6594	Out of service	
873	Carbon steel AST	1964	8x18	157	6594	ECA 9324/4999	
874	Carbon steel AST	1964	8x18	157	6594	ECA 4493	
875	Carbon steel AST	1968	8x18	157	6594	ECA 5087	
876	Carbon steel AST	1964	10x24	329	13818	PX 15	
880	Carbon steel AST	1969	30x32	3964	166488	ECA 5025	

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	Approximate Capacity (Gallons)	Tank Content	CAS Number
NO. 3 TANK FIELD							
901	Carbon steel AST	1958	60x50	25418	1067556	Water	
902	Carbon steel AST	1957	60x48	24447	1026774	LSFO	68476-33-5
903	Carbon steel AST	1957	60x48	24490	1028580	LSFO	68476-33-5
916	Carbon steel AST	1951	120x47	97080	4077360	PFF	
917	Carbon steel AST	1955	120x48	98109	4120578	AC-5	
918	Carbon steel AST	1957	120x56	114619	4813998	PFF	
919	Carbon steel AST	1957	120x56	114680	4816560	Out of service	
920	Carbon steel AST	1957	120x56	114626	4814292	MTBE	
921	Carbon steel AST	1957	120x56	114604	4813368	Out of service	
GENERAL TANK FIELD							
1053	Carbon steel AST	1925	120x42	85159	3576678	Storm water	
1054	Carbon steel AST	1925	120x42	85254	3580668	Out of service	
1055	Carbon steel AST	1925	120x42	85297	3582474	Bayway PGO	064810-00-4
1056	Carbon steel AST	1925	120x42	85281	3581802	Bayway PGO	064810-00-4
1057	Carbon steel AST	1925	120x42	85242	3580164	Out of service	
1058	Carbon steel AST	1925	120x42	85219	3579198	Out of service	
1060	Carbon steel AST	1958	150x50	160826	6754692	TURBO	64742-47-8
1061	Carbon steel AST	1958	150x50	160826	6754692	TURBO	64742-47-8
1062	Carbon steel AST	1958	150x50	160836	6755112	Cattar/HAFO	64741-62-4
1063	Carbon steel AST	1958	150x50	160732	6750744	Cattar/HAFO	64741-62-4
1064	Carbon steel AST	1958	150x50	160740	6751080	260 Diesel	68476-34-6
1071	Carbon steel AST	1969	150x56	170000	7140000	Water	64742-47-8
1072	Carbon steel AST	1969	150x56	170000	7140000	Bayway PGO	068410-00-4
1073	Carbon steel AST	1969	150x56	170000	7140000	Bayway PGO	068410-00-4
SOLVENT TANK FIELD							
1024	Carbon steel AST	1966	10x12	170	7140	Idle	
1025	Carbon steel AST	1967	70x48	33000	1386000	Xylene	1330-20-7
1026	Carbon steel AST	1923	75x42	33256	1396752	Varsol 1	8052-41-3
1027	Carbon steel AST	1923	75x42	33256	1396752	Idle	
1028	Carbon steel AST	1923	75x42	33281	1397802	Aromatic 100	64742-95-6
1029	Carbon steel AST	1923	40x42	33281	1397802	Varsol 18	8052-41-3
1030	Carbon steel AST	1959	40x48	10768	452256	L.O.P.S.	64742-47-8
1031	Carbon steel AST	1959	40x48	10770	452340	EXXPRINT 588D	64742-47-8
1032	Carbon steel AST	1962	40x48	10767	452214	Norpar 15	64771-72-8
1033	Carbon steel AST	1962	40x48	10725	450450	Isopar L	64742-49-9
1034	Carbon steel AST	1961	40x48	10766	452172	2429 Naptha	64742-89-8
1035	Carbon steel AST	1961	40x48	10767	452214	Norpar 12	64771-72-8
1036	Carbon steel AST	1961	40x48	10725	450450	EXXSOL D110	64742-47-8
1037	Carbon steel AST	1968	50x48	10700	449400	Aromatic 150	64742-94-5
1046	Carbon steel AST	1951	15x24	760	31920	Aromatic 200	64742-94-5
1047	Carbon steel AST	1928	60x42	21307	894894	Isopar G	64742-48-9
1048	Carbon steel AST	1962	40x48	10727	450534	HAN	64742-06-9
1049	Carbon steel AST	1961	50x48	16752	703584	Isopar H	64742-48-9

See footnotes on last page.

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	Approximate Capacity (Gallons)	Tank Content	CAS Number
LOW SULFUR TANK FIELD							
1065	Carbon steel AST	1967	150x56	170000	7140000	RSFO	
1066	Carbon steel AST	1967	150x56	170000	7140000	Out of service	
1067	Carbon steel AST	1967	150x56	170000	7140000	Cattar/HAFO	64741-62-4
1068	Carbon steel AST	1968	150x56	170000	7140000	RSFO	
1069	Carbon steel AST	1969	150x56	170000	7140000	Bayway PGO	068410-00-4
1070	Carbon steel AST	1969	150x56	170000	7140000	Bayway PGO	068410-00-4
PIERS AND EAST SIDE TREATMENT AREA							
659	Carbon steel AST	(a)	(a)	(a)	(a)	Idle	
996	Fiberglass Reinforced Plastic	1980	14x12	330	13860	Out of service (APH)	
997	Fiberglass Reinforced Plastic	1980	14x12	330	13860	Calgon	
1097	Carbon steel AST	1991	13x24	567	23830	Recycle Oil	
1098	Carbon steel AST	1964	20x24	2562	107604?	Recycle Oil	
1099	Carbon steel AST	1964	20x24	2562	107604?	Recycle Oil	
1100	Carbon steel AST	1947	15x18	576	24192	DEMAR	
1101	Carbon steel AST	1956	12x12	244	10248	XD-3XTRA-40	
DOMESTIC TRADE AREA							
1051	Carbon steel AST	1966	40x50	11200	470400	Idle (Domestic Trade)	
MISCELLANEOUS AREAS							
994	Carbon steel AST	1949	25x40	3494	146748	Out of service (CBH)	
995	Carbon steel AST	1949	25x40	3494	146748	Out of service (CBH)	
998	Carbon steel AST	1949	90x48	45320	1903440	CBH Storm water	

All tanks that are out of service or idle are empty.

*	Top compartment.
**	Middle compartment.
***	Bottom compartment.
(a)	Unknown.
AST	Aboveground storage tank.
ECA	Exxon Chemical Americas.
ATF	Asphalt tank field.
AV-GAS	Aviation gasoline.
CAS	Chemical abstract system.
Source:	Aboveground storage tank information ws obtained from R. Scerbo (1992).

Table 5-2. Documented Spills Over 100 Gallons at the Bayonne Plant, Bayonne, New Jersey.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		"A"-HILL TANK FIELD		
10/78	252,000	Tank No. 514	Heating Oil	Oil Spill Report (1978)
2/15/83	42,000	Tank No. 508	Process Gas Oil	Fuels Operations Supervisor Accident Report
		LUBE OIL AREA		
03/28/72	1,500	Roadway in plant (exact location not known)	Lube oil additive	Exxon Company, U.S.A.: Ground Spills
04/21/73	700	Roadway in plant (exact location not known)	Lube oil	Exxon Company, U.S.A.: Ground Spills
12/23/78	840-1,050	Tank No. 1	Electric insulating oil	General Accident Report (12/23/78)
12/24/78	6,300	Tank No. 1	Univolt 60	Letter to NJDEP (02/20/79)
03/24/87	10,000	Tank No. 6	1919 Motor oil	Spill/Mixture/Leak Report (03/24/87)
08/10/89	500	243,000-Gallon Tank (vicinity of Tank Nos. 25, 26, 35, and 36)	Lube base oil	NJDEP Notification Report

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		LUBE OIL AREA (Continued)		
08/23/89	100	Tank No. 8	Exxon Formula No. 1367	Spill/Mixture/Leak Report (08/23/89)
01/03/90	100	Pump on Tank No. 139	Slop oil	Spill/Mixture/Leak Report (01/03/90)
07/30/90	400	Tank No. 581	Wax	Spill/Mixture/Leak Report (07/30/90)
08/14/90	300	Tank No. 94	Lube oil	Spill/Mixture/Leak Report (08/14/90)
08/28/90	250	Tank No. 545	Slop oil	Spill/Mixture/Leak Report (08/28/90)
11/28/90	100	Tank No. 23	Raw lube oil (CORAY 220)	Spill/Mixture/Leak Report (11/28/90)
01/15/91	2,500	Tank No. 1	Univolt 60	Spill Incident Report (1991)
07/08/91	421	Ground (exact location not known)	Turbo oil	Spill Incident Report (1991)
08/26/91	100	Truck loading rack	Wax	Spill Incident Report (1991)

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		LUBE OIL AREA (Continued)		
02/14/92	100	Between Tank Nos. 106 and 107	Nuto H-46	Leaks, Discharges, and AIINS Incidents (1992)
02/18/92	600	Tank No. 107	Unknown	Leaks, Discharges, and AIINS Incidents (1992)
07/09/92	840	Wax at Tank Nos. 585 and 586	Wax	Leaks, Discharges, and AIINS Incidents (1992)
		PIER NO. 1 AREA		
09/22/72	2,100	Pier 1 Kill Van Kull Waterway	Wax (MEK Feed)	Oil Spill Report Second Half (1972)
06/28/78	670	Kill Van Kull Waterway	Waste oil	United States Coast Guard (02/06/79)
10/30/79	1,050-2,100	Kill Van Kull Waterway	Heavy fuel oil	Letter to HQ (11/01/79)
11/15/79	> 672	Kill Van Kull Waterway	Emulsion flux	Letter to HQ (11/26/79)
06/04/89	840	Pier 1 Kill Van Kull Waterway	Fuel oil	Bayonne Terminal Incidents (1989)

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		NO. 2 TANK FIELD		
3/01/89	Unknown	Tank No. 1005	No. 2 Fuel Oil	General Incident Report (03/01/89)
		ASPHALT PLANT AREA		
11/19/70	300	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
11/22/70	300	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
11/25/70	100	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/02/70	300	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/15/70	150	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/23/70	400	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
01/05/71	600	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA (Continued)		
01/08/71	300	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
03/19/71	350	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
05/25/71	100	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
05/28/71	200	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
07/15/71	200	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
07/30/71	1,000	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
08/09/71	500	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
08/11/71	200	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA (Continued)		
08/13/71	300	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
09/03/71	100	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
09/10/71	100	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
10/03/71	600	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
01/18/72	100	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
02/09/72	200	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
05/08/72	100	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
12/14/72	1,000	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		ASPHALT PLANT AREA (Continued)		
01/05/73	300	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
03/20/73	100	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
03/20/73	500	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
04/04/73	1,500	Roadway in plant (exact location not known)	Asphalt	Exxon Company, U.S.A.: Ground Spills
01/05/87	500	OCP at Tank No. 923	Exxon Formula No. 82899	Shift Super Spill Log
		AV-GAS TANK FIELD		
01/30/88	5,000	Tank No. 1010	Toluene	Spill/Mixture/Leak Report (01/30/88)
01/08/92	100	AV-Gas Tank Field (exact location not known)	Heavy fuel oil	Exxon Letter to NJDEPE

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		AV-GAS TANK FIELD (Continued)		
1992	Unknown	North of Tank No. 1015 at northern boundary to the west of the overhead piping rack.	Diesel	Personal communication with R. Scerbo (11/8/94)
		EXXON CHEMICALS PLANT AREA		
01/08/87	700	ATF R/R (exact location not known)	Exxon Formula No. 80831	Shift Super Spill Log
01/17/87	100	Tank No. 811	Exxon Formula No. 81348	Shift Super Spill Log
02/12/87	300	"A" Reactor (exact location not known)	Exxon Formula No. 80682	Shift Super Spill Log
02/14/87	300	Tank No. 799	Slop oil	Shift Super Spill Log
02/15/87	300	Tank No. 793 (exact location not known)	Exxon Formula No. 81744	Shift Super Spill Log
11/04/88	6,000	Tank No. 736	Cyclohexane	Emergency Response Field Report

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		EXXON CHEMICALS PLANT AREA (Continued)		
Unknown	Unknown	Tank No. 727 (explosion)	Napthalene	Personal Communication With Chemical Plant Personnel (11/8/94)
		NO. 3 TANK FIELD		
01/26/88	500	Tank No. 920	F540	Spill/Mixture/Leak Report (01/26/88)
8/3/78	Unknown	Tank No. 916 (evidence of tank leakage)	Unknown	Report by Bayway Inspections (8/3/78)
		GENERAL TANK FIELD		
10/14/90	300	Tank No. 1058	Oil	Spill/Mixture/Leak Report (10/14/90)
10/30/90	1,000	Tank No. 1059	Oily sludge	General Accident Report (10/30/90)
		SOLVENT TANK FIELD		
09/22/82	92,400	Tank No. 1033	Isopar L	Exxon Letter to NJDEP (11/16/82)

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		SOLVENT TANK FIELD (Continued)		
02/18/92	2,400	North of Low Sulfur Tank Field (exact location not known)	Heavy oil and diesel	Exxon Letter to NJDEP
09/10/90	1,114	Truck loading rack	Xylene	Spill/Mixture/Leak Report (09/10/90)
		LOW SULFUR TANK FIELD		
02/21/76	142,800	Tank No. 1069	F-942 No. 6 Oil	Report of Committee Investigating Spill
		PIERS AND EAST SIDE TREATMENT PLANT		
08/12/71	4,200	Pier 6 Upper New York Bay	Gear oil	Supervisor's Report Incident (8/12/71)
05/30/72	4,200	Pier 6 Upper New York Bay	Asphalt	Oil Spill Report (05/30/72)
08/22/72	21,000	Pier 6 Upper New York Bay	No. 6 oil	Oil Spill Report Second Half (1972)

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		PIERS AND EAST SIDE TREATMENT PLANT (Continued)		
09/10/72	21,000	Pier 6 Upper New York Bay	Gas-oil	Oil Spill Report Second Half (1972)
09/19/73	126	Pier 6 Upper New York Bay	Unknown	Oil Spill Report Second Half (1973)
10/21/73	210	Pier 7 Upper New York Bay	No. 2 fuel oil	Oil Spill Report Second Half (1973)
02/11/79	168	Pier 7 Upper New York Bay	No. 2 fuel oil	General Accident Report (02/11/79)
12/19/85	< 1,134	Pier 7 Upper New York Bay	No. 2 fuel oil	Spill Incident Report (1985)
11/23/87	100	Piers 6 and 7	Emulsion New York Bay	Oil Spill Summary (1987)
03/21/88	200	Upper New York Bay	Oil	Spill/Mixture/Leak Report (03/21/88)
05/01/88	200	Upper New York Bay	1941 ATF	Spill/Mixture/Leak Report (05/01/88)

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		PIERS AND EAST SIDE TREATMENT PLANT (Continued)		
10/24/89	100	Pier 7 Upper New York Bay	Diesel fuel	Bayonne Terminal Incidents (1989)
11/03/89	100	Pier 7 Upper New York Bay	Diesel fuel	Bayonne Terminal Incidents (1989)
02/09/90	20,000	Pier 7, Kill Van Kull	No. 2 fuel oil	NJDEP Incident Notification Report
05/22/91	350	Upper New York Bay	Xylene	Spill Incident Report (1991)
06/18/91	16,000	Upper New York Bay	No. 2 heating oil	Oil Spill Incident Report (1991)
08/01/91	100	Line near new Tank No. 1097	Blend oil	Spill Incident Report (1991)

DOMESTIC TRADE AREA

No documented spills greater than 100 gallons.

STOCKPILE AREA

No documented spills greater than 100 gallons.

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation

MDC BUILDING AREA

No documented spills greater than 100 gallons.

UTILITIES AREA

No documented spills greater than 100 gallons.

MAIN BUILDING AREA

No documented spills greater than 100 gallons.

MISCELLANEOUS SPILLS

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
11/23/76	147	Kill Van Kull Waterway or Upper New York Bay	No. 2 fuel oil	Oil Spill Data (1976)
07/13/78	168	Kill Van Kull Waterway or Upper New York Bay	Diesel	Oil Spill Data (1978)
10/10/78	630	Kill Van Kull Waterway or Upper New York Bay	Asphalt	Oil Spill Data (1978)
12/25/78	210	Kill Van Kull Waterway or Upper New York Bay	Bunker fuel oil	Oil Spill Data (1978)
03/28/88	200	Ground	EXXMARX 70-5720	Bayonne Plant 1988

See footnotes on last page.

Date	Reported Spill Volume (Gallons)	Approximate Location	Material Spilled	Spill Documentation
		MISCELLANEOUS SPILLS		
12/28/88	110	Barge overflow into New York Bay	No. 2 fuel oil	NJDEP Incident Notification Report
12/28/88	130	Hose transfer at pier	Fuel oil	Emergency Response Field Report
01/18/89	6,000	Ground	Motor oil dispersant	Spill/Mixture/Leak Report
02/28/90	715	Off barge E-25	No. 6 oil blend	
01/21/92	2,500	Transfer from barge to Tank No. 1065	Black oil	Leaks, Discharges, and AIINS Incidents (1992)
10/06/92	100	Tank	Unknown product	Leaks, Discharges, and AIINS Incidents (1992)

ATF Automatic transmission fluid.
HQ Headquarters.
NJDEP New Jersey Department of Environmental Protection.
AV-GAS Aviation gas.
MDC Metropolitan distribution center.
Source: Spill documentation was obtained from the Bayonne Health Department and Bayonne Fire Department (1992), from Exxon Company, U.S.A. files on spill reports (1992b), and through personal communications with R. Scerbo (1992, 1994a), and Exxon Chemicals Plant personnel (1994).

Table 5-3. Inventory of Past and Present Underground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank ID	Location	Capacity (gallons)	Contents	Date Installed	Integrity Testing	Status *
Unknown	Wax Building, Lube Oil Area	Unknown	Gasoline	Pre-1986	Unknown	Removed post-1986.
Unknown	1- and 5-Quart Filling Building, Lube Oil Area	Unknown	Gasoline	Pre-1986	Unknown	Removed post-1986.
Unknown	Blending and Packaging Warehouse, Lube Oil Area	Unknown	Gasoline	Pre-1986	Unknown	Removed prior to 1986. Perhaps April 1985.
E2 (concrete sump)	Exxon Chemicals Plant Area	4,210 (containment when disconnecting hoses)	Collection sump for lube oil additives	Unknown	Unknown	Unknown.
E3 (concrete sump)	Asphalt Plant Area	6,800	Collection sump for lube oil additives	Unknown	Unknown	Unknown.
E4 (concrete sump)	Exxon Chemicals Plant Area	6,824	Collection sump for transmission fluid	Unknown	Unknown	Unknown.
002 (also referred to as "light oil sump")	Filling Building, Solvent Tank Field	2,000	Solvents (Varsol, Isopar X, toluene, xylene, aromatics)	1973	Tested April 29, 1989 - failed. Hydrocarbon contamination noted on April 30, 1992 during excavation (Case No. 92-430-1202-30).	Removed April 1992. Residual contamination to be addressed by ACO.
Unknown	Domestic Trade Area	Unknown	Diesel	Pre-1986	Unknown	Removed post-1986.

See Page 2 for footnotes.

Table 5-3. Inventory of Past and Present Underground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank ID	Location	Capacity (gallons)	Contents	Date Installed	Integrity Testing	Status *
Unknown	Domestic Trade Area	Unknown	Waste (slop) oil	Pre-1986	Unknown	Removed post-1986.
Unknown	Domestic Trade Area	Unknown	Heating oil	Unknown	Unknown	Remains in service.
Unknown	MDC Building	Unknown	Diesel	Pre-1986	Unknown	Removed post-1986.
Unknown	MDC Building	Unknown	Diesel	Pre-1986	Unknown	Removed post-1986.
Unknown	MDC Building	Unknown	Diesel	Pre-1986	Unknown	Removed post-1986.
001 (also referred to as G-1)	Main Building	2,000	Unleaded gasoline	1979	Tested September 1982 - passed. Tested August 1989 - failed. Release reported to NJDEP on August 11, 1989 (Case No. 89-08-11-1107). Confirmation of release reported on August 15, 1989 (Case No. 89-08-15-1520).	Removed August 17, 1989. DICAR investigation to be conducted in conjunction with NJPDES-DGW permit.
003	Main Building	2,000	Unleaded gasoline	1989	Unknown	Currently in service. Replacement tank for 001.

MDC Metropolitan Distribution Center.
NJDEP New Jersey Department of Environmental Protection.
DICAR Discharge Investigation and Corrective Action Report.
NJPDES New Jersey Pollutant Discharge Elimination System.
DGW Discharge to Groundwater.
ACO Administrative Consent Order.
* Underground storage tank (UST) status on October 13, 1984 as related by Ron E. Scerbo, Exxon Company, U.S.A.

Sources: Exxon Company, U.S.A. 1988b.
Exxon Company, U.S.A. 1989a.
Exxon Company, U.S.A. 1990.

Table 5-4. Summary of Transformers Known to Have Contained Polychlorinated Biphenyl Dielectric Fluids, Bayonne Plant, Bayonne, New Jersey.

Location	Transformer	Location	Serial No.	PCB Content (ppm)	Weight (kg)	Dechlorination Date	Transformer Status *
Station F-1	GE 500 kva 4,160-480 V 280 Gal.	Lube Oil Area	G638543	PCB liquid	1,590	NA	Removed
Station G-3 Sub No. G-3	GE 750 kva 4,160-480 V 425 Gal.	Lube Oil Area	8641561	PCB liquid	2,145	12/17/86 425 Gal. Removed	Removed
Station A-3 Sub No. 15	GE 500 kva 4,160-480 V 140 Gal.	Solvent Tank Field	NA	13,720	795	12/17/86 140 Gal. Removed	Removed
Station C-2 Sub No. 17	GE 500 kva 160-480 V 110 Gal.	Low Sulfur Tank Field	F92760	2,093	625	12/17/86 110 Gal. Removed	In service
Station E-1	Wagner 300 kva 4,160-480 V 170 Gal.	Utilities Area	K9G1037	PCB liquid	966	NA	Removed
Station E-1	Wagner 200 kva 4,160-480 V 124 Gal.	Utilities Area	G9C1594	PCB liquid	705	NA	Removed
Station F-2	Standard 500 kva 4,160-480 V 247 Gal.	Main Building Area	130889	21,862	1,403	NA	Removed

PCB Polychlorinated biphenyls.
ppm Parts per million.
kg Kilograms.
GE General Electric.
kva Kilovolt ampere.
V Volt.
Gal. Gallon.
NA Information not available.
* Transformer status as of October 13, 1994 (Scerbo 1994b).

Sources:

Exxon Company, U.S.A. (1986)
Exxon Company, U.S.A. (1994)

Table 5-5. Product Thickness Measurements Conducted by Dan Raviv Associates, Inc. at the Bayonne Plant, Bayonne, New Jersey.

WELL ID	IRM AREA [a]	Product Thickness in Feet Dec. 91-Jan 92	Sep-92	Dec-92	6-Jan-93	11-Jan-93	31-Mar-93
OPERATIONAL AREAS							
"A" - Hill Tank Field							
EB-25	"A"-Hill Tank Field	0.15	NM	0.16	NM	NM	0.17
EB-26	"A"-Hill Tank Field	<0.01	NM	0.03	NM	NM	0.01
EB-27	"A"-Hill Tank Field	ND	NM	ND	NM	NM	ND
EB-28	"A"-Hill Tank Field	ND	NM	ND	NM	NM	ND
EB-29	"A"-Hill Tank Field	ND	NM	ND	NM	NM	ND
EB-30	"A"-Hill Tank Field	ND	NM	ND	NM	NM	ND
Lube Oil Area							
EB-16	Lube Area	1.54	NM	1.34	NM	NM	1.01
EB-17	Lube Area	>1.87	NM	>1.28	NM	NM	0.25
EB-21	Lube Area	<0.01	NM	ND	NM	NM	ND
EB-22	Lube Area	7.58	NM	0.16	NM	NM	0.11
EB-23	Lube Area	0.18	NM	0.11	NM	NM	0.11
EB-24	Lube Area	0.33	NM	0.34	NM	NM	0.33
PKMW-5	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-6	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-7	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-14	Platty Kill Creek Area	--	--	--	--	--	--
Pier No. 1 Area							
EB-1	Helipad Area	ND	NM	ND	NM	NM	ND
EB-2	Helipad Area	0.33	NM	0.17	NM	NM	0.22
EB-3	Helipad Area	0.7	NM	0.01	NM	NM	0.42
EB-4	Helipad Area	0.17	NM	0.06	NM	NM	0.04
EB-5	Helipad Area	0.11	NM	0.02	NM	NM	0.15
EB-6	Helipad Area	0.01	NM	ND	NM	NM	ND
EB-7	Helipad Area	0.18	NM	<0.01	NM	NM	0.16

See last page for footnotes.

Table 5-5. Product Thickness Measurements Conducted by Dan Raviv Associates, Inc. at the Bayonne Plant, Bayonne, New Jersey.

WELL ID	IRM AREA [a]	Product Thickness in Feet: Dec. 91-Jan 92	Sep-92	Dec-92	6-Jan-93	11-Jan-93	31-Mar-93
Pier No. 1 Area (Continued)							
EB-8	Helipad Area	ND	NM	ND	NM	NM	ND
EB-9	Helipad Area	0.91	NM	1.81	NM	NM	0.75
EB-10	Helipad Area	1.12	NM	0.14	NM	NM	1.5
EB-11	Helipad Area	0.61	NM	0.09	NM	NM	0.21
EB-12	Helipad Area	1.37	NM	3.53	NM	NM	3.11
EB-13	Helipad Area	3.65	NM	0.85	NM	NM	1.79
EB-14	Helipad Area	<0.01	NM	ND	NM	NM	ND
EB-15	Platty Kill Creek Area	ND	NM	ND	NM	NM	ND
EBR-1	Helipad Area	0.01	NM	0.02	NM	NM	0.01
EBR-2	Helipad Area	0.11	NM	0.01	NM	NM	ND
EBR-3	Helipad Area	<0.01	NM	0.26	NM	NM	0.07
EBR-4	Helipad Area	0.99	NM	0.32	NM	NM	0.16
EBR-5	Helipad Area	1.5	NM	2.73	NM	NM	4.13
EBR-6	Helipad Area	0.16	NM	0.01	NM	NM	0.01
EBR-7	Helipad Area	ND	NM	ND	NM	NM	ND
EBR-8	Helipad Area	0.75	NM	1.17	NM	NM	1.58
EBR-22	Platty Kill Creek Area	ND	NM	ND	NM	NM	ND
No. 2 Tank Field							
EB-92 *	Interceptor Trench Area	--	--	--	--	--	--
EB-93 *	Interceptor Trench Area	--	--	--	--	--	--
Asphalt Plant Area							
No monitoring wells currently exist in the Asphalt Plant Area.							
AV-Gas Tank Field							
EB-46	Interceptor Trench Area	<0.01	NM	ND	NM	NM	ND
EB-87 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
EB-88 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM

See last page for footnotes.

Table 5-5. Product Thickness Measurements Conducted by Dan Raviv Associates, Inc. at the Bayonne Plant, Bayonne, New Jersey.

		Product Thickness in Feet					
WELL ID	IRM AREA [a]	Dec. 91-Jan 92	Sep-92	Dec-92	6-Jan-93	11-Jan-93	31-Mar-93
AV-Gas Tank Field (Continued)							
EB-89 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
EB-91 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
EB-99 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
IT-MW1	Interceptor Trench Area	--	--	--	--	--	--
Exxon Chemicals Plant Area							
MW-1	Exxon Chemicals Plant Area	1.00	NM	1.00	NM	NM	1.97
MW-2	Exxon Chemicals Plant Area	1.20	NM	0.35	NM	NM	0.29
No. 3 Tank Field							
No monitoring wells currently exist in the No. 3 Tank Field.							
General Tank Field							
EB-47	Pier 7 Area	ND	NM	ND	NM	NM	ND
EB-48	Pier 7 Area	ND	NM	ND	NM	NM	ND
EB-50	Pier 7 Area	ND	NM	ND	NM	NM	ND
EB-51	Pier 7 Area	ND	NM	ND	NM	NM	ND
EB-52	Pier 7 Area	0.01	NM	1.34	NM	NM	1.00
SHERI 3	Pier 7 Area	NM	NM	NM	NM	NM	NM
Solvent Tank Field							
EB-53	LSSTF	<0.01	NM	ND	ND	ND	ND
EB-54	LSSTF	ND	NM	ND	ND	ND	ND
EB-56	Pier 7 Area	0.02	NM	0.65	NM	NM	0.58
EB-57	Pier 7 Area	ND	NM	ND	NM	NM	<0.01
EB-79	LSSTF	6.03	NM	8.79	7.52	8.50	7.30
EB-84	Pier 7 Area	NM	NM	NM	NM	NM	3.20

See last page for footnotes.

Table 5-5. Product Thickness Measurements Conducted by Dan Raviv Associates, Inc. at the Bayonne Plant, Bayonne, New Jersey.

WELL ID	IRM AREA [a]	Product Thickness in Feet					
		Dec. 91-Jan 92	Sep-92	Dec-92	6-Jan-93	11-Jan-93	31-Mar-93
Solvent Tank Field (Continued)							
MW-7	LSSTF	--	--	--	1.78	2.83	10.00
MW-8	LSSTF	--	--	--	11.85	9.40	17.75
MW-10	LSSTF	--	--	--	ND	ND	ND
MW-11	LSSTF	--	--	--	ND	ND	ND
Low Sulfur Tank Field							
EB-75	LSSTF	<0.01	NM	ND	ND	ND	ND
EB-76	LSSTF	0.40	NM	0.01	0.20	0.20	0.10
EB-77	LSSTF	8.02	NM	10.29	10.46	11.85	8.90
EB-78	LSSTF	5.15	NM	6.05	5.95	7.36	7.05
EB-80	LSSTF	7.13	NM	5.56	3.03	3.66	3.20
EB-81	LSSTF	0.74	NM	ND	<0.01	0.01	ND
MW-3	LSSTF	--	--	--	8.26	8.33	7.20
MW-4	LSSTF	--	--	--	ND	ND	0.07
MW-5	LSSTF	--	--	--	ND	ND	ND
MW-6	LSSTF	--	--	--	ND	ND	ND
MW-9 *	LSSTF	--	--	--	ND	ND	ND
MW-12	LSSTF	--	--	--	7.82	8.46	9.20
MW-13	LSSTF	--	--	--	11.95	12.44	10.20
MW-14	LSSTF	--	--	--	1.63	1.52	1.55
Piers and East Side Treatment Plant Area							
EB-49	Pier 7 Area	ND	NM	ND	NM	NM	ND
EB-58	Pier 7 Area	<0.01	NM	1.90	NM	NM	0.71
EB-59	Pier 7 Area	0.10	NM	ND	NM	NM	3.27
EB-60R	Pier 7 Area	<0.01	NM	ND	NM	NM	0.17
EB-61	Pier 7 Area	0.01	NM	1.11	NM	NM	0.16
EB-62	Pier 7 Area	0.01	NM	0.77	NM	NM	3.01
EB-63	Pier 7 Area	ND	NM	0.09	NM	NM	<0.01

See last page for footnotes.

Table 5-5. Product Thickness Measurements Conducted by Dan Raviv Associates, Inc. at the Bayonne Plant, Bayonne, New Jersey.

		Product Thickness in Feet					
WELL ID	IRM AREA [a]	Dec. 91-Jan 92	Sep-92	Dec-92	6-Jan-93	11-Jan-93	31-Mar-93
Piers and East Side Treatment Plant Area (Continued)							
EB-64	Pier 7 Area	0.73	NM	0.28	NM	NM	0.34
EB-65	Pier 7 Area	<0.01	NM	1.15	NM	NM	0.13
EB-66R	Pier 7 Area	0.02	NM	0.58	NM	NM	1.42
EB-67	Pier 7 Area	0.80	NM	0.36	NM	NM	0.21
EB-68	Pier 7 Area	ND	NM	ND	NM	NM	0.05
EB-69	Pier 7 Area	0.01	NM	0.73	NM	NM	1.75
EB-70	Pier 6 Area	NM	NM	NM	NM	NM	NM
EB-71	Pier 6 Area	ND	<0.01	0.02	NM	NM	ND
EB-72	Pier 6 Area	<0.01	0.67	0.60	NM	NM	0.43
EB-73	Pier 6 Area	<0.01	0.05	0.19	NM	NM	0.12
EB-74	Pier 6 Area	<0.01	0.04	0.09	NM	NM	<0.01
EB-82	Pier 7 Area	ND	NM	ND	NM	NM	ND
EB-85	Pier 6 Area	NM	NM	NM	NM	NM	NM
EB-86	Pier 6 Area	NM	NM	NM	NM	NM	NM
EBR-9	Pier 7 Area	ND	NM	ND	NM	NM	<0.01
EBR-10	Pier 7 Area	ND	NM	ND	NM	NM	0.01
EBR-11	Pier 7 Area	0.21	NM	<0.01	NM	NM	0.16
EBR-12	Pier 6 Area	0.01	0.63	0.42	NM	NM	0.50
EBR-13	Pier 6 Area	ND	<0.01	ND	NM	NM	ND
EBR-14	Pier 6 Area	ND	<0.01	ND	NM	NM	ND
EBR-15	Pier 6 Area	ND	ND	ND	NM	NM	ND
EBR-16	Pier 6 Area	<0.01	ND	ND	NM	NM	ND
EBR-17	Pier 6 Area	<0.01	ND	ND	NM	NM	ND
EBR-18	Pier 6 Area	<0.01	1.09	1.31	NM	NM	1.30
EBR-19	Pier 6 Area	ND	ND	ND	NM	NM	ND
EBR-20	Pier 6 Area	NM	ND	ND	NM	NM	ND
EBR-21	Pier 6 Area	NM	0.52	ND	NM	NM	ND
EBR-23	Pier 6 Area	NM	ND	ND	NM	NM	ND
P7MW-1	Pier 7 Area	--	--	--	--	--	--
P7MW-2	Pier 7 Area	--	--	--	--	--	--

See last page for footnotes.

Table 5-5. Product Thickness Measurements Conducted by Dan Raviv Associates, Inc. at the Bayonne Plant, Bayonne, New Jersey.

		Product Thickness in Feet					
WELL ID	IRM AREA [a]	Dec. 91-Jan 92	Sep-92	Dec-92	6-Jan-93	11-Jan-93	31-Mar-93
Piers and East Side Treatment Plant Area (Continued)							
SHERI 1	Pier 6 Area	NM	NM	NM	NM	NM	ND
SHERI 2	Pier 6 Area	NM	NM	NM	NM	NM	ND
Domestic Trade Area							
No monitoring wells currently exist in the Domestic Trade Area.							
MISCELANEOUS AREAS							
Stockpile Area							
EB-18	Platty Kill Creek Area	ND	NM	ND	NM	NM	ND
EB-19	Platty Kill Creek Area	0.69	NM	0.70	NM	NM	3.88
EB-90	Platty Kill Creek Area	NM	NM	NM	NM	NM	NM
PKMW-1	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-2	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-3	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-4	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-8	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-9	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-10	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-11	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-12	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-13	Platty Kill Creek Area	--	--	--	--	--	--
PKMW-15	Platty Kill Creek Area	--	--	--	--	--	--
MDC Building Area							
No monitoring wells currently exist in the MDC Building Area.							
Utilities Area							
No monitoring wells currently exist in the Utilities Area.							

See last page for footnotes.

Table 5-5. Product Thickness Measurements Conducted by Dan Raviv Associates, Inc. at the Bayonne Plant, Bayonne, New Jersey.

		Product Thickness in Feet					
WELL ID	IRM AREA [a]	Dec. 91-Jan 92	Sep-92	Dec-92	6-Jan-93	11-Jan-93	31-Mar-93
Main Building Area							
EB-31	Interceptor Trench Area	ND	NM	ND	NM	NM	ND
EB-33	Interceptor Trench Area	ND	NM	ND	NM	NM	ND
EB-34	Interceptor Trench Area	0.58	NM	0.60	NM	NM	0.42
EB-35	Interceptor Trench Area	ND	NM	ND	NM	NM	ND
EB-36	Interceptor Trench Area	0.01	NM	0.07	NM	NM	<0.01
EB-40	Interceptor Trench Area	0.01	NM	ND	NM	NM	ND
EB-41	Interceptor Trench Area	0.02	NM	ND	NM	NM	0.10
EB-42	Interceptor Trench Area	0.10	NM	ND	NM	NM	0.14
EB-44	Interceptor Trench Area	0.01	NM	ND	NM	NM	ND
EB-45	Interceptor Trench Area	ND	NM	ND	NM	NM	ND
EB-83	Interceptor Trench Area	NM	NM	NM	NM	NM	0.01
EB-94 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
EB-95 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
EB-96 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
EB-97 *	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
EB-98	Interceptor Trench Area	NM	NM	NM	NM	NM	NM
ITMW-2	Interceptor Trench Area	--	--	--	--	--	--
ITMW-3	Interceptor Trench Area	--	--	--	--	--	--
ITMW-4	Interceptor Trench Area	--	--	--	--	--	--
ITMW-5	Interceptor Trench Area	--	--	--	--	--	--
ITMW-6	Interceptor Trench Area	--	--	--	--	--	--

(a) IRM areas as adapted from Dan Raviv Associates, Inc. (1993a, 1993b, and 1994).
IRM Interim Remedial Measure.
LSSTF Low Sulfur and Solvent Tank Fields.
NM Not measured.
ND Product not detected.
-- Monitoring well not yet installed at this date.
< Less than.
> Greater than.
AV-Gas Aviation gasoline.
MDC Metropolitan Distribution Center.
* Well location is outside of the property boundary.
Source: Dan Raviv Associates, Inc. (1993d).

Table 5-1. Inventory of Aboveground Storage Tanks at the Bayonne Plant, Bayonne, New Jersey.

Tank Number	Tank Type	Year Built	Tank Dimensions (Diameter x height in feet)	Approximate Capacity (Barrels)	Approximate Capacity (Gallons)	Tank Content	CAS Number
ASPHALT PLANT AREA (CONT.)							
942	Carbon steel AST	1957	20x40	2251	94542	7060	
943	Carbon steel AST	1957	25x40	3517	147714	7037	64792-93-4
950	Carbon steel AST	1960	60x48	24227	1017534	AC-20	8052-42-4
955	Carbon steel AST	1948	60x48	23989	1007538	Out of service	
956	Carbon steel AST	1948	25x42	21269	893298	AC-20	8052-42-4
959	Carbon steel AST	1948	25x42	3678	154476	160/180 EMFLUX	
960	Carbon steel AST	1948	25x42	3686	154812	AC-5	8052-42-4
961	Carbon steel AST	1948	25x42	3681	154602	AC-20	8052-42-4
962	Carbon steel AST	1948	25x42	3693	155106	AC-10	8052-42-4
963	Carbon steel AST	1948	25x42	3669	154098	Out of service	
964	Carbon steel AST	1948	25x42	3683	154686	AC-5	8052-42-4
965	Carbon steel AST	1948	25x42	3683	154686	AC-20	8052-42-4
966	Carbon steel AST	1948	25x42	3683	154686	AC-10	8052-42-4
967	Carbon steel AST	1957	20x40	2235	93870	AC-10	8052-42-4
968	Carbon steel AST	1957	20x40	2226	93492	EXXPRINT 990	64742-93-4
969	Carbon steel AST	1960	20x40	2232	93744	7107 Rooters Flux	8052-42-4
970	Carbon steel AST	1957	20x40	2234	93828	160/180 EMFLUX	8052-42-4
971	Carbon steel AST	1957	10x32	2229	93618	LSFO	68476-33-5
972	Carbon steel AST	(a)	(a)	(a)	(a)	Out of service	
973	Carbon steel AST	1960	10x32	433	18186	EXXPAVEHP-60	8052-42-4
974	Carbon steel AST	1960	10x32	432	18144	AC-20	8052-42-4
975	Carbon steel AST	1960	10x32	432	18144	EXXPAVEHP-60	8052-42-4
986	Carbon steel AST	1924	25x30	2620	110040	Kerosene	8008-20-6
987	Carbon steel AST	1938	25x30	2625	110250	Varsol 18	8056-41-3
988	Horizontal Drum	(a)	10x25	349	14658	Cutback Naptha	
990	Carbon steel AST	1934	7'10-1/2x12'9	115	4830	1419 Ind. Oil	
993	Carbon steel AST	1959	25x40	3498	146916	NBH	
AVIATION (AV) GAS TANK FIELD							
1009	Carbon steel AST	1957	110x56	96324	4045608	Out of service	N/A
1010	Carbon steel AST	1957	75x56	44625	1874250	Toluene	108-88-3
1011	Carbon steel AST	1957	75x56	44611	1873662	Kerosene	8008-20-6
1012	Carbon steel AST	1957	50x56	19678	826476	Heptane	142-82-5
1013	Carbon steel AST	1957	60x56	28512	1197504	Hexane	110-54-3
1014	Carbon steel AST	1957	100x56	79501	3339042	Out of service	
1015	Carbon steel AST	1957	40x56	12592	528864	Out of service	
1016	Carbon steel AST	1957	40x56	12596	529032	Cutback Naptha	Multiple
1017	Carbon steel AST	1957	75x56	44625	1874250	AVGAS	N/A
1018	Carbon steel AST	1957	75x56	44625	1874250	260 Diesel	68476-34-6
CHEMICAL PLANT AREA							
730	Carbon steel AST	1959	10x32	440	18480	Out of service	
731	Carbon steel AST	1959	10x32	440	18480	Out of service	
732	Carbon steel AST	1959	10x32	440	18480	Out of service	
733	Carbon steel AST	1959	10x32	440	18480	Out of service	

See footnotes on last page.

EPA

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

I. IDENTIFICATION
01 STATE: NJ | 02 SITE NUMBER: 78

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): Exxon Bayonne Plant
02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: Foot of East 22nd Street
03 CITY: Bayonne
04 STATE: NJ | 05 ZIP CODE: 07002 | 06 COUNTY: Hudson | 07 COUNTY CODE: | 08 CONG. DIST.:
09 COORDINATES LATITUDE: 40 39 13.0 | LONGITUDE: 74 06 47.0
BLOCK: 381A | LOT: 81
10 DIRECTIONS TO SITE (Starting from nearest public road): New Jersey Turnpike South Exit 14A to Avenue E. then on to 21st. Street East. 21st St to Hook Road which leads to East 22nd. Street.

III. RESPONSIBLE PARTIES

01 OWNER (if known): Exxon Co, U.S.A.
02 STREET (Business, mailing, residential): Foot of East 22nd Street
03 CITY: Bayonne
04 STATE: NJ | 05 ZIP CODE: 07002 | 06 TELEPHONE NUMBER: 201-4747585
07 OPERATOR (If known and different from owner): C.B. Sounders
08 STREET (Business, mailing, residential):
09 CITY:
10 STATE: | 11 ZIP CODE: | 12 TELEPHONE NUMBER: ( )

13 TYPE OF OWNERSHIP (Check one)
- [X] 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
- [X] B. UNCONTROLLED WASTE (CERCLA 103c) DATE RECEIVED: 6/5/81 MONTH DAY YEAR
- [ ] C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
- [ ] YES DATE ______ MONTH DAY YEAR
- [X] 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)
- [X] A. ACTIVE
- [ ] B. INACTIVE
- [ ] C. UNKNOWN

03 YEARS OF OPERATION: 1877 (BEGINNING YEAR) | pres (ENDING YEAR) | [ ] UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Exxon Co. reported that oily wastes and other organic and inorganic chemicals were disposed of on-site at two separate locations; Packards Tankfield landfill and Bayonne Plant landfill. (Attachment A)

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
The facility contains two inactive chemical landfills. A potential exists for leachate migration causing soil and groundwater contamination. (Attachment A)

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)
- [X] B. MEDIUM (Inspection required)
- [ ] C. LOW (Inspection on time available basis)
- [ ] D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT: Fred Schmitt | 02 OF (Agency/Organization): NJDEP/BEERA | 03 TELEPHONE NUMBER: 609-2921215
04 PERSON RESPONSIBLE FOR ASSESSMENT: Soterios Stavrou | 05 AGENCY: | 06 ORGANIZATION: JRB Assoc. | 07 TELEPHONE NUMBER: 201-5990100 | 08 DATE: 2/28/85 MONTH DAY YEAR

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	78

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☒ D. OTHER Oily Wastes (Specify)
- ☐ E. SLURRY
- ☒ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

- TONS
- CUBIC YARDS Unknown
- 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			Oily wastes, organics
OLW	OILY WASTE	Unknown		and inorganics were
SOL	SOLVENTS	unknown		disposed of in landfills
PSD	PESTICIDES			and an impoundment between
OCC	OTHER ORGANIC CHEMICALS	unknown		1956 and 1965.
IOC	INORGANIC CHEMICALS	Unknown		Attachment A
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

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

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION

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)

NJDEP/ DWR (Central) files: Attachment A
EPA-Fed Plaza, Edison files: Attachment A

EPA FORM 2070-12 (7-81)

TIERRA-B-000568

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	76

II. HAZARDOUS CONDITIONS AND INCIDENTS

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

The facility was a petroleum-refinery-waste landfill and impoundment frcm 1956 to 1965. A high potential for ground water contamination exists. (Attachment A)

01 [X] B. SURFACE WATER CONTAMINATION — 02 [X] OBSERVED (DATE: 11/15/75) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED — 04 NARRATIVE DESCRIPTION

Exxon reported to EPA that approximately 40 gallons of emulsified oil entered Kill Van Kull River. The spill resulted from the overflow of the slop oil sump on Pier 1 while off-loading a ship. (Att. B)

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

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

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

01 [X] F. CONTAMINATION OF SOIL — 02 [ ] OBSERVED (DATE:) — [X] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION

The facility has a landfill and impoundment and that contain oily wastes from petroleum refining operations. As a result, the potential for soil contamination is very high. (Attachment A)

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

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

Part of the site was previously a landfill and impoundment where oily wastes were disposed of. A potential for worker exposure exists if there is contact with contaminated soil or water.

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

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

I. IDENTIFICATION
01 STATE: NJ | 02 SITE NUMBER: 78

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

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

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

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

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☒ OBSERVED (DATE: 6/18/76) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION
Exxon informed EPA of two oil spills. The first occurred on 11/15/75 when 40 gallons of emulsified oil entered Kill Van Kull. The second occurred on 2/21/76 when a tank overflowed while receiving oil. (Att. B)

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

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

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION
During the years of operation, refinery wastes were dumped into unlined landfills and impoundments on-site.

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

III. TOTAL POPULATION POTENTIALLY AFFECTED: ______

IV. COMMENTS
For additional information, refer to Site 76, Bayonne Municipal Landfill, which also received wastes from the refinery.

V. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)
EPA Fed Plaza Files: Attachments A,B
NJDEP/DWR Files: Attachment A

EPA

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

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
NJ 178

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

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

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

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

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☒ OBSERVED (DATE: 6/18/76) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED:
04 NARRATIVE DESCRIPTION
Exxon informed EPA of two oil spills. The first occurred on 11/15/75 when 40 gallons of emulsified oil entered Kill Van Kull. The second occurred on 2/21/76 when a tank overflowed while receiving oil. (Att. B)

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

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

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE:) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION
During the years of operation, refinery wastes were dumped into unlined landfills and impoundments on-site.

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

III. TOTAL POPULATION POTENTIALLY AFFECTED:

IV. COMMENTS
For additional information, refer to Site 76, Bayonne Municipal Landfill, which also received wastes from the refinery.

V. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)
EPA Fed Plaza Files: Attachments A,B
NJDEP/DWR Files: Attachment A

PHASE IA REMEDIAL INVESTIGATION BAYONNE PLANT BAYONNE, NEW JERSEY

VOLUME I OF III

TEXT AND TABLES

December 1995

Prepared for

Exxon Company, U.S.A.
P.O. Box 728
Linden, New Jersey 07036

Prepared by

Geraghty & Miller, Inc.
201 W. Passaic Street
Rochelle Park, New Jersey 07662
(201) 909-0700

PHASE IA REMEDIAL INVESTIGATION BAYONNE PLANT BAYONNE, NEW JERSEY

December 12, 1995

Prepared by GERAGHTY & MILLER, INC.

Marie F. McDonnell
Project Scientist

Brian A. Blum
Principal Scientist/Project Manager

Daniel A. Nachman
Vice President/Project Officer

PHASE IA REMEDIAL INVESTIGATION BAYONNE PLANT BAYONNE, NEW JERSEY

VOLUME I

CONTENTS

CONTENTS (continued)

CONTENTS (continued)

CONTENTS (continued)

CONTENTS (continued)

CONTENTS (continued)

TABLES

TABLES (continued)

TABLES (continued)

PHASE IA REMEDIAL INVESTIGATION BAYONNE PLANT BAYONNE, NEW JERSEY

1.0 INTRODUCTION

In September 1992, Geraghty & Miller, Inc. was retained by Exxon Company, U.S.A. (Exxon) to prepare a work plan for the implementation of a Remedial Investigation (RI) of the Bayonne Plant in Bayonne, New Jersey (the Site) pursuant to an Administrative Consent Order (ACO) issued by the New Jersey Department of Environmental Protection (NJDEP), dated November 27, 1991. The Bayonne Plant is an approximately 288-acre petroleum products terminal that was historically owned and operated by Exxon (Figure 1-1). Since the signing of the ACO, Exxon has sold the majority of the Bayonne Plant to International Matex Tank Terminals (IMTT). This report documents the activities and findings of Phase IA of the RI, which was carried out in accordance with the procedures and protocols specified in the Bayonne Plant RI Work Plan (RI Work Plan) submitted to the NJDEP on January 20, 1993 (Geraghty & Miller, Inc. 1993a); the Memorandum entitled "Modification to the RI Work Plan" (Memorandum Modification), submitted to the NJDEP in October 1994 (Geraghty & Miller, Inc. 1994a); and the NJDEP Field Sampling Procedures Manual (NJDEPE 1992a).

The RI Work Plan proposed a three-phase approach to characterize the Bayonne Plant and identified the phases as Phase IA, IB, and II. The Phase IA RI field work was carried out from October 1994 to January 1995. The majority of the field work included the drilling and sampling of soil borings to classify soil nature and quality, the advancement and sampling of temporary drivepoints and permanent monitoring wells to evaluate groundwater quality, and the installation of temporary well points to determine the presence and specific gravity of free-floating non-aqueous phase liquid (NAPL).

Phase IA RI field activities included the installation of a site-wide monitoring well network to complement the locations of existing on-site monitoring wells. These monitoring wells were screened in the unconsolidated deposits to evaluate groundwater flow conditions. Additional field activities initiated in Phase IA included the following: a stratigraphic soil boring program consisting of soil sampling, bedrock coring, and the installation of additional intermediate and deep monitoring wells in the shallow unconsolidated deposits; a synoptic round of groundwater level and NAPL thickness measurements; and a groundwater sampling event of selected RI and pre-existing interim remedial measure (IRM) monitoring wells. The Phase IA data collection activities were designed to develop a conceptual model of groundwater flow conditions and to explore the Site for areas of affected soil and groundwater.

As required by the ACO, NAPL IRM investigations are being conducted at the Bayonne Plant, in accordance with a NJDEP-approved work plan prepared by Dan Raviv Associates, Inc. (DRAI) (Dan Raviv Associates, Inc. 1993a). The NAPL IRM investigations at the General Tank Field, No. 3 Tank Field, Exxon Chemicals Plant Area, and Lube Oil Area, were conducted concurrent with RI activities, and involved the drilling of soil borings and installation of temporary well points and permanent monitoring wells. The results of the NAPL IRM field investigation were documented separately in the NAPL IRM investigation report submitted to the NJDEP on July 25, 1995 (Geraghty & Miller, Inc. 1995a).

1.1 PURPOSE AND SCOPE

The purpose of the RI is to characterize the nature and extent of contamination in soil and groundwater resulting from past activities at the Bayonne Plant, consistent with the ACO and the intent of the NJDEP "Technical Requirements for Site Remediation" (NJDEP 1993). The information collected during the RI will be used in the context of other potential contamination sources in this highly industrialized region to support an informed technical and risk management decision regarding the most appropriate remedy (or, where appropriate, no further action) for the Bayonne Plant.

To accomplish the requirements outlined in the ACO for the Bayonne Plant, the scope of work for the RI is being conducted in a phased manner, in which data collected during the Phase

IA field investigation will be used to refine the scope and focus of subsequent field activities. The Phase IA effort has facilitated planning of the scope of work for the remaining field efforts needed to achieve the objectives of the RI. The sampling efforts of the remaining RI field work in Phase IB will be focused to address Phase IA data gaps, as well as to fulfill the objectives of Phase (discussed below).

Phase IA of the RI was designed to develop a conceptual model of groundwater flow conditions and to explore the Site for areas of affected soil and groundwater. This objective was accomplished primarily by drilling 84 shallow soil borings at the Site and by installing a drivepoint, temporary well point, or monitoring well in these borings. At 69 of these locations, the boreholes were grouted after the completion of soil sampling and the removal of a drivepoint or temporary well point. At the remaining 15 borehole locations, groundwater monitoring wells were installed in accordance with NJDEP specifications. At four other locations, deep stratigraphic borings were drilled until bedrock was encountered to confirm the depth to bedrock. Three intermediate and four deep monitoring wells were installed at these locations. Ambient air monitoring data were collected to evaluate the impact of field activities on air quality; these data are briefly discussed in this report.

NAPL IRM investigations were implemented concurrently with the Phase IA field activities in the following areas of the Bayonne Plant: the No. 3 Tankfield, the General Tankfield, the Exxon Chemicals Plant (which involved the Utilities Area), and the Lube Oil Area. This work included the drilling of 32 additional soil borings and the installation of temporary well points, primarily to identify areas of the Bayonne Plant where NAPL can freely enter a standpipe or monitoring well and float on the water table. At five of these soil boring locations, a monitoring well was later installed because floating NAPL was detected in a temporary well point. To complement the Phase IA RI, the analytical scope of the IRM investigations was expanded to include soil sampling for laboratory analysis from 14 of the 32 IRM soil boring locations. The results of the soil analytical program and the temporary well point program are discussed in this report; detailed descriptions of the IRM methodologies are presented in the NAPL IRM Field Investigation Report (Geraghty & Miller, Inc. 1995a).

Collectively, the Phase IA effort and the NAPL IRM investigations resulted in the installation of 20 shallow monitoring wells, three intermediate monitoring wells, and four deep (overburden) monitoring wells. Groundwater samples were collected from 31 monitoring wells at the Site that did not exhibit floating NAPL. These wells included newly installed monitoring wells and historical and existing IRM wells.

Subsequent phases (Phase IB and II) of the RI will be designed to complete the requirements of the ACO. Phase IB will delineate the extent of floating NAPL and the extent of groundwater affected by dissolved constituents, and will address the soil quality data gaps that persist after the Phase IA RI effort. Phase II will be designed to complete site characterization and contaminant delineation and to provide the data needed to evaluate the feasibility of potential remedial approaches. Soil, sediment, and groundwater sampling for risk assessment purposes may be conducted throughout the RI investigation, as needed.

1.2 SITE LOCATION AND DESCRIPTION

A discussion of the general site location and setting and a detailed description of the terms used throughout the Phase IA RI report to designate specific "Operational Areas" and "Study Areas" are presented in the following sections.

1.2.1 General Site Location

The Bayonne Plant (the Site) is located at 250 East 22nd Street, Bayonne, New Jersey (see Figure 1-1). The Site occupies approximately 288 acres (250 land and 38 riparian waterfront acres) and is situated in the southeastern portion of Hudson County, which is referred to as Constable Hook, an industrialized peninsula in Upper New York Bay. The Site is located in the southwestern part of the Jersey City, New Jersey, U.S. Geological Survey (USGS) (1981) topographic quadrangle (see Figure 1-1). The Bayonne Plant property is shown on the 1986 City of Bayonne tax map(s) as the following block(s) and lot(s), in accordance with the ACO: Block

419, Lots 1, 3, and 4; Block 427, Lot 3; Block 465, Lots 1 to 5 and 9; Block 466, Lots 1 through 4; Block 477.01, Lot 3; Block 478, Lot 1; Block 480, Lot 1; and Block 418, Lots 3 and 4. In 1993, most of the Bayonne Plant, with the exception of the Lube Oil Area, the Contiguous Pier No. 1 Area (Block 478, Lot 1), and the Stockpile Area (Block 477.01, Lot 3), was purchased by IMTT. Copies of the relevant tax maps and a list of tax map lot and block numbers for the Bayonne Plant is provided in Appendix A.

The Bayonne Plant consists of a variety of features including offices, process areas, mechanical shops, warehouses, tank fields, pipelines, substations and other utility areas, railroad sidings, a helipad, tanker docks and piers, truck loading stations, and two wastewater treatment plants. The Bayonne Plant is bounded to the north by 22nd Street and Hook Road, to the east by Upper New York Bay, to the south by neighboring industries and the Kill Van Kull waterway, and to the west by the Platty Kill Canal and adjacent property that is also owned by IMTT (see Figure 1-2).

The Bayonne Plant is surrounded by heavy and light industry, interconnected by a transportation network of roadways, railroads, and the navigable waters of the Kill Van Kull and Upper New York Bay. The general vicinity of the Site is the largest urbanized area (the New York-Northeastern New Jersey Urbanized Area) in the United States (Forstall 1992). This area is noted by the U.S. Census Bureau as the most populated in the United States (16,044,012 inhabitants) and one of the most populated areas in the world (U.S. Census Bureau 1990).

1.2.2 Definition of Operational Areas and Study Areas

The RI scope of work was designed to focus on potential or suspected locations of contamination. Due to the extensive history of operations (over 120 years) at the Bayonne Plant and the diversity of operations in the various areas within the plant, Exxon and Geraghty & Miller thought that RI activities may vary between areas based on the nature of the operations, the size of the area, and existing contamination information. Therefore, the Site was divided into 13 "operational areas." Details regarding the definition and boundaries of the operational areas are provided in the Site History Report (Geraghty & Miller, Inc. 1994b). The 13 operational areas, as shown on Figure 1-3, are as follows: "A"-Hill Tank Field, Lube Oil Area, Pier No. 1 Area, No. 2 Tank Field, Asphalt Plant Area, AV-Gas Tank Field, Exxon Chemicals Plant Area (Chemicals Plant Area), No. 3 Tank Field, General Tank Field, Solvent Tank Field, Low Sulfur Tank Field, Piers and East Side Treatment Plant Area, and Domestic Trade Area. Four miscellaneous areas were also identified. These are the Stockpile Area, the MDC Building Area, the Utilities (Power Plant) Area, and the Main Building Area (see Figure 1-3).

Throughout this report, the term "area" will be used to describe recognized parts of the Site, such as IRM study areas, former operational/process areas, and active operational/process areas. These areas will be described specifically with an appropriate modifier and the "A" in area will be capitalized (e.g., the Domestic Trade Area, the East Side Treatment Plant Area, or the Main Building Area). Other previously unrecognized areas will be discussed within this report to describe the results of the Phase IA RI. These areas will be cited with a modifier, but the "A" in area will not be capitalized (e.g., the Tanks 1066, 1067, and 1068 areas).

1.3 REPORT ORGANIZATION

This Phase IA RI Report is consistent with the intent of NJDEP's "Technical Requirements for Site Remediation" (NJDEP 1993) and the ACO, and has been developed in a format suggested by the United States Environmental Protection Agency (USEPA). This report format is consistent with the format of the Phase IA RI Interim Report for the Bayway Refinery, which has been discussed and reviewed with the NJDEP Case Management Team. Section 2.0 provides historical information related to Bayonne Plant operations, surrounding land use, and previous environmental investigations. A more detailed discussion of Site background information has been presented in the Site History Report (Geraghty & Miller, Inc. 1994b). Section 3.0 discusses the field and analytical methods used during the implementation of Phase IA field activities, and Section 4.0 discusses the physical and hydrogeologic setting of the Site. Section 5.0 presents the findings of Phase IA of the RI, with subsections summarizing soil quality, occurrence of NAPL, and groundwater quality at the Bayonne Plant. Section 6.0 presents an overview of constituent and site properties affecting fate and transport. Section 7.0 provides an evaluation of the data, development of hypotheses, and conclusions regarding the fate and transport of contaminants in various areas of the plant. Section 8.0 presents the references used in the report. All tables and figures are provided at the end of the report, separated by tabs and enumerated in accordance with the section of the report in which they are first referenced.

Appendices A through K provide additional information. A map and list of the tax block and lot numbers for the Bayonne Plant is presented in Appendix A. Sample/core logs for soil boring and monitoring well boreholes are presented in Appendix B. These logs have been edited to provide uniform interpretation of conditions observed in the field. Sample event/criteria forms used for entering soil sample field information into the database, and chain-of-custody forms used for tracking samples during shipment, are provided in Appendix C. Monitoring well construction logs and the NJDEP Groundwater Monitoring Well Form B-Location Certification Forms are provided in Appendix D. Bedrock core logs prepared during the stratigraphic soil boring program are provided in Appendix E. Groundwater sampling logs from the January 1995 Phase IA groundwater sampling event are provided in Appendix F. Health and safety air monitoring readings and results of well head air monitoring are presented in Appendix G. The validated soil and groundwater sampling analytical results are provided in ASCII files on 3½-inch, high-density diskettes in Appendix H and Appendix I, respectively. A quality assurance/quality control (QA/QC) summary is provided in Appendix J. Downhole field parameter data are provided in Appendix K.

The report is intended to be viewed as an interim deliverable and not as the complete RI Report for the Bayonne Plant. Its purpose is to help guide subsequent data collection efforts under Phases IB and II. Many of the figures and tables and much of the text of this report will be revised to incorporate the addition of Phases IB and II data. All appropriate comments from the NJDEP regarding the information presented in this report will be incorporated into either the Phase IB or the Phase II draft RI reports. The Phase II draft RI report will document the activities and findings of all phases of the RI. Therefore, consistent with the goal of completing all phases of the RI in a timely manner and expediting remedial decisions, it is not planned for this report to undergo revision and resubmission. However, contents may be revised and incorporated into future deliverables, as discussed above.

1.4 CONSIDERATION OF REMEDIAL INVESTIGATION AND INTERIM REMEDIAL MEASURE FINDINGS

As part of the Sewer IRM required by the ACO, plant sewers have been undergoing cleaning and video camera inspection under the direction of IT Corporation. During a November 2, 1995 meeting between Exxon and NJDEP, a means of consolidating findings of the Sewer IRM and the Phase IA RI effort were discussed. In subsequent discussions with NJDEP, Exxon has agreed that a series of reports will be prepared by IT Corporation, documenting the work performed, and the findings for the various trunk lines of the Bayonne Plant sewer system.

These reports will include maps of the sewer systems depicting findings of the Sewer IRM work programs, with the Phase IA RI NAPL plume configurations and groundwater contour overlaid on them. The reports will assess the extent to which there appear to be correlations between Phase IA RI findings and NAPL and Sewer IRM findings, the extent to which sewer pipe is likely to be submerged below the groundwater table, and other factors which aid in definition of data gaps for additional phases of the RI. Information from these reports will be used in consideration of long-term remedial measures for the site.

2.0 HISTORICAL INFORMATION

This section provides a brief summary of the site history, surrounding land use, and previous environmental investigations, including previous and ongoing IRMs. Where appropriate, data from other investigations conducted prior to, or concurrent with, the Phase IA RI field activities were incorporated into this report. A detailed description of the history of Bayonne Plant operations and previous studies is presented in the Site History Report (Geraghty & Miller, Inc. 1994b).

2.1 SUMMARY OF SITE HISTORY AND SURROUNDING LAND USE

Since the late 1800s, nearly all of Constable Hook has been occupied by the petrochemical industry. The Prentice Refining Company established a small kerosene refinery in the Constable Hook Area in 1875. This operation consisted of 12 refining stills and was located in the areas of the Bayonne Plant currently occupied by the Lube Oil Area and a portion of the "A"-Hill Tank Field (Fairchild 1994). In 1877, John D. Rockefeller, representing Standard Oil Company (the predecessor company of Exxon), purchased the Prentice Oil Company refinery and several adjacent tracts of land totaling 176 acres (Fairchild 1994). From 1877 to approximately 1971, the Bayonne Plant was operated as a refinery and, up to 1936, underwent significant growth and expansion. During this period, Exxon, under the name of its predecessors (Standard Oil Company [New Jersey] and Standard Oil Company of New Jersey), purchased numerous surrounding tracts of land on Constable Hook.

The Standard Oil Company owned and operated approximately 650 acres on Constable Hook during the peak of plant operations in 1936 (Exxon Company, U.S.A. 1988). From 1936 through 1947, Standard Oil Company sold numerous parcels of land to various industries.

Between 1940 and 1947, the Constable Hook Area was extensively developed as a petrochemical area containing a network of railroad lines, roads, and piers for shipping. The northern portion of Constable Hook was undergoing extensive reclamation from Upper New York

Bay, and the southern portion of Constable Hook was occupied by hundreds of storage tanks. A major modernization and dismantling program began in 1955, and by 1963 one-third of the 330-acre plant lay vacant. In 1961, under an industrial development program adopted by Humble Oil & Refining Company (an affiliated company of Standard Oil) in cooperation with the City of Bayonne, numerous tracts of the plant property were sold to various industries for immediate construction (Humble Oil & Refining Company 1961).

The downsizing of plant operations continued throughout the 1960s until 1971, when all plant refining and manufacturing operations ceased, with the exception of the Exxon Chemicals Plant Area. Between 1974 and 1984, the area to the south of the Bayonne Plant was developed further by the petrochemical industry. By this time, the reclaimed area north of the General Tank Field was overgrown with vegetation. By 1989, the Bayonne Plant and its environs on Constable Hook resembled its present-day configuration.

In 1991, when the ACO was executed, Exxon owned 288 acres on Constable Hook, as depicted on Figure 1-2. On April 1, 1993, Exxon sold most of the property to IMTT, with the exception of the Lube Oil Area, the Pier No. 1 Area, and the Stockpile Area. Exxon still operates and maintains the Lube Oil Area as a lube oil and wax products storage, blending, and packaging terminal. The majority of the Bayonne Plant presently serves as a petroleum products storage terminal. The Asphalt Plant presently stores various grades of asphalt in aboveground storage tanks (ASTs). The Chemicals Plant area was formerly used by Exxon Chemical Americas to manufacture lube oil additives.

2.2 CHRONOLOGY OF PREVIOUS ENVIRONMENTALLY RELATED INVESTIGATIONS

Previous environmental investigations or pertinent environmental activities (including IRMs) at the Bayonne Plant for which documented data are available are described below. IRM activities at the Bayonne Plant are associated with NAPL, chromium, and the sewer system. The locations of NAPL IRM areas at the Bayonne Plant are shown on Figure 2-1. Historical monitoring wells and recovery wells that currently exist at the Bayonne Plant are shown on Figure 2-2.

- In 1958, Hydrotechnic Corporation Engineers conducted a hydrogeologic investigation of the Bayonne Plant (Hydrotechnic Corporation Engineers, Inc. 1958). The hydrogeologic study involved a review of the stratigraphy and hydrogeology underlying the Site, based on available well records in the Bayonne area. The purpose of the study was to explore the potential to develop freshwater resources for refinery usage and the feasibility of disposing acid waste by underground injection. There is no indication that this activity was ever conducted at the Bayonne Plant. The geologic descriptions and stratigraphic data provided in this 1958 report were used by Geraghty & Miller to support the development of a preliminary conceptual model of Site geologic conditions.

- In 1974, Leggette, Brashears & Graham, Inc. conducted a groundwater monitoring program at the Bayonne Plant to evaluate shallow hydrocarbon contamination (Leggette, Brashears & Graham, Inc. 1974a,b,c). Monitoring wells were installed along the Lehigh Valley Railroad right-of-way and near the piers. NAPL thickness and water-level data from these wells were used by Geraghty & Miller in this report to supplement more recent NAPL IRM data in assessing areas of the Site that contain floating NAPL.

- Dames & Moore conducted a hydrogeologic investigation of the Bayonne Terminal and Chemical Plant in 1979 (Dames & Moore 1979). The study included a description of the regional and local hydrogeology based on geotechnical soil borings drilled in the 1950s, and a preliminary assessment of the potential to obtain permits for the oil/water separators at the East and West Side Treatment Plants. The data provided in this report were used to support the development of a preliminary conceptual model of Site hydrogeologic conditions.

- From the late 1970s to approximately 1989, Roy F. Weston, Inc. (Weston) conducted a subsurface oil recovery program at the Bayonne Plant (Roy F. Weston, Inc. 1980; 1981a,b; 1985; 1986a,b,c; and 1989a,b,c,d,e). Monitoring wells were installed in the Pier No. 1 Area near the helipad (formerly known as the Pier No. 3 Area), Pier 6 and Pier 7 Areas, "A"-Hill Tank Field, and Low Sulfur Tank Field. During this period, Weston initiated NAPL recovery programs in the pier areas and in the Low Sulfur Tank Field. NAPL thickness data collected by Weston were used by Geraghty & Miller in this report to help evaluate areas of the Bayonne Plant that contain floating NAPL.

- In 1985, Malcolm Pirnie, Inc. conducted a Potential Hazardous Waste Site Preliminary Assessment of the Bayonne Plant on behalf of the USEPA (Malcolm Pirnie, Inc. 1985). Background information in this document regarding site conditions and historical operations were used by Geraghty & Miller in the development of the Site History Report and the RI Work Plan (Geraghty & Miller, Inc. 1994b, 1993a).

- Sandaq, Inc., P.C. conducted a toxic substance investigation of the sewer system at the Bayonne Plant in 1986 (Sandaq, Inc., P.C. 1986). The sewer investigation involved a review and sampling of the sewer systems in nine areas of the plant. The results of the investigation concluded that certain areas of the plant had significant concentrations of organic compounds in the sewer system, and that steps should be taken to reduce organic loading to the sewers. The locations and analytical data for the sewer system were evaluated by Geraghty & Miller in the design and development of the scope for the Phase IA RI.

- In 1988, CH2M Hill, Inc. prepared a site water budget for the Bayonne Plant (CH2M Hill, Inc. 1988). Information regarding input and output wastewater and storm-water streams were incorporated by Geraghty & Miller into the Site History Report (Geraghty & Miller, Inc. 1994b).

- In 1990, the NJDEP conducted a site inspection of the Bayonne Plant and collected surface soil samples for chromium analysis (NJDEP 1990). In conjunction with the NJDEP study, Exxon conducted its own soil sampling and analytical program for chromium in January 1990. Chromium analytical data for soils were used in the development of the Site History Report (Geraghty & Miller, Inc. 1994b) and in the development of the scope for the RI Work Plan (Geraghty & Miller, Inc. 1993a).

- In April 1991, Environmental Resource Management, Inc. (ERM) collected soil samples throughout the Site for total and hexavalent chromium analysis (Dan Raviv Associates, Inc. 1992). The soil quality data from this study were incorporated into the Site History Report (Geraghty & Miller, Inc. 1994b).

- In 1992, ICF Kaiser Engineers, Inc., on behalf of Pittsburgh Plate and Glass Industries, Inc. (PPG), drilled soil borings in the General Tank Field and the No. 3 Tank Field areas (PPG Industries, Inc. 1992). Surface and subsurface soil samples collected from these soil borings were analyzed for chromium. The analytical results for chromium derived from this investigation were incorporated into the Site History Report (Geraghty & Miller, Inc. 1994b).

- NAPL IRM investigations, many of which are ongoing, have been conducted by DRAI and Geraghty & Miller. During the period from early 1994 through June 1995, DRAI conducted NAPL IRM investigations in the Platty Kill Canal Area, Helipad Area, Pier No. 6 Area, Pier No. 7 Area, and the Interceptor Trench (Dan Raviv Associates, Inc. 1994a,b; 1995a,b,c,d). Floating NAPL has historically been observed in all five of these areas, and NAPL containment/recovery systems are currently in operation in the Platty Kill Canal Area, the Pier No. 7 Area, and the Interceptor Trench area. NAPL containment/recovery systems are planned for the Helipad and Pier No. 6 Areas. Data collected during the NAPL IRM investigations typically included information regarding bulkhead construction, NAPL and water-level thickness data, pumping test data, NAPL recovery data, NAPL fingerprint data, and tidal fluctuation data. Similar data were also obtained during NAPL IRM investigations in the Low Sulfur and Solvent Tank Fields (also referred to as the "Tank 1066" area) conducted by DRAI in 1992 and 1993 (Dan Raviv Associates, Inc. 1993b). A vacuum enhanced recovery (VER) recovery system for NAPL containment and recovery is currently being designed by Geraghty & Miller for implementation in the Tank 1066 area (Geraghty & Miller, Inc. 1995b). Concurrent with the Phase IA RI, a NAPL IRM investigation was also conducted by Geraghty & Miller during the period from October 1994 through January 1995 at the General Tank Field, No. 3 Tank Field, Exxon Chemicals Plant (Utilities Area), and Lube Oil Area (Geraghty & Miller, Inc. 1995a). Data generated during this investigation included observations of hydrocarbons in soil, and NAPL and water-level data from temporary well points and permanent monitoring wells. Quarterly NAPL and water-level monitoring was conducted during a 1-year period from 1994 to 1995 as part of the "A"-Hill Tank Field NAPL IRM (Geraghty & Miller, Inc. 1995c). Generally, data from the above NAPL IRM investigations were incorporated in this Phase IA RI report, as appropriate, to supplement Phase IA RI data regarding the nature and extent of floating NAPL and dissolved phase plumes.

- In 1993, ICF Kaiser Engineers, Inc. conducted a site-wide IRM investigation at the Bayonne Plant to address chromium contamination (ICF Kaiser Engineers, Inc. 1993, 1994). The investigation involved the collection of soil, air, and wipe samples for total and hexavalent chromium analysis, as well as a site inspection.

- IT Corporation has recently completed mapping, sewer cleaning, inspection, and videotaping of the sewer system at the Bayonne Plant (IT Corporation 1993; Exxon Company, U.S.A. 1995). The findings from the sewer integrity evaluations will be considered in conjunction with Phase IA RI findings as discussed in Section 1.4 (Consideration of Remedial Investigation and Interim Remedial Measure Findings) of this report.

3.0 TECHNICAL OVERVIEW - INVESTIGATION METHODOLOGY

This section discusses the field investigation methods used during the Phase IA RI. Specific details of the field procedures and protocols are discussed in the Field Sampling Plan (FSP) (Appendix A of the RI Work Plan [Geraghty & Miller, Inc. 1993a]). The organizational structure of the data collection activities was discussed in the Quality Assurance Project Plan (QAPP) (Appendix B of the RI Work Plan [Geraghty & Miller, Inc. 1993a]) and specific health and safety procedures are documented in the Health and Safety Plan (HASP) (Appendix C of the RI Work Plan [Geraghty & Miller, Inc. 1993a]). Generally, the methods employed in the field were either consistent with, or identical to, methods that are described in the NJDEP's Field Sampling Procedures Manual (NJDEPE 1992a). The Phase IB RI Work Plan will address the need to collect additional data throughout the Site to fulfill the intent of the Technical Requirements. Phase IA soil boring, monitoring well, and surface-water measurement point locations are presented on Figure 3-1. A summary of the number of soil and groundwater samples analyzed during the Phase IA RI is provided in Table 3-1.

3.1 SAMPLE DESIGNATION

Each sample collected during the Phase IA RI was given a unique designation that was documented in the field logs. The sample designation describes the following elements:

- The operational area code (representing each operational or miscellaneous area).
- The matrix code.
- The location number.
- The sample interval depth (for soil borings and drivepoints).

The operational area code is a prefix for each sample designation and is used to identify the part of the plant from which a given sample was collected or intended to evaluate.

A summary of operational area prefix codes is provided in Table 3-2. An operational area code was not designated for the Low Sulfur Tank Field because no soil borings or monitoring wells were drilled in this area as part of the Phase IA RI. In some areas (e.g., the No. 3 Tank Field), more than one prefix was used in order to distinguish between RI and IRM soil borings. Some exceptions to this prefix scheme occurred for a variety of reasons. These exceptions are included in Table 3-2.

Matrix codes are as follows:

Groundwater Monitoring Wells (GMMW)
Soil Boring (SB)
Drive Point (DP)

Because the sample identification is an important descriptive tool, examples are provided below to facilitate understanding of the various sample designations.

For the locations where soil borings were completed as monitoring wells, the monitoring well designation was used. Deep and intermediate monitoring wells were designated with the D and I suffixes, respectively.

Groundwater: GMMW10 (denotes a sample collected from Monitoring Well GMMW10, also designated as soil boring GTFSB6, a soil boring located in the General Tank Field Area).

Groundwater: GMMW23D (denotes a sample collected from the Deep Monitoring Well GMMW23D installed at the boring APSB-7 drilled in the Asphalt Plant Area to study the stratigraphy).

For soil boring samples, the last sample number reflects the bottom depth of the 2-foot long sample interval in the test boring. Soil borings drilled as part of the investigatory IRM study were distinguished by adding "IRM" to the boring location.

RI Soil Boring: AHTFSB01-02 (denotes the split-spoon sample collected in the interval from land surface to a depth of 2 feet from RI Soil Boring SB1 in the "A"- Hill Tank Field).

IRM Soil Boring: GTFIRMB06-08 (denotes the spilt-spoon sample collected in the interval from 6 feet to a depth of 8 feet from investigatory IRM Soil Boring SB6 in the General Tank Field)

Examples of drivepoint sample designations are as follows:

Drivepoint: N3TFSB04-DP10 (denotes a drivepoint groundwater sample taken from the borehole of Soil Boring SB4 in the No. 3 Tank Field at the bottom depth of 10 feet).

Blind field replicate samples were given fictitious numbers, which were recorded in the file notes and project file.

Trip blank and field equipment blank samples were labeled as TB and FB, respectively, followed by a number and the date of shipment to the laboratory for trip blanks and date of concern for field blanks.

Trip Blank: TB102594 (denotes a trip blank sample prepared on October 25, 1994 for samples being shipped on the same day).

Field Blank: FBA110294 (denotes an aqueous field equipment blank prepared for aqueous samples collected on November 2, 1994).

Field Blank: FBNA02-100694 (denotes aqueous field blank Number 2, prepared for non-aqueous samples collected on October 6, 1994).

3.2 ANALYTICAL SOIL BORING AND DRIVEPOINT PROGRAM

As part of the Phase IA RI, 84 shallow soil borings were drilled at the Site from October 1994 through January 1995. Soil samples were collected for laboratory analysis from each of the Phase IA soil borings. At 69 of these Phase IA RI locations, the boreholes were grouted after the completion of soil sampling and the removal of a drivepoint or temporary well point (see Section 3.2.4 [Drivepoint Installation and Sampling] and Section 3.3.1 [Floating NAPL Delineation]). At the 15 remaining borehole locations, a groundwater monitoring well was completed according to NJDEP specifications. An additional 32 investigatory IRM soil borings were drilled at locations along the boundaries of the General Tank Field, No. 3 Tank Field, Exxon Chemical Plant (Utilities Area), and Lube Oil IRM study areas. Soil samples were collected for laboratory analyses at 14 of these 32 investigatory IRM Borings. Two of these 14 IRM soil borings were completed as shallow monitoring wells. Shallow soil boring locations were selected to investigate subsurface conditions near historical spills, former process areas, former oil/water separators, sewer and septic systems, and various potential areas of contamination (e.g., tanks, loading/unloading racks, drum storage areas), and to provide broad areal coverage of the Site. The rationale for Phase IA soil boring locations is outlined in Table 3-3 and presented in further detail in the Memorandum Modification (Geraghty & Miller, Inc. 1994a). Table 3-4 documents instances in which a planned boring or well was relocated because of specific site conditions. Location descriptions and the rationale for relocation of Phase IA monitoring wells and soil borings are presented in Table 3-4. The final locations of Phase IA soil borings, monitoring wells, and surface-water measurement points are shown on Figure 3-1.

All shallow soil borings were drilled using 4¼-inch inside diameter (ID) hollow-stem augers. A center bit (4-inch diameter tricone roller bit or equivalent) attached to AW-rods was used to prevent cuttings from entering the augers. Split-barrel core (split-spoon) samples were collected continuously through the auger flights prior to advancing the augers and the drill bit assembly. Typically, a 24-inch long and 3-inch diameter, split-barrel core sampler was advanced into the formation by dropping a conventional 300-pound (lb) hammer from a height of 30 inches onto the sampling assembly. Occasionally, a 24-inch long by 2-inch diameter split-spoon core sampler was advanced with a 140-lb hammer where soil sampling was not conducted (e.g., investigatory IRM soil borings). Decontamination procedures for all sampling equipment and drilling equipment are presented in the FSP (Appendix A of the RI Work Plan [Geraghty & Miller, Inc. 1993a]).

Shallow soil borings were advanced into the formation until the water table was encountered. When water-table conditions were not easily identified (e.g., because a perched zone was present or saturated deposits were not encountered), soil borings were advanced to greater depths than originally planned. Except for stratigraphic soil borings, no soil borings were extended below a depth of 20 feet below land surface (bls). When hydrocarbon material was observed in soil samples, soil borings were advanced past the water table to a depth at which hydrocarbon was no longer present (without drilling through a confining soil unit). Final shallow soil boring depths ranged from approximately 12.5 to 18 feet bls.

Four of the six stratigraphic soil borings proposed in the Memorandum Modification (Geraghty & Miller, Inc. 1994a) were drilled at various locations throughout the Site (Figure 3-1). The purpose of the stratigraphic soil borings was to provide additional subsurface data to conceptualize site stratigraphy. Soil samples collected from stratigraphic borings were used to evaluate lithology, but were not submitted to the laboratory for analysis. Two of the proposed locations were not drilled during Phase IA because further information was not required (NJDEP 1994a). At three of the four stratigraphic soil boring locations, an intermediate and deep monitoring well cluster was installed (Figure 3-1). At the fourth stratigraphic soil boring location, a deep monitoring well was installed. The methods and procedures employed in the drilling of stratigraphic soil borings and the installation of intermediate and deep monitoring wells are described in Section 3.5 (Stratigraphic Borings).

3.2.1 Soil Sample Criteria

Split-spoon samples were collected continuously to the total depth of each boring for lithologic logging and screening with a flame ionization detector (FID). Two split-spoon samples were then collected at each borehole location for laboratory analysis. The two samples designated for laboratory analysis were selected based on criteria established in the RI Work Plan (Geraghty & Miller, Inc. 1993a) and the Memorandum Modification (Geraghty & Miller, Inc. 1994a) that incorporated visual evidence, FID headspace readings, determination of hydrocarbon presence, and QA/QC. The analyses conducted for Phase IA soil and groundwater are summarized in Table 3-1. Analytical parameters for surface and subsurface soil samples are also depicted on Figures 3-2 and 3-3.

Soil for potential volatile organic compound (VOC) analyses was collected from every 2-foot vertical interval immediately after the split-spoon sampler from a given 2-foot interval was opened. Soils from all of the intervals in the boring were then compared for FID headspace and the visual presence of hydrocarbon. Based on this comparison, two intervals were selected and sufficient additional soil was collected from these intervals for analysis of total petroleum hydrocarbons (TPH), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), target analyte list (TAL) inorganic parameters, and hexavalent chromium. Detailed soil-collection procedures are discussed below.

Once retrieved from the borehole, the split-spoon sampling device was placed on clean plastic sheeting covering a sturdy wooden table. On opening the split-spoon sampler, the field personnel used an FID and/or photoionization detector (PID) to screen the recovered soil in approximately 6-inch intervals within the 24-inch split-spoon sampler. The 6-inch soil interval that exhibited the highest FID/PID readings within the sampler was immediately placed in a laboratory-provided vial for potential laboratory analysis for VOCs. If elevated FID/PID readings were not observed within the 2-foot interval, a potential VOC sample was taken from a 6-inch interval at the center of the split-spoon sampler. In addition to FID screening, the entire contents of the split-spoon sampler were described for lithology, using the Unified Soil Classification System, and measured with a ruler to determine sample recovery. Database-generated sample/core logs are presented in Appendix B. When recording the lithology of each split-spoon sample, the field hydrogeologist included a description of any hydrocarbons in the soil based on the visual appearance of the sample (see Section 3.2.3 [Hydrocarbon Identification in Soil]). A small amount of soil from the same 6-inch interval where VOC samples were collected was placed in a plastic Zip-lock bag for headspace screening with an FID or PID. The split-spoon sampling device was then closed, and its ends were covered with small plastic bags and sealed with rubber bands. The split-spoon sampler was stored in a sturdy, covered, wooden rack with slots marked with the sample depth. After all of the split-spoon samplers had been recovered, sampled, and stored as described above, headspace readings for each 2-foot interval were taken using the procedures outlined in the FSP (Appendix A of the RI Work Plan [Geraghty & Miller, Inc. 1993a]).

Using the headspace readings and the sample descriptions, the field hydrogeologist applied the following criteria to select the two laboratory sample intervals from each boring and assigned the boring a criteria number based on the following observations and sampling selection protocol:

0 Insufficient recovery from sample intervals throughout the boring or sample intervals are predetermined (i.e., QA/QC replicate) or other deviation from criteria (e.g., unknown materials, anomalous color change).

1 No visual evidence of hydrocarbons. No FID readings. Collect 0- to 2-foot interval and the interval located directly above the water table.

2 No visual evidence of hydrocarbons. FID readings. Collect samples from the interval with the highest FID reading and interval with next highest FID reading. If possible, sampling intervals should be 2 feet apart.

3 Hydrocarbons visually present but in less than 75 percent of total boring depth. Collect one sample from the zone containing hydrocarbons and the second sample from the interval with the highest FID readings. If possible, the soil collection

intervals should be separated by several feet for broader vertical characterization of soil quality.

4 Hydrocarbons visually present in greater than 75 percent of total boring depth. Collect samples from the shallowest and deepest intervals containing hydrocarbons.

After the two sample intervals selected for laboratory analysis had been determined, the split-spoon samplers for those intervals were re-opened, homogenized in stainless-steel bowls, and transferred to laboratory-supplied containers. The samples previously collected from the two selected intervals for VOC analysis were retained, and the other samples previously collected from the boring for VOC analysis were properly disposed.

3.2.2 Soil Sample Analytical Selection Criteria

The two soil samples selected from each borehole (see Section 3.2.1 [Soil Sample Criteria]) were analyzed for TPH and hexavalent chromium. In instances where a borehole was terminated at depths of less than 5 feet because of shallow groundwater conditions or subsurface interference, only one sample was analyzed. Soil samples selected for TPH and hexavalent chromium analysis were also considered for potential analysis of the following:

- Target compound list (TCL) VOCs plus hexane, methyl tertiary butyl ether (MTBE), 1,2-dibromoethane, tertiary butyl alcohol (TBA), N-butyl alcohol, sec-butyl alcohol, N-propyl benzene, and isopropyl alcohol.

- TCL SVOCs.

- TCL pesticides/PCBs.

- TAL inorganic compounds plus cyanide.

The initial goal of the Phase IA field program was to analyze approximately 25 percent of those samples being analyzed for TPH and chromium for this expanded list of constituents. After the analytical results of TPH in soil for a given sample group (e.g., those samples collected in a day) were received, a "secondary request for analysis" was made. The laboratory was instructed to further analyze selected samples that had been containerized and refrigerated for an expanded list of parameters. The samples selected for secondary analysis were chosen based on the following criteria:

- Bias was given to those soil samples with relatively high TPH results in a given area.

- Samples were selected for broad areal distribution across the Site and within each operational area.

- Samples were selected to represent the vertical profile of the vadose zone, but were biased toward the 0 to 2-foot interval because of the surface-exposure potential. Where the 0 to 2-foot interval from a soil boring was selected for laboratory analyses based on the soil sample criteria (Section 3.2.1), the analyses were pre-designated for the expanded parameter list.

- Other predetermined locations were analyzed for the expanded list of constituents based on site history and operations information as discussed in the Site History Report and Memorandum Modification (Geraghty & Miller, Inc. 1994b, 1994a) or for QA/QC purposes.

3.2.3 Hydrocarbon Identification in Soil

Determining the visual presence of hydrocarbon in split-spoon soil samples was an important part of the Phase IA soil boring program because of its significance to the Site soil characterization and because the presence or absence of hydrocarbon was used to govern the selection of soil samples for laboratory analysis. When recording the lithology in each split-spoon sample, the field hydrogeologist included a description of any hydrocarbons in the soil based on the visual appearance of the sample. The following determination regarding the presence of hydrocarbon was made and documented on the sample event/criteria forms provided in Appendix C.

Y Yes, hydrocarbon appears to be present in the soil as "visually observed" and confirmed with the FID and/or odor.

N No, hydrocarbon is not present in the soil. There are no visual or instrument indications of hydrocarbon.

T Trace, there is either an extremely small amount of hydrocarbon present (e.g., only 1 inch of tar-like residual or droplets over the length of a 10-foot boring) or hydrocarbon is suspected because of the presence of a sheen, but generally not over a vertical interval greater than 2 inches.

High total VOC readings from the initial screening of the soil with an FID was considered an indicator of the possible presence of hydrocarbons. In addition to visual and field instrument screening of the soil, several field methods were used to determine the presence of hydrocarbon. Typically, a small amount of soil from the split-spoon sampler was placed on the plastic-covered sample table, squirted with a small amount of distilled water, and observed for the presence of a sheen on the surface of the water. Occasionally, a small amount of soil was placed in a Zip-lock bag with sufficient water added to saturate the soil. The bag was sealed and agitated, then opened to check for the presence of a sheen on the surface of the water.

3.2.4 Drivepoint Installation and Sampling

Where no hydrocarbons or only trace hydrocarbons were observed in soil samples from a boring, a temporary drivepoint was installed to collect a groundwater sample from this location. Thirteen groundwater samples were collected from drivepoints or temporary well points at soil boring locations during Phase IA of the RI. These samples were analyzed in the laboratory for TCL VOCs (and eight additional site-specific VOCs).

Drivepoints consisted of a 3-foot long and 2½-inch diameter, continuously wound, stainless-steel screen with 0.020-inch (20-slot) openings and a conical point to facilitate advancement into the formation. Five-foot long, galvanized steel riser sections were threaded to the drivepoint screen to construct the desired length. The drivepoint technique used during the Phase IA RI was a modification of one of the methods outlined in the NJDEP "Alternative Groundwater Sampling Techniques Guide" dated July 1994 (NJDEP 1994b). The drivepoints and riser sections were decontaminated according to the procedures outlined in the RI Work Plan (Geraghty & Miller, Inc. 1993a) and stored in clean plastic until use.

Continuous split-spoon sampling was conducted at each soil boring. At the first clear indications of water-table conditions (i.e., the fully water-saturated split-spoon sampler), the drivepoint was inserted through the auger flights to a depth of approximately 2 feet below the water-table depth. In some cases, the drivepoint was pushed to the desired depth using the hydraulic drill head. In most cases, a split-spoon sampler was advanced below the water table to confirm water-table conditions and lithology, and the drivepoint was lowered into the hole made by the final split-spoon sampler.

Prior to being sampled, the drivepoint was purged of either three volumes of standing water (if it recharged) or one volume of standing water (until complete evacuation) using a clean Teflon bailer to promote collection of a representative groundwater sample. A 40-milliliter (mL) sample of groundwater was collected for laboratory analysis of the TCL VOCs from the drivepoint consistent with the procedures outlined in the Memorandum Modification (Geraghty & Miller, Inc. 1994a).

Based on the geology and water-table conditions encountered at specific boring locations, a few exceptions to the guidelines for the depth of drivepoint installation and purging were made. At some locations, perched groundwater existed at shallow depths. Where perched water was suspected in a boring, split-spoon sampling continued until 3 to 4 feet of saturated soil were encountered, indicating true water-table conditions. In other instances, marginally confined conditions caused the water level inside the augers and drivepoint to rise above the top of the drivepoint screen; in this situation, samples did not represent the water-table surface. In still other locations, particularly in clayey soils, the soil did not yield sufficient water for sampling. In these instances, the drivepoints were left in the borehole for as long as 24 hours to allow groundwater to enter the screen. Drivepoints were always removed within 48 hours. In extremely low permeability deposits that did not recharge the drivepoint, the drivepoints were not purged before sampling, and the auger flights were entirely removed to allow water from the entire depth of the borehole to enter the drivepoint.

3.3 HYDROCARBON DELINEATION - TEMPORARY WELL POINT PROGRAM AND HYDROMETER TESTING

Hydrocarbon in soil was observed in accordance with the procedures outlined in Section 3.2.3 (Hydrocarbon Identification in Soil). Evidence of petroleum hydrocarbons was observed in 94 of the 116 soil borings (i.e., 84 RI soil borings and 32 investigatory IRM borings) drilled. Delineation of floating NAPL in the subsurface involved the use of temporary well points. Temporary well points were installed in 77 of the 94 soil borings in which petroleum hydrocarbons were observed in soil. To characterize the physical characteristics of floating NAPL and to apply an appropriate correction factor to site groundwater elevation data, NAPL observed in temporary well points and monitoring wells was subjected to hydrometer testing. The methodologies and procedures employed in implementing the temporary well point program and hydrometer testing are described below.

3.3.1 <u>Floating NAPL Delineation</u>

Determining the presence or absence of floating NAPL was an important part of Phase IA; this determination was accomplished by installing temporary well points. These temporary well points were installed at locations where hydrocarbon appeared to be present in soils based on a "yes" determination, as specified in Section 3.2.3 (Hydrocarbon Identification in Soil). The well points were used to evaluate if the hydrocarbon was free to migrate into a well screen or if it was bound to the soils and would not migrate. If the hydrocarbon observed in the subsurface environment was saturated enough to migrate into a temporary well point or well screen, then it was defined as floating NAPL. Floating NAPL was typically described as a sheen or as a measurable thickness on the water table. Non-saturated bound hydrocarbons were typically described as droplets within soil interstices, as thick tar-like material, or as unique or unknown materials.

When the field hydrogeologist determined that hydrocarbon was visually present in the soil samples from the boring as confirmed with an FID (a "yes" determination), a temporary 2-inch diameter polyvinyl chloride (PVC), stainless-steel, or galvanized steel well screen (continuously wound, 20 slot) was placed in the open borehole to monitor the presence and/or thickness of floating NAPL on the water table. The well screen was inserted to the total depth of the boring and the auger flights were removed. The temporary well point was left in place undisturbed for a maximum period of approximately 2 weeks, during which time the water surface was measured using an electronic oil-water interface probe at 2- to 4-day intervals for floating NAPL. If NAPL was consistently measured in a well point within several days of its installation and a determination was made that the thickness of NAPL was not likely to change over time, the well point was often removed. If the oil-water interface probe indicated that NAPL was present, a visual inspection of the water surface and the water at the bottom of the well screen was made by lowering a bailer and retrieving a sample.

Well permits were obtained from the NJDEP Bureau of Water Allocation for temporary well points that were left in place for more than 48 hours. Soil borings that did not exhibit petroleum hydrocarbons in soil and/or did not reveal floating NAPL in a temporary well point were abandoned in accordance with the procedures outlined in the NJDEP Field Sampling Procedures Manual (NJDEPE 1992a). These temporary well points were removed and the boreholes were grouted to the surface. Well abandonment forms for these temporary well points will be filed with the NJDEP Bureau of Water Allocation.

3.3.2 Hydrometer Testing

Hydrometer testing was performed in the field on NAPL samples from temporary well points and monitoring wells during Phase IA of the RI. The purpose of hydrometer testing was to evaluate the physical characteristics of floating NAPL, where present, and to determine the appropriate correction factors to apply to groundwater elevation data in generating a site-wide groundwater contour map. Specific gravity analyses were performed on NAPL samples from nine temporary well points (including RI and IRM well points), five Phase IA monitoring wells, and 35 existing monitoring wells at the Bayonne Plant. Hydrometer testing was conducted on NAPL samples from selected RI and historical wells concurrent with the collection of NAPL and water-level measurements on December 12, 1994.

Where a sufficient amount of NAPL was observed in either a temporary well point or a monitoring well, a sample of floating NAPL was collected using a disposable bailer. The NAPL was transferred in the field to a graduated cylinder, into which a hydrometer was placed. NAPL specific density was then read directly from the assembly.

3.4 SHALLOW MONITORING WELL INSTALLATION

As part of the Phase IA RI, 15 shallow monitoring wells were installed at the Site from October 1994 through January 1995. Five additional shallow monitoring wells installed in the General Tank Field, No. 3 Tank Field, Exxon Chemical Plant (Utilities Area), and Lube Oil investigatory IRM study areas were also utilized as part of the Phase IA RI for soil and/or groundwater sample collection. Monitoring well locations were selected to provide broad areal coverage to evaluate groundwater flow conditions and to investigate soil and groundwater quality near potential locations of contamination (e.g., spills, former process areas, former oil/water separators, septic systems, loading/unloading racks). The rationale for Phase IA monitoring well locations in each investigative unit is presented in Table 3-3. Final monitoring well locations are shown on Figure 3-1.

Monitoring wells were constructed using 4-inch diameter, flush-joint, internally threaded, schedule 40 PVC well screen and riser. The PVC well screens were made of continuous wire wound screen (Johnson V-Wire) with a 0.020-inch slot size (20 slot). A No. 0 Morie Sand was placed approximately 0.5 to 3 feet below the bottom of the screen to approximately 1 to 2 feet above the top of the screen in all wells. A 0.5 to 2.5-foot thick bentonite seal was emplaced by tremie pipe above the sand pack, and a cement grout slurry was emplaced by tremie pipe above the bentonite seal extending to land surface. Typically, wells were completed with the PVC riser 2 feet above grade, with a PVC slip cap or expanding gasket cap, and a locking, 6 5/8-inch diameter, protective steel casing that was set and grouted down to 2 feet below land surface. In high traffic areas, monitoring wells were completed at grade and filled with a flushmount cast iron manhole cover. A vent hole was drilled in the PVC riser to maintain atmospheric pressure in the well and prevent potential pressure and suction from interfering with water-level fluctuations. Monitoring wells were affixed with a permanent identification marker, including the well permit number, in accordance with NJDEP requirements.

Shallow monitoring well soil borings were completed according to the same procedures described in Section 3.2 (Analytical Soil Boring and Drivepoint Program), except that these soil borings were drilled with 6 5/8-inch augers instead of 4 ¼-inch augers.

Phase IA shallow monitoring well screens were set to straddle the water table, except where marginally confining conditions were encountered. Generally, the top of the well screen was set 2 to 5 feet above the depth at which water-table conditions were encountered in split-spoon soil samples. The bottom of the well screen varied in depth depending on the thickness of the stratigraphic unit in which the water table was encountered. Often, a judgment was made between constructing a well with sufficient screen length to yield water for efficient groundwater sampling and constructing a well discretely screened across only one lithologic type resulting in one unique hydraulic gradient. Shallow well screens ranged in length from 10 to 13 feet. Upon completion of all Phase IA monitoring wells, a datum marked at the top of the well casing was surveyed by Taylor, Weissman & Taylor of Dayton, New Jersey, a New Jersey-licensed land surveyor. Table

3-5 provides a summary of construction details for all monitoring wells installed during the Phase IA RI, and Appendix D contains the well construction logs and the Form B-NJDEP Location Certification Forms.

3.5 STRATIGRAPHIC BORINGS

To characterize and evaluate the vertical extent of the stratigraphy and the hydrogeologic conditions underlying the Site, a series of stratigraphic soil borings were drilled throughout the Bayonne Plant. Stratigraphic borings were drilled in the Pier No. 1 Area, Lube Oil Area, Asphalt Plant, and Piers and East Side Treatment Plant Area. At three of the four stratigraphic boring locations, an intermediate and deep overburden monitoring well cluster was installed. The fourth stratigraphic soil boring was converted into a deep overburden monitoring well. The locations of the stratigraphic borings and the intermediate and deep monitoring wells are shown on Figure 3-1.

3.5.1 Intermediate and Deep Well Installation

The intermediate wells were installed by casing off the upper shallow zone by drilling with a hydraulic (mud) rotary method and installing an upper steel casing; a lower PVC casing and screen were then installed through this upper steel casing. Wells were designed in this manner to permanently seal off any potential upper soil or groundwater contamination from lower water-bearing strata. Monitoring well construction details for the intermediate and deep wells are included in Table 3-5.

Specifically, the methodology used to install the intermediate wells during Phase IA of the RI was as follows:

- A 12-inch diameter borehole was drilled by the hydraulic (water or water plus pure bentonite) rotary method and advanced at least 2 feet into the meadow-mat layer.

- An 8-inch diameter steel casing, with a PVC cap on the bottom, was inserted into the 12-inch diameter borehole. The 12-inch diameter borehole was grouted in place by first filling half of the borehole with cement by the tremie pipe method and then sinking the casing, which was sealed at the bottom with a PVC cap, into the grout. This method is called displacement grouting and it was also used to install the deep wells. The casing was held down with the drill rig for a minimum of 12 hours.

- The PVC plug was penetrated, and split-spoon samples were collected through the 8-inch casing ahead of the 7 7/8-inch drilling bit; these soil samples were evaluated to select the screen setting of the well within the water-bearing zone.

- A 4-inch diameter PVC casing and screen were installed in the 7 7/8-inch diameter borehole and constructed in a fashion similar to the shallow monitoring wells.

All of the deep overburden monitoring wells were similarly installed using hydraulic mud rotary methods. Deep monitoring wells were installed with a double-cased borehole to prevent cross-contamination of water-bearing units and/or to permanently seal off shallow soil contamination that was observed in the vadose zone. The following is a description of the well installation method used for these wells:

- A 16-inch diameter borehole was drilled at least 2 feet into the local confining unit (either the meadow-mat layer and/or the glacial till unit).

- A 12-inch diameter steel casing (with PVC cap) was inserted into the 16-inch diameter borehole and grouted in place by using a displacement grouting technique.

- The casing and grout were allowed to set for at least 12 hours.

- The PVC cap was penetrated and split-spoon samplers were advanced and telescoped through the 12-inch diameter casing to the next encountered confining unit.

- An 11 7/8-inch diameter borehole was drilled by hydraulic rotary method and was telescoped through the 12-inch diameter steel casing at least 2 feet into the next encountered confining unit (alluvial clay layer or glacial till).

- An 8-inch diameter steel casing (with PVC cap) was inserted into the 12-inch diameter borehole, grouted in place, and allowed to set for 12 hours.

- The PVC cap was penetrated and split-spoon samplers were advanced and telescoped through the 8-inch diameter casing to the borehole.

- A 7 7/8-inch diameter borehole was drilled by hydraulic rotary method and was telescoped through the 8-inch diameter steel casing to bedrock.

- A clean, 7 ¾-inch diameter, temporary casing (with diamond but hollow tip) was drilled approximately 0.5 foot into the top of the bedrock to create a watertight seal.

- The casings were flushed clear with potable water.

- Bedrock coring equipment was advanced and cores were obtained in 5-foot lifts using the standard, Diamond Core Drill Manufacturer Association (DCDMA) specifications for the "G"-group core barrels and NX-sized, flush-coupled casing and diamond bits.

- Bedrock coring was completed into competent rock (i.e., rock that was not significantly weathered) to a depth of 10 feet.

- The borehole was grouted to the approximate top of bedrock elevation.

- A 4-inch diameter PVC casing and well screen were installed in the 8-inch diameter borehole and constructed in a manner similar to the shallow monitoring wells.

3.5.2 Bedrock Coring

Bedrock coring was conducted at stratigraphic boring locations that were ultimately converted into deep monitoring wells. The bedrock cores have been retained by Exxon and are stored at the Bayonne Plant. Bedrock coring was conducted using the field methods described in the preceding section. During the 5-foot coring runs, the following information was recorded: depth of run, penetration, run duration (per foot), penetration rate, and down pressure (in pounds per square inch [psi]). After completion of the coring run, the core barrel was brought to the surface and analyzed by a Geraghty & Miller geologist. The following information was recorded: recovery, percent recovery, rock quality designation (RQD), lithology, fracture frequency, fracture fit, fracture spacing, orientation of fractures, degree of weathering, and any odors or discoloration observed in the rock core. Bedrock core logs are provided in Appendix E.

3.6 SYNOPTIC WATER-LEVEL MEASUREMENTS

On December 12, 1994, synoptic water-level measurements were obtained at the 22 monitoring wells installed during Phase IA (including five investigatory IRM monitoring wells), at 157 existing and historical IRM monitoring wells and recovery wells, and at seven surface-water measuring points. Water-level measurements were collected from 171 shallow monitoring wells, seven intermediate monitoring wells, and one deep monitoring wells. Each well was measured at low tide (approximately 10:18 a.m.) and at high tide (at approximately 16:15 p.m.) on this date. Measurements were made using either an electronic interface probe, or a weighted steel tape and indicator chalk, according to the measurement and decontamination procedures outlined in the RI Work Plan (Geraghty & Miller, Inc. 1993a). The water-level data were used to determine groundwater flow directions and the general presence and degree of influence of the tidal fluctuations in the Kill Van Kull and Upper New York Bay on groundwater levels across the Site. Surface-water elevations were also obtained relative to seven surface-water measuring points established at fixed structures (i.e., points on piers and bulkheads) and existing staff gauges (i.e., PVC casing markers in the Platty Kill Canal) (Figure 3-1). Interpretation of the measurement data and Site groundwater flow is presented in Section 4.6.2.1 (Shallow Groundwater Flow).

3.7 GROUNDWATER SAMPLING

From January 23 to 27, 1994, groundwater samples were collected from 21 Phase IA monitoring wells and ten historical and existing IRM monitoring wells. Phase IA monitoring wells sampled included 14 shallow Phase IA monitoring wells, three intermediate monitoring wells, and four deep monitoring wells. Groundwater samples were not collected from six shallow monitoring wells (which includes five IRM monitoring wells) due to the presence of floating NAPL, as detected with an electronic oil/water interface probe or a steel tape and indicator paste, and confirmed with a bailer. Whenever possible, three volumes of the standing water in a well were purged prior to sampling, and no sampling was performed unless the total water column (at least one volume) was replaced by groundwater directly from the formation. Groundwater samples were not collected from new wells until at least 2 weeks after well development. Each well was purged using a centrifugal pump or a stainless-steel submersible pump, and dedicated tubing. All equipment used to purge the wells was documented on the water sampling logs, which are provided in Appendix F.

The temperature, pH, conductivity, dissolved oxygen (DO) content, and redox potential (eH) of the groundwater were generally measured during the purging of every well volume. Samples were collected within 2 hours after the well was evacuated. Low-yielding wells were evacuated to dryness and allowed to recover prior to sampling. All purge water was containerized in 55-gallon drums; then properly disposed into the on-site sewers or into a storage tank and transported for disposal at the on-site wastewater treatment plant.

Samples were collected using decontaminated, dedicated, bottom-loading Teflon bailers and Teflon-coated stainless-steel leaders (3 to 6 feet in length). In general, wells were sampled in the ascending order of contamination, with the least contaminated well being sampled first.

Samples were carefully poured into laboratory-supplied containers, avoiding agitation or turbulence that can result in the loss of VOCs and/or excessive oxygenation of the samples.

Sample bottles were filled in the following order: VOCs, SVOCs, TPH, PCBs/pesticides, total metals, dissolved metals, phenols, cyanide, sulfate and chloride, preserved inorganics, and non-preserved inorganics. Samples were shipped to the laboratory, CompuChem Environmental Corporation Laboratory of Raleigh, North Carolina (CompuChem), at the end of every day of the sampling event. Samples for analysis of dissolved gases (i.e., oxygen, nitrogen dioxide, methane, carbon dioxide, and carbon monoxide) were collected from monitoring wells using a peristaltic pump and transferred directly into zero-headspace sample containers. Samples for analyses of dissolved gases were shipped to Microseeps Laboratories of Pittsburgh, Pennsylvania (Microseeps). The chain-of-custody forms are provided in Appendix C with the sample/event criteria forms.

As required by the NJDEP, temperature, pH, specific conductance, DO, and eH measurements were also made at the time of sampling (after the VOC sample was taken) because these properties may change during storage. These field parameters were measured in situ using a HydroLab multiparameter downhole instrument. Field parameter readings were obtained at 2-foot depth intervals throughout the water column in each monitoring well. These data were recorded on the water sampling logs, which are presented in Appendix F. Field instrument types are outlined in the RI Work Plan (Geraghty & Miller, Inc. 1993a). Instruments were calibrated at the beginning of the day and checked periodically during the day.

To monitor the effectiveness of decontamination procedures, field blanks were collected during groundwater sampling. At the field location, analyte-free water was poured through the clean sample equipment and into sample containers for analysis. Field blanks were preserved in the same manner as other samples. Trip blanks were used to monitor possible VOC contamination of water samples during handling and transport. Blind duplicate samples were collected at a frequency of one for every 20 samples collected.

Groundwater samples were collected for analysis of both dissolved (filtered) and total (unfiltered) metals during the Phase IA field activities. Samples collected for dissolved metals analysis were filtered on-site prior to sample preservation. A glass flask and filter apparatus was used and precleaned with a 10 percent nitric acid (HNO_3) solution, followed by a distilled/deionized water rinse. A dedicated, cellulose-based, 0.45-micrometer (um) membrane filter was used to filter samples. Field blanks for dissolved metals were collected by pouring laboratory-provided, deionized/distilled water through the entire filtering apparatus.

3.8 AMBIENT AIR MONITORING

The ambient air monitoring program was conducted to determine the appropriate level of protection for workers performing RI tasks. Appendix B, Section E.5(a) of the ACO required the characterization of baseline ambient air quality conditions throughout the Bayonne Plant and the identification of RI activities that may adversely impact ambient air quality.

Ambient air monitoring was conducted at the Site during all tasks and was implemented using appropriate field methods and instrumentation (PID or FID), as discussed in the FSP and HASP, Appendix A and Appendix C, respectively, of the RI Work Plan (Geraghty & Miller, Inc. 1993a). Characterization of baseline conditions and the development of a field screening program was accomplished by (1) wellhead monitoring and soil sample emissions analyses, and (2) air monitoring as outlined in the HASP. The results of the ambient air monitoring are summarized and presented in a table in Appendix G.

3.8.1 Flame Ionization and Photoionization Detectional Equipment

During intrusive RI activities, one of the following instruments were used to determine levels of personal protective equipment (PPE): a Foxboro OVA-128 FID, a Foxboro TVA-1000 FID/PID combination meter, or an HNU PID. To define appropriate levels of PPE, readings upwind of the work zone were monitored to determine background air quality. If action levels were exceeded within the work zone, intrusive work was stopped and workers were instructed to move upwind of the work zone to let the area vent. If readings remained above the action levels, appropriate upgrades in PPE were made and work was continued. Approximately 95 percent of the RI investigative activities were conducted in Level D health and safety protection. The remaining 5 percent (work in the No. 3 Tank Field and Chemical Plant Areas), was conducted in Level C.

3.8.2 Draeger/Sensydine Tubes

If air monitoring readings were obtained (by the methods described in Section 3.8.1 [Flame Ionization and Photoionization Detectional Equipment]) above the action levels (as specified in the HASP), Draeger tube tests were conducted to determine the concentrations of benzene. If action levels for benzene were exceeded within the work zone, intrusive work was stopped and workers were instructed to move upwind of the work zone to let the area vent. If readings remained above the action levels, appropriate upgrades in PPE were made and work was continued.

3.8.3 Dust Monitoring

Historical use of chromium slag as fill material at various parts of the site necessitated the use of a random air monitor (RAM) for continuous measurement of dust (potentially chromium) within the work zone. The RAM was used to monitor for ambient particulate matter smaller than 10 microns (um). If action levels were exceeded within the work zone, dust was suppressed by using a water spray before work was resumed. Data were collected and stored in the RAM during the day and downloaded into a hard copy printout at the end of each work day.

3.9 QUALITY ASSURANCE/QUALITY CONTROL

During the Phase IA RI of the Bayonne Plant, 116 soil borings, including 32 IRM borings, were drilled; and 20 shallow monitoring wells, including five investigatory IRM wells, were installed. One hundred and eighty-one soil samples, 13 groundwater samples from drivepoints, and 31 groundwater samples from monitoring wells were collected and shipped to CompuChem for analysis. A summary of the number of analyses conducted for Phase IA soil and groundwater samples is provided in Table 3-1. Figures 3-2 and 3-3 present the scope of the analyses performed on soil samples collected from the various soil boring and monitoring well locations.

All of the soil samples collected were analyzed for TPH by New Jersey-modified USEPA Method 418.1 and for hexavalent chromium by New Jersey-modified USEPA Method 3060A/7196. In addition, over 55 percent of the soil samples were analyzed for TCL VOCs and eight additional site-specific VOCs, TCL SVOCs, TCL pesticides/ PCBs, and TAL metals and cyanide. These analyses were performed according to the USEPA Contract Laboratory Program (CLP) methodology for organics and inorganics (USEPA 1991a, 1991b). Throughout this report, reference to the TCL/TAL plus miscellaneous parameters will include the parameters listed in the tables cited in Section 5.0 (Phase IA Findings). Analytical results for soil are provided on diskette in Appendix H.

Where NAPL was not detected in a drivepoint or temporary well point, a groundwater sample was collected. Of the 84 Phase IA RI soil borings drilled, 48 exhibited NAPL thicknesses of at least 0.01 foot or greater. A temporary drivepoint was installed in 13 of the remaining 36 soil borings where NAPL was not detected in a temporary well point. Groundwater samples were collected from the 13 drivepoints and analyzed for VOCs. Thirty-one monitoring wells were sampled and analyzed for TCL VOCs (and eight additional site-specific TCL VOCs), TCL SVOCs, TCL pesticides/PCBs, TAL metals (dissolved) plus total cyanide, hexavalent chromium, total iron and manganese, and TPH. The samples from these 31 wells were also analyzed for the following wet chemistry parameters: chemical oxygen demand (COD), biological oxygen demand (BOD), total organic carbon (TOC), ammonia, chloride, nitrate, sulfate, sulfide, total dissolved solids (TDS), phosphate, and alkalinity; and for the following dissolved gases: methane, carbon monoxide, carbon dioxide, nitrogen dioxide, and dissolved oxygen. Approximately 15 percent of the monitoring wells were analyzed for both total and dissolved TAL constituents. The TCL/TAL analytes were analyzed according to the USEPA CLP methodology (USEPA 1991a, 1991b). The remaining remedial parameters and the gases were analyzed by various standard USEPA methods not regulated under CLP (see Section 5.3.2 [Groundwater Sampling Laboratory Analytical Results]). Analytical results for groundwater are provided on diskette in Appendix I.

Validation of 20 percent of the data based on the NJDEP guidelines (NJDEP 1991, 1992b, and 1992c) and a data usability assessment based on 100 percent of the data were performed in accordance with a letter dated October 12, 1994 from Ms. Susan Chapnick of Gradient Corporation to Ms. Linda Caramichael and Mr. James Bover of Exxon. Twenty percent of the Phase IA RI laboratory analytical data were selected for validation in accordance with NJDEP guidance (Boyer 1994), based on the following: (1) focusing on results indicating relatively low to moderate contaminant levels; (2) validating the sample results from all of the representative matrices (soil, sediment, and groundwater); (3) providing validation from a representative set of sample results from all operational areas; and (4) reducing data validation time by evaluating samples from the same sample delivery group (SDG), when feasible. The results of the field QA/QC are discussed in Sections 5.1.1 (Summary of Field QA/QC for Soil Samples) and 5.3.1 (Summary of Field QA/QC for Groundwater Samples). A summary of the data usability assessment is provided in Appendix J.

3.9.1 Soil Quality QA/QC

Field QA/QC samples included field blanks, blind field replicates, and matrix spike and matrix spike duplicates (MS/MSDs). The frequency of collection and associated analytical parameters are described below.

3.9.1.1 Field Blanks

Field blanks were collected at a rate of 10 percent of the total number of samples to evaluate potential cross-contamination during sampling and also to check the laboratory-prepared analyte-free water. Figures 3-2 and 3-3 present the scope of the laboratory analyses performed on soil samples collected from various locations at various depths, and Table 3-1 presents the total number of analyses conducted. A total of 18 field blanks was collected during the soil boring program; all of them were analyzed for TPH and hexavalent chromium, except for four of the field blanks, which were not analyzed for hexavalent chromium because the hexavalent chromium analyses were suspended for 2 weeks (from October 5 to October 18, 1994) to give the laboratory sufficient time to implement modifications to Method 3060A/7196. In addition, nine of the field blanks were analyzed for the TCL/TAL parameters.

3.9.1.2 Blind Field Replicates

Blind field replicate samples were collected at a rate of one for every 20 soil samples to evaluate the reproducibility of the sampling technique. A total of nine replicates was collected during the soil boring program. All of them were analyzed for TPH and hexavalent chromium, except for one of the replicates, which was not analyzed for hexavalent chromium because the hexavalent chromium analyses were suspended for 2 weeks (see Section 3.9.1.1 [Field Blanks]). In addition, six of the replicates were also analyzed for the TCL/TAL parameters.

3.9.1.3 Matrix Spike and Matrix Spike Duplicates

MS/MSD samples were collected at a rate of one for every 20 soil samples to determine the precision (i.e., reproducibility) and the accuracy (i.e., the true analytical result) of the data. During the soil boring program, 12 MS/MSD samples were collected and analyzed for TPH. In addition, ten of the MS/MSD samples were also analyzed for the TCL/TAL parameters as well as hexavalent chromium.

3.9.2 Groundwater Quality QA/QC

As previously discussed, groundwater samples were collected during the soil boring program using drivepoints and temporary well points. A total of 13 drivepoints or temporary well points was installed for collection of groundwater samples and laboratory analyses for VOCs.

Two field blanks were collected with the drivepoint samples. Five trip blanks were analyzed for VOCs only on days that the drivepoints were shipped to the laboratory for analyses. Two blind field replicates were collected and analyzed for VOCs. Two MS/MSD samples were collected at a frequency of one per 2-week period that drivepoint samples were collected.

Thirty-one monitoring wells that did not contain floating NAPL were sampled for TCL VOCs (and eight additional site-specific VOCs), SVOCs, pesticides/PCBs, TAL dissolved metals plus cyanide, TPH, hexavalent chromium, dissolved gases, and wet chemistry parameters. Five of these wells were sampled for both total and dissolved metals to meet the requirements specified in the draft "Field Verification Procedures and Analysis Plan," prepared in conjunction with RI activities at the Bayway Refinery (Geraghty & Miller, Inc. 1993b).

Five field blanks and trip blanks were collected, one for each day of groundwater sampling. Two blind field replicates were collected to meet the requirement of one for every 20 samples. Two MS/MSD samples were collected to meet the requirement of one for every 20 samples.

3.9.3 Technical Data Usability Assessment

A technical data usability assessment was performed by Gradient Corporation on 100 percent of the TCL/TAL, and hexavalent and total chromium analytical data. The primary objective of the data usability assessment was to quantify, where applicable, the uncertainty in the data so that the end user was aware of the potential biases, false-negatives, and false-positives in the analytical data. The data usability was performed in accordance with the criteria defined in the NJDEP Data Validation Statement of Procedures (SOP) (NJDEP 1991, 1992b, and 1992c), National Functional Guidelines for Evaluating Organic and Inorganic Analytes (USEPA 1992a), Guidance for Data Usability in Risk Assessment (USEPA 1993), USEPA CLP Statement of Works for Organics and Inorganics Analyses (USEPA 1991a, 1991b), and Gradient Corporation's professional judgment. Qualifiers were applied to the data during the data usability assessment to flag these uncertainties. Data rejected (qualified "R") are unusable because the level of uncertainty in the value is unacceptable as a basis for project decisions. Overall, 1.2 percent of the soil data, 0.8 percent of the aqueous data, and 5.8 percent of the aqueous dissolved metals data were rejected.

Overall the data quality objectives (DQOs) for completeness as defined in the QAPP were achieved and the data reported were of good quality. A detailed summary of the data usability assessment is provided in Appendix J.

3.10 DATA EVALUATION METHODS

In the absence of site-specific, risk-based criteria, analytical data for soil and groundwater samples collected during the Phase IA RI have been evaluated on a preliminary basis by comparing the concentrations to the NJDEP cleanup criteria, guidelines, and standards for these media. The following sections discuss the purpose and application of these criteria.

3.10.1 NJDEP Soil Cleanup Criteria

Analytical data collected for soils have been compared to the most recently developed "Soil Cleanup Criteria," published and distributed by the NJDEP on February 3, 1994. These criteria were derived from Tables 3-1 and 7-1 and the accompanying text of the Proposed New Rule, New Jersey Administrative Code (NJAC) 7:26D published in the New Jersey Register on February 3, 1992. These criteria are included in the appropriate analytical data tables in this report to facilitate comparison.

3.10.1.1 Non-Residential Direct Contact Soil Cleanup Criteria

The NJDEP has developed surface soil cleanup criteria based on assumptions of long-term contact between a human receptor and the contaminated soils. Separate criteria have been established for residential and non-residential settings. Surface soil cleanup criteria were established to reduce the risks associated with chronic ingestion and/or inhalation of relatively small amounts of soil. Because the Site is located in an industrial zone, is used for industrial operations and its use is limited by a deed restriction, the Non-Residential Direct-Contact Soil Cleanup Criteria (non-residential criteria) are more applicable for screening the soil results. However, for characterization purposes, detected analyte concentrations are also compared to the Residential Direct-Contact Soil Cleanup Criteria (residential criteria).

3.10.1.2 Impact to Groundwater Soil Cleanup Criteria

Subsurface Impact to Groundwater Soil Cleanup Criteria were developed by the NJDEP to protect groundwater quality in areas where groundwater is an actual or potential potable drinking water source. These criteria are based on assumptions regarding the rate at which contaminants will potentially leach to groundwater. For example, the criteria established for VOCs are based on a model that predicts the percentage of contaminants that may leach to groundwater over a 70-year period, while criteria developed for SVOCs were developed using a ranking system that considered solubility, biodegradability, and toxicity.

Additional criteria established by the NJDEP and used in this Phase IA RI Report to evaluate soil conditions at the Bayonne Plant included the 10,000 parts per million (ppm) guidance for total organic contamination, which includes TPH, and the 1,000-ppm guidance for total VOC contamination. Analytical TPH data were also compared to the criterion of 30,000 ppm for defining New Jersey hazardous waste when soil is excavated.

3.10.2 Total and Hexavalent Chromium Cleanup Criteria

For the purposes of conducting the chromium IRM investigation at the Bayonne Plant and of establishing which areas of the plant require IRMs, a site-specific action level of 500 ppm for total chromium in soil was established in discussions between Exxon, NJDEP, and ICF Kaiser Engineers, Inc. (ICF Kaiser Engineers, Inc. 1993). The NJDEP has published suggested soil cleanup criteria for chromium (NJDEP 1995a). A residential soil cleanup criterion of 78,000 ppm is suggested for trivalent chromium and the NJDEP recommends that trivalent chromium not be regulated in a non-residential situation. The NJDEP-suggested values, based on human health inhalation exposure, for hexavalent chromium are: 130 ppm for residential use and 190 ppm for non-residential settings. Other suggested guidance values for hexavalent chromium are 10 ppm based on dermal exposure risk and 15 ppm for protection of groundwater.

Because the final levels upon which decisions regarding chromium will be based are not established, comparative criteria for total and hexavalent chromium in soils were established for use in this report. The criteria established for this report encompass all but the highest NJDEP suggested guidance values. A comparative criterion of 10,000 ppm was used for total chromium. Comparative values of 100 ppm and 10 ppm were used to evaluate hexavalent chromium concentrations in soil.

3.10.3 NJDEP Groundwater Quality Standards

In January 1993, the NJDEP promulgated the Groundwater Quality Standards (NJAC 7:9-6), which classified groundwaters of the state based on their potential for use for drinking water supply and their ability to support sensitive ecosystems. These regulations established numerical standards for the groundwater classification that pertains to most of the state. Laboratory analytical data for groundwater samples collected from the shallow intermediate and deep overburden were evaluated by comparing concentrations to the NJDEP groundwater quality standards. However, groundwater on portions of the Site may be amenable to reclassification based on high natural concentrations of iron and manganese, which render it unusable for drinking water.

4. PHYSICAL SETTING

This section provides a general description of the site-wide physical setting and prevailing hydrogeologic conditions at the Bayonne Plant. It includes a description of topography and drainage, land use, climate, soils and vegetation, geology, and hydrogeology.

4.1 TOPOGRAPHY AND DRAINAGE

The Bayonne Plant is located in the portion of Bayonne known as Constable Hook, which can be described as a spit or peninsula protruding into Upper New York Bay (Figure 1-1). The topography in the Constable Hook area is gentle, with elevations ranging from 0 to about 25 feet above mean sea level (msl). Most of the Site is at an elevation of 10 to 15 feet above msl, with the exception of the shoreline, which has lower elevations, and the tops of the berms surrounding the tank fields, which have higher elevations.

Under natural, undisturbed conditions, direct runoff from the Site would drain directly into Upper New York Bay or the Platty Kill Canal and Kill Van Kull Waterway. However, under current conditions at the Site, precipitation in the tank field areas does not run off directly because of the spill containment berms. Most of the Site is graded to direct runoff into the sewer system, which flows to the East Side Treatment Plant, treated water ultimately being discharged near the confluence of the Kill Van Kull and Upper New York Bay (Figure 3-1) under New Jersey Pollutant Discharge Elimination System (NJPDES)-Discharge to Surface Water (DSW) Permit No. NJ0002089. Only precipitation falling at the extreme perimeter of the Site (e.g., the undeveloped area immediately east of the General Tank Field), adjacent to the waterfront (riparian land), runs off directly into the adjacent waterways.

4.2 LAND USE

The Bayonne Plant is located in Hudson County, a 46-square mile urbanized area in northeastern New Jersey. The population density in Hudson County, as of the 1990 census, was 11,920 people per mile (Hudson County Department of Planning and Economic Development

1992). It is geographically the smallest and the most densely populated county in New Jersey. The general area surrounding the Site consists of heavy and light industry, interconnected by a transportation network of roadways, railroads, and the navigable waters of the Kill Van Kull and Upper New York Bay. Neighboring industries include petroleum and petrochemical companies, warehouses, distribution facilities, and various manufacturing operations. The closest non-industrial (commercial or residential) establishments are approximately 0.4 mile to the south across the Kill Van Kull Waterway in Staten Island, New York, and about 0.65 mile to the west along 22nd Street in Bayonne.

4.3 CLIMATE

Although greatly modified by the Atlantic Ocean, the climate of Hudson County is humid-continental. The climate is dominated by continental influences because air masses and weather systems affecting Hudson County have their origin principally over the land areas of North America. A maritime influence is also significant. Characteristics of the climate such as an extended period of freeze-free temperatures, a reduced range in both diurnal and annual temperature, and heavy precipitation in winter relative to that in summer are a result of the county's maritime exposure.

Periods of extreme cold are of short duration in most years. The average annual rainfall in the area is about 42 inches, as measured at Newark International Airport (National Oceanic Atmospheric Administration [NOAA] 1991). The average annual temperature is 53.4 degrees Fahrenheit (°F). The highest average monthly temperature occurs in July (76.8°F) and the lowest average monthly temperature occurs in January (31.3°F) (NOAA 1991). The predominant wind direction on a regional scale is from the west-southwest; however, localized flow patterns (eddies) do exist.

4.4 SOILS AND VEGETATION

Because of the extensive urbanization in Hudson County, no recently published information describing the soils in the area is available. A study conducted by researchers at Rutgers University (Lueder et al. 1952) describes the soil at the Site as reclaimed because of the extensive amount of filling that took place on Constable Hook to bring it to its present configuration. Historic aerial photographs confirm that a significant portion of the Site has been filled and reclaimed from Upper New York Bay and the Kill Van Kull Waterway. The extent of filling in the northern portion of Constable Hook can be observed on aerial photographs and historical maps dating back to 1940. However, much of the filling along the southern portion of the hook predates available aerial photographs. The nature of the fill varies across the Site and is described in more detail in Section 4.5.1 (Regional Geology).

The Site is sparsely vegetated due to the extensive industrial setting. Vegetation is limited to grasses and low-lying shrubs (native and ornamental), with occasional ornamental hardwood trees planted near the main building. More natural vegetation exists on the Site in limited undeveloped pockets adjacent to Upper New York Bay (e.g., the area to the east of the General Tank Field).

4.5 REGIONAL AND SITE GEOLOGY

This section provides a description of the regional and site-specific geology. Interpretation of the regional geology is based on information provided in regional or county-wide studies conducted by the USGS or other researchers as referenced below. Local geologic information has been interpreted by reviewing hundreds of logs of historical borings drilled across the Site for geotechnical purposes (e.g., foundation analysis for tanks and buildings) or monitoring and recovery well installation. The majority of the historical soil borings were drilled at the Site in the 1950s and 1960s. Historical borings and wells depicted on Figure 2-2 have been extensively evaluated by Geraghty & Miller, and the corresponding lithologic information has been put into a geographic information system (GIS) database. Information from 512 soil borings, 40 monitoring wells, and ten recovery wells was compiled and is currently in the GIS database. In addition, lithologic information from soil borings and monitoring wells, installed in 1993 and 1994 as part of the ongoing NAPL IRM investigations, has been compiled.

4.5.1 Regional Geology

The Site is located in the glaciated portion of the Piedmont physiographic province, which is underlain by mostly late Triassic-age rocks. The Piedmont is characterized in New Jersey by a long and narrow fault-blocked basin bordered on the west by uplifted fault-blocked mountains. The eastern border of the Piedmont lies near Bayonne and Staten Island (Schuberth 1968) and has been mapped by the Geological Survey of New York (1970) as running directly through Constable Hook. The Triassic-age rocks of the Piedmont include the sedimentary rocks of the Newark Basin Super group and intruded units of diabase and interbedded flows of basalt. The Triassic rocks comprise a sequence that attains a thickness on the order of 22,000 feet and dips generally northwestward; the sequence is locally faulted and folded. From northwest to southeast, or youngest to oldest, the sedimentary rocks include the Brunswick Formation, the Lockatong Formation, and the Stockton Formation (McGuinness 1963). More recent studies provide a more detailed stratigraphic sequence nomenclature within the Newark Basin Super Group. The Stockton Formation rests on the folded and extensively eroded metamorphic rock complex of the New York City Group. The sedimentary basin deposits are interlayered with extensive basaltic intrusive and extrusive rocks.

The Brunswick Formation has been reclassified as the Brunswick Group and is comprised of several sedimentary and volcanic formations (Olsen et al. 1989). The Passaic Formation (within the Brunswick Group) is the most abundantly exposed unit of the Newark Basin Super Group. It consists mostly of red shale, but includes sandstone beds that are thicker and more numerous in the northeastern part of the Newark Basin. The Lockatong Formation consists mostly of dark shales and argillites, but may include some thin-bedded sandstone or conglomerate. The Stockton Formation is mostly an arkosic sandstone and conglomerate.

The igneous deposits consist of either extrusive lava flows of the Watchung Basalt that are interbedded with the sedimentary rocks of the Newark Super Group, or the intrusive diabase of the Palisades, which forms a ridge of massive bedrock with a dark gray, mottled appearance extending from Rockland County, New York, through Hudson County, New York (west of the Site), and ending in Staten Island, New York. Based on regional mapping, the bedrock bordering the eastern extent of the Triassic deposits in the vicinity of the Site is either the Manhattan Formation, which consists principally of mica schist (Geological Survey of New York 1970) or a post-Ordovician serpentinite common to Staten Island (State of New Jersey Department of Conservation and Economic Development 1950). Geologic maps depicting bedrock for both New York and New Jersey show a geologic contact beneath the overlying unconsolidated deposits at the Site; however, the maps differ in their interpretation of the formations present. Both interpretations are consistent in that they hold that part of Constable Hook is underlain by crystalline metamorphic bedrock. A review of the historical boring logs indicate that under most of the Site, glacial till deposits are underlain by the Triassic-age (Newark Super Group) Stockton Formation, which is comprised primarily of arkosic sandstone and conglomerate. However, drilling activities did confirm the presence of the Manhattan Formation (Manhattan Schist) beneath the eastern portion of the Site.

Unconsolidated sediments deposited by glaciers or by glacial meltwater during the Pleistocene mantle the bedrock surface in much of the vicinity of Constable Hook. These deposits consist of clay, silt, sand, gravel, and boulders. Recent age deposits, primarily marine and near-marine sediments composed of silt, clay, and peat (where present), overlie the glacial sediments.

4.5.2 Site Geology

Previous soil investigations by various drilling and geotechnical engineering contractors provided hundreds of soil boring logs covering much of the Site. The Site History Report for the Bayonne Plant (Geraghty & Miller, Inc. 1994b) presented a summary of these historical borings. Based on shallow, intermediate, and deep subsurface borings drilled during this Phase IA RI, the geologic characterization of the Site as presented in the Site History Report has been refined. The significant modifications of the Site geologic characterization include the following: (1) a more detailed characterization of the shallow deposits overlying the glacial till deposits, and (2) verification of a relatively consistent bedrock surface at approximately 100 feet bls directly overlain by a thick continuous layer of pre-glacial or interglacial alluvium (below the glacial till).

The generalized geology of the Site, from the surface downward, consists of the following five main stratigraphic units: (1) fill, (2) marsh deposits, (3) glacial till, (4) alluvium, and (5) bedrock. The stratigraphic units are classified based on the inferred depositional environment and the stratigraphic position of these units. Figure 4-1 shows the locations of hydrogeologic cross sections that illustrate the subsurface stratigraphy of the Site. Within each stratigraphic unit, subunits based on lithologic and hydrogeologic characteristics are also identified; these subunits are presented on the cross sections (see Figures 4-2 through 4-5). Abbreviations given in parentheses following soil descriptions in this section are designations from the United Soil Classification System.

4.5.2.1 Fill

The fill unit is the uppermost stratigraphic unit, extending across the entire Site. Fill material was used to modify site elevations, to provide structural support for foundations of tanks and other structures, and to reclaim parts of the Kill Van Kull Waterway and Upper New York Bay Shoreline. The fill unit varies from approximately 3 to 25 feet in thickness, and consists of a heterogeneous mixture of cinders, ash, clay, silt, sand, gravel, construction debris, and miscellaneous slag (F-M). In limited areas such as the coastal Piers and East Side Treatment Plant Area, the fill does not contain appreciable quantities of ash, cinders, or fine grained sediments, but is composed primarily of sand and gravel (F-SM). These more permeable sandy zones are found infrequently across the Site and appear both spatially and vertically discontinuous.

4.5.2.2 Marsh Deposits

The marsh deposits comprise a discontinuous, interlayered mixture of fine, medium, and coarse granular deposits. The marsh deposits include a thin (less than 1 to 4 feet), organic, fiberrich silt and clay subunit, referred to as the meadow mat (MM-PT), a more continuous alluvial subunit consisting of black organic silt and clay (AL-OL), and an organic, sandy clay with abundant plant fibers (MM-SP). Along the eastern coastline, a loose, organic silt subunit (AL-OL) extends into Upper New York Bay and is interpreted as an esturarine deposit.

4.5.2.3 Upper Alluvium

The upper alluvium is composed of four subunits that form a continuous, permeable unit underneath the marsh deposits. The upper subunit (AL-SW) is a gray to tan, very fine sand that varies in thickness from 0 to 18 feet. The thickest portion of this subunit fills an east-west buried stream channel that runs across the northern portion of the Site and has eroded to the underlying glacial till unit. The lower three alluvial subunits consist of red-brown, coarse-grained alluvial deposits (AL-SM, AL-SP, AL-GP) that become more coarse with depth and are interpreted as reworked glacial deposits or glacial outwash. Collectively, the lower three units vary in thickness from 0 to 19 feet.

4.5.2.4 Glacial Till

The glacial till unit generally consists of a densely compacted, red to brown deposit of poorly sorted clay, silt, sand, and gravel (GT-GM). Three subunits can be differentiated based upon grain size and permeability characteristics. The upper subunit (GT-SM) is gradational with the overlying alluvium and is composed of red, silty sand or poorly sorted sand and clay. A very low permeability clayey silt (GT-ML) is interlayered with the more abundant GT-GM sediments across the site and usually forms the base of the glacial till unit. At one location, a dense, tan to red clay (GT-CH) overlies the other glacial till subunits and may have formed as a ponded lake deposit following the last glacial recession. The upper surface of the glacial till is variable and exhibits up to 35 feet of relief across the Site, much of which is due to past stream activity which eroded channels into the glacial till sediments. The channels were subsequently filled with upper alluvium or marsh sediments. The thickness of the glacial till unit varies from 19 to 71 feet, and the subunits form a continuous low permeability zone across the Site.

4.5.2.5 Lower Alluvium

A continuous layer of brown to red-brown, medium to coarse sand (AL-SW) underlies the glacial till layer to bedrock. This sediment is approximately 55 to 60 feet thick across the Site and was deposited prior to the last glacial advance.

4.5.2.6 Bedrock

Prior to this Phase IA RI, inconsistencies in the previously interpreted depth to bedrock on the historical soil boring logs were noted in the Site History Report (Geraghty & Miller, Inc. 1994b). These inconsistencies were attributed to variations in drilling techniques and effectiveness of subsurface penetration. The shallower depths to bedrock were suspected to be incorrect due to erroneous interpretation of inferred bedrock from drilling refusal at the top of the glacial till. To verify the depth to bedrock, four deep soil borings (Soil Borings PN1SB1, LOSB19, APSB7, and PESB3) were drilled across the Site during the Phase IA RI. These soil borings were converted into deep overburden Monitoring Wells GMW21D, GMW22D, GMW23D, and GMW24D, respectively. To confirm the presence of bedrock and to determine the bedrock lithology, bedrock core samples were obtained at these four locations. Soil boring logs and core logs are provided in Appendix B.

The deep borings confirmed that the shallow bedrock elevations inferred by previous workers were incorrect. The four deep borings encountered bedrock at a depth of approximately 100 to 125 feet bls. The actual depth to bedrock is similar to the deeper depths to bedrock reported in some historical borings on-site and at the adjacent IMTT property (Geraghty & Miller, Inc. 1994b). A relatively flat bedrock surface rather than a highly variable bedrock surface is more consistent with the erosion of the bedrock to a common base level during periods of lower sea levels. Bedrock recovered from the three deep borings on the western portion of the Site (Soil Borings GMMW-21D, GMMW-22D, and GMMW-23D) indicate that approximately 2 to 12 feet of weathered red siltstone overlies competent red sandstone. This sandstone is interpreted as the Stockton Formation of the Newark Basin Super Group.

The bedrock recovered from deep Soil Boring GMMW-24D indicates that the eastern edge of the Bayonne Plant is underlain by bedrock composed of gray mica schist. This mica schist bedrock is interpreted as the Manhattan Formation of the New York City Group. This interpretation is consistent with regional mapping by the New York State Geological Survey (Geological Survey of New York 1970). A weathered rock horizon was not encountered; only competent mica schist bedrock was encountered in deep boring GMMW-24D. An unconformable contact between the Stockton and Manhattan Formations apparently underlies the Site.

4.6 HYDROGEOLOGY

This section provides a description of the regional and the site-specific hydrogeology.

4.6.1 Regional Hydrogeology

The major aquifer systems in the northeast New Jersey metropolitan area include the following: (1) glacial till deposits, (2) stratified drift, and (3) Triassic-age shales and sandstones of the Newark Basin Super Group. Sedimentary coastal plain aquifer systems, such as the Sayerville Sand Member and the Farrington Sand Member, are not present in the vicinity of the Site. The glacial till deposits are only permeable in limited areas; in most areas, these deposits do not form a significant water-bearing sequence. West of Constable Hook, the City of Bayonne is underlain by the intrusive diabase of the Palisades Sill. This diabase bedrock commonly outcrops along the northeast-trending ridge underlying Bayonne. East of the diabase ridge, the stratified drift deposits and Triassic-age sedimentary rocks that are present underlying Constable Hook are not used as a source of groundwater.

A November 1992 computer survey of NJDEP Bureau of Water Allocation files, which document major groundwater withdrawals (greater than 100,000 gallons per day [gpd], indicates that no major withdrawals occurred within 4.5 miles of the Site (Geraghty & Miller, Inc. 1994b). According to Mr. James Monkowski of the City of Bayonne Health Department, there are no industrial, domestic, or public water supply wells within a 1-mile radius of the Site (Monkowski 1994). The USGS (McGuinness 1963) documented areas in New Jersey (including Bayonne, Linden, and Elizabeth) having groundwater quality problems as early as the 1960s. As of November 1992, 242 Comprehensive Site List cases were located within a 5-mile radius of the Bayonne Plant. In addition, 48 known contaminated sites are listed in the City of Bayonne (NJDEP 1994b). Known contaminated sites include Amerada Hess Terminal, Bayonne City Landfill, Bayonne Industries, Bayonne Terminals, Inc., ICI Americas, Inc., McGovern Trucking, Powell Duffryn, PSE&G, and White Chemical. Documented water-quality problems, the proximity to the saline near-shore environment, and the low yield of the subsurface deposits probably contribute to the lack of water supply development in the vicinity of Bayonne.

4.6.2 Site Hydrogeology

As discussed in Section 4.5.2 (Site Geology), six stratigraphic units have been identified at the Site. Based on the lithologic descriptions and hydrogeologic characteristics of these stratigraphic units, Geraghty & Miller has sorted these units into five hydrogeologic units. Three water-bearing units (shallow, intermediate, and deep) are separated by two confining layers (an upper leaky confining layer and a lower confining layer).

The uppermost water-bearing unit is the saturated fill deposits. Depth to groundwater ranges from 3.8 to 10 feet bls beneath the Site. The hydraulic characteristics of the fill are highly variable depending on the type of fill. However, the relatively thin saturated thickness (averaging less than 10 feet) and the variable lateral extent of more permeable fill results in limited groundwater withdrawal capacities. Shallow groundwater elevations range from 2.5 to 13.5 feet above msl. The base of this shallow water-bearing unit is most commonly defined by the upper leaky confining layer, which consists of the meadow mat and underlying marsh silt and clay unit. This confining layer is nearly continuous, with only a few limited areas that allow for hydraulic connection between the saturated fill and the intermediate water-bearing unit, which consists of the marsh/alluvial sand unit that overlies the glacial till. Significant differences between the potentiometric head of the intermediate marsh/alluvial sand and the shallow water-bearing fill illustrate the effectiveness of the upper confining layer. Vertical hydraulic head data are discussed in Section 4.6.2.2 (Vertical Flow Gradients). Occasionally, at a few locations, all of the marsh deposits are absent and the fill is directly underlain by the glacial till confining layer. No intermediate water-bearing unit is present at these isolated locations.

The lower confining layer at the Site consists of the glacial till unit. This dense, laterally continuous and thick (19 to 71 feet) layer of poorly sorted glacial till effectively isolates the shallow and intermediate water-bearing units from the deep water-bearing unit. The deep water-bearing unit consists of the alluvial sand unit and, to a lesser extent, the underlying fractured bedrock.

4.6.2.1 Shallow Groundwater Flow

Water levels were measured in shallow monitoring wells at the Bayonne Plant on December 12, 1994; those data are presented in Table 4-1. On April 17, 1995, water levels were measured at all intermediate and deep monitoring wells and at selected shallow monitoring wells, as presented in Table 4-2. Water-level measurements confirm the existence of intermediate and deep hydrostratigraphic zones in the overburden. Water levels measured in shallow wells during low tide on December 12, 1994 were used to construct a contour map showing the configuration of the water-table surface (see Figure 4-6). Figure 4-6 illustrates multiple groundwater flow directions from four general areas of higher groundwater elevations (i.e., recharge areas or groundwater mounds) as described below. Shallower groundwater commonly flows in a radial pattern away from the recharge areas toward Upper New York Bay, the Kill Van Kull Waterway, and the Platty Kill Canal. Shallow groundwater elevations along the east and southwest portions of the Site are slightly below sea level during low tide, similar to the elevation of the nearby tidal surface-water bodies. Horizontal flow gradient calculations are summarized in Table 4-3.

The first groundwater mound (greater than 15 feet above msl) occurs in the northwest portion of the Site. In this area, a groundwater recharge ridge is present beneath the center of the

"A"- Hill Tank Field and extends to the east beneath the southwest corner of the No. 2 Tank Field (see Figure 4-6). This groundwater divide results in a northeast flow direction beneath the Main Building Area, the No. 2 Tank Field, and the eastern portion of the "A"- Hill Tank Field. This northeast component of groundwater flow may be induced in part by pumpage of the interceptor trench, which is oriented northwest-southeast along the Site boundary. Horizontal gradients for this portion of the Site range from 0.012 to 0.017 foot per foot (ft/ft). On the other side of this divide, groundwater flows to the southwest under the western portion of the "A"- Hill Tank Field. In the center of the Bayonne Plant, near the Exxon Chemicals Plant Area, groundwater flow is generally to the east.

The second groundwater (hydraulic) mound is present beneath the center of the Lube Oil Area, with radial flow to the west, southwest, south, and southeast (see Figure 4-6). Groundwater flowing to the west and southwest discharges to the Platty Kill Creek and Pier No. 1 on the Kill Van Kull Waterway, with horizontal gradients ranging from 0.11 to 0.016 ft/ft.

In the eastern portion of the Site, the remaining two mounds, which are linear in form, straddle a groundwater trough that trends west to east beneath the eastern portion of the Low Sulfur Tank Field (see Figure 4-6). The groundwater trough effectively captures all shallow flow beneath the Solvent Tank Fields and the Low Sulfur Tank Field, with a very shallow gradient toward Upper New York Bay. Horizontal flow gradients are steeper between the mounds and the north and south sides of the trough (0.007 ft/ft), but become gentler within the trough (0.002 ft/ft). Shallow groundwater flow beneath the General Tank Field is generally to the north and northeast, with a horizontal gradient of approximately 0.010 ft/ft.

The elongated mounds in the water table apparently represent recharge areas for shallow groundwater. These recharge areas may be caused by several factors, including the following: (1) surface drainage patterns that direct run-off to the recharge areas; (2) more permeable surface deposits at the recharge areas that promote infiltration; (3) infiltration of leakage from aboveground and/or belowground water utilities and from sewers; and (4) depression of groundwater elevations in adjacent areas due to high permeability deposits, including backfill along sewers and utility trenches.

4.6.2.2 Vertical Flow Gradients

After the Phase IA RI intermediate and deep monitoring wells were installed and developed, two rounds of water-level measurements were made on April 17, 1995 from these wells and nearby shallow wells to provide data to evaluate vertical flow gradients. Table 4-2 presents the water levels measured on April 17, 1995. Due to the lateral distance (100 to 200 feet) between the nearest shallow well and the intermediate and deep well pairs, estimation of vertical gradients between the shallow and deeper water-bearing units was conducted in more qualitative terms. General trends can be determined with the existing data by comparing the interpolated shallow water levels shown on Figure 4-5 with actual deep and intermediate water levels. At Monitoring Well Cluster GMMW-23I/GMMW-23D near the center of the Site, the shallow groundwater elevation is approximately 9.5 feet above msl, which is approximately 6.5 feet higher than the groundwater elevation measured in Monitoring Well GMMW-23I. Therefore, there is the potential for a downward component to groundwater flow in this area. Comparison of shallow groundwater elevations with groundwater elevations in intermediate wells near the shoreline indicates that a slightly downward or horizontal potential exists near Monitoring Well GMMW-24I and a slightly upward potential exists near Monitoring Well GMMW-21I.

Table 4-4 presents a summary of the vertical gradient calculations for intermediate and deep well clusters. As indicated in Table 4-4, the vertical gradient is consistently downward between the intermediate wells and the deep wells in the each of the three well pairs. This represents a potential for downward flow; but downward flow from the intermediate to deeper zone is impeded by the intervening glacial till confining layer.

4.6.2.3 Tidal Influences

Table 4-1 presents product and water-level measurements made during two comprehensive rounds (during low and high tide) at shallow monitoring wells and surface-water measuring points on December 12, 1994. These measurements were made over 8 1/2 hours and included measurements made during a rising tide cycle. Water-level measurements at surface-water measuring points indicated tidal variations of 1.05 to 3.48 feet with an average tidal range of 2.65 feet. The variation of recorded surface-water levels is likely due to differences between the time of measurements and the peak tide, and to local variations due to wind, currents, and wakes from marine vessels. With the exception of a few shoreline areas, the groundwater elevations in shallow monitoring wells did not exhibit significant fluctuations with the tidal cycle. Shallow monitoring wells that exhibited a water-level rise of greater than 1 foot during the rising tide cycle on December 12, 1994 are located adjacent to the shoreline of the Platty Kill Creek, the Kill Van Kull, and the Upper New York Bay. Water-level fluctuations of less than 1 foot (and more frequently less than 0.10 foot) were recorded at the majority of the other shallow monitoring wells, including all wells in the inland areas of the Site. Thus, the tidal influence on the shallow water table is generally limited to areas within approximately 600 to 650 feet of Upper New York Bay (Piers No. 6 and 7), within 200 to 400 feet of the Kill Van Kull (i.e., Helipad and Pier No. 1 Area), and in the immediate vicinity (within 100 to 200 feet) of Platty Kill Canal. One exception to this generalization is the Tank 1066 area where tidal variations were evidenced further inland.

The tidal fluctuations of water levels in the intermediate and deep monitoring wells were evaluated using two rounds of water-level measurements made on April 17, 1995 during a falling tide cycle (see Table 4-2). Similar to the shallow wells, intermediate and deep monitoring well water-level fluctuations at well pairs near the shoreline (i.e., Monitoring Well Clusters GMMW21I/GMMW21D and GMMW24I/GMMW24D) exhibited water-level fluctuations of 2.30 to 4.84 feet that correlated with the tide cycle. The two inland well pairs (i.e., Monitoring Well Clusters GMMW22I/GMMW22D and GMMW23I/GMMW23D) exhibited water-level fluctuations of 0.90 foot or less, and typically the groundwater elevations increased during the falling tide, demonstrating either no correlation with the tidal cycle or else a possible response, but with a time lag.

5.0 PHASE IA - FINDINGS

This section describes the findings of the Phase IA RI program at the Bayonne Plant. It presents a summary and discussion of the results of soil and groundwater sampling, including a summary of QA/QC data evaluation. Observations of hydrocarbons in soil and floating NAPL are described in the context of the Phase IA findings and also in terms of site-wide NAPL plumes and ongoing NAPL IRM programs.

This section is not intended to provide a comprehensive assessment of the inter-relationships between soil, groundwater, and floating NAPL in operational areas of the Bayonne Plant. These relationships are discussed in Section 6.0 (Overview of Constituent and Site Properties Affecting Fate and Transport) and Section 7.0 (Data Evaluation, Hypothesis Development, and Conclusions).

5.1 SOIL QUALITY

Soil samples were collected for analytical purposes at 83 soil boring locations and 15 separate monitoring well locations during Phase IA of the RI. Of the 98 locations at which soil samples were collected, 84 locations were selected specifically for the RI and the remaining 14 locations were drilled in connection with contemporaneous IRM study activities. A total of 183 TPH, 108 TCL VOC (plus miscellaneous compounds), 108 TCL SVOC, 105 TCL pesticides/PCBs, and 112 TAL parameters, and 181 total and 141 hexavalent chromium analyses was completed on these soil samples, not including QA/QC blanks and replicates.

The analytical results of all soil samples collected at the Bayonne Plant during the RI and contemporaneous IRM study activities are provided in Tables 5-1 through 5-6 for TPH, TCL VOCs (plus miscellaneous compounds), TCL SVOCs, pesticides/PCBs, and TAL parameters (hexavalent chromium), respectively. Tentatively identified compounds (TICs) were not included in the analytical data summary tables for VOCs and SVOCs. The interpretation, evaluation, and use of TIC data for the Bayonne Plant RI were not deemed necessary, in accordance with a July 6, 1995 NJDEP guidance letter to Exxon (NJDEP 1995b) in connection with the Bayway Refinery RI. The quantifiable level of weathered TPH in soils is sufficient to characterize contamination at the Bayonne Plant. For screening purposes, the analytical results were compared to the following applicable cleanup guidance levels for soils at contaminated sites: (1) residential direct-contact soil cleanup criteria, (2) non-residential direct-contact soil cleanup criteria, and (3) impact to groundwater soil cleanup criteria. Analytical results for TPH were compared to the following criteria: (1) the NJDEP criterion of 10,000 milligrams per kilogram (mg/kg) for total organic compounds, and (2) the Construction, Maintenance, and Emergency Repairs Protocol (CMERP) criterion of 30,000 mg/kg, as shown in Table 5-1. Analytical results that exceed the non-residential direct-contact soil cleanup criteria or the impact to groundwater soil cleanup criteria are identified in Tables 5-2 through 5-5 and are discussed in the following constituent group summary sections. Results for total chromium and hexavalent chromium are provided in Table 5-6, with total chromium compared to the value of 10,000 mg/kg, and hexavalent chromium compared to values of 100 mg/kg and 10 mg/kg pending finalization of NJDEP guidance for chromium. Table 5-7 provides the minimum and maximum quantified concentration of constituents detected in soil and presents the number and percentage of samples with constituent exceedance(s) of the applicable cleanup criteria for the whole site and for individual areas. It also provides the geometric mean concentration for each constituent for the entire site. This methodology was selected over the arithmetic mean because the data distributions were not normal and frequently tended to resemble a log normal distribution. It may not be meaningful for all constituents. The number and distribution of data points should be evaluated when using this mean value for decision making.

In addition to the summary tables, five figures (Figures 5-1 through 5-4) that depict summary soil quality are presented. Figure 5-1 depicts the TPH analytical data and identifies locations at which soil samples have or have not exceeded the soil quality criteria of 10,000 mg/kg and 30,000 mg/kg. Figures 5-2 and 5-3 provide specific constituent exceedances of the non-residential direct contact and impact to groundwater soil cleanup criteria for TCL/VOCs, TCL SVOCs, TCL pesticides/PCBs, and TAL inorganics in surface and subsurface soils. Chromium (total and hexavalent) exceedances are shown on Figure 5-4.

5.1.1 Summary of Field QA/QC for Soil Samples

The QA/QC measures for Phase IA soil samples were conducted according to the QAPP of the RI Work Plan (Geraghty & Miller, Inc. 1993a) and are consistent with NJDEP guidance (NJDEPE 1992a). Sample collection and handling procedures and QA/QC sample collection frequency are discussed in Section 3.9 (Quality Assurance/Quality Control) and in the RI Work Plan (Geraghty and Miller, Inc.1993a). Analytical results for soil replicate samples and field blanks associated with the samples collected during the RI are summarized below and discussed in detail in Appendix J. In accordance with the NJDEP Field Sampling Procedures Manual (NJDEPE 1992a), trip blanks were not required for soil samples.

Field replicates were collected to evaluate the reproducibility of the sampling technique, the laboratory precision in analyzing samples, and the degree to which variability in the soil type affects the analytical result. Ten "blind" field replicate samples were collected at Phase IA soil sampling locations. Analytical results for the ten replicate soil samples indicate a good degree of repeatability for the overall analytical data for soil samples collected at the Bayonne Plant. Six of these samples were analyzed for TPH, TCL VOCs plus site-specific alcohols and additional compounds, TCL SVOCs, TCL pesticides/PCBs, TAL metals and cyanide, and hexavalent chromium. This list constitutes the "full suite" of analyses at the Bayonne Plant and will be referred to in this report as the "full suite" or "full parameters." Two of the replicates collected were analyzed for TPH, total chromium, and hexavalent chromium only. One replicate sample was analyzed for TPH only, and one replicate sample was analyzed for hexavalent chromium only. The analytical results for each replicate were compared against the results for its associated soil sample to verify that the reported values for each constituent did not vary by more than 100 relative percent difference (RPD) (USEPA 1992a).

The sample/replicate pairs exceeded the RPD limit of 100 for TPH in two soil samples, for some metals (chromium, zinc, arsenic, and lead) in three soil samples, for one pesticide in one soil sample, and for one VOC in one soil sample. These exceedances are discussed in detail in Appendix J. In these cases, the heterogeneity of the soil sample matrix probably effected the large difference in the analytical result between the sample and replicate. The soil samples collected at the Bayonne Plant exhibited the significant heterogeneity, which is common for filled industrial sites. Soil sample heterogeneity makes it difficult to replicate a sample. Therefore, differences in analytical results may not be indicative of laboratory precision, but instead may reflect the inherent variability of the soil matrix and the difficulty in homogenizing a soil sample. Samples selected for VOC analysis are not homogenized, thus creating the potential for greater heterogeneity. Analytical results for the ten replicate soil samples indicate a good degree of repeatability for the overall analytical data for soil samples collected at the Bayonne Plant.

Field blanks were prepared to evaluate the potential for cross-contamination. The field blank results were used to determine if the sampling tools or decontamination techniques affected the integrity of the analytical results for the samples collected in the field and also to check the laboratory-prepared analyte-free water. Twenty aqueous field blanks were prepared on days when soil samples were collected during the Phase IA RI at the Bayonne Plant. Nine of the 20 field blanks were analyzed for full parameters; four were analyzed for TPH, hexavalent chromium, and total chromium; four were analyzed for TPH only; one was analyzed for TPH and hexavalent chromium only; one was analyzed for hexavalent chromium and SVOCs only; and one was analyzed for hexavalent chromium only (some of these field blanks were associated with the re-sampling efforts for SVOCs and hexavalent chromium). PCBs were not detected in any of the non-aqueous field blanks associated with the soil samples. One field blank contained detectable concentrations of TPH and one pesticide; six contained detectable concentrations of VOCs (methylene chloride and acetone, which are common laboratory contaminants), and eight contained detectable concentrations of SVOCs (in seven of these, the only SVOCs detected were phthalates, a common sampling artifact). One field blank also contained three other base/neutral extractable organic compounds. Nine field blanks contained detectable concentrations of various metals; one of these field blanks contained detectable concentrations of lead. However, none of the field blanks yielded elevated concentrations of the above constituents. A detailed discussion of the field blank results is provided in Appendix J.

Analytical results from field blanks and soil samples collected on the same day were compared. In all cases, detected constituent levels in the blanks were at least an order of magnitude less than the constituent concentrations in their associated samples. Therefore, Geraghty & Miller concluded that no significant cross-contamination of samples had occurred due to sampling activities or decontamination procedures.

5.1.2 <u>Total Petroleum Hydrocarbons in Soils - Analytical Results</u>

A total of 183 soil samples obtained from 98 soil borings and monitoring well locations was submitted for TPH analysis (see Table 5-1). For screening purposes, all concentrations of TPH above the NJDEP soil cleanup guidance level of 10,000 mg/kg for total organic contaminants and the 30,000 mg/kg CMERP criteria are indicated in Table 5-1. TPH was detected in all soil samples at concentrations ranging from 75.2 to 479,000 mg/kg. The NJDEP soil cleanup guidance level of 10,000 mg/kg was exceeded for 109 samples (60 percent) at 73 locations (74 percent). TPH was more frequently detected in subsurface soil than in surface soils, and at higher concentrations. Thirteen surface-soil samples exceeded 30,000 mg/kg, whereas 50 subsurface soil samples exceeded this criterion. Thirteen surface-soil samples had concentrations exceeding 10,000 mg/kg but less than 30,000 mg/kg, as opposed to 33 subsurface soil sample exceedances over this range.

Figure 5-1 illustrates the areas of the Site where TPH has been detected in soil at concentrations greater than 10,000 and 30,000 mg/kg. As shown on this figure, high concentrations (above 10,000 mg/kg) of TPH are present in soils over much of the Site. The highest concentrations of TPH (greater than 100,000 mg/kg) in soil were observed in the General Tank Field, the Lube Oil Area, the Main Building Area, and the No. 3 Tank Field. In each of these areas, past practices are possible sources of these higher TPH concentrations. Separator bottoms were disposed in the area of the General Tank Field; separators were formerly operated in the Lube Oil and No. 3 Tank Field Areas; and storage tanks, pump houses, and sweetening stills were formerly located in the Main Building Area.

Detected TPH concentrations are attributable to historic activities throughout the Bayonne Plant's 120 years of operation. Some portion of the TPH in the soil may be attributed to the composition of the fill. Observations made during drilling and soil sampling indicate that the TPH detected at many locations is visually evident as stains and adsorbed liquid.

5.1.3 Volatile Organic Compounds in Soils - Analytical Results

Of the 183 samples analyzed for TPH, 108 samples (59 percent) from 75 locations were selected for VOC analysis. Table 5-2 presents the concentrations of VOCs in soil samples and, for screening purposes, indicates, in bold type and underlined, all concentrations of VOCs that exceeded the NJDEP non-residential direct-contact or impact to groundwater soil cleanup criteria. Figures 5-2 and 5-3 depict locations where VOC concentrations in soils were compared to the NJDEP non-residential direct-contact soil cleanup criteria and impact to groundwater soil cleanup criteria for surface soils (0 to 2 feet bls) and subsurface soils (greater than 2 feet bls), respectively. The most stringent of these criteria for VOCs is generally the impact to groundwater criteria, which the NJDEP based on empirical models of transport mechanisms.

VOCs were detected in eleven samples at seven locations at concentrations above the impact to groundwater criteria. Only one of the eleven VOC samples with concentrations above the impact to groundwater criteria also had concentrations above the non-residential direct contact soil cleanup criteria. For screening purposes, Table 5-2 also provides a tabulation of total TCL VOCs identified in soil samples during Phase IA, with total VOC exceedances in bold and underlined. Only one location (Soil Boring ECPSB2 at a depth of 10 to 12 feet bls) contained total TCL VOCs (plus miscellaneous compounds) at concentrations above the NJDEP soil cleanup criteria of 1,000 mg/kg for total VOCs. The locations where VOCs were detected above the impact to groundwater soil cleanup criteria are discussed below.

The following VOCs were detected in soil above the impact to groundwater cleanup criteria (the number of exceedances is in parentheses): benzene (2), chlorobenzene (5), and xylenes (4). Only chlorobenzene at one location exceeded the non-residential direct contact soil cleanup criteria.

Of the seven locations at which soil criteria were exceeded, only three locations were surface soils (0 to 2 feet bls), and none of these surface soils exceeded the non-residential direct contact criteria. All three surface soil exceedances for VOCs detected at the Bayonne Plant were in the No. 3 Tank Field (Soil Borings N3TFSB6, N3TFSB7, and N3TFSB8) where mostly gasoline or light naphtha products were stored. The constituent exceedances in surface soil were benzene, chlorobenzene, and xylenes. The benzene and xylenes exceedances in this area can be related to a historic spill of light naphtha (Geraghty & Miller, Inc. 1994b) but the chlorobenzene source is not known. However, chlorobenzene may be present due to operations in the neighboring Exxon Chemicals Plant Area.

Five locations exhibited subsurface soil concentrations above the applicable criteria. At three locations (Soil Borings ECPSB2, ECIRMB3, and APSB6), chlorobenzene was observed in subsurface soils above the applicable criteria. One of these locations (Soil Boring ECPSB2) also showed xylene exceedances. Similar to the surface soil exceedances, chlorobenzene was observed in proximity to the Exxon Chemicals Plant Area. Xylene was observed above the applicable criteria at Soil Boring GTFSB9 in the General Tank Field. The presence of xylene at this location can be attributed to former spills in the General Tank Field. At one other location in the No. 2 Tank Field (Soil Boring N2TFSB4), xylene in the subsurface soil cannot be attributed to a specific spill; however, this constituent is typical of refined petroleum products.

5.1.4 Semivolatile Organic Compounds in Soils - Analytical Results

Of the 183 soil samples submitted for TPH analysis, 108 samples (59 percent) from 76 locations were submitted for SVOC analysis. Table 5-3 provides the SVOC concentration results for soil samples, and, for screening purposes, also indicates SVOC concentrations in soil samples that exceeded the NJDEP non-residential direct contact or impact to groundwater soil cleanup criteria. Figures 5-2 and 5-3 depict locations where SVOC concentrations in soil exceeded one or both of the NJDEP soil criteria (the non-residential soil cleanup criteria, and the impact to groundwater soil cleanup criteria) for surface and subsurface soils, respectively.

SVOC concentrations in soil were detected above the applicable criteria in 40 samples at 34 locations. The following SVOCs were detected in soil above the applicable criteria (the number of exceedances is in parentheses): benzo(a)anthracene (11), benzo(b)fluoranthene (9), benzo(a)pyrene (36), benzo(k)fluoranthene (9), chrysene (2), dibenz(a,h)anthracene (15), indeno(1,2,3-cd)pyrene (4), naphthalene (2), pyrene (1), N-nitrosodiphenylamine (1), 1,2-dichlorobenzene (1), and 1,4-dichlorobenzene (1). All but three of these constituents (N-nitrosodiphenylamine, 1,2-dichlorobenzene, and 1,4-dichlorobenzene) are polycyclic aromatic hydrocarbons (PAHs). The non-PAH SVOCs were each detected above the impact to groundwater soil cleanup criteria and were observed at Soil Borings ECPSB2 and N3TFSB7, which are located in the Exxon Chemicals Plant Area and the No. 3 Tank Field Area, respectively. These constituents may have originated from smaller sources that released the VOCs observed in the same locations. Naphthalene was detected above the impact to groundwater criteria at two locations: one in the Solvent Tank Field and the other at the same location as the non-PAHs in the Chemical Plant.

The PAHs are generally observed above the non-residential direct contact soil cleanup criteria throughout much of the Bayonne Plant. The higher concentrations and densities of exceedances were observed in the Lube Oil Area (including the Stockpile Area), the Pier No. 1 Area, the Exxon Chemicals Plant Area, the AV-Gas Tank Field, parts of the Asphalt Plant, and the No. 3 Tank Field Area. Other exceedances were found but were sporadic. The greatest number of exceedances was observed for benzo(a)pyrene, with 36 samples exceeding the non-residential soil criteria. Specific sources cannot be identified for observed concentrations of PAHs. PAHs are present in various hydrocarbon products and residues associated with several generations of operating refinery history and smaller concentrations of PAHs are possibly associated with the coal-derived cinders that were used for fill on Constable Hook. In general, the highest concentrations of PAHs are found primarily in former processing areas, with lower concentrations observed in long-term tank field areas; this pattern would be expected based on the derivation of PAHs. In general, the relatively higher concentrations of PAHs at the Site are in the subsurface soils, with the exception of Soil Boring ECPSB5 where benzo(a)pyrene was detected at 33,000 ug/kg. PAH concentrations are higher in the subsurface soils, possibly because surface soils have been reworked in the course of multi-plant reconstruction/service change activities and probably because TPH concentrations tend to be higher in subsurface soils. There are, however, 14 locations in which PAHs were detected above the applicable criteria in surface soils compared to 20 subsurface locations above the applicable criteria.

5.1.5 Pesticides and PCBs in Soils - Analytical Results

A total of 105 of the 183 soil samples (57 percent) collected at 75 locations at the Bayonne Plant was submitted for pesticide and PCB analysis during the Phase IA investigation. Table 5-4 presents all of the analytical data for pesticides and PCBs in soil samples collected during Phase IA, and, for screening purposes, also indicates concentrations that exceeded the non-residential and/or impact to groundwater soil quality criteria for pesticides/PCBs. Figures 5-2 and 5-3 depict locations where pesticides and PCB concentrations in soil exceeded one or both of the NJDEP soil quality criteria (the non-residential soil cleanup criteria and the impact to groundwater soil cleanup criteria) for surface and subsurface soils, respectively.

Only one surface soil sample throughout the Site, Soil Boring LAIRMB1, located in the Lube Oil Area, exhibited exceedances of the applicable criteria for pesticides in soil. The following constituents were observed above the non-residential direct-contact soil cleanup criteria: 4,4'-DDD, 4,4'-DDT, and dieldrin. 4,4'-DDD also exceeded the impact to groundwater soil cleanup criterion. Because this was the only location where pesticide exceedances were observed and it was in a surface soil sample, it is possible that this detection is a remnant of pest control. Exxon's flea, lice, insect, and tick (FLIT) pesticides were manufactured for a short period at the plant; however, this specific exceedance cannot necessarily be attributed to this operation (Geraghty & Miller, Inc. 1994b).

No PCBs were observed above the applicable criteria at the Bayonne Plant.

5.1.6 Metals and Other Miscellaneous Analytes in Soils - Analytical Results

A total of 112 soil samples collected from 75 locations was analyzed for TAL constituents (i.e., metals). At 97 locations, 141 surface and subsurface soil samples were collected for total and hexavalent chromium analysis. Table 5-5 presents the analytical data for metals detected in soil, and, for screening purposes, also indicates which metal concentrations exceeded the NJDEP non-residential direct-contact soil criteria for metals, for all depths. Samples from 47 locations (64 percent) exceeded the non-residential soil criteria for the following metals, not including chromium (the number of exceedances is in parentheses): arsenic (49), beryllium (4), copper (6), lead (22), nickel (1), thallium (4), and zinc (3). Table 5-6 provides a list of individual results for total and hexavalent chromium. Figures 5-2 and 5-3 depict the number of exceedances for metals concentrations in surface and subsurface soils, respectively; these concentrations were compared to the non-residential soil cleanup criteria. Currently, the NJDEP has not published impact to groundwater soil cleanup criteria for metals. For evaluation purposes, chromium results were compared to 10,000 mg/kg for total chromium results, and 100 mg/kg and 10 mg/kg for hexavalent chromium pending establishment of regulatory standards for chromium. Figure 5-4 depicts the number and areas of exceedances for chromium. Sampling for chromium was generally not conducted in known chromium areas but was conducted to ascertain the extent to which chromium was present outside those areas.

49 of the 112 soil samples (44 percent) submitted for TAL metals analysis exceeded the 20 mg/kg applicable criteria for arsenic. Of the exceedances, 25 were between 20 and 40 mg/kg, 13 between 40 and 80 mg/kg, 3 between 80 and 120 mg/kg, and 8 greater than 120 mg/kg. Arsenic levels are above the criterion in both surface and subsurface soils. The highest concentrations were detected in the subsurface soil borings in the Exxon Chemicals Plant Area (Soil Boring ECPSB2), AV-Gas Tank Field (Soil Boring AGTFSB1), the Main Building Area (Soil Boring MBSB3), and the Asphalt Plant (Soil Boring N3TFSB2), and also in the surface samples at the No. 3 Tank Field (Soil Borings N3TFSB7 and N3TFSB8). Because arsenic was detected throughout the facility at concentrations not significantly above the applicable criterion, the arsenic may be related to the coal-derived cinders emplaced during historical operations, or to other background factors.

Lead has been observed above the applicable criterion in 22 of the 112 soil samples (20 percent) analyzed for TAL metals. Twelve of the exceedances (11 percent of the samples) at eight locations were detected at 1,000 mg/kg or more, compared to the criteria of 600 mg/kg. Nine of the 12 exceedances that exhibited concentrations of lead above 1,000 mg/kg were at five locations in the northwest part of the General Tank Field. The high lead concentrations in this area are likely derived from the historic disposal of lead-contaminated separator bottoms or possibly from former fire training operations in that area. Lead concentrations above 1,000 mg/kg were also observed in soil borings at the AV-Gas Tank Field (Soil Boring AGTFSB3), the Lube Oil Area (Soil Boring LOSB17), and the No. 3 Tank Field (Soil Boring N3TFSB9). The relatively high lead concentrations in the AV-Gas Tank Field is not unexpected, since AV-gas is leaded; it is uncertain why there are high lead concentrations in the No. 3 Tank Field or in the Lube Oil Area.

All other metals detected above the criteria were sporadically located throughout the Site. Copper was detected above the applicable criterion in five areas of the Bayonne Plant;

three times in the surface soils and three times in the subsurface soils. Thallium was also detected sporadically throughout the Site; however, it was only detected above the applicable criterion in subsurface soils. Zinc was detected above the criterion at two locations in the General Tank Field and was present where lead concentrations were also high.

Due to past filling activities, some emphasis was placed on soil sampling for total and hexavalent chromium. One hundred and eighty samples were analyzed for total chromium from 97 locations and 141 samples from 87 locations were analyzed for hexavalent chromium (Table 5-6). Twenty-nine samples (16 percent) exhibited quantifiable concentrations of both total and hexavalent chromium. Total chromium was not detected above 10,000 mg/kg. Hexavalent chromium was detected above 100 mg/kg in three soil samples (2 percent) and above 10 mg/kg in 16 soil samples (11 percent) (Figure 5-4).

The data provided in Table 5-6 do not suggest a bias in chromium concentrations when surface soil results are compared with subsurface results. Nine surface soil samples exceeded the hexavalent chromium criteria, while seven subsurface soil samples exceeded one or both of the comparative criteria for hexavalent chromium.

The deposits of chromium fill at the Bayonne property are being studied in more detail by ICF Kaiser Engineers as part of an IRM study.

5.2 SUBSURFACE HYDROCARBONS AT THE BAYONNE PLANT

This section describes the hydrocarbon/NAPL observations from the Phase IA RI field activities and the NAPL IRM study activities. The NAPL discussion focuses on the shallow water-table zone in which almost all the NAPL was encountered, with the exception of the NAPL observed in the intermediate water-bearing deposits adjacent to the Platty Kill Canal. A more detailed review of NAPL in the area adjacent to the Platty Kill Canal has been conducted by DRAI (Dan Raviv Associates, Inc. 1994b). Throughout this Phase IA RI report, reference is made to NAPL thickness or apparent NAPL thickness. In this report, these terms are synonymous because they refer to the observed thickness of NAPL in a temporary well point or monitoring well under static conditions, which is generally significantly greater than the true thickness of NAPL on the groundwater table in the geologic formation. To determine "true" NAPL thickness in the subsurface deposits, further testing, such as baildown tests, is warranted.

5.2.1 Hydrocarbon Observations from the Phase IA RI and Contemporaneous IRM Soil Boring and Well Installation Program

Temporary well points were installed at 99 of the 116 soil borings to determine whether the hydrocarbons visible in soil were free to migrate and accumulate on the shallow water table. Table 5-8 presents the results of the well point program conducted during Phase IA of the RI. Temporary well points were installed at the 99 locations in response to the visible presence of hydrocarbon sheens, products, or residual materials in soil (see Table 5-8). The field and construction techniques used to complete the well points are described in Section 3.3 (Hydrocarbon Delineation - Temporary Well Point Program and Hydrometer Testing).

NAPL was identified at measurable thicknesses (greater than 0.01 foot) in 54 of the 99 (55 percent) temporary well points installed during the RI/IRM field activities. NAPL thicknesses of less than 0.1 foot were measured at 13 of the 54 locations (24 percent); thicknesses between 0.1 and 1 foot were measured at 22 locations (41 percent); and thicknesses greater than 1 foot were measured at 19 locations (35 percent). The maximum NAPL thickness, 8.29 feet, was measured at Soil Boring N3TFSB1, which is located in the southern portion of the No. 3 Tank Field.

Five of the IRM well point locations that contained measurable thicknesses of floating hydrocarbons were completed as monitoring wells. Measurements were subsequently collected at the newly installed wells (before and after development) for comparison with the earlier well point measurements. NAPL thickness measured in each monitoring well was comparable to the measurement in the well point previously installed at the same location (see Table 5-8). RI monitoring wells were installed without temporary well points, but were monitored in a similar manner.

NAPL samples were collected from 16 temporary well points and four RI/IRM monitoring wells for specific gravity measurements using a hydrometer. NAPL samples were also collected from 38 pre-existing IRM monitoring wells; these results are discussed in Section 5.2.2 (Plant-Wide Overview). The results of the hydrometer analysis are presented in Table 5-9 and shown on Figure 5-5. The testing procedures are described in Section 3.3.2 (Hydrometer Testing). NAPL samples were not collected from every temporary well point location that contained NAPL; rather they were collected from a selection of temporary well points located throughout the Site, to provide areal information on the types of floating hydrocarbons. NAPL specific gravities ranged from 0.820 (a diesel fuel-range specific gravity) at Soil Boring AHTFSB1 (located in the northern portion of the "A"-Hill Tank Field) to 0.970 (a No. 6 Fuel Oil-range gravity) at Soil Boring ECPSB2 (located in the northern portion of the Exxon Chemicals Plant) and Soil Boring AGTFSB4 (in the AV-Gas Tank Field).

5.2.2 Plant-Wide Overview

Figure 5-5 presents the apparent thickness of NAPL measured at the Site during the RI/IRM field activities. This figure was prepared by using maximum well point-measured NAPL thicknesses in conjunction with the synoptic NAPL thickness information obtained during the low-tide groundwater/NAPL level measuring event conducted on December 12, 1994. NAPL specific gravity information was derived from hydrometer analysis on NAPL samples collected from 20 RI/IRM well point/monitoring well locations and also from NAPL samples collected at 39 pre-existing IRM monitoring wells. This specific gravity information is provided in Table 5-9 and also shown near the temporary well point or monitoring well locations on Figure 5-5.

Seventeen floating NAPL plumes (Plumes No. 1 through 17) were identified during the field activities associated with the RI/IRM, as summarized in Table 5-10 and shown on Figure 5-5. The plumes are enumerated on Figure 5-5. Only NAPL observed in at least two contiguous boring/well locations is designated and enumerated as a plume on Figure 5-5. The depicted shape of the NAPL plumes on Figure 5-5 was determined by evaluating the direction of shallow groundwater flow, the orientation of groundwater divides, and the specific gravity of the NAPL.

To facilitate a discussion of the NAPL findings and the relationship of NAPL to soil and groundwater contamination, the Site is discussed by operational area from east to west; in some instances, contiguous operational areas are grouped. NAPL findings are therefore described for ten areas at the Bayonne Plant. These areas are intended to provide a geographic/operational perspective for the evaluation of NAPL in this section and for the contaminant relationship evaluations provided in Section 7.0 (Data Evaluation, Hypothesis Development, and Conclusions). The following is a brief description of the NAPL plume areas, including apparent NAPL thickness/thickness range, specific gravity and type, potential sources, and other information obtained from recent IRM activities, such as gas chromatograph (GC) fingerprinting.

- Piers, and the East Side Treatment Plant and MDC Building Area

  Three NAPL plumes (Plumes No. 1 through 3) have been identified in this area (Figure 5-5). The largest NAPL plume (Plume No. 1) in this area is a 850-foot long linear feature, oriented east-west.

  No NAPL was measured at several wells located immediately south of the Plume No. 1, indicating that the plume is probably not very wide. Apparent NAPL thicknesses during the low-tide water-level measuring event ranged from 0.44 foot at Monitoring Well EB66R to 3.57 feet at Monitoring Well EB69 (see Table 4-1 and Figure 5-5). During past IRM activities, DRAI has measured apparent NAPL thicknesses as great as 7 feet in this area. NAPL specific gravity results in this area are indicative of diesel/No. 2 fuel oil products (0.860 at Monitoring Well EB59) at the western end of the plume, and of the No.6 fuel oil-product (specific gravities of 0.990 and 0.991 at Monitoring Wells EB69 and EB62, respectively) at the eastern end of the plume. Lighter product-specific gravity obtained from NAPL samples from monitoring wells at the nearby Pier 6 and Low Sulfur Tank Field indicates that the Plume No. 1 is not related to these other occurrences of floating NAPL.

As part of the Pier No 7 NAPL IRM, NAPL fingerprinting was conducted; results indicated that there is a mixture of NAPL in this area ranging from heavily degraded gasolines and diesel products to "fresh" heavy fuel oil, No. 6 fuel oil, and high viscosity lube base stock (Dan Raviv Associates, Inc. 1995c). NAPL samples from the Pier No. 7 Area were submitted for chemical analysis, the results indicating the presence of benzene, chlorobenzene, and xylenes (Dan Raviv Associates, Inc. 1995c). The original NAPL source is unknown, but may be related to ASTs that were present near Pier 7 between 1921 and 1970, or to a former oil-water separator that operated in the area between 1932 and 1970 (Geraghty & Miller 1994b). Additional potential migration pathways include backfilled sewer and piping trenches.

Two relatively small NAPL plumes (Plumes No. 2 and 3) were identified to the north and south of Pier 6 (see Figure 5-5). Apparent NAPL thicknesses ranged from 0.16 foot in a temporary well point installed in Soil Boring PESTSB2 to 1.05 feet at Monitoring Well EBR18 (see Table 4-1). NAPL specific gravity measurements by Geraghty & Miller indicate that the NAPL is in the kerosene/lube oil range (specific gravities of 0.851 and 0.852 at Monitoring Wells EBR71, EB72, and EBR18, respectively). DRAI obtained similar NAPL specific gravity results (0.851 to 0.854) for the Pier 6 area (Dan Raviv Associates, Inc. 1995b). The Pier 6 area has been a marine terminal since the early 1900s, and most likely the source of the NAPL is from historical spills (Dan Raviv Associates, Inc. 1995b).

Temporary well points installed by Geraghty & Miller during Phase IA of the RI in locations to the west north and south of Plumes 2 and 3 indicated that they are isolated and is not contiguous with the nearby Pier 7 (Plume No. 1) and Low Sulfur Tank Field plume (Pier No. 4).

- Low Sulfur and Solvent Tank Fields

A relatively large NAPL plume (Plume No. 4) is present in this area (Figure 5-5). The plume is centered in the vicinity of Tank 1066, and extends to the northwest toward Tank 1026, to the southeast toward Tank 1068, and to the east toward Tank 1035. NAPL thicknesses ranged from 0.51 foot at Monitoring Well EB81 to 13.6 feet at Monitoring Well MW8, located at the northeastern plume edge (see Table 4-1). Two types of NAPL appear to be present in this area. NAPL specific gravity measurements from various NAPL samples in the area indicate primarily a light product (specific gravity of 0.780 to 0.807). GC fingerprinting analyses of the NAPL in this area confirms that the NAPL has gasoline and kerosene characteristics. Analytical results of NAPL samples indicated that benzene, toluene, ethylbenzene, and xylene (BTEX), and naphthalene, PAHs, and lead are the major constituents present in the NAPL. This NAPL layer has been observed floating on the water table in this area since 1980. The source of this NAPL is likely to be from historical spills that occurred prior to 1967 when gasoline was stored in former ASTs in this area (Geraghty & Miller, Inc. 1994b).

A smaller, more localized pocket of heavier NAPL was observed in the vicinity of Tank 1066. This NAPL has a specific gravity of 0.990 and is indicative of a heavy fuel oil, such as No. 6 fuel oil or catalytic cracking fractionator tower bottoms (see Table 5-9). This NAPL was described as a viscous dark brown to black material (Dan Raviv Associates, Inc. 1993a). The source of this NAPL may be related to a historical release that occurred from Tank 1066 (Geraghty & Miller, Inc. 1994b).

- General Tank Field

  Two floating NAPL plumes (Plumes No. 5 and 6) are defined within the General Tank Field, not including the portion of Plume No. 1 in the southeast corner of the tank field that extends into the area from the Piers and East Side Treatment Plant Area (see Figure 5-5). The first plume (Plume No. 5) is located in the north-central portion of the tank field, where one temporary well point (Soil Boring GTFSB2) and one Phase IA monitoring well (Monitoring Well GMMW10) showed floating NAPL in the range of 0.24 to 0.3 foot. The second plume (Plume No. 6) is located along the southern perimeter of the tank field, where temporary well points at Soil Borings GTFSB8 and GTFSB9 showed 1.2 feet and 2.07 feet of floating NAPL, respectively. A NAPL sample from Plume No. 6 had a specific gravity of 0.960, which is characteristic of No. 6 fuel oil. The NAPL in the northern plume appeared to be visually similar (i.e., very thick, black, weathered NAPL). The NAPL observed in the General Tank Field is most likely the result of historical spills from former ASTs that were located in the area between 1925 and 1974 and potentially from a pump house that operated near Soil Boring GTFSB8 between 1925 and 1951 (Geraghty & Miller 1994b). The two plumes may be contiguous since there is a lack of data points between them (see Figure 5-5).

- AV-Gas Tank Field and Domestic Trade Area (includes southern part of Interceptor Trench)

  One NAPL plume (Plume No. 7) has been identified in this area. This plume occupies most of the AV-Gas Tank Field and extends southward into the Asphalt Plant Area. NAPL thicknesses ranged from 0.20 foot in the northern portion of the Asphalt Plant at the temporary well point for Soil Boring APSB4 to 9.9 feet in IRM Monitoring Well ITMW1 (see Tables 4-1 and 5-8). NAPL specific gravities in the interior part of the Tank Field were 0.965 (at Soil Boring AGTFSB3) and 0.970 (at Soil Boring AGTFSB4). These specific gravities are indicative of lube oils and No. 6 fuel oil products, and probably reflect historical spills from former ASTs (1932 to 1940), a former crude stills facility (1920 to 1930), or two historical oil-water separators (1940 and 1945); the tank field is currently used to store aviation fuel. Specific gravities obtained from NAPL samples at Monitoring Well ITMW1, located on the northern perimeter of the tank field and closer to the interceptor trench, indicated much lighter NAPL in this area, with a specific gravity of 0.830, which is in the diesel/aviation fuel range. The source of the light NAPL identified in Monitoring Well ITMW1 could be related to a diesel spill (amount unknown) that was discovered north of Tank 1014 in 1992 (Geraghty & Miller 1994b).

Considering the absence of floating NAPL in the upgradient well point and monitoring well locations that surround the AV-Gas Tank Field, the upgradient side of this NAPL plume is considered to be well defined. However, a performance evaluation conducted on the interceptor trench determined that the NAPL identified in IRM Monitoring Well ITMW1 is not being captured by the trench (Dan Raviv Associates, Inc. 1995a). DRAI has proposed additional monitoring wells to further evaluate the extent of the floating NAPL and the effects of the interceptor trench to the east (Dan Raviv Associates, Inc. 1995a).

- Asphalt Plant and Exxon Chemicals Plant (includes Utilities Area)

Two NAPL plumes (Plumes No. 8 and 9) have been identified in this area, not including Plume No. 7, which occupies most of the AV-Gas Tank Field and extends into the Asphalt Plant Area. The first and larger of the plumes (Plume No. 8) is located in the northwestern portion of the Chemicals Plant and Asphalt Plant Areas (Figure 5-5). Measured NAPL thicknesses ranged from 0.34 foot at historical Monitoring Well MW2 to 1.58 feet at the Phase IA temporary well point at Soil Boring ECPSB2 (see Table 5-8). NAPL samples collected from two of the temporary well point locations showed specific gravities of 0.968 and 0.970 at Soil

Borings EC2SB1 and ECPSB2, respectively. These specific gravities are indicative of a heavier (or weathered) hydrocarbon, such as a No. 6 fuel oil or asphalt.

The second plume (Plume No. 9) is located along the southern boundary of the Utilities Area and extends into the No. 3 Tank Field. Apparent NAPL thickness in this area ranges from 0.11 foot to 4.67 feet (see Tables 4-1 and 5-8). NAPL specific gravities ranged from 0.853 to 0.870, as measured in NAPL samples from Monitoring Wells GMMW5 and GMMW18. This range may be indicative of lube oil or No. 2 fuel oil. There are many potential sources of the NAPL identified in the central portion of the Site, including spills related to former ASTs, a spill from Tank 916 in the No. 3 Tank Field (discovered in August 1978, unknown product and amount spilled), numerous documented asphalt spills to the ground, and several documented spills of slop oil and various Exxon lube oil additives (with specific gravities between 0.88 and 0.89) in the Chemicals Plant Area (Scerbo 1995, Geraghty & Miller, Inc. 1994b).

- No. 3 Tank Field

One NAPL plume (Plume No. 10) was identified in this area, as depicted on Figure 5-5, not including Plume No. 9, which is described in the Chemicals Plant Area although it extends into the No. 3 Tank Field. Apparent NAPL thicknesses ranged from 0.41 foot to 4.81 feet (see Tables 4-1 and 5-8). NAPL specific gravities ranged from 0.830 to 0.841 as measured from NAPL samples at Monitoring Wells GMMW7 and GMMW16 (see Table 5-9). This range is indicative of a naphtha that was stored in the tank field (Bruzzi 1995) or a kerosene-range product. Temporary well points and soil borings completed between Plume Nos. 9 and 10 did not contain floating NAPL, indicating that these two plumes are distinct and separate. Potential sources of the NAPL identified in the No. 3 Tank Field include former ASTs that were in operation between 1921 and 1970 in the area east of present Tank 921, a former oil-water separator located south of Tanks 902 and 903, and spills at Tank 920 (500 gallons of F540 [powerformer feed stock, light product similar to kerosene] in January 1988) (Geraghty & Miller, Inc. 1994b, Scerbo 1995).

- No. 2 Tank Field and Main Building Area (includes northern part of Interceptor Trench)

Two NAPL plumes (Plumes No. 11 and 12) have been identified in this area, not including the portion of the NAPL plume (Plume No. 13) that extends into the area from the "A"-Hill Tank Field (Figure 5-5). The two plumes represent two isolated areas of floating NAPL along the northern and eastern/southeastern portion of the Main Building Area near the interceptor trench (see Figure 5-5).

In the northern area (Plume No. 11), five IRM monitoring wells contained floating NAPL at thicknesses ranging from 0.1 foot at Monitoring Well EB42 to 2.87 feet at Monitoring Well EB36 (see Table 4-1). Specific gravity measurements were performed on a NAPL sample from Monitoring Well ITMW4 and showed a specific gravity of 0.971, which is indicative of a heavy No. 6 fuel oil.

The second plume (Plume No. 12) is located north and east of the inter-refinery pipeline (IRPL) pump pad (see Figure 5-5). Three IRM monitoring wells and one Phase IA temporary well point location showed floating NAPL at thicknesses ranging from 0.11 foot at Soil Boring MBSB3 to 2.98 feet at IRM Monitoring Well ITMW2. Specific gravity measurements performed on a NAPL sample from Monitoring Well ITMW2 showed a NAPL specific gravity ranging from 0.866 to 0.870, which is characteristic of diesel or No. 2 fuel oil. These specific gravity values are similar to those obtained by DRAI during the Interceptor Trench NAPL IRM investigation (Dan Raviv Associates, Inc. 1995a).

The source of the heavy NAPL identified near the interceptor trench is most likely related to spills associated with historical ASTs that were in operation in the northern part of No. 2 Tank Field and extended into the AV-Gas Tank Field and Main Building Area between 1921 and 1970 or from sweetening stills that operated in this area, circa 1920 (Geraghty & Miller, Inc. 1994b). A performance evaluation completed on the interceptor trench in June 1995 indicated that the NAPL in the two areas defined above is being captured by the trench, either by natural gradients, or by pumping-influenced conditions (Dan Raviv Associates, Inc. 1995a).

- "A"-Hill Tank Field

One floating NAPL plume (Plume No. 13) has been identified in this area (Figure 5-5). The plume is centered on the "A"-Hill Tank Field and extends into the eastern portion of the Main Building Area (Figure 5-5). Five temporary well points installed in the "A"-Hill Tank Field and neighboring Main Building Area showed floating NAPL with similar NAPL specific gravities (see Figure 5-5). NAPL thickness in this area ranged from 0.11 foot at Soil Boring AHTFSB2, located in the northeastern portion of the tank field, to 6.56 foot at Soil Boring AHTFSB4, to 8.0 feet at Soil Boring MBSB2 located near the Main Building. Two NAPL samples obtained from well points installed within the tank field, and also from the well point installed near the Main Building, showed identical NAPL specific gravities of 0.820, which is indicative of a diesel-range product. IRM monitoring wells located on the up- and downgradient perimeter of the tank field have shown only trace amounts of floating NAPL, indicating that this NAPL is, for the most part, contained in the interior of the tank field.

Storage tanks that are still in operation in the "A"-Hill Tank Field currently hold heating oil. Historically, these tanks were known to contain heating oils and process gas oils. Two historical spills have been documented in this area, including a 252,000-gallon spill of heating oil that occurred at Tank 514 in October 1978 and a 42,000-gallon spill of process gas oil (heavy feed stock for gasoline refining) that occurred at Tank 508 in February 1983 (Geraghty & Miller, Inc. 1994b). Process gas oil is stored in heated tanks, and considering that the spill was in February, it is likely that the spilled material congealed quickly and did not penetrate beyond the top few inches of soil. Accordingly, the heating oil spill is the probable source for Plume No. 13.

- Lube Oil Area and Stockpile Area (includes Platty Kill Canal)

Three NAPL plumes (Plumes No. 14, 15, and 16) have been identified in this area (Figure 5-5). One of the plumes (Plume No. 14) is located in the Lube Oil Area, and two are located in the Stockpile Area (Plumes No. 15 and 16). The first plume (Plume No. 14) is located in the northern part of the Lube Oil Area, to the east and northeast of Sub Station #18. This plume is defined by four historical monitoring wells and one Phase IA monitoring well containing floating NAPL. NAPL thicknesses ranged from 0.12 foot at Soil Boring EB24, located at the northern plume perimeter, to 0.77 foot at Monitoring Well GMMW1 located adjacent to the Blending and Packaging Warehouse. NAPL specific gravities for this plume ranged between 0.885 and 0.895, indicating a lube No. 2 oil-range product. The source of the floating NAPL in the northern portion of the Lube Oil Operational Area may be related to historical spills at two former pump houses (1932 to 1945) and at two tank car/tank truck loading racks (1932 to 1951) (Geraghty & Miller, Inc. 1994b). These facilities were located in the area between Monitoring Wells GMMW1 and EB24 (see Figure 5-5). A more likely source is the significantly damaged sewer which exists at the eastern edge of this plume. This sewer line formerly conveyed pumpage from the Interceptor Trench, which would have been water with small amounts of oil. This type of leakage could explain the large, but very thin plume observed in this area which has no apparent source area with greater NAPL thickness (Chapman 1995).

The Stockpile Area contains two shallow NAPL plumes (Plumes No. 15 and 16) in the unconsolidated fill/alluvium and a NAPL plume in the deeper, confined unconsolidated deposits (see Figure 5-5). Both of the shallow NAPL plumes extend to the east into the Lube Oil Area. Apparent NAPL thicknesses in the shallow plumes ranged from 0.11 foot at Monitoring Well GMMW12 in the northern plume to 3.23 feet in the temporary well point installed at Soil Boring LOSB8 in the southern plume (see Tables 4-1 and 5-8). NAPL specific gravities of 0.916 at the temporary well point at Soil Boring SSB-1 in the northern plume and of 0.907 at Monitoring Well EB19 in the southern plume are indicative of lube oil. Several historical oil-water separators (which operated between 1921 and 1959) located near Soil Boring LOSB1, lube oil spills at Tanks 106 and 107, and an existing loading rack could be the source or sources of the NAPL identified as Plume No. 15.

Three IRM monitoring wells completed in deeper, confined unconsolidated deposits also contained measurable amounts of NAPL. NAPL plumes in the intermediate zone are depicted on Figure 4-5. Apparent NAPL thicknesses in the deeper wells ranged from 0.75 foot at Monitoring Well PKMW14 to 9.34 feet at Monitoring Well PKMW11. NAPL specific gravity obtained from samples in the deeper wells were indicative of a lighter product (0.870 to 0.882). GC fingerprinting conducted on NAPL samples from Monitoring Wells PKMW11 and PKMW12 indicated that the NAPL is similar to jet fuel (Dan Raviv Associates, Inc. 1994b). Heavier product (a specific gravity of 0.920) was identified in one of the deep monitoring wells (Monitoring Well PKMW14), located at the northwestern edge of the plume. This observation may indicate a different source, and a potential mixing zone. A number of historical activities, as well as other unknown factors, may be sources of these plumes.

- Pier No.1 (includes Helipad Area)

During the synoptic low-tide groundwater level measuring event, a floating NAPL plume (Plume No. 17) was measured in many of the IRM monitoring wells located near the old No. 1 Pier and Helipad IRM areas (see Figure 5-5). Apparent NAPL thicknesses ranged from 0.19 foot at several monitoring wells in the southern and southeastern portion of this area to 4.18 feet at Monitoring Well EB12 (see Table 4-1). NAPL samples obtained from four IRM monitoring wells indicated specific gravities of 0.885 to 0.995. This range is indicative of a mixture of lube oils and heavier fuel oils, such as No. 6 fuel oil. Potential sources of the NAPL identified in the Pier No. 1 and the Helipad IRM area could be related to several loading/filling racks that operated near, north, and east of Monitoring Well EB12 between 1932 and 1945 (Geraghty & Miller, Inc. 1994b). The heavier NAPL (specific gravity of 0.995) was identified at Monitoring Well EB13, located at the western edge of the plume. NAPL samples collected as part of the Helipad NAPL IRM investigation indicate that the shallow NAPL is primarily composed of base neutral extractable compounds and benzene, toluene, and xylene (BTX) compounds.

This source may be related to two pump houses (No. 3 and No. 22), a loading rack, and former ASTs that were in operation between 1921 and 1951 in the area of the western portion of this plume (presently near Monitoring Wells EB6 and EB13) (see Figure 5-5). Monitoring wells completed in the deeper, confined unconsolidated deposits (Monitoring Wells GMMW21I and GMMW21D) did not contain floating NAPL, indicating that the NAPL observed in this area is confined to the shallow water-bearing zone. Temporary well points and/or soil borings completed along the property boundary to the east and at the southern edge of the tank field to the north did not contain floating NAPL. This lack of floating NAPL indicates that the plume does not extend onto adjacent property to the east and also does not extend significantly to the north. However, few data points are available to the west and northwest of the plume (see Figure 5-5).

A summary of the Phase IA RI findings with respect to the NAPL plumes discussed above, and a discussion of NAPL and contaminant fate and transport in the various plume areas, is provided in Section 7.0 (Data Evaluation, Hypothesis Development, and Conclusions) of this report.

5.3 GROUNDWATER QUALITY AT THE BAYONNE PLANT

A total of 48 groundwater samples, including associated QA/QC samples, was collected from monitoring wells and drivepoints at the Bayonne Plant as part of Phase IA of the RI. Groundwater samples collected from 31 monitoring wells were analyzed for TPH, TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TAL metals, and miscellaneous inorganic parameters. In addition, groundwater samples collected from 13 temporary drivepoints were analyzed for TCL VOCs. Analytical results of groundwater samples for TPH, TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TAL metals, and miscellaneous inorganic parameters are provided in Tables 5- 11 through 5-16. The number of groundwater samples from drivepoints is relatively small because NAPL was frequently encountered.

To evaluate constituent concentrations in groundwater underlying the Bayonne Plant, analytical results were compared to the NJDEP groundwater quality standards. This groundwater classification represents groundwater that is suitable for potable water use following treatment. As groundwater underlying Constable Hook is not used as a potable water supply, the application of these groundwater standards to the Bayonne Plant provides a very conservative comparison. A summary of the minimum and maximum quantified concentration of constituents detected in groundwater and the percentage of samples with constituent exceedances is provided in Table 5-17. Exceedances of the groundwater quality standards for organic compounds, metals, and inorganic constituents are shown on Figures 5-6 and 5-7. It also provides the geometric mean concentration for each constituent for the whole site summary section. This methodology was selected over the arithmetic mean because the data distributions were not normal and frequently tended to resemble a log normal distribution. It may not be meaningful for all constituents. The number and distribution of data points should be evaluated when using this mean value for decision making.

The following sections provide a brief discussion of field QA/QC groundwater samples and laboratory analytical results by fraction.

5.3.1 Summary of Field QA/QC for Groundwater Samples

The QA/QC measures for Phase IA groundwater and drivepoint samples were conducted according to the QAPP, as provided in Appendix C of the RI Work Plan (Geraghty & Miller, Inc. 1993a) and are consistent with NJDEP guidance (NJDEPE 1992a). Sample collection and handling procedures and QA/QC sample collection frequency are discussed in Section 3.9 (Quality Assurance/Quality Control) and in the RI Work Plan (Geraghty and Miller, Inc.1993a). Analytical results for aqueous replicate samples, field blanks, and trip blanks associated with the samples collected during the RI are summarized below and are discussed in detail in Appendix J.

Two field replicates were collected in conjunction with drivepoint groundwater sampling at the Bayonne Plant. Both replicates were analyzed for VOCs only, similar to drivepoint groundwater samples. The analytical results for each replicate were compared against the result for its associated groundwater sample to verify that the reported values for each constituent did not vary by more than 50 RPD (USEPA 1992a). Both sample and replicate pairs met the criteria.

Two field replicates were collected in conjunction with groundwater sample collections from monitoring wells at the Bayonne Plant. Samples and field replicates were analyzed for the full suite of compounds as well as miscellaneous inorganic parameters (such as BOD, COD, nitrate, sulfide, alkalinity, total phosphorus, sulfate, TDS, ammonia, organic carbon, and chloride) and dissolved gases (carbon dioxide, carbon monoxide, dissolved oxygen, methane, and dissolved oxygen). Both groundwater sample/replicate pairs exceeded the standards for some metals and inorganic constituents. The analytical results from the field replicates associated with the Phase IA monitoring well and drivepoint groundwater sampling indicate that, both from an overall view and for the significant constituents, the analytical data from Phase IA water samples are precise.

Trip blanks were analyzed to determine if contamination was introduced into the sample during shipment or storage on-site. Field blank results were analyzed to determine if the sampling tools or decontamination techniques affected the integrity of the analytical results for samples collected in the field. The analytical results of each field and trip blank were compared to the results of all groundwater samples collected on the same day to identify constituent concentrations in the samples that were potentially raised above the NJDEP groundwater standards because of cross-contamination from the sampling containers, sampling equipment, field conditions, or filtering equipment.

Five field blanks and five trip blanks were prepared on days when groundwater samples were collected from monitoring wells at the Bayonne Plant. The field blanks were analyzed for the full suite of compounds that samples were analyzed for. The metals analyses were for the dissolved constituents only, except for cyanide, which was quantitated as total cyanide. Five samples were analyzed for both dissolved and total metals to satisfy NJDEP requirements according to the Field Verification Procedures and Analysis Plan (Geraghty & Miller, 1993b). The field blank associated with these samples was also analyzed for both dissolved and total metals. Trip blanks were analyzed for TCL VOCs plus site-specific compounds. Dissolved metals, phthalates, and common VOC laboratory contaminants were detected in all the field blanks at low concentrations, but these detections are not believed to have any significant effect on sample results. Two field blanks were reported with low concentrations of two pesticides, but these results did not impact the sample results. Acetone, methylene chloride, and chlorobenzene were detected in the trip blanks at low concentrations.

In general, the analytical data for field blanks and trip blanks prepared on days when groundwater samples were collected from drivepoints and monitoring wells at the Bayonne

Plant indicate that the data are useable and that no significant cross-contamination occurred during sampling activities or decontamination procedures.

5.3.2 Groundwater Sampling Laboratory Analytical Results

As part of Phase IA of the RI, a total of 48 groundwater samples was submitted to the laboratory for analysis. These samples included groundwater samples collected from 31 monitoring wells, 13 drivepoints, and four field replicate groundwater samples. Groundwater samples from 21 Phase IA monitoring wells and ten existing monitoring wells were analyzed for TPH, TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TAL metals, and miscellaneous inorganic constituents. Groundwater samples from monitoring wells containing NAPL were not submitted for laboratory analysis due to the obvious presence of floating petroleum hydrocarbons. Analytical results of groundwater samples collected from monitoring wells were used to evaluate the groundwater quality in three different hydrostratigraphic zones. These samples consisted of the following: 24 groundwater samples from wells screened in the shallow overburden (primarily fill), three groundwater samples from intermediate overburden wells, and four groundwater samples collected from monitoring wells screened in the deep overburden, immediately above the bedrock.

5.3.2.1 Total Petroleum Hydrocarbons in Groundwater

Of the 31 groundwater samples collected from monitoring wells and analyzed for TPH, 30 of the samples (97 percent) exceeded the groundwater quality standard of 1 milligram per liter (mg/L) for TPH (Table 5-11). TPH concentrations in groundwater samples collected during the Phase IA RI are provided in Table 5-11.

All 24 groundwater samples collected from shallow overburden monitoring wells exceeded the groundwater quality criterion for TPH. TPH exceedances ranged from 4.25 to 121 mg/L in groundwater samples from shallow wells (Figure 5-6). TPH exceedances are widespread and are indicative of the long history, the site-wide refinery and petroleum storage operations, and the permeable nature of the cinder fill materials used over significant areas of the Site. Seventeen of the 24 shallow groundwater samples had TPH concentrations ranging from 4.25 to 25 mg/L. The highest concentrations of TPH were reported in Monitoring Wells GMMW3, GMMW10, and GMMW15 at 42.1 mg/L, 121 mg/L, and 40.2 mg/L, respectively. The highest TPH concentrations were found in the vicinity of the General Tank Field, the MDC Building Area, and the Asphalt Plant Area (Figure 5-6).

TPH exceeded the groundwater quality criterion of 1 mg/L in the samples from the three intermediate monitoring wells (Figure 5-6). TPH concentrations of 1.85 mg/L, 3.37 mg/L, and 14.1 mg/L were reported in intermediate Monitoring Wells GMMW21I, GMMW23I, and GMMW24I, respectively.

TPH was detected in three of the four deep overburden monitoring wells sampled (Figure 5-6). Groundwater samples collected from Monitoring Wells GMMW22D, GMMW23D, and GMMW24D had concentrations of TPH slightly exceeding the groundwater quality criterion. TPH concentrations in these samples were reported at 1.1 mg/L, 1.15 mg/L, and 3.08 mg/L, respectively.

The relatively lower TPH concentrations detected in the intermediate and deep overburden monitoring wells compared to the TPH concentrations in the shallow zone may be indicative of one or more of the following: background groundwater quality, limited downward migration of petroleum hydrocarbons from the shallow zone, and interconnection between the surrounding waterways and the intermediate and deep hydrogeologic zones.

5.3.2.2 Volatile Organic Compounds in Groundwater

Of the 48 groundwater samples collected from monitoring wells and drivepoints and analyzed for TCL VOCs, 26 samples (54 percent) exceeded the NJDEP groundwater quality standards for one or more VOCs (Table 5-11). VOC concentrations in groundwater samples collected during the Phase IA RI are provided in Table 5-11. Thirteen VOCs exceeded the groundwater quality standards in at least one sample. The bulk of the exceedances were for petroleum hydrocarbon constituents, such as benzene, chlorobenzene, and xylene. Benzene exceeded the groundwater quality criterion at a frequency of approximately 41 percent.

Of the 37 groundwater samples collected from shallow overburden monitoring wells and drivepoints, 19 samples (51 percent) exceeded the groundwater quality standards for VOCs. Exceedances were reported for one or more monitoring wells in the Lube Oil Area, Main Building Area, Exxon Chemicals Plant Area, Utilities Area, General Tank Field, Low Sulfur and Solvent Tank Fields (Tank 1066 area), and Pier No. 7 Area (Figure 5-6). In many of these areas, concentrations of dissolved benzene in the groundwater were located downgradient or in the vicinity of floating NAPL plumes. The greatest number of exceedances were for benzene, chlorobenzene, and xylenes. At Monitoring Well MW6, located immediately downgradient of the Low Sulfur Tank Field, 1,2-dichloroethene (1,2-DCE) and vinyl chloride were reported in exceedance of the NJDEP standards.

Groundwater samples collected from the three intermediate overburden monitoring wells at the Bayonne Plant exceeded the NJDEP groundwater quality standards for one or more VOCs. Benzene and 2-butanone (MEK) exceeded the groundwater quality standards in Monitoring Wells GMMW23I and GMMW24I, respectively (Figure 5-6). Benzene and several chlorinated VOCs were reported in Monitoring Well GMMW22I in the Pier No. 1 Area. These chlorinated VOCs were 1,2-DCE, tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride. The source of these constituents is not known.

VOCs exceeded the NJDEP groundwater quality standards in groundwater samples collected from the four Phase IA deep overburden monitoring wells at the Bayonne Plant. Chloroform and/or bromodichloromethane exceeded the groundwater quality standards in Monitoring Wells GMMW22D, GMMW23D, and GMMW24D (Figure 5-6). Acetone exceeded the groundwater quality standards in Monitoring Well GMMW21D. The source of these VOCs in the deep overburden zone is not known.

5.3.2.3 Semivolatile Organic Compounds in Groundwater

Of the 31 groundwater samples collected from monitoring wells and analyzed for TCL SVOCs, six samples (19 percent) exceeded the NJDEP groundwater quality standards for one or more SVOCs (Table 5-12). SVOC concentrations in groundwater samples collected during Phase IA of the RI are provided in Table 5-12. SVOCs that exceeded the criteria consisted of 1,4-dichlorobenzene, naphthalene, 2,4-dimethylphenol, 2-methylnaphthalene, and pentachlorophenol. Naphthalene most frequently exceeded the groundwater quality criterion. SVOC exceedances for groundwater samples collected during the Phase IA RI are shown on Figure 5-6.

Of the 31 samples analyzed for TCL SVOCs, four samples from shallow monitoring wells exceeded the NJDEP groundwater quality standards. Naphthalene exceeded the standard in one monitoring well in each of the following areas: the Asphalt Plant Area, the No. 2 Tank Field, and the Low Sulfur and Solvent Tank Fields (Figure 5-6). 1,4-dichlorobenzene exceeded the standard in Monitoring Well GMMW3 in the Asphalt Plant Area. 2,4-Dimethylphenol and 2-methylnaphthalene exceeded the NJDEP groundwater standard in Monitoring Well MW10 in the Solvent Tank Field. 2-Methylnaphthalene exceeded the standard in Monitoring Well GMMW2 in the No. 2 Tank Field. These SVOCs were detected in the vicinity of floating NAPL plumes in the Asphalt Area and the Tank 1066 Area and may be associated with the dissolution of floating NAPL constituents into the groundwater.

Of the three groundwater samples collected from intermediate monitoring wells at the Bayonne Plant, one sample from Monitoring Well GMMW21I had a concentration of pentachlorophenol in exceedance of the NJDEP groundwater quality standards.

No SVOCs exceeded the groundwater quality standards in the four deep overburden monitoring wells.

5.3.2.4 Pesticides and PCBs in Groundwater

Of the 31 groundwater samples collected from monitoring wells at the Bayonne Plant, two samples (6 percent) exceeded the NJDEP groundwater quality standards for two pesticides (Table 5-13). No PCBs were detected in the groundwater samples collected as part of the Phase IA RI. Pesticide and PCB concentrations in groundwater samples collected during the Phase IA RI are provided in Table 5-13. Pesticide exceedances for groundwater samples are included on Figure 5-6.

A total of 24 groundwater samples from shallow monitoring wells was analyzed for pesticides and PCBs. Of the 24 samples, 4,4'-DDT was reported at a concentration of 0.12 micrograms per liter (ug/L) in a groundwater sample from Monitoring Well GMMW17 in the No. 3 Tank Field (Figure 5-6). No other exceedances were reported in groundwater samples from shallow monitoring wells.

One pesticide, alpha-BHC, was estimated at a concentration of 5 ug/L in a sample from one of the three intermediate monitoring wells, Monitoring Well GMMW21I (Figure 5-6). Pesticides did not exceed the groundwater standards in the other two intermediate monitoring wells.

Pesticides or PCBs were not reported at concentrations exceeding the groundwater quality standards in groundwater samples collected from the four Phase IA deep overburden monitoring wells.

5.3.2.5 Metals in Groundwater

Thirty-one groundwater samples were collected from monitoring wells at the Bayonne Plant as part of the Phase IA RI; these samples were filtered in the field and analyzed for TAL metals. The resulting data represent dissolved metals in the groundwater. In addition, five of the 31 groundwater samples (16 percent) were submitted to the laboratory in unfiltered form to assess the relative concentration of total metals in groundwater. Iron and manganese were analyzed for total and dissolved metals for 27 of the 31 groundwater samples. Analytical results of total and dissolved metals in groundwater samples are provided in Tables 5-14 through 5-15. Exceedances of total and dissolved metals in groundwater samples are shown on Figure 5-7.

Of the 31 groundwater samples analyzed for TAL metals, 29 of the samples had exceedances of one or more dissolved metals (Figure 5-7). Iron and manganese were the most frequent exceedances of the NJDEP groundwater quality standards. Elevated concentrations of dissolved iron and manganese in almost all of the groundwater samples analyzed are likely indicative of background or regional groundwater quality conditions.

Twenty-four groundwater samples collected from monitoring wells screened in the shallow overburden were analyzed for TAL dissolved metals. Exclusive of the widespread exceedances of iron and manganese, 20 of the 24 samples exceeded the groundwater quality standards for one or more other dissolved metals. Dissolved sodium and/or aluminum exceeded the groundwater criteria in 16 of the 24 samples. These exceedances are probably indicative of background groundwater quality. Dissolved lead and arsenic exceeded the criteria at frequencies of approximately 6 and 23 percent, respectively. Dissolved lead and arsenic exceedances occurred in one or more shallow monitoring wells in the General Tank Field, Asphalt Plant, No. 2 Tank Field, Lube Oil Area, and Pier No. 1 Area (Figure 5-7). Dissolved chromium exceeded the NJDEP groundwater quality standards at three locations. These locations were Monitoring Well GMMW17 in the No. 3 Tank Field, Monitoring Well MW6 in the Low Sulfur Tank Field, and Monitoring Well EBR19 in the Pier No. 6 Area.

Shallow Monitoring Wells MW6 and EBR19 in the vicinity of the Low Sulfur Tank Field and Pier No. 6 areas revealed sporadic exceedances of additional dissolved metals (Figure 5-7). These additional metals consisted of antimony, beryllium, cadmium, cobalt, nickel, and verillium. The source of these miscellaneous metals may be related to the former Case & Can Plant, which was historically located in the MDC Building and Pier No. 6 Areas.

Groundwater samples collected from the three Phase IA intermediate wells at the Bayonne Plant exceeded the groundwater quality standards for the similar suite of metals reported in shallow overburden wells (Figure 5-7). Exclusive of iron and manganese, which were also elevated in the intermediate wells, there were exceedances for dissolved arsenic, sodium, and lead. Monitoring Well GMMW24I, in the Pier No. 6 Area, exhibited additional dissolved metals, specifically antimony, beryllium, cadmium, chromium, cobalt, and nickel.

Exceedances of one or more dissolved metals were reported in groundwater samples collected from the four deep overburden monitoring wells installed as part of the Phase IA RI. Two of the four monitoring wells exceeded the groundwater standards for dissolved iron and manganese. A groundwater sample from Monitoring Well GMMW21D exceeded the criteria for dissolved aluminum and sodium. Monitoring Well GMMW23D exceeded the groundwater criteria for dissolved sodium and arsenic.

5.3.2.6 Miscellaneous Inorganic Compounds in Groundwater

Groundwater samples collected from 27 monitoring wells during Phase IA of the RI were analyzed for miscellaneous inorganic compounds. Groundwater samples were collected from ten shallow Phase IA monitoring wells, ten existing shallow monitoring wells, three intermediate monitoring wells, and four deep overburden monitoring wells. Miscellaneous inorganic compounds consisted of various wet chemistry parameters and intrinsic biological parameters, which included dissolved gases. Concentrations of inorganic compounds for each of the groundwater samples analyzed are provided in Table 5-16.

Chloride concentrations in groundwater samples ranged from 5.47 to 11,300 mg/L. Approximately 11 of the 27 groundwater samples exceeded the groundwater quality standard of 250 mg/L for chloride. TDS concentrations in groundwater samples ranged from 106 to 4,630 mg/L. Approximately 11 of the 27 groundwater samples exceeded the NJDEP standard of 500 mg/L. Overall, approximately one-third to one-half of the Bayonne Plant exceeds the criteria for both chlorides and TDS, as would be anticipated for a peninsular setting surrounded by the tidal estuaries of the Kill Van Kull and Upper New York Bay. However, these concentrations are not representative of Class III A groundwater. The minimum concentrations for Class III A groundwater are 3,000 mg/L for chloride and 5,000 mg/L for TDS.

Of the 20 groundwater samples collected from shallow monitoring wells, approximately ten samples (or 50 percent) had DO concentrations greater than 2 mg/L. DO data from shallow monitoring wells at the Bayonne Plant where NAPL and dissolved phase petroleum hydrocarbon constituents have been reported, indicate that site conditions are favorable for both aerobic and anaerobic biodegradation. Areas where groundwater has not been heavily impacted by organic contaminants tend to reflect moderate to high concentrations of DO. Case studies and the literature have shown that if sufficient DO (i.e., greater than 1 to 2 mg/L) is present in groundwater, aerobic biodegradation can degrade petroleum hydrocarbons at relatively higher rates than those achieved anaerobically (McAllister & Chiang 1994). Examples of such areas are Monitoring Wells EB29, EB1, and GMMW11. In areas of the plant that have sustained a higher degree of impact, the DO level has been depressed. Groundwater samples collected from intermediate and deep overburden wells generally yielded DO concentrations of less than 2 mg/L. When DO concentrations are depleted to less than 1 mg/L, anaerobic conditions prevail, and biodegradation of petroleum hydrocarbons can occur at relatively lower rates provided that nitrates, sulfates, or iron (ferrous iron) are available as electron acceptors. Examples of such areas are Monitoring Wells PKMW4, EBR13, and GMMW13, where DO levels are less than 1 mg/L. These monitoring wells are located in areas where floating NAPL and/or dissolved phase contaminants are present in groundwater.

Ammonia concentrations in groundwater samples range from 0.136 to 5.01 mg/L. The NJDEP groundwater quality standards for ammonia is 0.5 mg/L. Of the 27 groundwater samples analyzed, 15 samples exceeded the standard for ammonia.

Concentrations of sulfate range from 12.5 to 1,840 mg/L. Approximately 3 of the 20 groundwater samples collected from shallow monitoring wells exceed the NJDEP standard of 250 mg/L for sulfate. One of the three groundwater samples from intermediate wells, and three of the four groundwater samples from the deep overburden monitoring wells, exceeded the standards for sulfate. Concentrations of nitrate ranged from 0.063 to 3.2 mg/L. Nitrate concentrations were well below the NJDEP groundwater standard of 10 mg/L for nitrate. Nitrate and sulfate are electron acceptors that support the anaerobic biodegradation of contaminants. Concentrations of these analytes may be depressed as a result of anaerobic biodegradation processes. Examples of this are groundwater samples from Monitoring Wells MW6 and MW10, which exhibit relatively lower concentrations of sulfate and nitrate.

Certain anaerobic bacterial processes involved in the breakdown of organic compounds produce methane. Methane is commonly present in groundwater in reduced geochemical systems. Methane was detected in 16 of the 20 shallow monitoring wells sampled at concentrations ranging from 0.3 to 13.4 mg/L. Methane concentrations in groundwater samples from intermediate monitoring wells ranged from 0.3 to 3 mg/L, while methane was not detected in deep overburden monitoring wells.

TOC and COD provide a relative indication of the organic load to groundwater. COD values for groundwater samples from shallow monitoring wells ranged from 86 to 800 mg/L. TOC concentrations in the shallow zone ranged from 9.4 to 100 mg/L. Although the intermediate and deeper overburden zones indicate higher concentrations of COD, lower concentrations of TOC are manifested in these zones compared to the shallow overburden. Higher TOC in the shallow zone may be derived from organic contaminants in the shallow zone. Relatively higher COD in the intermediate and deep zones may be caused by anaerobic conditions that facilitate reduction of inorganic components in the water. These compounds may exert a high oxygen demand during COD analysis.

BOD_5 concentrations range from 6.4 to 74 mg/L for groundwater samples from shallow monitoring wells. Higher BOD_5 concentrations of 17 to 700 mg/L and 420 to 1,600 mg/L were reported for monitoring wells screened in the intermediate and deep overburden. The generally lower levels of BOD_5 in the shallow wells may be caused by the presence of elevated metals, potentially suppressing microbial activity of the test seed stock.

5.3.2.7 Field Parameters for Groundwater Samples

Field parameters were measured and recorded for groundwater samples from 25 shallow monitoring wells, three intermediate monitoring wells, and four deep monitoring wells during Phase IA of the RI. Measurement of field parameters was conducted concurrent with groundwater sampling activities on January 23 through January 27, 1995. Field parameters consisted of temperature, specific conductance, pH, DO, and redox potential. The parameters were recorded using a downhole probe, which was used to measure the parameters at approximately 2-foot intervals throughout the screened interval of each monitoring well. Measurement of the field parameters was conducted prior to and following monitoring well purging. Of the measurements recorded, the values recorded at the base of the water column in each monitoring well following purging were considered most representative of actual in-situ groundwater conditions. A summary of these field parameters is provided in Table 5-18. Additional field parameter data are included in Appendix O.

The temperature of the groundwater underlying the Bayonne Plant ranged from approximately 49 to 63 degrees Fahrenheit (°F). These temperatures are within the normal range for groundwater.

The pH for naturally occurring groundwater ranges from 6.0 to 8.5. The pH of groundwater underlying the Bayonne Plant was generally within this range. Lower pH values of 4.4 and 4.91 were measured in deep intermediate monitoring wells GMMW21D and GMMW22D. Higher pH values of 8.61 and 9.63 were measured for samples from shallow monitoring wells GMMW1 and GMMW2. Local variations in pH may be due to a number of factors, including oxidation reactions and to the aerobic biodegradation process, resulting in the production of carbon dioxide.

Specific conductance of groundwater is an indication of ion concentration. Specific conductance of groundwater samples collected from shallow, intermediate, and deep monitoring wells at the Site ranges from 100 to 9,280 micromhos per centimeter (umhos/cm). These values are similar to those for fresh to slightly brackish water. A typical specific conductance value for sea water is 50,000 umhos/cm. Local variations in specific conductance are likely to be due to variations in chloride, sulfate, nitrate, and hardness content.

DO concentrations of groundwater samples collected from shallow monitoring wells ranged from 0.39 to 11.73 mg/L. Approximately 15 of the 25 groundwater samples from shallow monitoring wells had DO concentrations of greater than 2 mg/L. Intermediate and deep overburden monitoring wells exhibited DO concentrations of less than 2 mg/L. Local variations in DO may be due to oxidation-reduction chemical reactions and/or may be indicative of active aerobic or anaerobic biodegradation processes. The field DO measurements are relatively consistent with those reported by the laboratory for groundwater samples.

Redox potential is a numerical index of the intensity of oxidizing or reducing conditions within a groundwater system. A positive value indicates a relatively oxidizing system, while a negative value indicates a relatively reducing system. Of the 25 shallow monitoring wells, 17 yielded negative values for redox potential. The three intermediate monitoring wells and two of the four deep overburden monitoring wells also indicated negative redox potential values. Thus, the results indicate that the majority of the shallow groundwater underlying the Site is under relatively reducing conditions, strongly implying that intrinsic bioattenuation processes are active at the Bayonne Plant. The intermediate and deep zones also appear to be reducing environments, perhaps because of the unavailability of oxygen in deeper zones.

6.0 OVERVIEW OF CONSTITUENT AND SITE PROPERTIES AFFECTING FATE AND TRANSPORT

Migration of the constituents detected at the Site is dependent on the physical and chemical properties of the constituents and the characteristics of the surrounding environment. This section discusses the composition of the petroleum hydrocarbons; the physical and chemical properties of the constituents; and the influence of those properties on the potential for migration in soil, groundwater, and air. This information will be used in the risk assessment to identify exposure pathways and to evaluate potential human health and environmental effects from exposure to the constituents of potential concern.

6.1 CHEMICAL STRUCTURE OF CONSTITUENTS DETECTED

The constituents detected in environmental media at the Site can be classified into several groupings. The basic groups are VOCs, SVOCs, pesticides/PCBs, and inorganics. Within each of these groups, the constituents can be classified into categories according to their similarity in chemical structure and/or physical-chemical properties (factors that influence mobility in the environment). The constituent categories and the constituents within each category that were detected at the Site at concentrations above the NJDEP non-residential and/or impact to groundwater soil cleanup criteria, and in groundwater above the NJDEP groundwater standards, are listed below. The metals shown with an asterisk in this list are those that were reported at concentrations of more than ten times the non-residential soil cleanup criteria.

- Constituents in Soil

  - Monocyclic aromatics: Benzene, chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, and xylenes.

  - PAHs: Benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, pyrene, and naphthalene.

- Amines: N-nitrosodiphenylamine.

- Pesticides: 4,4-DDD, 4,4-DDT, dieldrin.

- Inorganics: Arsenic*, beryllium, chromium, copper*, lead*, nickel, thallium, zinc, and chromium (although chromium does not have a cleanup criterion, its presence at the site warrants discussion).

- Constituents in Groundwater

    - Halogenated aliphatics: Bromodichlomethane, chloroform, 1,2-DCE, methylene chloride, PCE, TCE, and vinyl chloride.

    - Monocyclic aromatics: Benzene, chlorobenzene, 1,4-dichlorobenzene, ethylbenzene, and xylenes.

    - Ketones: Acetone and MEK.

    - PAHs: 2-Methylnaphthalene and naphthalene.

    - Phenols: 2,4-Dimethylphenol and pentachlorophenol.

    - Pesticides: alpha-BHC and 4,4-DDT.

    - Inorganics: Arsenic, antimony, beryllium, cadmium, chromium, cobalt, lead, and nickel.

6.2 PHYSICAL AND CHEMICAL PROPERTIES INFLUENCING CONSTITUENT MIGRATION

The environmental fate and transport of constituents are dependent on the physical and chemical properties of the constituents, the environmental transformation processes affecting them, and the media through which the constituents are migrating. This section will describe the primary physical and chemical properties that affect the fate and transport of the constituents. Key chemical and physical properties discussed in this section include water solubility, specific gravity, volatility, organic-carbon partition coefficient (K_{oc}), soil distribution coefficient (K_d), octanol-water partition coefficient (K_{ow}), and half-lives. Physical and chemical properties of the organic constituents are summarized in Table 6-1. The properties most often used to calculate K_d for organic constituents are the K_{oc}, which measures the selective affinity for soil organic carbon versus water, and the fraction of organic carbon (f_{oc}) in soil. In the absence of site-specific data, the K_d is expressed as the product of the K_{oc} and f_{oc} (USEPA 1989). The coal-derived cinders in the fill and the peat deposits under the fill at the Site are materials typically posessing relatively high f_{oc} values.

Solubilities of organic chemicals range from the low microgram per liter range to miscible, with most common organic chemicals having solubilities between 1 and 1,000,000 mg/L (Lyman et al. 1990). The ketones (acetone and MEK) are the most soluble constituents detected. The other VOCs are soluble, although to a lesser extent. The SVOCs tend to be less soluble; hence, there are fewer SVOCs detected in groundwater. None of the PAHs observed in soils, except naphthalene, was observed in the groundwater above the applicable NJDEP standards.

Organic compounds with Henry's law constants in the range of 10^{-3} atmospheres-cubic meter per mole (atm-m^3/mol) and greater, and with molecular weights equal to, or less than, 200 grams per mole (g/mol) can be expected to readily volatilize from water (i.e., VOCs). Organic compounds with values ranging from 10^{-3} to 10^{-5} atm-m^3/mol are associated with possibly significant, but not facile, volatilization, while compounds with values less than 10^{-5} atm-m^3/mol will only volatilize slowly from water and to a limited extent. The VOCs, with the exception of acetone and MEK, are expected to volatilize from water. Most of the other constituents detected are not expected to volatilize to an appreciable extent. Volatilization is the major removal mechanism from soil and surface water, and oxidation is the primary mechanism for atmospheric destruction of the monocyclic aromatic constituents.

The K_{ow} often is used to estimate the extent to which a constituent will partition from water into lipophilic parts of organisms, such as animal fat. Similarly, the K_{oc} reflects the propensity of a compound to adsorb to the organic matter found in soil or sediments. The bioconcentration factor (BCF) is the ratio of the concentration of the constituent in fish tissue to its concentration in water. As a group, the VOCs have low values of K_{ow}, K_{oc}, and BCF, indicating a tendency not to partition to soil from water. The SVOCs (PAHs) have higher values of K_{ow}, K_{oc}, and BCF and have strong tendencies to partition to soil, depending in part on the organic matter content of the soils and available pathways. PAHs sorb strongly onto soil particles and are therefore observed in soils. Once sorbed to soil particles, mobility of PAHs is limited. In general, as the molecular weight increases, water solubility decreases. Biodegradation and biotransformation are the ultimate fate processes for PAHs in soil.

Adsorption potential typically is expressed in terms of a partition coefficient K_{oc} or K_d. Higher values of K_{oc} (greater than 10,000 milliliters per gram [mL/g]) indicate a greater potential for the constituent to adsorb to organic carbon in soil and aquifer materials. Constituents with low K_{oc} values (less than 1,000 mL/g) do not adsorb strongly to soil and aquifer materials (Ney 1990). Values of K_{oc} are shown in Table 6-1, and the values typically are based on several different types of studies or element-specific parameters. The VOCs are characterized by low K_{oc}s. These constituents do not tend to adsorb readily to organic soil or aquifer materials, and thus are characterized by high mobility in the environment. The other constituents, including the components of weathered petroleum hydrocarbon, are not expected to be as mobile as the VOCs. The occurrence of subsurface materials with high f_{oc} under most of the Site would tend to increase the K_d for all organic compounds and would reduce their mobility.

Persistence is a measure of the time constituents prevail in the environment and is commonly expressed in terms of half-lives ($T_{1/2}$) for specific environmental media. The half-life of a constituent is the period of time required for one-half of the mass of a compound to be transformed into other constituents from the time of its introduction to the environment. Half-lives of the detected constituents are presented in Table 6-1 in ranges because the rate of degradation varies according to site-specific environmental conditions and concentration. Half-lives may be used to characterize the relative persistence of a constituent in various environmental media. The more persistent compounds detected at the Site include some of the PAHs [benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and pyrene] and the chlorinated aliphatics [TCE, PCE, 1,2-DCE, and vinyl chloride].

The inorganic constituents are not included in Table 6-1 because their properties are dependent on the form of the element. In soil, metals typically have very low mobilities, particularly under neutral or alkaline conditions. In addition, inorganic metal ions are not volatile. Metals in the soil tend to adsorb to soil particles, but may be desorbed when the conditions of the water moving through the soil are appropriate (primarily changes in pH and oxidation-reduction potential). Rain water is generally acidic due to the presence of carbon dioxide and industrial activity in the region. Therefore, the potential exists for inorganic constituents to migrate to some extent into groundwater. Once in groundwater, the inorganic constituents may be removed from the dissolved phase through reactions with ions of an opposite charge in the soil matrix. Since the inorganic elements do not degrade, the loss mechanisms are limited by such chemical interactions.

The mobility of inorganics depends on the soil bulk density, surface area, particle-size distribution, pH, redox status, ion exchange capacity, amount of organic matter, type and amount of metal oxides, and type and amount of clay materials. Soil pH is the property that most influences inorganic mobility. Cationic metals tend to be mobilized at low pH. The amount of organic matter, free iron oxides, and cation exchange capacity can significantly affect the amount of inorganics retained.

The K_d for inorganics provides a general indication of potential subsurface migration. Beryllium, chromium (as Chromium^{3+}), lead, and thallium have high K_d values (650 to 1,500 mL/g) indicating relatively low mobility through soil. The K_d values for arsenic, hexavalent chromium, copper, nickel, and zinc are lower (5 to 40 mL/g), indicating greater potential mobility. The different characteristics of the geologic strata beneath the Site result in different inorganic mobilities. For example, deposits of materials with relatively low hydraulic conductivities, such as cinders in the fill and the underlying marsh and related clay deposits beneath the Site, tend to reduce the mobility of inorganics. Because of the heterogeneity of the fill materials and the varying organic content of the subsurface deposits, it is very difficult to predict specific mobilities through the different deposits under the Site. However, a general discussion of the mobility of antimony, arsenic, beryllium, zinc, cadmium, chromium, cobalt, copper, lead, nickel, and thallium is provided in the following paragraphs.

Antimony is present as the oxide or antimonite salt in most natural waters. In reducing environments, volatile stibine (SbH_3), which is a gas at room temperature and quite soluble in water, may be formed. It is, however, unstable in aerobic waters or air and is oxidized to form the oxide. Sorption to clays is the most important mechanism, resulting in the removal of antimony from solution, thus reducing the aqueous transport of antimony.

Arsenic has many forms, but most commonly appears as anions in the environment. The most common forms are arsenite ($H_2AsO_3^-$ or $HAsO_3^{2-}$) and arsenate ($H_2AsO_4^-$ or $HAsO_4^{2-}$). Unlike the ten cations discussed above, ion exchange of arsenic in soil is limited, although some positively charged sites on soils can retard the migration of arsenic species. Also, adsorption of arsenic anions is increased and, therefore, mobility decreased at lower pH levels (that is, pH in the range of 3 to 7).

Beryllium (Be^{2+}) and zinc (Zn^{2+}) are divalent cations at low to moderate pH values in the environment. They do not form as many low solubility salts as lead; but as doubly charged cations, they undergo attenuation in soil through ion exchange reactions that are fairly strong. Beryllium is chemically similar to aluminum and therefore is expected to adsorb to clay particles. Zinc also complexes with clay, organic matter, and metal oxides.

Cadmium is found in the divalent (Cd^{2+}) state with pH controlling the speciation in water. Waters with pH values below 7 (acidic conditions) are more prone to leach inorganics. Higher pH values (basic conditions) usually result in decreased leaching potential and may also cause increased precipitation of metals as oxides and hydroxides. Cadmium is among the most mobile of the heavy metals, and its mobility depends more on sorption processes. Sorption of cadmium is influenced by the clay and metal oxide content of the soil and sediments.

Chemical speciation is critical in determining the fate and transport of chromium. Chromium in soil or water exists in either a trivalent (Cr^{3+}) or hexavalent (Cr^{6+}) oxidation state, depending on the presence of reducing agents. Hexavalent chromium is more commonly associated with residues from industrial processing of chromium and is soluble with adsorption to soil being an insignificant fate pathway. The presence of estuarine sediments can remove Cr^{6+} from solution by a two-step process: reduction of Cr^{6+} to Cr^{3+} followed by adsorption of Cr^{3+} to the sediments. Dominant fate processes of trivalent chromium include reaction with aqueous hydroxide ions to form an insoluble precipitate (chromium hydroxide) and adsorption of dissolved chromium to soil particulates and sediments. Consequently, migration of trivalent chromium is limited.

Cobalt is a relatively rare metal and its mobility is controlled by adsorption. This is governed by pH, redox potential, and concentration. Cobalt forms ionic chloride complexes in saltwater that are readily adsorbed to sediments. Elemental cobalt is otherwise relatively unreactive and is quite stable in water.

Copper, also a divalent cation (Cu^{2+}), is more immobile than lead. It does not form as many low-solubility salts, but through ion exchange, it is very strongly held to soil and organic matter particles. In addition, above approximately pH 7, substantial amounts of immobile solid copper hydroxide [$Cu(OH)_2$] forms.

Lead is especially slow moving because of two important mechanisms. First, many salts of lead (for example, lead sulfate) have low solubilities; the presence of any number of negatively charged ions (anions) in soil can result in the creation of immobile lead salts. Second, lead is a divalent cation (Pb^{2+}) and has a very high affinity for ion-exchange sites present on the surfaces of many soil fractions, including natural organic matter particles. This ion-exchange reaction will hold lead in place close to the source area. Soluble organic acids, such as might be found in the meadow mat, could increase the solubility of lead and other cations.

Nickel (Ni^{2+}) is usually found in the divalent state and forms salts with sulfate, chloride, nitrate, carbonate, oxide, hydroxide, and organic ligands. These salts are sufficiently soluble under aerobic conditions and pH below 9. Fulvic acid and humic materials, ubiquitous in natural soils and waters, increase the solubility of nickel, with adsorption processes being moderately effective in limiting the mobility of nickel.

Thallium (Tl^{+}) is a monovalent cation. Although its migration through soil is slowed somewhat by ion exchange, most ion exchange sites on soil and organic matter particles will prefer to react with divalent cations such as lead, copper, berryllium, and zinc, thereby leaving Tl in solution unless there is excess ion exchange capacity available. Thallium's metallic and covalent radicals are similar to lead and, therefore, it is expected to behave in a manner similar to lead.

For all 11 cations listed above, if soil conditions are reducing as is common at the Bayonne Plant, and sulfide (S^{2-}) is present, the mobility of the metals will be substantially lowered. All metal sulfides have extremely low solubilities in water.

6.3 COMPOSITION OF PETROLEUM HYDROCARBONS

TPH is an analytical method that quantifies concentrations of a complex mixture of petroleum-derived hydrocarbons. The hydrocarbons fall into four major classes, as follows: alkanes or paraffins (straight- or branched-chain hydrocarbons), cycloalkanes (ring structures), alkenes (carbon chains with one or more double-bonds), and aromatics (containing benzene-type rings) (Bergamini 1992).

When TPH enters the soil and/or groundwater, compositional changes referred to as weathering begin immediately. Volatilization of the lighter compounds occurs at a higher rate than that of heavier compounds, resulting in a shift in the composition of the weathered TPH toward heavier compounds. The solubilities of the heavier hydrocarbons are generally lower and the adsorption characteristics are stronger than those of the lighter compounds. Therefore, these heavier compounds tend to remain adsorbed to soil organic matter for longer periods of time, while the more soluble components partition into soil moisture and/or groundwater more quickly and more completely. Rates of biotransformation also are different; short-chain alkanes generally are biodegraded more quickly than aromatics, cycloalkanes, and heavier alkanes (USEPA 1989). The net result of these weathering processes is that the TPH concentrations reported from older, weathered product such as that encountered in parts of the Site will reflect a greater proportion of the heavier TPH components than fresh product. These heavier components are comprised largely of cycloalkanes and straight-chained and branched-chain alkanes (Andrews and Snyder 1991).

6.4 BIODEGRADATION OF PETROLEUM CONSTITUENTS AT THE SITE

Many of the petroleum constituents detected in soil and groundwater at the Site are susceptible, to varying degrees, to biodegradation by indigenous bacteria. Biodegradation of petroleum constituents in soil is primarily an aerobic process because of the availability of oxygen in soil pores. Biological and chemical processes occurring in soil can be important in determining the ultimate fate of the constituents in soils and groundwater at the Site. Microorganisms naturally occurring in soils are able to use numerous organic compounds as a food source, degrading the components ultimately to carbon dioxide and water (Kostecki and Calabrese 1989).

In most cases, an organic contaminant is not broken down completely to carbon dioxide and water by a bacterium, but is metabolized to an intermediate, which is, in turn, degraded further. The metabolites isolated depend primarily on the time at which the reaction is stopped.

The monocyclic aromatics (e.g., benzene) can be degraded aerobically (i.e., in the presence of oxygen) in soil (Kostecki and Calabrese 1989). In surficial soil, biodegradation can be relatively rapid, provided adequate amounts of oxygen, moisture, and nutrients (e.g., nitrogen and phosphorus) are available. Aerobic metabolism of constituents under these conditions may result in the total depletion of oxygen. When this happens, the microorganisms may begin utilizing inorganic ions (such as nitrate or sulfate) as electron receptors and continue aerobic respiration, or other types of microorganisms may become active in metabolizing the constituents (USEPA 1989).

The PAHs also can be biodegraded. Factors contributing to the degree to which biodegradation occurs include biodegradability rates, production of intermediates, and the effects of mixtures. In general, smaller PAHs with two (e.g., naphthalene) or three rings (e.g., phenanthrene) are more readily degraded than larger PAHs (McKenna and Heath 1976).

In groundwater, biodegradation of petroleum constituents can proceed aerobically and anaerobically, depending primarily on the availability and replenishment of oxygen. In larger portions of the interior of the Site, it is likely that anaerobic processes dominate, as oxygen depleted by initial aerobic processes cannot be replenished by the slow groundwater flow rates to sustain aerobic degradation. Conversely, the alternative electron receptors needed for anaerobic degradation (sulfate, iron, manganese) are in abundant supply in Site groundwater and would be replenished at rates sufficient to sustain anaerobic degradation. In the near-shore zones adjacent to the Platty Kill Creek, the Kill Van Kull, and New York Bay, tidal flushing probably replenishes oxygen at rates sufficient to maintain aerobic degradation.

As described in Section 3.0 (Technical Overview - Investigation Methodology) and Section 5.0 (Phase IA - Findings), groundwater samples collected from selected monitoring wells were analyzed for a suite of organic and inorganic parameters that are indicators of the potential for, and the by-products of, aerobic and anaerobic degradation. The analytical results are provided in Table 5-16. The potential for aerobic biodegradation is determined primarily by the availability of DO and the redox potential; increases in carbon dioxide could be indicative of active aerobic biodegradation. Concentrations of these constituents are evaluated relative to background levela and/or pertinent references (McAllister and Chiang 1994; Wiedemeier et. Al. 1994) for assessing natural attenuation.

The potential for anaerobic degradation is determined by the availability of electron receptors such as sulfate, iron, and manganese. All of these are abundant in groundwater under the Site (Table 6-1). By-products of anaerobic biodegradation include methane, carbon dioxide, and sulfides (reduced from sulfate); the presence of elevated concentrations of these constituents could be indicative of active anaerobic biodegradation.

Background groundwater quality is probably reflected in Monitoring Wells EB-1 and EB-29, which had relatively high DO, little or no sulfide, no methane, and moderate to low carbon dioxide concentrations. Several monitoring wells appear to show evidence of anaerobic biodegradation; these monitoring wells are near the edges of NAPL plumes. These monitoring wells, which include Monitoring Wells GMMW3 (Asphalt Plant Area), GMMW9 and GMMW10 (General Tank Field), GMMW14, and MW10 (Solvent Tank Field) are generally characterized by elevated methane, carbon dioxide, and sulfide concentrations and negative redox potentials. These monitoring wells are also characterized by low or no concentrations of BTEX constituents (except for Monitoring Well MW10), which suggests that anaerobic biodegradation processes are destroying dissolved constituents emanating from NAPL plumes. More data are required to fully assess the extent of these processes around the margins of plumes, best obtained once NAPL removal measures are in effect.

6.5 MECHANISMS OF MIGRATION

There are several mechanisms by which constituents may migrate through environmental media at the Site. Migration into the air can occur via volatilization or fugitive dust emissions, and migration from soil into groundwater can occur by percolation of infiltrating rain water. Constituents can dissolve from NAPL bodies into groundwater. Dissolved constituents can be transported with prevailing groundwater flow. The mechanisms of migration are discussed in this section from a conceptual standpoint, together with a discussion of constituent persistence and transformations that may occur in the source or transport medium.

6.5.1 Migration into Air

The following two processes control migration of constituents into air: (1) Organic constituents may volatilize and migrate into the air; (2) constituents adsorbed to surface soil may migrate into the air through the generation of dust either by wind erosion in unpaved areas or by mechanical means. Constituents released into the atmosphere are subject to transport and dispersion by prevailing winds. Given the operations of the Bayonne Plant (i.e., well ventilated open areas), there is virtually no potential for volatilized constituents to present a risk to human health.

Fugitive dust emissions from wind or vehicle operations could occur from unpaved portions of the Site and during construction activities. During the entire 4-month field effort conducted for the Phase IA RI, dust monitoring was conducted; the results of the dust monitoring indicated that the dust generation at the Site was not a health concern to workers (see Appendix G). Constituents with relatively low organic carbon partition coefficients (K_{oc} values less than 1,000) and moderate to high water solubility (greater than 1 mg/L) are more likely to be associated with the water or vapor phases than to remain in soil and, therefore, are unlikely to be present in emitted dust. The VOCs fall into this category; therefore, these constituents are not expected to be emitted in dust. The heavier fractions of TPH, SVOCs, pesticides, and metals are expected to adsorb to soil and hence could be emitted as fugitive dust.

Most of the metals can form insoluble compounds with constituents found in soils or sorb onto soil particles. These processes will result in the inorganic compounds remaining in the soil. As a result, inorganic constituents could be transported by fugitive dust.

6.5.2 Migration in Soil

Solubility in water, area rainfall characteristics (which affect fluctuations in the groundwater levels), the tendency to bind to soil and organic carbon, the type of soil (particle size distribution, clay content, f_{oc} content, porosity, and permeability), and the depth to groundwater are significant factors in determining the potential for constituents to be carried from soil to groundwater. The presence of the coal-derived cinders under much of the Site may tend to retard migration of constituents with high K_{oc}s. The more soluble constituents may migrate through soil to the groundwater with infiltrating precipitation. Typically, organic constituents with high water solubilities and low K_{oc}s are particularly susceptible to leaching. The more volatile constituents may migrate into air, as discussed in the previous section. In general, the pesticides, the PAHs, and the metals detected in soil are not very soluble or mobile.

The nature of the site soils significantly affects transport within the soil. Clays and certain minerals exhibit adsorptive behavior, while organic matter is capable of both adsorption and absorption. Coarse silica sands are very poor at sorbing chemicals. Because sorption is an equilibrium process, some of the sorbed constituents may "desorb" from the particles into the dissolved phase, be released into the soil moisture, and be transported with infiltrating precipitation. These dissolved constituents then may become sorbed to aquifer materials again, followed by dispersion by groundwater transport. The more mobile constituents are expected to be VOCs and the constituents with low molecular weight in the TPH mixtures, such as benzene.

The soils under the Site are composed of predominantly fine-grained fill materials with a high percentage of coal-derived cinders. The peat deposits under the fill have a high percentage of clay, silt, and organic matter, and will act to retard constituent migration.

The transport of the inorganic constituents through soil to groundwater is influenced by soil characteristics and water movement. Soil parameters to be considered are cation and anion exchange capacities (i.e., the interaction between positively and negatively charged ions), f_{oc}, pH, oxidation-reduction potential, porosity, and permeability. In general, inorganic constituents with a positive charge (cations) will be retarded (sorbed) by clays that exhibit an overall negative charge. Arsenic and chromium typically are often present as anions (e.g., arsenates and chromates) and will not be retarded by clay as readily as other metals.

6.5.3 Dissolution from NAPL

Depending on their chemical composition, the NAPL bodies delineated under the Site, can act as sources of dissolved constituents that can partition to groundwater. Heavier NAPL bodies, such as products that have specific gravities characteristic of lube oils and No. 6 fuel oil, do not contain constituents that are readily soluble. Lighter fuels, such as kerosene, gasoline, and naphtha, could be sources of dissolved constituents that could partition to groundwater, such as benzene, ethylbenzene, and xylenes, all of which have been detected in groundwater near NAPL bodies.

6.5.4 Migration in Groundwater

Transport of constituents in groundwater is expected to be a primary mechanism of transport of the lighter and more soluble constituents detected at the Site. Groundwater transport of organic compounds is controlled by many of the same processes discussed in Section 6.5.2 (Migration in Soil). Solubility and sorption are the most important constituent properties affecting leaching and groundwater transport. The moderate to high solubility values and low K_{oc} values of the halogenated aliphatics, monocyclic aromatics, ketones, naphthalene, and phenols detected in groundwater indicate that these constituents tend to dissolve and move with groundwater, and will adsorb to aquifer materials only partially, if at all. Constituents migrate in the subsurface primarily in the dissolved aqueous phase. TPH, PAHs, pesticides, and metals have low solubilities and tend to sorb to soils; they normally do not dissolve to appreciable concentrations nor migrate with groundwater over appreciable distances. Metals with a low K_d value (arsenic, copper, and zinc) are potentially more mobile, while those with a high K_d value (berryllium, chromium, lead, and thallium) will tend to be more immobile.

As soluble constituents are transported with groundwater, they are subject to various processes that can retard their migration or degrade them completely. The petroleum constituents and halogenated aliphatics will be retarded to some extent by adsorption on the fine-grained silt and clay that compose a large percentage of the fill, and by the carbonaceous compounds that make up the coal-derived cinders. Dissolved metals such as lead will also be retarded, given their potential to adsorb to clay particles. As discussed in Section 6.4 (Biodegradation of Petroleum Constituents at the Site), there is evidence that biodegradation, particularly anaerobic processes, are destroying soluble petroleum constituents as they migrate with prevailing groundwater flow. Finally, given that groundwater is discharging ultimately to surface-water bodies, tidal flushing in near-shore zones will act to replenish oxygen at rates sufficient to maintain aerobic biodegradation, which would tend to destroy any residual concentrations of soluble petroleum constituents. This process will serve to reduce dissolved constituent concentrations before they can ultimately discharge to the Platty Kill Creek, the Kill Van Kull Waterway, or New York Bay.

7.0 DATA EVALUATION, HYPOTHESIS DEVELOPMENT, AND CONCLUSIONS

In this section, the distribution of contaminants in site media is analyzed, and the relationships between conditions in soil, floating NAPL, and groundwater quality are interpreted. This analysis and interpretation is based on the characterization of hydrogeologic conditions (Section 4.0 [Physical Setting]); contaminant distribution (Section 5.0 [Phase IA - Findings]); and the processes affecting contaminant fate and transport (Section 6.0 [Overview of Constituent and Site Properties Affecting Fate and Transport]).

A more detailed description of the relationships between soil quality, groundwater quality, and NAPL plumes is presented and organized geographically, consistent with the NAPL plume description in Section 5.0 (Phase IA Findings). Each area-specific description of relationships is followed by a discussion of area-specific contaminant fate and transport. NAPL plume areas with higher potential for requiring prompt remediation due to potential off-site impact(s) or other concerns are distinguished from those that are less significant because of their distance from site boundaries or their need for further characterization in Phase IB. Potential remedial technologies to remove or control the migration of floating NAPL are identified, and data gaps relative to the feasibility of potential remedial approaches for NAPL control/remediation are discussed on a site-wide basis. The primary focus of the discussion herein is NAPL removal, which is a priority not only to limit additional migration, but also because the presence of large amounts of NAPL limits characterization effectiveness for soil and groundwater.

7.1 SUMMARY OF FINDINGS

This section presents a broad overview of the analytical findings (soil and groundwater quality) and NAPL observations discussed in detail in Section 5.0 (Phase IA - Findings). To facilitate the discussion of analytical findings and NAPL observations, Table 7-1 has been prepared as a reference. All exceedances are listed in Table 7-1, but only the most important exceedances are discussed in this section. Constituents detected above the NJDEP non-residential direct contact or impact to groundwater soil cleanup criteria in both surface (0 to 2 feet bls) and subsurface (greater than 2 feet bls) soil are presented in Table 7-1. The numerical designations of the NAPL plumes observed on the water table, identified during the RI and IRM activities, and presented on Figure 5-5 and in Table 5-10, are included for each area in Table 7-1. Analytes detected in groundwater above the NJDEP standards or the interim generic groundwater quality criteria (IGGWQC) are also summarized in this table. The findings provided in Table 7-1 are presented for ten areas in the Bayonne Plant, the areas having geographic continuity and similarities in contamination characteristics. The areas discussed below are presented in order from east to west across the Site.

7.1.1 Soil Quality Summary

The following constituents, listed by frequency of occurrence, were observed above the NJDEP non-residential direct contact or impact to groundwater soil cleanup criteria in both surface and subsurface soils, on a site-wide basis: TPH, arsenic, and benzo(a)pyrene. Other constituents detected above criteria in surface and subsurface soils on a less frequent, and area-related, basis included the following: miscellaneous PAHs other than benzo(a)pyrene, VOCs (benzene, chlorobenzene, and xylenes), and some metals (lead, copper, beryllium, and zinc). Hexavalent chromium was also detected in areas where filling of chromate slag historically occurred, but was only detected above the criterion of 100 mg/kg in soils at three locations. Only one location in the entire Site exhibited a pesticide concentration above the criteria, and that was only in surface soil. PCBs were not detected in any soils at the Site.

7.1.2 NAPL Observations Summary

Seventeen NAPL plumes were identified during the RI and IRM activities. For discussion purposes, a NAPL plume was defined in Section 5.2.2 (Plant-Wide NAPL Overview) as an area in which the presence of NAPL was observed in either a temporary well point or monitoring well in at least two contiguous locations (see Figure 5-5). The seventeen NAPL plumes enumerated on Figure 5-5 include only NAPL observed floating on the water table. A NAPL plume does exist in the intermediate water-bearing zone near the Platty Kill Canal; this deeper NAPL plume is depicted in cross-sectional view on Figure 4-5. This plume is the subject of a detailed IRM study (Dan Raviv Associates, Inc. 1994b) and IRM activities are ongoing. The plumes identified at the Site and enumerated on Figure 5-5 range in size from approximately 0.4 acre (Plume No. 3) to 7.6 acres (Plume No. 4) with apparent NAPL thicknesses ranging from 0.11 to 13.6 feet. Apparent thickness should not be confused with true "formation" NAPL thickness. Typically, in deposits with low hydraulic conductivities such as those observed at this site, true NAPL thicknesses are significantly less than apparent NAPL thicknesses. Product types have been differentiated based on specific gravity and on historical descriptions of tank contents, land use, or other anecdotal information. The following inferred product types were observed most frequently across the Site (see Table 5-10): diesel, No. 2 fuel oil, No. 6 fuel oil, kerosene, and lube oil.

7.1.3 Groundwater Quality Summary

The following constituents, listed by frequency of occurrence, were detected above the NJDEP standards or the IGGWQC on a site-wide basis: iron, manganese, and TPH. Other constituents observed above the standard less frequently, and on an area-specific basis, are as follows: VOCs (mostly benzene, chlorobenzene, ethylbenzene, and xylenes), SVOCs (generally limited to naphthalene and 2-methylnaphthalene), miscellaneous metals (aluminum, arsenic, lead, sodium, cadmium, chromium, nickel, beryllium, cobalt, and vanadium). Of the pesticides, alpha-BHC and 4,4'-DDT were observed in only one location each, and PCBs were not detected in any of the groundwater samples collected. Several wells exhibited chloride and sulfate above the standards, which is consistent with their near-shore location.

7.2 RELATIONSHIPS BETWEEN CONTAMINANTS AND FATE AND TRANSPORT ON AN AREA-SPECIFIC BASIS

This section addresses the relationship between soil quality, groundwater quality, and NAPL observations on an area-specific basis. TPH was the only constituent detected above the soil and groundwater quality criteria on a site-wide basis. Concentrations of TPH were often detected significantly above the soil and groundwater quality criterion. These high TPH concentrations in soil and groundwater correlate well across the Site. The heavy PAHs [benzo(a)pyrene and other multi-ring compounds] that were observed often in soil were not observed above NJDEP groundwater quality standards at all in groundwater. With the exception of several locations, soil exceedances for metals were not significantly above the criteria. Most metal exceedances were no more than twice the cleanup criteria. Metals such as arsenic and lead were occasionally observed above the standards in groundwater, but to a lesser extent than they were observed in soil. VOCs found in soil were generally also found above standards in nearby groundwater but VOCs were more prevalent in groundwater than in soil. A discussion of area-specific contaminant fate and transport follows each area-specific discussion of contaminant relationships.

7.2.1 Piers and East Side Treatment Plant Area, and MDC Building Area

Contaminant relationships and contaminant fate and transport hypotheses are discussed below for the Piers and East Side Treatment Plant Area, and MDC Building Area.

7.2.1.1 Contaminant Relationships

As presented in Table 7-1, soil exceedances of TPH were identified in this area during the Phase IA RI. The exceedances observed for benzene, chlorobenzene, xylenes, and TPH in groundwater are probably a result of dissolution from the NAPL bodies identified in the area. This dissolution is evidenced by the results of TCL analysis on NAPL samples collected during the Pier 7 IRM. These analytical results indicated maximum concentrations in the NAPL of 22,000 ug/L for benzene, 21,000 ug/L for chlorobenzene, and 360,000 ug/L for o-xylene. Other target compounds, including ethylbenzene, methylene chloride, toluene, n-propyl benzene, acetone, SVOCs, and several chlorinated VOCs, that were identified in the NAPL are apparently not partitioning into groundwater.

The exceedances identified in the groundwater sample from the intermediate monitoring well (screened at 30 to 40 feet bls), including TPH, MEK (2-butanone), and pentachlorophenol (observed only in replicate sample), suggest that shallow groundwater may have leaked through the meadow mat/marsh clay confining unit in, or upgradient of, this area. Water-level measurements indicate that there is a downward vertical gradient between the shallow and intermediate zones. MEK, a very soluble VOC, and pentachlorophenol, a relatively insoluble SVOC, were not detected in the NAPL samples from Pier 7.

The source of the TPH and benzene identified in the groundwater sample from Monitoring Well GMMW15, near the MDC Building, is probably not related to the Solvent Tank Field NAPL plume. These dissolved constituents may be from past spills from historical drum-filling activities and a naphtha filling building that operated in this area (Geraghty & Miller, Inc. 1994b).

Two shallow monitoring wells near the MDC Building Area (Monitoring Well EBR19 and Monitoring Well MW6, which is located to the east of the Low Sulfur Tank Field) and Intermediate Monitoring Well GMMW24I exhibit exceedances for a suite of metals dissolved in groundwater. These metals are antimony, beryllium, cadmium, chromium, cobalt, nickel, and vanadium. With the exception of chromium, none of these metals occurs in excess of NJDEP groundwater standards in any other monitoring wells at the Site. The presence of these dissolved metals may be related to the former Case & Can Plant, which operated in this area (Geraghty & Miller, Inc. 1994b).

7.2.1.2 Contaminant Fate and Transport

NAPL (Plumes No. 1 through 3) floating on the shallow water table and the dissolved constituents detected in shallow and intermediate monitoring wells have the potential to move toward, and eventually discharge into, New York Bay. Two parallel, concrete gantry walls, extending to a depth of 10 feet bls, are containing the NAPL in the vicinity of Pier 7. During extreme low tides, groundwater levels are sometimes lower than the two gantry walls, and

NAPL can then migrate beneath the walls into New York Bay (Dan Raviv Associates, Inc. 1995c). During high tide, the NAPL is trapped behind the walls. Exxon has installed a fixed boom containment system along the entire length of Pier 7. This containment system is effectively containing any NAPL seeps and preventing them from migrating out of the pier area further into the bay. Tidal studies conducted as part of the Pier 6 IRM indicated that groundwater flow in this area is toward the bay (eastward) during low tide and landward (westward) during high tide (Dan Raviv Associates, Inc. 1995b). This back-and-forth motion may result in static conditions for the floating NAPL identified in the two smaller plumes, resulting in no net flow into the bay.

The dissolved constituents are capable of undergoing biodegradation. Biodegradation is most likely enhanced in this area due to the influx and cycling of groundwater by the tides. Tidal flushing could result in constant replenishment of dissolved oxygen to the shallow groundwater, thereby enhancing aerobic degradation.

It is likely that the dissolved constituents are being biodegraded by aerobic processes in the tidally influenced groundwater zones adjacent to the piers; it is not currently known if the combination of biodegradation and the back-and-forth tidal motion completely removes dissolved constituents prior to discharge to the bay.

7.2.2 Low Sulfur and Solvent Tank Fields

The inter-media relationships and contaminant fate and transport hypotheses for the Low Sulfur and Solvent Tank Fields are discussed below.

7.2.2.1 Contaminant Relationships

There appears to be a strong correlation between NAPL and groundwater quality with respect to VOCs, but little correlation (with the possible exception of naphthalene) between soil and groundwater quality in this area. BTEX and two chlorinated VOCs were reported in groundwater samples from monitoring wells in the Low Sulfur and Solvent Tank Fields. Concentrations of these constituents in groundwater were relatively high, as follows: benzene (73 to 710 ug/L), ethylbenzene (12,000 ug/L), and xylene (2,300 to 38,000 ug/L). These VOCs were identified as being primary constituents of the NAPL observed in the area (Dan Raviv Associates, Inc. 1993b). Thus, components of the NAPL appear to be partitioning into the groundwater and contributing to a dissolved phase plume. The chlorinated VOCs, 1,2-DCE (11,000 ug/L) and vinyl chloride (3,700 ug/L), were detected in one groundwater sample. The source of these constituents is not readily apparent. None of these chlorinated VOCs was reported in soil samples in concentrations that exceeded the soil cleanup criteria.

Naphthalene appears in groundwater at two locations at concentrations of 73 and 180 ug/L. 2-Methylnaphthalene and 2,4-dimethylphenol also exceeded the groundwater criteria at one location. Naphthalene was identified by DRAI (1993b) as being the most prevalent SVOC constituent of the NAPL present in the Low Sulfur and Solvent Tank Fields (Dan Raviv Associates, Inc. 1993b). Naphthalene exceeded the impact to groundwater soil cleanup criterion in a subsurface soil sample from one location in the Solvent Tank Field. Naphthalene in soil may be contributing to dissolved phase naphthalene, but is probably relatively insignificant compared to naphthalene partitioning from NAPL. Conversely, naphthalene associated with the NAPL (Plume No. 4) may be adsorbing to soils during rises in water levels and then dissolving into groundwater. 1,2-Methylnaphthalene and 2,4-dimethylphenol may also be present in the NAPL. Neither of these two constituents was reported in exceedance of the criteria in soil. Benzo(a)pyrene was reported in soil in exceedance of the non-residential soil cleanup criterion at one location in the Solvent Tank Field. The absence of benzo(a)pyrene in groundwater indicates that this compound is not partitioning to the dissolved phase.

There is little correlation between NAPL, soil quality, and groundwater quality with respect to metals. Of the metals reported in groundwater (antimony, arsenic, beryllium, cadmium, chromium, cobalt, and lead), only arsenic was detected in soil in exceedance of the non-residential soil cleanup criterion at one location. Lead, which was identified in NAPL, was detected in exceedance of the NJDEP groundwater quality criteria in a groundwater sample from only one location.

7.2.2.2 Contaminant Fate and Transport

Most of the contaminants detected in soil [i.e., arsenic, copper, and benzo(a)pyrene] in the Low Sulfur and Solvent Tank Fields will tend to stay adsorbed in soil and will not partition to groundwater. Naphthalene may potentially partition from soil to groundwater, although this mechanism is probably not significant compared to partitioning from NAPL if it is present. Naphthalene was found in exceedance of the criteria in one soil sample and two groundwater samples in the area. The NAPL observed in the area (Plume No. 4) contains BTEX, naphthalene, a variety of PAHs, and lead. Based on the groundwater sampling results, the NAPL appears to be acting as a source of VOCs partitioning to groundwater. Soluble constituents (benzene, ethylbenzene, xylene, and naphthalene) were detected in groundwater in exceedance of the NJDEP groundwater quality criteria.

The dissolved constituents in groundwater are capable of undergoing biodegradation. Carbon dioxide and methane concentrations are elevated in Monitoring Wells MW6, MW9, and MW10, which indicates significant anaerobic biodegradation.

Although the regional groundwater flow is radial toward Upper New York Bay and the Kill Van Kull, migration of the floating NAPL plume in the vicinity of the Low Sulfur and Solvent Tank Fields appears to be limited. Based on the most probable source(s) of the NAPL in this area (i.e., historical spills in the tank fields prior to 1967 when gasoline was stored in the tank fields, and in 1979 when Tank 1066 released fuel oil), the floating NAPL plume does not appear to be migrating. Despite the relatively low density of the NAPL, the floating NAPL plume may be stabilized or contained within the apparent trough created in the shallow groundwater surface. The local trough may be the result of elevated hydraulic heads and tidal influence along areas of more permeable backfill along the northern and southern boundaries of the area.

The floating NAPL plume (Plume No. 4) is creating an associated dissolved phase plume. The extent of the dissolved phase constituents in the groundwater is not fully known. Dissolved NAPL constituents were detected in groundwater samples collected from the furthest downgradient monitoring wells along the southern boundary of the tank field. Based on the apparent local groundwater flow regime, the potential for off-site migration of dissolved phase constituents exists. There is evidence that anaerobic biodegradation processes are active in the vicinity of the Low Sulfur and Solvent Tank Fields, so the dissolved constituents are being degraded as they migrate, lowering their concentrations. Implementation of an IRM and other natural attenuation mechanisms (e.g., adsorption) will also help to limit the migration of constituents off-site.

7.2.3 General Tank Field

The inter-media relationships and the fate and transport hypotheses of contaminants in the General Tank Field are discussed below.

7.2.3.1 Contaminant Relationships

With the exception of naturally occurring constituents (e.g., sodium, chloride, iron, and manganese), groundwater exceedances are limited to TPH at four locations (ranging from 5 to 121 mg/L) and benzene at one location (2 ug/L). The presence of naturally occurring constituents at relatively high concentrations is probably related to the geochemistry of the fill and this area's history and proximity to the shoreline. Prior to development of Constable Hook, the General Tank Field area was submerged by the waters of Upper New York Bay.

With the exception of TPH detected in relatively high concentrations in soil and groundwater, there is no correlation between specific constituents detected in soil and groundwater or the occurrence of NAPL. The metals and benzo(a)pyrene detected in soil have not been detected in groundwater, and the NAPL is apparently not a source of soluble constituents that partition to groundwater.

7.2.3.2 Contaminant Fate and Transport

Most of the contaminants detected in soil in the General Tank Field [arsenic, lead, benzo(a)pyrene] will tend to stay adsorbed in soil and will not partition to groundwater. The exception is TPH. Extremely high levels of TPH in soil have leached to the groundwater below the General Tank Field. The two NAPL bodies (Plumes No. 5 and 6) in this area are not believed to be sources of contaminants to groundwater because the No. 6 fuel oil that appears to comprise these plumes does not contain appreciable soluble constituents for which there are groundwater standards. Only xylene in the subsurface soil exhibits the potential to leach to groundwater, but it is not observed in groundwater in excess of the applicable standard.

The lack of soluble organic constituents in groundwater beneath the General Tank Field may be related to natural degradation activities. The presence of elevated methane, carbon dioxide (CO_2), and sulfide in relatively high concentrations suggests that the decay of hydrocarbon constituents in the subsurface by anaerobic respiration of microorganisms is possible.

The NAPL bodies (Plumes No. 5 and 6) will potentially migrate to the north and east under the influence of groundwater flow, but migration will be significantly hindered by the high viscosity of the NAPL. The current NAPL plume bodies may be under equilibrium conditions, i.e., not migrating or growing appreciably over time.

7.2.4 <u>AV-Gas Tank Field and Domestic Trade Area (Includes Southern Part of Interceptor Trench)</u>

Contaminant relationships and fate and transport hypotheses for the AV-Gas Tank Field and Domestic Trade Area are discussed below.

7.2.4.1 Contaminant Relationships

With the exception of TPH, there is no correlation between observations of soil quality and groundwater quality in the AV-Gas Tank Field and the Domestic Trade Area. Groundwater quality beneath the AV-Gas Tank Field Area has not been evaluated due to the widespread presence of NAPL in monitoring wells and temporary well points installed in the area. The presence of NAPL and soil contamination in the AV-Gas Tank Field appear to be related.

7.2.4.2 Contaminant Fate and Transport

Most of the contaminants detected in soil in this area [i.e., arsenic and benzo(a)pyrene] will tend to stay adsorbed in soil and will not leach to groundwater. TPH was the only constituent observed in relatively high concentrations (i.e., above NJDEP criteria) in both soil and groundwater. The low carbon dioxide and methane concentrations in the one monitoring well sampled in the Domestic Trade Area suggest that little biodegradation is taking place, which may indicate that there is either limited organic contamination to act as a substrate for biological activity or oxygen levels may be insufficient to support aerobic bacteria.

The NAPL body (Plume No. 7) located along the plant perimeter in the AV-Gas Tank Field is migrating under the influence of groundwater flow. The western portion of this NAPL body is apparently captured by the interceptor trench. The eastern portion of this NAPL body should be investigated with regard to potential off-site migration. Although Figure 4-6 does not depict off-site migration of groundwater in this area, the potential for off-site migration does exist.

Dissolved constituents in groundwater may be migrating off-site; however, due to the presence of NAPL, dissolved constituents were not analyzed in the AV-Gas Tank Field. Dissolved organic constituents (other than TPH) were observed in one monitoring well in the Domestic Trade Area.

7.2.5 Asphalt Plant and Chemicals Plant (Includes Utility Area)

Contaminant relationships and fate and transport hypotheses are discussed below for the Asphalt Plant and Chemicals Plant Area.

7.2.5.1 Contaminant Relationships

Chlorobenzene appears in groundwater at a relatively high concentration (7,100 ug/L); it is possible that this chlorobenzene is related to the chlorobenzene detected in soil, particularly the high concentration (980,000 ug/kg) detected in the northern portion of the Chemicals Plant. It does not appear that chlorobenzene found in groundwater is related to NAPL, since the higher concentrations detected are not located downgradient of the NAPL plumes in this area (Plumes No. 8 and 9). A sewer investigation report by Sandaq, Inc. (1986) cited that chlorobenzene used at the Chemicals Plant was in the sewer system. However, although unrelated to this area, NAPL samples collected from monitoring wells at the interceptor trench area and Pier 7 IRM areas did show chlorobenzene present at concentrations up to 21,000 ug/L. The chlorobenzene was used solely at the Chemicals Plant and probably migrated to the pier area by way of the sewer system. Benzene detected in groundwater above the standard at one location did not have any related soil exceedances in this area. Chlorobenzene, 1,4-dichlorobenzene, and naphthalene were detected in soil above the impact to groundwater criteria and are also present in groundwater above New Jersey standards. The widespread benzo(a)pyrene exceedances in soil are apparently bound in the soil and, due to the chemical properties of benzo(a)pyrene (i.e., its high organic carbon partition coefficient), it is not expected to partition to groundwater. No monitoring wells are located immediately downgradient of the soil sample in the Chemicals Plant that showed high concentrations of xylenes, dichlorobenzene, and naphthalene, but a nearby monitoring well located in a side-gradient direction did show exceedances for 1,4-dichlorobenzene and naphthalene.

7.2.5.2 Contaminant Fate and Transport

Most of the contaminants detected in soil in this area [i.e., benzo(a)pyrene, arsenic] will tend to preferentially stay adsorbed to soil rather than partition to groundwater. Constituents that may be potentially leaching from soil to groundwater include chlorobenzene, 1,4-dichlorobenzene, and naphthalene. The chlorobenzene detected in subsurface soil, and to a lesser extent some of the other constituents detected in the Chemicals Plant, have the potential to leach to groundwater. The two NAPL plumes (Plumes No. 8 and 9) have specific gravities of lube oil, No. 6 fuel oil, or asphalt, which do not have appreciable soluble constituents for which there are groundwater standards.

The dissolved constituents are capable of undergoing biodegradation. This is supported by the high methane and carbon dioxide concentrations in nearby Monitoring Well GMMW3, suggesting that anaerobic biodegradation is occurring in the interior of this area.

The NAPL bodies (Plumes No. 8 and 9) are migrating under the influence of groundwater flow. The apparent No. 6 fuel oil or asphalt plume under the interior portion of the Chemicals Plant (Plume No. 8) has the potential to migrate to the east and southeast, but given the low permeability of the fill and high viscosity of the NAPL, it is migrating very slowly, if at all. The lube oil plume located south of the Chemicals Plant (Plume No. 9) also has the potential to migrate to the southeast, and there is a potential that it may migrate from the Utilities Area onto a small corner of off-site property. Similar to Plume No. 8, this NAPL body is moving very slowly, if at all.

7.2.6 <u>No. 3 Tank Field</u>

Contaminant relationships and fate and transport hypotheses for the No. 3 Tank Field are discussed below.

7.2.6.1 Contaminant Relationships

Chlorobenzene appears in groundwater at relatively high concentrations (270 to 14,000 ug/L); it is possible that this chlorobenzene is related to high concentrations detected in soil (35,000 to 110,000 ug/kg). The benzene detected at concentrations ranging from 5 to 170 ug/L in groundwater may have leached from soil, due to the benzene exceedances found in soil (11,000 ug/kg maximum). Some of the benzene detected may be present as a result of dissolution from NAPL bodies, but otherwise NAPL does not appear to be loading high concentrations of dissolved constituents to groundwater. Chromium observed above the 100-mg/kg criterion for soil was also detected in groundwater in excess of the groundwater quality standard. Arsenic was also observed in soil and groundwater in excess of the respective criteria.

7.2.6.2 Contaminant Fate and Transport

The NAPL plume (Plume No. 10) may be a source of VOCs to partition to groundwater, since it has a specific gravity similar to kerosene. The kerosene-like product has the potential to migrate to the south and southeast; a portion of this NAPL body may have already migrated off-site, as discussed in the IRM report (Geraghty & Miller, Inc. 1995a).

Dissolved constituents in groundwater are being transported with groundwater flow to the south and southeast. There is evidence of anaerobic biodegradation, so it is likely that the chlorobenzene and benzene concentrations are being reduced as they migrate in groundwater. The potential for off-site transport of chlorobenzene exists along the southern and southeastern edge of the No. 3 Tank Field, where dissolved chromium may also be transported off-site.

7.2.7 <u>No. 2 Tank Field and Main Building Area (Includes Northern Part of Interceptor Trench</u>

The inter-media relationships and contaminant fate and transport hypotheses for the No. 2 Tank Field and Main Building Area are discussed below.

7.2.7.1 Contaminant Relationships

Benzene, xylenes, 2-methylnaphthalene, and naphthalene were reported in one groundwater sample from the No. 2 Tank Field, upgradient of the interceptor trench. Xylenes exceeded the impact to groundwater criterion in a subsurface soil sample collected from the eastern portion of the No. 2 Tank Field. It is possible that the xylenes present in subsurface soil, at least at this location, may be leaching to groundwater. Analytical results of NAPL samples collected from the Avenue J Sump and Sump A of the interceptor trench indicate that the primary constituents of the NAPL in this area (Plumes No. 11 and 12) are chlorobenzene, ethylbenzene, toluene, xylene, n-propylbenzene, and a suite of PAHs (Dan Raviv Associates, Inc. 1995a). It does not appear that the benzene, 2-methylnaphthalene, and naphthalene reported in the groundwater are related to the NAPL collected by the interceptor trench, since the monitoring well from which this sample was analyzed (Monitoring Well GMMW2) is located a significant distance upgradient of the interceptor trench and the NAPL plumes. These dissolved phase constituents may be remnants of a source further upgradient of the area. Lead exceeds the non-residential soil cleanup criterion in subsurface soil at two locations in this area. Lead does not appear in groundwater. Copper, total chromium, and hexavalent chromium, which were detected in subsurface soil samples in this area in exceedance of the criteria or comparative values, were not detected in groundwater. These observations support the interpretation that these metals do not appear to be leaching from soil to groundwater in this area. Arsenic was reported in excess of the non-residential soil cleanup criterion in one soil sample from the eastern Main Building Area. Dissolved arsenic was also reported in one groundwater sample collected from a well upgradient of this area. However, it is difficult to make an assessment based on these two data points as to whether arsenic is leaching from the soil.

Dissolution of constituents from the two NAPL bodies in the area may be occurring locally in the vicinity of the interceptor trench. Groundwater samples were not collected from immediately adjacent wells because of the presence of floating NAPL.

7.2.7.2 Contaminant Fate and Transport

Most of the contaminants detected in soil in this area (i.e., arsenic, chromium, copper, lead, and thallium) will tend to stay adsorbed in soil and will not leach to groundwater. Xylenes are the most likely constituent to potentially leach from soil to groundwater. The two NAPL bodies (Plumes No. 11 and 12) located along the northeastern boundary of this area appear to be capable of contributing dissolved phase constituents (e.g., benzene, chlorobenzene, xylene) to groundwater at the boundary. This phenomenon cannot be confirmed using the available groundwater data in these areas since flow is collected by the Interceptor Trench and further downgradient areas are off-site. Indicator parameter results for one groundwater sample from this area suggest that conditions appear to be suitable for biodegradation.

The two NAPL plumes (Plumes No. 11 and 12) are migrating under the influence of the prevailing groundwater flow direction to the northeast. As discussed in the Interceptor Trench NAPL IRM report, pumping of the trench only affects those wells nearest to the trench and does not alter regional groundwater flow. The results of the performance evaluation of the interceptor trench indicated that the section of the trench in this area is effective in capturing these NAPL bodies (Dan Raviv Associates, Inc. 1995a).

Dissolved constituents (e.g., benzene and xylene) in the groundwater are being transported with groundwater flow to the northeast. Dissolved phase contaminants will ultimately be captured by the interceptor trench. Although insufficient data exist to evaluate if active bioattenuation of dissolved phase constituents is occurring in this area, conditions appear to be suitable for biodegradation.

7.2.8 <u>"A"-Hill Tank Field</u>

The inter-media relationships and fate and transport hypotheses for contaminants detected in the "A"-Hill Tank Field are discussed below.

7.2.8.1 Contaminant Relationships

Arsenic and TPH exceed the NJDEP soil cleanup criteria in surface and subsurface soil samples analyzed. The arsenic was not detected in groundwater in excess of the groundwater quality standards, indicating that it does not appear to be leaching into the groundwater. TPH does appear to be leaching to the groundwater.

Based on the specific gravity (0.82) of the floating NAPL in this area, the NAPL is similar to diesel. Exclusive of iron and manganese, which appear to be regionally elevated in groundwater, benzene, xylenes, 2-methylnaphthalene, naphthalene, and dissolved lead (estimated 17.8 ug/L) were the constituent exceedances in groundwater. Although these constituents were observed upgradient of NAPL Plume No. 13, it is possible that the floating NAPL contributed dissolved phase benzene to the groundwater.

The PAHs [benzo(a)anthracene, benzo(a)pyrene, and benzo(a,h)anthracene] detected in subsurface soil indicates that the NAPL is adsorbing to the soil in the vadose zone and capillary firinge.

7.2.8.2 Contaminant Fate and Transport

The arsenic detected in soil in this area will tend to stay sorbed in soil and will not leach to groundwater.

The floating NAPL plume (Plume No. 13) appears to be acting as a source of dissolved phase benzene to partition to groundwater, since it has a specific gravity similar to diesel fuel and benzene also appears in groundwater downgradient of the NAPL plume. Dissolved VOCs and SVOCs are capable of undergoing biodegradation under either aerobic or anaerobic processes, assuming that suitable conditions prevail. One groundwater sample was collected from an upgradient monitoring well in the "A"-Hill Tank Field. Although it is not possible to demonstrate that biodegradation is occurring in this area based on the results of one well, values of DO (7 mg/L) and pH (6.15) are consistent with a potential for aerobic degradation.

If the local groundwater divide interpreted in this area exists as shown on Figure 4-6, part of the floating NAPL plume (Plume No. 13) has the potential to spread and migrate to the east and northeast toward the Main Building Area. This portion of Plume No. 13 would ultimately be captured under the hydraulic influence of the interceptor trench, thereby preventing it from migrating off-site. In addition, a component of the NAPL plume located west of the interpreted groundwater divide has the potential to flow to the southwest. This will be further investigated during Phase IB. Given the low permeability of the fill and viscosity of the NAPL, the plume is migrating very slowly, if at all.

7.2.9 Lube Oil and Stockpile Area (Includes Platty Kill Canal)

The inter-media relationships and fate and transport hypotheses for contaminants detected in the Lube Oil and Stockpile Area are discussed below.

7.2.9.1 Contaminant Relationships

There is very little relationship between the compounds detected in soil in the Lube Oil/Stockpile Area and the compounds detected in groundwater. No VOCs were detected in soil at concentrations above the impact to groundwater criteria, although there were a few low exceedances of the groundwater standard for benzene in shallow monitoring wells. There were numerous exceedances for PAHs and metals in both shallow and subsurface soil samples. Two SVOCs [benzo(b)fluoranthene and pyrene] were detected in soil at concentrations above the impact to groundwater criteria, but these compounds were not identified at elevated concentrations in groundwater samples. The only metal detected in soil that may be partitioning into groundwater is arsenic, which was detected in one groundwater sample at a concentration an order of magnitude above the groundwater quality standard.

The lack of VOCs in soil samples and the presence of VOCs in groundwater indicates that the source of the VOCs in groundwater is probably related to historical spills or NAPL plumes that have been recently identified. The source of the VOCs is probably not related to ongoing leaching from soils.

7.2.9.2 Contaminant Fate and Transport

NAPL floating on the shallow water table and NAPL identified in the confined intermediate zone has the potential to move toward and eventually discharge to the Platty Kill Canal. Dissolved constituents that are most likely associated with these NAPL bodies also have the potential to eventually discharge to the Platty Kill Canal. However, none of the shallow wells located directly adjacent to the canal contains floating NAPL. IRM studies conducted in the Platty Kill Canal Area found that the tidal influence on the shallow water table is limited to wells located directly adjacent to the canal; these gradient and flow reversals were observed (Dan Raviv Associates, Inc. 1994b). However, although the potential exists, no migration of NAPL in the shallow groundwater zone to Platty Kill Canal has been observed.

A laterally continuous and relatively thick clay and silt layer exists beneath the Platty Kill IRM Area. This layer separates the unconfined and confined zones and provides a confining layer to the deep zone (Dan Raviv Associates, Inc. 1994b). The lateral continuity of the clay and silt layer was confirmed by tidal and pumping test water-level measurements that suggested a lack of hydraulic connection between the two zones. Tidal influence was observed in all of the deeper intermediate zone monitoring wells. A dampened tidal amplitude and a succession of longer delay times was observed in these wells as distance from the canal increased. These tidal effects provide a tidal barrier between the confined zone and the Platty Kill Canal, effectively preventing the discharge of NAPL from this deeper zone to the canal.

Very little DO was detected in both the shallow (0.7 mg/L) and intermediate groundwaters (1.0 mg/L). Both of these zones contained little to no methane and moderate concentrations of carbon dioxide, suggesting that little biodegradation is taking place due to lack of significant substrate or not enough oxygen to support aerobic biological activity.

The absence of floating NAPL in monitoring wells located downgradient and adjacent to the Platty Kill Canal indicates that the floating NAPL in all of the identified plumes is well defined and is not posing an imminent threat to the nearby surface-water bodies. Both the NAPL and dissolved constituents have the potential to flow toward the Platty Kill Canal, but IRM studies indicate that tidal effects are effectively preventing discharge into the canal.

7.2.10 Pier No. 1 Area (Includes Helipad)

The contaminant relationships and fate and transport hypotheses for the Pier No. 1 Area are discussed below.

7.2.10.1 Contaminant Relationships

One soil sample from the Pier No. 1 Area contained exceedances for several PAHs and arsenic. Low concentrations of PAHs (below the groundwater quality standard) were identified in the shallow groundwater sample from existing Monitoring Well EB1, indicating that these compounds are not partitioning in significant quantities to shallow groundwater. Several chlorinated compounds, including TCE, PCE, 1,2-DCE, and vinyl chloride, were identified at elevated concentrations in the groundwater sample from intermediate Monitoring Well GMMW21I. These compounds were not detected in soil samples collected in this area, nor were they detected in the TCL analysis of NAPL collected from the shallow water-bearing zone (Dan Raviv Associates, Inc. 1995d). The source of the chlorinated compounds is unknown. The pesticide, alpha-BHC, which was also detected in the intermediate groundwater sample may have been mobilized by the presence of the other dissolved chlorinated compounds.

7.2.10.2 Contaminant Fate and Transport

NAPL (Plume No. 17) floating on the shallow water table and the dissolved constituents detected in shallow and intermediate monitoring wells have the potential to move toward, and eventually discharge into, the Kill Van Kull Waterway. Bulkheading installed to depths of 40 to 60 feet in the area of the old Pier No. 1 appears to channel groundwater movement toward the deteriorated portion of steel sheet pile bulkhead near the Salt Water Pumping Station.

The dissolved constituents are amenable to biodegradation. Biodegradation is most likely enhanced in this area due to the influx and cycling of groundwater by the tides. Tidal flushing could result in a constant supply of dissolved oxygen to the dissolved-phase portion of the plume, thereby enhancing aerobic degradation.

Both floating NAPL and dissolved constituents in groundwater have the potential to migrate and eventually discharge to the Kill Van Kull Waterway. NAPL (Plume No. 17) migration is significantly hindered by the tidal reversal of groundwater flow and also by the bulkheading that has been installed along the local western, central, and eastern shores. The IRM studies indicate that the eastern bulkheading is in poor, deteriorating condition, and NAPL and groundwater do have the potential to migrate and possibly discharge to the Kill Van Kull Waterway in this direction. The western and southern shore bulkheads are deeper, extend to clay layers, are constructed with concrete, and are in better condition, forming an effective barrier to migration.

The chlorinated VOCs detected in Intermediate Monitoring Well GMMW21I have the potential to be transported to the Kill Van Kull Waterway. However, the migration will be retarded by attenuation and by tidally influenced reversals in gradient. Any chlorinated VOCs that ultimately discharge to the Kill Van Kull Waterway will be immediately diluted to concentrations below detection limits due to the enormous flow in this surface-water body and the extremely low groundwater discharge rates from the intermediate water-bearing stratum.

7.3 POTENTIAL REMEDIAL REQUIREMENTS FOR NAPL

This section describes the goals of remediation specific to the NAPL plumes delineated at the site. NAPL plumes that warrant mitigation in accordance with the established goals are identified, followed by a list of potential remedial technologies that could satisfy the remedial objectives.

7.3.1 Remedial Goals for NAPL

NAPL remedial decisions for the Bayonne Plant will be guided by the following remedial goals:

- Intercept off-site migration and reduce potential off-site exposure.
- Reduce potential on-site exposure to workers either by direct contact or other concerns (e.g., explosion or vapor generation).
- Eliminate sources of dissolved groundwater contamination if it is a threat to significant resources.
- Mitigate significant volumes of NAPL where recoverable by practical means before it becomes more difficult to recover.

7.3.2 NAPL Areas That Warrant Remediation

Listed below are the areas of the Bayonne Plant with NAPL plumes that warrant remediation in accordance with the goals described above. These plumes are enumerated consistent with Figure 5-5 and Tables 5-10 and 7-1.

Area	Plume No.	Remedial Goal(s) To Be Addressed
Piers and East Side Treatment Plant	1, 2, 3	Off-site migration.
Low Sulfur and Solvent Tank Fields	4	On-site exposure. Significant volume. Probable dissolved migration.
AV-Gas Tank Field	7	Off-site migration.
Utilities Area	9	Off-site migration.
No. 3 Tank Field	10	Off-site migration. On-site exposure.
"A"-Hill Tank Field	13	Significant volume. Probable dissolved migration.
Stockpile/Platty Kill Area	15, 16	Eventual off-site migration.
Pier No. 1 Area (Helipad)	17	Off-site migration.

Each of the areas listed above except Plume No. 15 has been investigated during IRM studies and will remain a focus of remedial efforts. Plumes 5, 6, 8, and 14 appear to be stable on-site at present. Plumes 11 and 12 seem to be controlled by the Interceptor Trench. These will be further characterized during subsequent phases of the RI.

7.3.3 Potential Remedial Technologies for NAPL

The following remedial technologies will be considered for NAPL mitigation at the Bayonne Plant:

- Conventional recovery/containment in wells by either pumping of total fluids (single pump), dual phase pumping (two pumps), or passive skimming.
- Vacuum-enhanced recovery by low vacuum (generally less than 5 psi), with a skimmer pump for NAPL recovery only.
- Vacuum-enhanced recovery by high vacuum (generally greater than 10 psi), for NAPL and water recovery.
- Horizontal wells.
- Interceptor trenches with either passive skimming or pumping.
- Impermeable barriers to funnel NAPL migration to a collection well or trench.
- Natural attenuation.

7.4 DATA GAPS FOR NAPL REMEDIATION

Some or all of the following data gaps will need to be addressed for each NAPL body listed in Section 7.3.2 (NAPL Areas That Warrant Remediation) to design optimal remedial systems for NAPL mitigation:

- The actual extent of the NAPL body in the vertical plane (i.e., apparent versus true NAPL thickness) by performing bail-down tests in existing wells.

- The horizontal extent of some of the NAPL bodies, particularly the southernmost NAPL plume in the No. 3 Tank Field (Plume No. 10 on Figure 5-5), as noted in the NAPL IRM report (Geraghty & Miller, Inc. 1995a).

- The mobile or static nature of some of the NAPL bodies and the direction of migration, through continued monitoring of existing wells and additional wells installed during subsequent phases of the RI.

- Hydraulic characteristics of the saturated subsurface materials through pumping tests, slug tests, and physical testing (e.g., grain size distribution)..

- Physical and chemical characteristics of the NAPL, through laboratory analysis.

These data gaps will be addressed in formulating work plans for subsequent phases of the RI.

8.0 REFERENCES

Andrews, L.S., and R. Snyder. 1991. Toxic Effects of Solvents and Vapors. In: Casarett and Doull's Toxicology. The Basic Science of Poisons. Fourth Edition. Amdur, M.O., J. Doull, C.D. Klaassen (Editors). Macmillan Publishing Co., New York, New York.

Bergamini. 1992. Petroleum Product Chemistry. Underground Tank Technology Update. Vol. 6, No. 2.

Boyer, J. 1994. Staff member of NJDEP Case Management Team. Personal communication with B. Blum, Geraghty & Miller, Inc. and L. Caramichael, Exxon Company U.S.A., April 13, 1994.

Bruzzi, J. 1995. Exxon Company, U.S.A., Personal communication with Geraghty & Miller, Inc. September 8, 1995.

CH2M Hill, Inc. 1988. Water Balance, Exxon, Bayonne, New Jersey Facility, August 1988.

Chapman, D. 1995. Personal Communication with Geraghty & Miller, Inc., December 5, 1995.

Dames & Moore. 1979. Bayonne Terminal and Chemical Plant Hydrogeologic Studies for Exxon Company, U.S.A., July 16, 1979.

Dan Raviv Associates, Inc. 1992. Proposed Interim Remedial Measures Work Plan for the Exxon Company, U.S.A., Bayonne Plant, Bayonne New Jersey, February 25, 1992.

Dan Raviv Associates, Inc. 1993a. Non-Aqueous Phase Liquids (NAPLs) Interim Remedial Measures Work Plan, Exxon Company, U.S.A., Exxon Bayonne Plant, Bayonne, New Jersey, January 29, 1993.

Dan Raviv Associates, Inc. 1993b. Interim Remedial Measures Investigation and Conceptual Remedial Design Parameters for NAPL Recovery, Low Sulfur and Solvent Tank Fields, Former Exxon Bayonne Plant, Bayonne, New Jersey, November 1993.

Dan Raviv Associates, Inc. 1994a. Addendum to Non-Aqueous Phase Liquid Interim Remedial Measures (IRM) Work Plan, Exxon Company, U.S.A., Exxon Bayonne Plant, Bayonne, New Jersey, June 17, 1995.

Dan Raviv Associates, Inc. 1994b. Non-Aqueous Phase Liquid (NAPL) Interim Remedial Measures Investigation, Platty Kill Canal Area, Exxon Bayonne Plant, Bayonne, New Jersey, June 17, 1995.

Dan Raviv Associates, Inc. 1995a. Non-Aqueous Phase Liquid (NAPL) Interim Remedial Measure Investigation, Interceptor Trench Area, Exxon Bayonne Plant, Bayonne, New Jersey, June 26, 1995.

Dan Raviv Associates, Inc. 1995b. Non-Aqueous Phase Liquid (NAPL) Interim Remedial Measures Investigation, Pier 6 Area, Bayonne Plant, Bayonne, New Jersey, July 25, 1995.

Dan Raviv Associates, Inc. 1995c. Non-Aqueous Phase Liquid (NAPL) Interim Remedial Measures Investigation, Pier 7 Area, Bayonne Plant, Bayonne, New Jersey, July 31, 1995.

Dan Raviv Associates, Inc. 1995d. Non-Aqueous Phase Liquid (NAPL) Interim Remedial Measure, Helipad Area, Exxon Bayonne Plant, Bayonne, New Jersey, August 18, 1995.

Dripps, M. 1872. City of Bayonne, New Jersey, Map Showing Farm Lines, etc., Published by M. Dripps, 34 Vesey St., New York, 1872.

Exxon Company, U.S.A. 1988. Pride and Bayonne, Copyright 1988. Exxon Corporation.

Exxon Company, U.S.A. 1995. 2nd Quarter 1995 Progress Report, July 25, 1995.

Fairchild, R.E. 1994. Chronological History of Constable Hook and Background on Standard Oils' Coming to Bayonne, October 20, 1994.

Forstall, R. 1992. Staff Member of United States Census Bureau, Division of Population. Telephone conversation with B. Blum, Geraghty & Miller, Inc., November 19, 1992.

Geological Survey of New York. 1970. Geologic Map of New York, Lower Hudson Sheet, March 1970.

Geraghty & Miller, Inc. 1993a. Remedial Investigation Work Plan, Exxon Company, U.S.A., Bayonne Plant, Bayonne, New Jersey, January 20, 1993.

Geraghty & Miller, Inc. 1993b. Field Verification Procedures and Analysis Plan, Phase IA Remedial Investigation, Exxon Company, U.S.A., Bayway Refinery, Linden, New Jersey, October 1993.

Geraghty & Miller, Inc. 1994a. Memorandum Modification to the Remedial Investigation Work Plan, Bayonne Plant, Bayonne, New Jersey, October 1994.

Geraghty & Miller, Inc. 1994b. Site History Report, Bayonne Plant, Bayonne, New Jersey, November 21, 1994.

Geraghty & Miller, Inc. 1995a. Non-Aqueous Phase Liquid (NAPL) Interim Remedial Measure (IRM) Investigation at the General Tank Field, No. 3 Tank Field, Exxon Chemical Plant (Utilities Area), and the Lube Oil Area, at the Bayonne Plant, Bayonne, New Jersey, July 25, 1995.

Geraghty & Miller, Inc. 1995b. Vacuum Enhanced Recovery Pilot Study, Bayonne Plant, Bayonne, New Jersey, June 1995.

Geraghty & Miller, Inc. 1995c. Fourth Quarter and Annual NAPL and Water-Level Measurements for the "A"-Hill Tank Field Area, Bayonne Plant, Bayonne, New Jersey, October 20, 1995.

Hazardous Substances Database (HSDB). 1993. MEDLARS, The National Library of Medicine's Online Network. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, Bethesda, Maryland.

Howard, P.H., 1989. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume I, Large Production and Priority Contaminants. Lewis Publishers, Inc., Chelsea, Michigan. 574 pp.

Howard, P.H., 1990. Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volume II, Solvents. Lewis Publishers, Inc., Chelsea, Michigan. 546 pp.

Howard, P.H., R.S. Boethling, W.F. Jarvis, W.M. Meylan, and E.M. Michalenko. 1991. Handbook of Environmental Degradation Rates. Lewis Publishers, Inc., Chelsea, Michigan. 725 pp.

Humble Oil & Refining Company. 1961. Article for Special Centennial Issue of the Bayonne Facts, June 1, 1961.

Hudson County Department of Planning and Economic Development. 1992. Fact Sheet of Demographic Inforamation on Hudson County.

Hydrotechnic Corporation Engineers. 1958. Report on Groundwater Conditions, May 1958.

ICF Kaiser Engineers, Inc. 1993. Interim Remedial Measures Investigation Report for Chromium Contamination at the Bayonne Plant, Bayonne, New Jersey, July 7, 1993.

ICF Kaiser Engineers, Inc. 1994. Interim Remedial Measures Investigation Report for Chromium Contamination at the Bayonne Plant, Bayonne, New Jersey, Supplement 1-Conrail Right-of-Way Investigation, February 25, 1994.

IT Corporation. 1993. Phase I Interim Remedial Measure Work Plan Proposed Sewer System Evaluation, February 10, 1993.

Kostecki, P.T., and E.J. Calabrese. 1989. Petroleum Contaminated Soils, Volume I, Remediation Techniques, Environmental Fate, Risk Assessment. Lewis Publishers, Inc., Chelsea, Michigan. 357 pp.

Leggette, Brashears & Graham, Inc. 1974a. Status Report of Shallow Ground-Water Contamination Investigation, Exxon Company, U.S.A., Bayonne Plant, New Jersey, September 20, 1974.

Leggette, Brashears & Graham, Inc. 1974b. Letter from M. Schultz to D. Petrow, Exxon Company, U.S.A., May 21, 1974.

Leggette, Brashears & Graham, Inc. 1974c. Status Report for October 1974 Shallow Groundwater Contamination Investigation, Exxon Company, U.S.A., Bayonne Plant, New Jersey, November 6, 1974.

Lueder, D. R., G. H. Obear, W. W. Holman, and F. C. Rogers. 1952. Engineering Soil Survey of New Jersey, Report No. 4. Engineering Research Bulletin No. 18. New Jersey State Highway Department and Rutgers University, in Cooperation with the Bureau of Public Roads, U.S. Department of Commerce, September 1952.

Lugg, G.A., 1968. Diffusion Coefficients of Some Organic and Other Vapors in Air. Analytical Chemistry. Vol. 40(7), pp. 1072-1077.

Lyman, W.J., W.F. Reehl, and D.H. Rosenblatt, 1990. Handbook of Chemical Property Estimation Methods. American Chemical Society, Washington D.C.

McAllister & Chiang. 1994. A Practical Approach to Evaluating Natural Attenuation of Contaminants in Groundwater, Groundwater Monitoring Review, Spring 1994.

McGuinness, C.L. 1963. The Role of Groundwater in the National Water Situation, U.S. Geological Survey Water Supply Paper 1800. United States Government Printing Office, Washington, 1120 pp.

McKenna, E.J., and R.D. Heath. 1976. Biodegradation of Polynuclear Aromatic Hydrocarbon Pollutants by Soil and Water Microorganisms. Water Resources Center, University of Illinois, Research Report No. 113. UILV-WEC-76-0113.

Malcolm Pirnie, Inc. 1985. Potential Hazardous Waste Site Preliminary Assessment at Exxon Bayonne Plant, February 28, 1985.

Monkowski, J. 1994. City of Bayonne Department of Health. Telephone conversation with J. Karn, Geraghty & Miller, Inc., October 20, 1994.

Montgomery, J.H., and L.M. Welkom, 1990. Groundwater Chemicals Desk Reference. Lewis Publishers, Inc., Chelsea, Michigan. 640 pp.

National Oceanic Atmospheric Administration (NOAA). 1991. Climatology Data Annual Summary, New Jersey, 1991, Vol. 96, No. 13.

New Jersey Department of Environmental Protection (NJDEP). 1990. Division of Hazardous Waste Management, Bureau of Planning and Assessment. Site Inspection, Exxon Bayonne Plant, Bayonne, Hudson County, EPA ID No.: NJD045435807. [sic], December 27, 1990.

New Jersey Department of Environmental Protection (NJDEP). 1991. Quality Assurance Data Validation of Analytical Deliverables - TCL - Organics (based on the USEPA May 1990 SOW OLM01.0 with revisions). SOP NO. 5.A.13. Revision No. 0.

New Jersey Department of Environmental Protection and Energy (NJDEPE). 1992a. Field Sampling Procedures Manual, May 1992.

New Jersey Department of Environmental Protection (NJDEP). 1992b. Quality Assurance Data Validation of Analytical Deliverables - TAL - Inorganics (based on the USEPA CLP SOW ILM02.0). SOP NO. 5.A.02. Revision No. 0.

New Jersey Department of Environmental Protection (NJDEP). 1992c. SOP for the Completion of the CLP Data Validation Report Forms and the Preparation of the Final Data Validation Report. SOP NO. 5.A.15 Revision No. 0.

New Jersey Department of Environmental Protection (NJDEP). 1993. Technical Requirements for Site Remediation, NJAC 7:26E, July 1, 1993.

New Jersey Department of Environmental Protection (NJDEP). 1994a. Personal Communication between: M. Hrenda, NJDEP; L. Caramichael, Exxon; and B. Blum, Geraghty & Miller, Inc.; December 19, 1994.

New Jersey Department of Environmental Protection (NJDEP). 1994b. Alternative Groundwater Sampling Techniques Guide, July 1994.

New Jersey Department of Environmental Protection (NJDEP). 1994c. Known Contaminated Sites in New Jersey, July 1994.

New Jersey Department of Environmental Protection. 1995a. Site Remediation Program, Basis and Background, Suggested Soil Cleanup Criteria for Trivalent and Hexavalent Chromium, Executive Summary, September 1995.

New Jersey Department of Environmental Protection. 1995b. Letter from M. Kenney to J. Hannig, Exxon, July 6, 1995.

Ney, R.E. 1990. Where Did That Chemical Go? Van Nostrand Reinhold, New York, New York.

Olsen et. al. 1989. Tectonic, Depositional, and Paleoecological History of the Early Mesozoic Rift Basins, Eastern North America, Washington, D.C., American Geophysical Union Field Trip Guide Book T351, 174 pp.

PPG Industries, Inc. 1992. Letter to C. Hess, Exxon Company, U.S.A. from L. Bryant. Re: Final Investigation Work Plan, Tank Farm #3 and General Tank Farm, Bayonne Terminal, July 9, 1992.

Roy F. Weston, Inc. 1980. Letter from A. Thomas to M. Kenney, Exxon Company, U.S.A. Re: Subsurface Oil Recovery Program, Bayonne Plant - Meeting on June 1980, June 13, 1980.

Roy F. Weston, Inc. 1981a. Letter. Re: New Wells for the Low Sulphur Area, March 4, 1981.

Roy F. Weston, Inc. 1981b. Letter from A. Thomas to J. B. Wells, Exxon Company, U.S.A. Re: Maintenance of Oil Recovery Wells, March 9, 1981.

Roy F. Weston, Inc. 1985. Subsurface Oil Recovery and Monitoring Program Pier 3, Exxon Company U.S.A., June 4, 1985.

Roy F. Weston, Inc. 1986a. Letter from A. Thomas to D. Petrow, Exxon Company, U.S.A., Concerning the Potential for Hydrocarbon Seepage from Pier 7 to the Bay and Site Inspection of Pier 6 and Pier 3 Area, July 15, 1986.

Roy F. Weston, Inc. 1986b. Letter to D. Petrow, Exxon Company, U.S.A. Re: Letter Dated August 15, 1986 on Piers 6 and 7 Area, August 19, 1986.

Roy F. Weston, Inc. 1986c. Letter from A. Thomas to D. Petrow, Exxon Company, U.S.A., Concerning Additional Monitoring Wells, September 23, 1986.

Roy F. Weston, Inc. 1989a. Letter from H. A. Anwar to D. Petrow, Exxon Company, U.S.A. Re: Meeting Summary, Discussion of Well Monitoring Results and Overall Environmental Strategy, Exxon Bayonne Refinery, Bayonne, New Jersey, January 6, 1989.

Roy F. Weston, Inc. 1989b. Fourth Quarter Monitoring Report (1989), Exxon U.S.A., Bayonne Facility, Bayonne, New Jersey, March 27, 1989.

Roy F. Weston, Inc. 1989c. First Quarter Monitoring Report (1989), Exxon U.S.A., Bayonne Facility, Bayonne, New Jersey, May 1, 1989.

Roy F. Weston, Inc. 1989d. Second Quarter Monitoring Report (1989), Exxon U.S.A., Bayonne Facility, Bayonne, New Jersey, August 21, 1989.

Roy F. Weston, Inc. 1989e. Letter from H. A. Anwar to D. Petrow, Exxon Company, U.S.A. Re: Third Quarterly 1989 Monitoring Data for the Exxon Bayonne Facility, October 27, 1989.

Sandaq, Inc., P.C. 1986. Sewer Investigation Report for Toxic Substances, April 27, 1986.

Scerbo, R. 1995. Personal communication with Geraghty & Miller, Inc.

Schuberth, C.J. 1968. The Geology of New York City and Environs. Natural History Press, New York, 304 pp.

Shen, T.J., 1982. Air Quality Assurance for Land Disposal of Industrial Waste. Environmental Management. Vol. 6, pp. 297-305.

State of New Jersey Department of Conservation and Economic Development. 1950. Geologic Map of New Jersey, Revised in 1950.

United States Census Bureau. 1990. Demographic Data for United States.

United States Environmental Protection Agency. 1989. Transport and Fate of Contaminants in the Subsurface. Seminar Publication. Center for Environmental Research Information, Cincinnati, Ohio.

United States Environmental Protection Agency. 1991a. Contract Laboratory Program Statement of Work for Organic Analysis, ILM01.8.

United States Environmental Protection Agency. 1991b. Contract Laboratory Program Statement of Work for Inorganic Analysis, ILM02.1.

United States Environmental Protection Agency. 1992a. National Functional Guidelines for Evaluating Organic and Inorganic Analytes.

United States Environmental Protection Agency. 1993. Guidance for Data Usability in Risk Assessment.

United States Geological Survey (USGS). 1981. Jersey City Quadrangle, New Jersey-New York, 7.5 Minute Topographic Map, Photo Revised, 1981.

Verschueren, K., 1983. Handbook of Environmental Data on Organic Chemicals, Second Ed. Van Nostrand Reinhold Co., New York, New York. 1,310 pp.

Wiedemeier, T., et. al. 1994. United States Air Force Guidelines for Successfully Supporting Intrinsic Remediation with an Example from Hill Air Force Base. Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Groundwater Conference, Houston, Texas, November 2, 1995.

Table 3-2. Summary of Operational Area Prefix Codes, Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Zone	Operational Area	Prefix Codes	Prefix Code Exceptions*
AHTF	"A"-Hill Tank Field	AHTF	
LO	Lube Oil Area	LO, LA	
P1	Pier No. 1 Area	PN1	LA (1)
N2TF	No. 2 Tank Field	N2TF	
AP	Asphalt Plant	AP	N3TF (1)
AGTF	AV-Gas Tank Field	AGTF	
ECP	Exxon Chemical Plant	ECP	EC2 (1)
N3TF	No. 3 Tank Field	N3TF	EC (1)
GTF	General Tank Field	GTF	EGTF (1)
STF	Solvent Tank Field	STF	GF (1)
PEST	Piers and East Side Treatment Plant	PEST	
DT	Domestic Trade Area	DT	
MB	Main Building Area	MB	PS (1)
MDC	MDC Building Area	MDC	
U	Utilities Area		EC (2), T998 (1)
SS	Stockpile Area	SS	LO (1)

* Prefix code exception with number of prefix code exceptions indicated in parentheses.

Table 3-1. Number of Analyses Conducted for Phase IA Soil and Groundwater Samples, Bayonne Plant, Bayonne, New Jersey.

Matrix	TPH	TCL VOCs[3]	TCL SVOCs	TCL Pesticides/PCBs	TAL[1,2,7] Metals	Total[2] Chromium	Hexavalent[2] Chromium	Wet Chemistry[4]	Dissolved Gases[5]
Soil									
Phase IA RI Soil Borings (84 locations)	155	91	92	88	88	153	125	NA	NA
IRM Soil Borings (14 locations)	28	17	16	17	24	28	16	NA	NA
Groundwater									
Phase IA RI Wells	21	21	21	21	216[4]	21[4]	21[7]	17	17
Phase IA RI Drivepoints		13							
Existing Wells		10	10	10	106[1]	10[1]	10	10	10

QA/QC samples (i.e., replicates, matrix spike/matrix spike duplicates [MS/MSDs], field blanks, and trip blanks) are not included.

QA/QC Quality assurance/quality control.
TPH Total petroleum hydrocarbons.
TCL Target compound list.
VOCs Volatile organic compounds.
SVOCs Semivolatile organic compounds.
PCBs Polychlorinated biphenyls.
TAL Target analyte list.
NA Not analyzed.
1 Does not include chromium analysis, which are tabulated separately.
2 Unless otherwise indicated, groundwater samples were analyzed for dissolved constituents. A subset of the number of dissolved samples were also analyzed for total constituents, as indicated in parentheses and italics.
3 Include miscellaneous alcohols and site-specific compounds.
4 Wet chemistry parameters consist of chloride, alkalinity, sulfate, sulfide, total dissolved solids, biological oxygen demand, chemical oxygen demand, nitrate, phosphate, total organic carbon, ammonia, total iron, and total manganese.
5 Dissolved gases consist of carbon monoxide, carbon dioxide, dissolved oxygen, methane, and nitrogen dioxide.
6 A total of 28 groundwater samples was analyzed for total and dissolved iron and manganese.
7 One sample was also analyzed as a total due to the high turbidity.

Table 3-3. Rationale for Selection of Soil Borings and Monitoring Wells for the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Boring/Well Identification	Adjacent to Sewer	Adjacent to Sanitary Septic System	Documented Spill	Historical Process Area	Adjacent to Former Oil-Water Separator	Location Selected to Provide Broad Areal Coverage	Comments
"A" -Hill Tank Area							
AHTFSB1	X						Current and former storage tanks.
AHTFSB2	X						Current and former storage tanks.
AHTFSB3	X		X		X		Current and former storage tanks.
AHTFSB4	X		X				Current and former storage tanks.
Lube Oil Area							
LOSB1	X		X	X			Former MEK Plant, Phenol Plant, and truck loading area.
LOSB2	X			X			Former separator and agitator tanks. Nearby substation transformer area.
LOSB3				X		X	Former clay filter building, shops, and pump house.
LOSB4	X		X		X		Former storage tanks.
LOSB5/GMMW1						X	Former storage tanks. Nearby railroad loading area.
LOSB6		X					Former shops.
LOSB7		X					Former barrel factory and boiler house.
LOSB9	X		X				Former storage tanks. Nearby truck loading areas.
LOSB10	X	X	X				Former storage tanks. Nearby truck and railroad loading areas.
LOSB11		X					Former storage tanks and shops.
LOSB12	X		X	X			Former MEK and Phenol Plants, pump house, truck loading and stills area.
LOSB13			X				Former storage tanks, separator, and pump house.
LOSB14	X						Former storage tanks and acid tanks.
LOSB15						X	Former railroad tracks and loading racks.
LOSB16			X				Former storage tank and truck loading area.
LOSB17		X		X	X		Former storage tanks and separator.
LOSB18				X	X		Former main separator for Lube Oil Area.
* LOSB19/GMMW22D	X					X	Stratigraphic boring; former supply house.
† LAIRMB1						X	Former truck loading rack; railroad car filling rack.
† LAIRMB2							East of former paint shop/machine shops.
† LAIRMB3							Former barrel factory and boiler house.
† LAIRMB4/GMMW19							Northeast of former experimental laboratory.
† LAIRMB5							Southeast of former experimental laboratory.
† LAIRMB6							

See last page for footnotes.

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Table 3-3. Rationale for Selection of Soil Borings and Monitoring Wells for the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Boring/Well Identification	Adjacent to Sewer	Adjacent to Sanitary Septic System	Documented Spill	Historical Process Area	Adjacent to Former Oil-Water Separator	Location Selected to Provide Broad Areal Coverage	Comments
Pier No. 1 Area							
GMMW21I						X	Intermediate monitoring well.
* PN1SB1/GMMW21D						X	Stratigraphic boring and deep monitoring well.
‡ PN1SB2						X	Former pump house and transformer area.
† LAIRMB7							East of old saltwater pump house in transformer area.
No. 2 Tank Field							
N2TFSB1/GMMW2			X	X			Former boiler house and sweetening stills.
N2TFSB2	X			X			Former storage tanks, boiler house, and sweetening stills.
N2TFSB3							Former storage tanks, pipe shop, and pump house.
N2TFSB4	X						Former storage tanks.
N2TFSB5				X	X		Pump house, separator, stacks, and furnaces.
N2TFSB6	X						Former pump house and storage tanks.
Asphalt Plant Area							
APSB1	X						Former pitch drum filling and storage shed, adjacent to former tanks and agitators.
APSB2/GMMW3	X	X					Former pitch drum shed, pump house and piping manifolds. Transformer area.
APSB3	X		X				Former storage tanks. Active truck loading area.
APSB4						X	Former storage tanks and pump house.
APSB5/GMMW4	X					X	Former pump house and storage tanks.
APSB6				X	X	X	Former off-gas incinerator, oxidizer, ferric chloride tank; near a transformer area.
GMMW23I	X	X					Intermediate depth well.
* APSB7/GMMW23D	X	X				X	Stratigraphic boring and deep well. Railroad car filling area, former drum filling area and storage area.
N3TFSB2		X					current and former storage tanks.
AV-Gas Tank Field							
AGTFSB1	X			X	X		Former storage tanks and crude stills; near transformer area.
AGTFSB2	X		X	X			Former crude stills.
AGTFSB3	X		X	X			Former storage tanks and colprovian asphalt pans.
AGTFSB4	X						Near former pitch filling plant and asphalt pans.

See last page for footnotes.

Boring/Well Identification	Adjacent to Sewer	Adjacent to Sanitary Septic System	Documented Spill	Historical Process Area	Adjacent to Former Oil-Water Separator	Location Selected to Provide Broad Areal Coverage	Comments
Exxon Chemicals Plant							
ECPSB1	X						Transformer area.
ECPSB2	X	X	X				Former storage tanks and pipe trench near substation and truck loading area.
ECPSB3	X		X	X			Pipe still and chemical plant units.
ECPSB4	X	X	X	X			Condenser and pipe stills, separator, and pipe trench.
ECPSB5			X	X			Chlorine car and truck yard; former underground storage tanks, acid neutralization pit, parapoid and paraflow plants.
No. 3 Tank Field							
N3TFSB1/GMMW5	X		X			X	Current and former storage tanks.
N3TFSB3/GMMW6						X	Current and former storage tanks.
N3TFSB4					X		Current and former storage tanks.
N3TFSB5	X						Current and former storage tanks.
N3TFSB6	X						Current and former storage tanks.
N3TFSB7	X		X				Current and former storage tanks.
N3TFSB8/GMMW7			X			X	Current and former storage tanks.
N3TFSB9						X	
† 3TFIRMB1/GMMW16							Former storage tanks south of pipe trench.
† 3TFIRMB2							Former storage tanks south of pipe trench.
† 3TFIRMB3/GMMW17							Former slop tank near separator.
† 3TFIRMB4					X		Former separator, concrete separator outfall, and slop well.
† ECIRMB3	X						Former tile acid sewer.
General Tank Field							
GTFSB1/GMMW8						X	Current and former storage tanks near former separator sludge area potentially containing lead.
GTFSB2	X						Current and former storage tanks.
GTFSB3/GMMW9						X	Current and former storage tanks.
GTFSB4	X						Current and former storage tanks within old municipal landfill area.
GTFSB5						X	Current and former storage tanks.
GTFSB6/GMMW10						X	Current and former storage tanks.
GTFSB7	X		X				Current and former storage tanks.
GTFSB8	X						Current and former storage tanks near pump house.

See last page for footnotes.

Table 3-3. Rationale for Selection of Soil Borings and Monitoring Wells for the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	Boring/Well Identification	Adjacent to Sewer	Adjacent to Sanitary Septic System	Documented Spill	Historical Process Area	Adjacent to Former Oil-Water Separator	Location Selected to Provide Broad Areal Coverage	Comments
	General Tank Field (continued)							
	GTFSB9	X						Current and former storage tanks.
	EOTFSB1			X			X	Fill area east of current and former storage tanks.
†	GTFIRMB1					X		Current and former storage tanks.
†	GTFIRMB2						X	Current and former storage tanks.
†	GTFIRMB3							Current and former storage tanks.
†	GTFIRMB4							Current and former storage tanks.
†	GTFIRMB5/GMMW20							Current and former storage tanks.
†	GTFIRMB6							Current and former storage tanks.
†	GTFIRMB7							Current and former storage tanks.
†	GTFIRMB8							Current and former storage tanks.
†	GTFIRMB9							Current and former storage tanks.
†	GTFIRMB10							Current and former storage tanks.
†	GTFIRMB11							Current and former storage tanks.
†	GTFIRMB12							Current and former storage tanks.
†	GTFIRMB13			X				Current and former storage tanks.
†	GTFIRMB14			X				Current and former storage tanks.
†	GTFIRMB15			X				Current and former storage tanks.
†	GTFIRMB16			X				Current and former storage tanks.
†	GTFIRMB17	X		X				Current and former storage tanks.
†	GTFIRMB18	X		X				Current and former storage tanks.
	Solvent Tank Field							
	STFSB1	X		X	X		X	Former pump house, truck loading area, manifold pits, and transformer area near former Lower Hook Nap and Acid Tank Field, and drum filling building. Former truck loading area.
	STFSB2	X	X	X				Former storage tanks and pump pad with nearby truck and rail loading areas and transformers.
	STFSB3	X	X					Former storage tanks.
	OFSB1/OMMW14	X					X	Former truck rack and Norton spheroid.

See last page for footnotes.

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Table 3-3. Rationale for Selection of Soil Borings and Monitoring Wells for the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Boring/Well Identification	Adjacent to Sewer	Adjacent to Sanitary Septic System	Documented Spill	Historical Process Area	Adjacent to Former Oil-Water Separator	Location Selected to Provide Broad Areal Coverage	Comments
Piers and East Side Treatment Plant Area							
PESTSB1	X	X	X		X		Current and former large separator. Near former pump house and truck loading area.
PESTSB2	X				X		Barrel filling building. Near truck loading area.
GMMW24I		X				X	Intermediate depth well.
* PESTSB3/GMMW24D						X	Stratigraphic boring and deep monitoring well barrel staging area near transformers and truck loading area.
Domestic Trade Area							
DTSB1/GMMW11				X			Former cracking coil area near truck loading area, former underground storage tanks, and pump house.
DTSB2				X			Former cracking coil area near truck loading area, former underground storage tanks, and pump house.
DTSB3						X	
MISCELLANEOUS AREAS							
Utilities Area							
† ECIRMB1				X			Former boiler house and former sludge tank, near transformers.
† ECIRMB2/GMMW18						X	
EC2SB1		X					Former transformer area.
** T998SB1/GMMW13	X					X	Former boiler house.
Main Building Area							
MBSB1	X						Former storage tanks near transformers.
MBSB2	X						Former storage tanks near underground storage tanks.
MBSB3					X		Former storage tanks, sweetening stills, and underground storage tanks.
MBSB4				X			Former storage tanks, stirring tanks, and compound building, near transformers.
PSSB1		X		X			Former reducing stills, paraffin boiler house, and pump house.

See last page for footnotes.

Table 3-3. Rationale for Selection of Soil Borings and Monitoring Wells for the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Boring/Well Identification	Adjacent to Sewer	Adjacent to Sanitary Septic System	Documented Spill	Historical Process Area	Adjacent to Former Oil-Water Separator	Location Selected to Provide Broad Areal Coverage	Comments
MDC Building Area							
MDCSB1	X	X		X			Former Butterworth System, Inc. building, light oil filling building, and fuel station. Near former drum filling building and underground storage tanks.
MDCSB2/GMMW15				X		X	Former Naptha filling building.
Stockpile Area							
SSB1				X			Former MEK Dewaxing Plant and Phenol Plant area near former transformers.
SSB2/GMMW12				X			Former MEK Dewaxing Plant and Phenol Plant area near former transformers.
SSB3				X	X		Former MEK Dewaxing Plant and Phenol Plant area. Former storage tanks and wax area.
LOSB8				X	X		Former MEK Dewaxing Plant and Phenol Plant area, and stills area.

CMERP Construction Measures Emergency Repairs Protocol.
IRM Interim Remedial Measure.
NAPL Non-aqueous phase liquid.

* Denotes a stratigraphic soil boring that was converted into a deep monitoring well.
† Denotes an IRM soil boring/monitoring well.
** Soil Borings N3TFSB9 and PN1SB2 added to the RI field program: PN1SB2 was a CMERP soil boring added at the request of Exxon; N3TFSB9 was added to delineate NAPL in the No. 3 Tank Field.

Note: Soil borings and monitoring wells are listed above under the operational area in which the soil boring /monitoring well is located and not necessarily under the operational area that they were intended to evaluate (i.e., certain IRM soil borings in the Pier No. 1 Area and in the Utilities Area were intended to address potential NAPL migrating from the Lube Oil Area and Chemical Plant Area, respectively).

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Table 3-4. Location and Rationale for Relocation of Phase IA Soil Borings and Monitoring Wells, Bayonne Plant, Bayonne, New Jersey.

Location I.D.	Distance and Direction Moved from Formerly Proposed and Approved Location	Rationale for Moving the Location	Final Location Description
"A" Hill Tank Field			
AHTFSB4	60 ft SE	Surface water inside fire bank prevented access.	North of tank 516.
Lube Oil Area			
LOSB1	220 ft SE	Moved at request of John Boyer of the NJDEP to area near spill culvert at Tank 411.	Northeast of tank 411.
LOSB10	80 ft N	Moved due to subsurface concrete.	West of Control House at Lube Oil Area.
LOSB15	60 ft W	Moved into open area to complement spacing between RI and IRM borings.	East of tank 57.
LOSB16	40 ft WSW	Moved downgradient of documented spill or release.	Southwest of tank 46.
Pier No. 1 Area			
PN1SB1	60 ft NW	Moved north due to bulkheading along pier.	East southeast of the Helipad Pier No. 1
No. 2 Tank Field			
N2TFSB6	100 ft ESE	Moved to former process area.	East of tank 1001.
Asphalt Plant Area			
N3TFSB2	40 ft N	Moved to previous truck loading rack on other side of fence. Location was inaccessible due to pipe racks and utilities.	East of truck loading rack.
Exxon Chemical Plant Area			
EC2SB1	100 ft E	Moved as close as possible to sanitary sewer due to low overhead utilities at original location.	East of the Exxon Chemical Building No. 2.
ECPSB5	100 ft WSW	Moved downgradient (to a gravel area) along railroad loading area due to poor access and train traffic at original location.	Northwest of tank 916.

See last page for footnotes.

Table 3-4. Location and Rationale for Relocation of Phase IA Soil Borings and Monitoring Wells, Bayonne Plant, Bayonne, New Jersey.

Location I.D.	Distance and Direction Moved from Formerly Proposed and Approved Location	Rationale for Moving the Location	Final Location Description
No. 3 Tank Field			
GMMW7	80 ft NE	Moved towards area containing visually stained soil.	West of GMMW16.
General Tank Field			
GTFIRMB8	140 ft WSW	Moved into the interior of the tank field to complement spacing of IRM and RI borings.	Inside the firebank north of tank 1073.
GTFBIRMB18	60 ft E	Moved to road edge due to overhead utilities.	Northwest of electrical Substation No. 3.
EGTFSB1	100 ft S	Construction debris prevented access to original location.	North of Substation No. 3.
Piers and East Side Treatment Plant Area			
PESTSB1	40 ft W	Moved to edge of former oil/water separator.	East of Granular Activated Carbon Building.
PESTSB2	40 ft W	Moved to other side of fence due to pipe rack.	
PESTSB3	200 ft SW	Moved based on access problems due to bulkhead along pier, and also to complement well spacing.	East of Substation No. 4.
Domestic Trade Area			
DTSB3	40 ft W	Moved due to low overhead utility line.	
Utilities Area			
GMMW13	40 ft W	Moved to complement spacing with IRM borings.	West of tank 998.

See last page for footnotes.

Table 3-4. Location and Rationale for Relocation of Phase IA Soil Borings and Monitoring Wells, Bayonne Plant, Bayonne, New Jersey.

Location I.D.	Distance and Direction Moved from Formerly Proposed and Approved Location	Rationale for Moving the Location	Final Location Description
Main Building Area			
PSSB1	150 ft NW	Moved due to low overhead utilities and old buried railroad ties; also to delineate the extent of NAPL which was observed in the "A"-Hill Tank Field and Main Building areas.	North of the Paramins Store House.
MBSB1	40 ft N	Moved due to proximity to Main Building.	North of Main Building (middle of parking lot).
Stockpile Area			
GMMW12	185 ft NW	Moved to complement spacing with DRAI wells.	Stockpile Area.
SSB1	100 ft ESE	Moved due to access problem at original location.	West of tank 404.

ft Feet.
SE Southeast.
N North.
W West.
WSW West southwest.
NW Northwest.
ESE East southeast.
E East.
NE Northeast.
S South.
SW Southwest.
NJDEP New Jersey Department of Environmental Protection.
RI Remedial Investigation.
IRM Interim Remedial Measure.
NAPL Non-aqueous phase liquid.
DRAI Dan Raviv Associates, Inc.

Table 3-5. Phase IA Remedial Investigation Monitoring Well Construction Details, Bayonne Plant, Bayonne, New Jersey.

Well ID	Well Completion Date	Well Screen and Casing Diameter (inches)	Well Screen Material (20-slot wound)	Total Depth of Well (ft bls)	Depth of Screened Interval (ft bls)	Depth to Top of Sand Pack (ft bls)	Depth to Top of Bentonite Slurry (ft bls)	Measuring Point Elevation*		Depth to Top of Bedrock (ft bls)	Top of Bedrock Elevation (ft bls)
								Ground	Top of PVC		
Shallow											
GMMW1	10/11/94	4	PVC	12.5	2.5 - 12.5	1.5	0.5	10.3	9.70	NA	NA
GMMW2	10/12/94	4	PVC	16.0	6.0 - 16.0	4.0	2.0	17.6	17.44	NA	NA
GMMW3	10/26/94	4	PVC	17.0	7.0 - 17.0	5.0	3.0	15.9	15.17	NA	NA
GMMW4	10/12/94	4	PVC	14.0	4.0 - 14.0	2.0	1.0	10.3	9.72	NA	NA
GMMW5	10/18/94	4	PVC	13.0	3.0 - 13.0	2.0	1.0	9.7	9.26	NA	NA
GMMW6	10/13/94	4	PVC	14.0	4.0 - 14.0	3.0	2.0	12.4	14.43	NA	NA
GMMW7	10/18/94	4	PVC	13.0	3.0 - 13.0	2.0	1.0	9.1	8.36	NA	NA
GMMW8	10/10/94	4	PVC	16.0	3.0 - 16.0	2.0	1.0	9.4	8.80	NA	NA
GMMW9	10/10/94	4	PVC	13.0	3.0 - 13.0	2.0	1.5	8.6	7.91	NA	NA
GMMW10	10/11/94	4	PVC	13.0	3.0 - 13.0	2.0	1.0	9.3	8.88	NA	NA
GMMW11	10/27/94	4	PVC	15.5	5.5 - 15.5	3.5	2.0	11.8	11.58	NA	NA
GMMW12	10/12/94	4	PVC	13.0	3.0 - 13.0	2.0	1.0	10.5	13.73	NA	NA
GMMW13	10/12/94	4	PVC	13.0	3.0 - 13.0	2.0	1.0	9.8	11.85	NA	NA
GMMW14	10/12/94	4	PVC	14.0	4.0 - 14.0	3.0	1.0	9.6	9.30	NA	NA
GMMW15	10/11/94	4	PVC	16.0	6.0 - 16.0	4.0	2.0	9.6	9.45	NA	NA
GMMW16	10/17/94	4	PVC	12.5	2.5 - 12.5	1.5	0.5	8.9	11.61	NA	NA
GMMW17	11/1/94	4	PVC	12.5	2.5 - 12.5	1.5	0.5	8.8	10.91	NA	NA
GMMW18	11/2/94	4	PVC	14.0	4.0 - 14.0	3.0	0.5	12.2	15.09	NA	NA
GMMW19	11/2/94	4	PVC	12.0	2.0 - 12.0	1.0	0.5	8.3	11.12	NA	NA
GMMW20	11/1/94	4	PVC	14.0	4.0 - 14.0	2.0	1.0	8.9	8.22	NA	NA
Intermediate											
GMMW21I	11/17/94	4	PVC	40.0	30.0 - 40.0	26.0	24.0	10.5	13.2	NA	NA
GMMW23I	12/30/94	4	PVC	65.0	55.0 - 65.0	53.0	51.0	15.8	15.14	NA	NA
GMMW24I	11/30/94	4	PVC	40.0	30.0 - 40.0	26.0	24.0	9.4	8.93	NA	NA

See last page for footnotes.

Table 3-5. Phase IA Remedial Investigation Monitoring Well Construction Details, Bayonne Plant, Bayonne, New Jersey.

Well ID	Well Completion Date	Well Screen and Casing Diameter (inches)	Well Screen Material (20-slot wound)	Total Depth of Well (ft bls)	Depth of Screened Interval (ft bls)	Depth to Top of Sand Pack (ft bls)	Depth to Top of Bentonite Slurry (ft bls)	Measuring Point Elevation*		Depth to Top of Bedrock (ft bls)	Top of Bedrock Elevation (ft bls)
								Ground	Top of PVC		
Bedrock											
GMMW21D	12/8/94	4	PVC	107.0	97.0 - 107.0	93.0	89.0	10.9	12.43	110.0	-99.1
GMMW22D	12/16/94	4	PVC	120.0	110.0 - 120.0	108.0	105.0	10.7	10.37	120.0	-109.30
GMMW23D	12/29/94	4	PVC	110.0	100.0 - 110.0	98.0	90.0	15.3	15.29	117.0	-101.70
GMMW24D	11/30/94	4	PVC	128.0	118.0 - 128.0	115.0	112.0	9.4	8.85	129.0	-119.6

* Based on National Geodetic Vertical Datum 1929.
PVC Polyvinyl chloride.
NA Not applicable.
ft bls Feet below land surface.
IRM Interim Remedial Measure.
NAPL Non-aqueous phase liquid.

Note: A summary of monitoring well construction details for IRM monitoring wells in the General Tank Field, No. 3 Tank Field, Exxon Chemical Plant (Utilities Area) and Lube Oil Area, was provided in the NAPL IRM Investigation Report (Geraghty & Miller, Inc., 1995a).

Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

			Low Tide (10:18)					High Tide (16:15)						
Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Phase IA RI Monitoring Wells														
Shallow														
GMMW1	9.70	0.885	11:45	3.39	4.16	0.77	6.22	16:55	3.42	4.19	0.77	6.19	-0.03	GMMW1[2]
GMMW2	17.44	NA	11:20	NA	3.92	NA	13.52	17:04	NA	3.95	NA	13.49	-0.03	
GMMW3	15.17	0.970	9:53	8.18	8.19	0.01	6.99	15:12	NA	8.20	NA	6.97	-0.02	ECPSB2[3]
GMMW4	9.72	0.853	10:08	5.30	5.305	0.005	4.42	15:24	NA	5.33	NA	4.39	-0.03	GMMW5[3]
GMMW5	9.26	0.853	11:58	2.69	7.36	4.67	5.88	16:00	2.64	7.31	4.67	5.93	0.05	GMMW5[2]
GMMW6	14.43	NA	10:22	NA	10.05	NA	4.38	14:43	NA	10.1	NA	4.36	-0.02	
GMMW7	8.36	0.841	11:42	2.70	7.51	4.81	4.90	15:56	2.64	7.57	4.93	4.94	0.04	GMMW7[2]
GMMW8	8.80	NA	12:39	NA	4.62	NA	4.18	16:27	NA	4.60	NA	4.20	0.02	
GMMW9	7.91	NA	12:30	NA	4.89	NA	3.02	16:22	NA	4.90	NA	3.01	-0.01	
GMMW10	8.88	NA	13:01	NA	4.66	NA	4.22	16:38	NA	4.63	NA	4.25	0.03	
GMMW11	11.58	NA	12:16	NA	6.59	NA	4.99	16:14	NA	6.57	NA	5.01	0.02	
GMMW12	13.73	0.916	10:28	7.24	7.35	0.11	6.48	15:55	7.23	7.26	0.03	6.50	0.02	SSB1[2]
GMMW13	11.85	0.885	11:35	4.00	4.02	0.02	7.85	16:47	NA	4.02	NA	7.83	-0.02	GMMW1[3]
GMMW14	9.30	NA	13:26	NA	3.85	NA	5.45	17:03	NA	3.81	NA	5.49	0.04	
GMMW15	9.45	NA	10:10	NA	7.10	NA	2.35	15:27	NA	6.90	NA	2.55	0.20	
GMMW16	11.61	0.830	11:24	5.76	9.88	4.12	5.15	15:42	5.76	9.84	4.08	5.16	0.01	GMMW16[2]
GMMW17	10.91	NA	11:08	NA	4.83	NA	6.08	15:37	NA	4.88	NA	6.03	-0.05	
GMMW18	15.09	0.870	11:40	6.99	7.94	0.95	7.98	16:50	7.00	7.92	0.92	7.97	-0.01	
GMMW19	11.12	0.853	11:30	5.85	5.86	0.01	5.27	16:45	NA	5.78	NA	5.34	0.07	GMMW5[3]
GMMW20	8.22	NA	12:47	NA	5.05	NA	3.17	16:32	NA	5.04	NA	3.18	0.01	
Intermediate														
GMMW21I	13.20	NA	10:23	NA	12.98	NA	0.22	15:06	NA	10.6	NA	2.59	2.37	
GMMW23I	15.14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
GMM224I	8.93	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI			

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Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

			Low Tide (10:18)					High Tide (16:15)						
Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Phase IA RI Monitoring Wells (continued)														
Deep														
GMMW21D	12.43	NA	10:19	NA	11.94	NA	0.49	15:05	NA	9.39	NA	3.04	2.55	
GMMW22D	10.37	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
GMMW23D	15.29	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
GMMW24D	8.85	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
Surface-Water Measuring Point														
SWMP1	3.36	NA	13:13	NA	2.5	NA	0.86	16:48	NA	1.45	NA	1.91	1.05	
SWMP2	7.04	--	--	--	--	--	--	--	--	--	--	--	--	
SWMP3	10.21	NA	10:03	NA	11.34	NA	-1.13	15:08	NA	8.04	NA	2.17	3.30	
SWMP4	9.65	NA	10:04	NA	10.69	NA	-1.04	15:28	NA	7.28	NA	2.37	3.41	
SWMP5	8.27	NA	9:35	NA	9.14	NA	-0.87	15:29	NA	6.01	NA	2.26	3.13	
SWMP6	9.91	NA	10:50	NA	11.22	NA	-1.31	16:18	NA	7.74	NA	2.17	3.48	
SWMP7	11.42	NA	11:43	NA	12.68	NA	-1.26	16:59	NA	9.97	NA	1.45	2.71	
Existing Monitoring Wells														
Shallow														
EB1	8.92	0.901	10:24	5.81	5.82	0.01	3.11	15:07	NA	5.80	NA	3.12	0.01	EB2[3]
† EB2	8.93	0.901	9:15	8.10	9.15	1.05	0.73	15:11	7.48	8.53	1.05	1.35	0.62	EB2[2]
† EB3	8.96	0.901	9:17	7.67	8.75	1.08	1.18	15:15	7.58	8.62	1.04	1.28	0.09	EB2[3]
EB4	9.01	0.901	9:20	8.05	8.72	0.67	0.89	15:17	7.39	8.03	0.64	1.56	0.66	EB2[3]
† EB5	9.09	0.901	9:23	8.20	8.58	0.38	0.85	15:20	7.58	7.97	0.39	1.47	0.62	EB2[3]
† EB6	9.20	0.901	9:25	7.79	7.80	0.01	1.41	15:23	NA	7.93	NA	1.27	-0.14	EB2[3]
EB7	8.87	0.885	9:30	7.71	7.74	0.03	1.16	15:25	7.77	7.78	0.01	1.10	-0.06	EBR5[3]
EB8	8.12	NA	9:32	NA	8.92	NA	-0.80	15:27	NA	5.94	NA	2.18	2.98	

See last page for footnotes.

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Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

			Low Tide (10:18)					High Tide (16:15)						
Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Existing Monitoring Wells (continued)														
Shallow														
† EB9	8.81	0.901	9:39	6.91	8.40	1.49	1.75	15:30	6.82	8.44	1.62	1.83	0.08	EB2[3]
EB10	8.78	0.885	9:49	4.32	7.42	3.1	4.10	15:36	4.34	7.41	3.07	4.09	-0.02	EBR5[3]
EB11	9.30	--	--	3.60	--	--	--	16:03	3.61	--	--	--	--	Well caved in.
EB12	9.53	0.910	10:40	0.92	5.10	4.18	8.23	16:07	0.60	4.55	3.95	8.57	0.34	EB12[2]
† EB13	9.68	0.995	9:58	4.15	4.67	0.52	5.53	15:44	4.10	4.82	0.72	5.58	0.05	EB13[2]
EB14	11.01	NA	10:56	NA	8.29	NA	2.72	16:20	NA	8.31	NA	2.70	-0.02	
† EB15	9.74	NA	11:07	NA	9.44	NA	0.30	16:25	NA	7.69	NA	2.05	1.75	
EB16	12.56	0.885	11:15	11.02	12.73	1.71	1.34	16:42	11.02	12.8	1.73	1.34	0.00	EB16[2]
EB17	12.36	0.918	12:08	2.03	2.05	0.02	10.33	17:17	2.06	2.08	0.02	10.30	-0.03	EB17[2]
EB19	9.67	0.907	11:16	4.23	6.24	2.01	5.25	16:32	4.25	6.08	1.83	5.25	0.00	EB19[2]
EB22	13.31	0.895	10:20	2.80	3.05	0.25	10.48	15:47	2.78	3.03	0.25	10.50	0.02	EB24[3]
EB23	14.73	0.895	9:59	2.93	3.09	0.16	11.78	15:40	2.92	3.07	0.15	11.79	0.01	EB24[3]
EB24	15.82	0.895	9:53	5.27	5.40	0.13	10.54	15:36	5.25	5.37	0.12	10.56	0.02	EB24[2]
EB25	13.76	0.820	9:47	3.09	3.11	0.02	10.67	15:32	3.10	3.13	0.03	10.65	-0.01	AHTFSB1[3]
EB26	15.99	NA	9:42	NA	3.61	NA	12.38	15:28	NA	3.63	NA	12.36	-0.02	
EB27	16.23	NA	9:38	NA	5.11	NA	11.12	15:25	NA	5.16	NA	11.07	-0.05	
EB28	16.06	0.820	9:31	5.90	5.91	0.01	10.16	15:21	5.73	5.74	0.01	10.32	0.16	AHTFSB1[3]
EB29	17.74	0.820	9:24	2.05	2.06	0.01	15.69	15:15	NA	2.10	NA	15.64	-0.05	AHTFSB1[3]
EB30	13.05	0.820	9:27	3.37	3.38	0.01	9.68	15:18	NA	3.39	NA	9.66	-0.02	AHTFSB1[3]
EB31	16.76	NA	9:12	NA	8.92	NA	7.84	15:11	NA	9.00	NA	7.76	-0.08	
EB33	11.05	NA	9:39	NA	8.13	NA	2.92	15:02	NA	8.17	NA	2.88	-0.04	
EB34	12.84	0.971	9:33	8.56	8.83	0.27	4.27	14:58	8.54	8.75	0.21	4.29	0.02	ITMW4[3]
EB35	10.62	NA	9:37	NA	6.56	Trace	4.06	15:12	NA	6.60	NA	4.02	-0.04	
EB36	8.09	0.971	9:51	2.66	5.53	2.87	5.35	15:04	2.71	--	--	--	--	Dry
EB40	10.89	0.971	9:47	8.14	8.27	0.13	2.75	15:15	8.17	8.23	0.06	2.72	-0.03	ITMW4[3]

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Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

			Low Tide (10:18)					High Tide (16:15)						
Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Existing Monitoring Wells (continued)														
Shallow														
EB41	9.84	0.971	10:01	7.35	7.39	0.04	2.49	15:07	7.37	7.38	0.01	2.47	-0.02	ITMW4[3]
EB42	12.01	0.971	10:11	9.81	9.91	0.1	2.20	15:25	9.82	9.93	0.11	2.19	-0.01	ITMW4[3]
EB44	11.18	NA	10:15	NA	8.92	NA	2.26	15:28	NA	8.88	NA	2.3	0.04	Trace
† EB47	9.83	NA	9:20	NA	6.33	NA	3.50	15:07	NA	6.33	NA	3.50	0.00	
EB48	9.06	NA	9:22	NA	6.32	NA	2.74	15:08	NA	6.37	NA	2.69	-0.05	
EB49	10.62	NA	9:24	NA	8.42	NA	2.20	15:09	NA	8.47	NA	2.15	-0.05	
EB50	10.91	0.862	9:40	6.51	6.78	0.27	4.36	15:12	6.52	6.67	0.15	4.37	0.01	EB59[3]
EB51	10.21	NA	9:39	NA	5.72	NA	4.49	15:11	NA	5.74	NA	4.47	-0.02	
EB52	10.53	0.862	9:34	6.94	10.01	3.07	3.17	15:17	6.89	10	3.13	3.21	0.04	EB59[3]
† EB53	8.73	0.862	9:55	2.75	2.76	0.01	5.98	15:33	2.74	2.75	0.01	5.99	0.01	EB59[3]
† EB54	8.48	NA	8:53	NA	2.33	NA	6.15	15:34	NA	2.34	NA	6.14	-0.01	
EB56	8.90	NA	9:57	NA	4.27	NA	4.63	15:37	NA	4.27	NA	4.63	0.00	
EB57	8.14	NA	10:12	NA	4.46	NA	3:68	15:36	NA	4.44	NA	3.70	0.02	
EB58	8.94	0.862	10:07	6.31	6.52	0.21	2.60	15:42	6.33	8.51	2.18	2.31	-0.29	EB59[3]
EB59	10.41	0.862	10:14	7.66	8.67	1.01	2.61	15:45	7.14	7.97	0.83	3.16	0.54	EB59[2]
EB60R	11.37	0.862	10:22	12.11	13.38	1.27	-0.92	15:52	8.51	11.7	3.23	2.41	3.33	EB59[3]
EB61	10.59	0.862	10:37	8.84	9.05	0.21	1.72	15:56	8.51	8.80	0.29	2.04	0.32	EB59[3]
EB62	10.83	0.991	10:37	11.54	13.99	2.45	-0.73	15:58	8.42	10.8	2.33	2.39	3.12	EB59[3]
EB63	10.11	NA	10:40	NA	8.29	NA	1.82	16:00	NA	8.13	NA	1.98	0.16	
EB64	9.25	0.862	10:05	7.28	7.64	0.26	1.93	15:41	7.37	7.58	0.21	1.85	-0.08	EB59[3]
EB65	12.46	0.862	10:16	12.14	15.18	3.04	-0.10	15:47	9.88	11.7	1.86	2.32	2.42	EB59[3]
EB66R	11.98	0.862	10:23	12.75	13.19	0.44	-0.83	15:50	9.69	10.1	0.39	2.24	3.07	EB59[3]
EB67	10.57	0.991	10:50	10.95	12.17	1.22	-0.39	16:12	7.90	10.40	2.5	2.65	3.04	EB59[3]
EB68	11.52	NA	10:48	NA	12.25	NA	-0.73	16:10	NA	9.16	NA	2.36	3.09	
EB69	11.47	0.990	10:44	12,33	15.90	3.57	-0.90	16:05	9.15	11.4	2.29	2.30	3.19	EB69[2]

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Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Low Tide (10:18) Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	High Tide (15:15) Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Existing Monitoring Wells (continued)														
Shallow														
† EB70	--	--	--	--	--	--	--	--	--	--	--	--	--	Buried Well
EB71	12.15	0.852	9:56	10.56	10.57	0.01	1.59	15:21	10.58	10.6	Trace	1.57	-0.02	EBR18[2]
EB72	12.27	0.94	9:50	10.69	11.33	0.64	1.54	15:49	10.66	11.10	0.44	1.58	0.04	EB72[2]
† EB73	11.51	0.94	9:39	9.81	10.35	0.54	1.67	15:16	9.76	10.3	0.57	1.72	0.05	EB73[2]
† EB74	12.01	0.94	9:34	10.68	10.73	0.05	1.33	15:10	10.7	10.8	0.07	1.31	-0.02	EB73[2]
EB75	13.47	NA	10:42	NA	6.64	NA	6.83	16:00	NA	6.55	NA	6.92	0.09	
EB76	11.88	0.889	10:43	7.50	8.24	0.74	4.30	16:15	7.58	8.20	0.62	3.68	-0.62	EB76[2]
EB77	10.94	0.802	--	7.11	16.86	9.75	1.90	16:01	6.63	16.8	10.13	2.30	0.40	MW13[3]
EB78	11.50	0.802	13:10	7.23	14.40	7.17	2.85	15:47	7.16	14.3	7.16	2.92	0.07	MW13[3]
EB79	12.34	0.832	13:22	8.50	15.08	6.58	2.73	15:49	8.19	14.9	8.69	3.03	0.29	MW8[3]
EB80	13.21	0.800	13:30	8.92	12.82	3.9	3.51	16:27	8.86	12.70	3.84	3.58	0.07	EB80[2]
EB81	13.04	0.990	13:32	3.05	3.20	0.15	9.99	16:29	3.09	3.23	0.14	9.95	-0.04	EB81[2]
EB82	10.70	NA	10:00	NA	8.62	NA	2.08	15:39	NA	8.48	NA	2.22	0.14	
† EB83	11.58	NA	9:43	NA	6.63	NA	4.95	15:03	NA	6.64	NA	4.94	-0.01	
† EB84	8.98	NA	9:48	NA	4.24	NA	4.74	15:30	NA	4.23	NA	4.75	0.01	
EB85	NS	NA	9:17	NA	8.94	NA	NA	14:56	NA	7.94	NA	NA	NA	
EB87	8.60	NA	11:36	NA	0.62	NA	7.98	16.07	NA	0.65	NA	7.95	-0.03	
EB88	8.24	NA	11:33	NA	0.49	NA	7.75	16.10	NA	0.45	NA	7.79	0.04	
† EB89	9.08	--	11:39	--	--	NA	--	16:05	--	--	NA	--	--	Casing blocked.
† EB90	9.45	NA	11:09	NA	5.45	NA	4.00	16:30	NA	5.45	NA	4.00	0.00	
EB91	9.20	NA	11:46	NA	5.86	NA	3.34	16:00	NA	5.89	NA	3.31	-0.03	
EB92	8.56	0.917	11:49	5.66	5.74	0.08	2.89	15:58	5.66	5.75	0.09	2.89	0.00	EB104[3]
EB93	9.48	NA	11:54	NA	5.43	NA	4.05	15:53	NA	6.45	NA	3.03	-1.02	
EB94	7.52	0.870	12:00	5.81	5.88	0.07	1.70	15:49	5.84	5.89	0.05	1.67	-0.03	ITMW2[3]
EB95	7.82	0.870	10:37	5.96	6.10	0.14	1.84	15:46	5.97	5.99	0.02	1.85	0.01	ITMW2[3]
EB96	7.71	0.870	10:35	6.49	6.58	0.09	1.21	15:44	6.46	6.53	0.07	--	--	No water.

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Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Low Tide (10:18) Measuring Time	Low Tide (10:18) Depth to Product (ft bmp)	Low Tide (10:18) Depth to Water (ft bmp)	Low Tide (10:18) Product Thickness (feet)	Low Tide (10:18) Water-Table Elevation (corrected where applicable) (ft msl)	High Tide (16:15) Measuring Time	High Tide (16:15) Depth to Product (ft bmp)	High Tide (16:15) Depth to Water (ft bmp)	High Tide (16:15) Product Thickness (feet)	High Tide (16:15) Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Existing Monitoring Wells (continued)														
Shallow														
EB97	6.54	--	11:45	5.87	--	NA	--	15:42	5.87	--	--	--	--	Casing blocked.
EB98	10.90	NA	10:23	NA	9.21	NA	1.69	16:21	NA	9.20	NA	1.70	0.01	
EB99	8.95	NA	11:43	NA	2.76	NA	6.19	16:01	NA	2.71	NA	6.24	0.05	
EB100	NS	--	10:37	--	--	NA	--	16:51	--	--	--	--	--	Dry well.
EB101	NS	0.917	10:13	9.43	9.45	0.02	NA	16:50	NA	9.43	NA	NA	NA	
EB102	NS	0.917	10:10	9.59	9.60	0.01	NA	16:48	NA	9.71	NA	NA	NA	
EB103	NS	0.917	10:07	8.69	8.70	0.01	NA	16:46	8.7	8.71	0.01	NA	NA	
EB104	NS	0.917	10:03	9.00	9.73	0.73	NA	16:45	9.01	9.62	0.61	NA	NA	
EB105	NS	0.917	9:39	8.97	9.94	0.97	NA	16:43	8.96	9.61	0.65	NA	NA	
EB106	NS	0.927	9:36	8.45	9.15	0.7	NA	16:41	9.1	9.49	0.39	NA	NA	
EBR1	13.83	0.995	10:12	12.50	12.51	0.01	1.33	15:55	12.51	12.5	0.01	1.32	-0.01	EB813[3]
EBR2	8.93	0.901	10:26	9.30	9.31	0.01	-0.37	15:09	7.59	7.60	0.01	1.34	1.71	EB2[3]
EBR4	8.58	0.885	9:44	7.20	8.84	1.64	1.19	15:37	6.89	8.73	1.84	1.48	0.29	EBR5[3]
EBR5	8.60	0.885	9:47	7.15	8.85	1.7	1.25	15:34	6.94	8.81	1.87	1.44	0.19	EBR5[2]
EBR6	10.38	0.885	10:04	4.90	5.42	0.52	5.42	15:50	4.9	5.19	0.29	5.45	0.03	EBR5[3]
EBR7	9.64	NA	10:35	NA	3.00	NA	6.64	16:07	NA	3.05	NA	6.59	-0.06	Sheen
EBR8	9.46	0.885	9:53	4.19	5.99	1.8	5.06	15:40	4.19	6.04	1.85	5.08	-0.01	EBR5[3]
† EBR9	8.69	NA	9:25	NA	7.37	NA	1.32	15:10	NA	7.09	NA	1.60	0.28	EB59[3]
EBR10	9.30	0.862	9:27	7.87	7.88	0.01	1.43	15:20	8.00	8.01	0.01	1.30	-0.13	
EBR11	9.24	NA	9:43	NA	19.95 •	NA	-10.71	15:22	NA	8.62	NA	0.62	11.33 •	
EBR12	10.04	0.865	9:19	8.96	9.99	1.03	0.94	15:00	8.37	9.43	1.06	1.53	0.59	EBR12[2]
EBR13	10.06	NA	9:21	NA	8.74	NA	1.32	15:04	NA	8.54	NA	1.52	0.20	
EBR14	10.05	NA	9:25	NA	8.84	NA	1.21	15:05	NA	8.50	NA	1.55	0.34	
EBR15	9.52	NA	9:27	NA	7.83	NA	1.69	15:05	NA	7.84	NA	1.68	-0.01	
EBR16	10.29	--	9:30	--	--	NA	--	15:08	NA	8.82	NA	1.47	NA	
† EBR17	9.68	NA	9:33	NA	7.69	NA	1.99	15:09	7.77	7.80	0.03	1.85	-0.14	EBR18[3]

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Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

			Low Tide (10:18)					High Tide (16:15)						
Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Existing Monitoring Wells (continued)														
Shallow														
EBR18	11.44	0.852	9:35	9.94	10.99	1.05	1.34	15:09	9.82	10.9	1.06	1.46	0.12	
EBR19	9.54	NA	9:37	NA	6.64	NA	2.90	15:14	NA	6.62	NA	2.92	0.02	
EBR21	10.12	NA	9:40	NA	8.41	NA	1.71	15:18	8.44	8.44	Trace	1.68	-0.03	
† EBR22	10.10	0.885	12:00	8.02	8.03	0.01	2.07	17:10	NA	7.92	NA	2.18	0.11	
EBR23	9.50	NA	9:42	NA	6.62	NA	2.88	15:15	NA	6.75	NA	2.75	-0.13	
ITMW1	13.85	0.830	11:08	7.95	17.85	9.9	4.22	16:55	7.78	17.70	9.92	4.38	0.17	
ITMW2	15.28	0.870	10:38	11.77	14.75	2.98	3.12	16:24	11.71	14.8	3.13	3.16	0.04	ITMW2[2]
ITMW3	15.50	0.870	10:40	11.98	14.71	2.73	3.17	16:26	11.97	14.8	2.8	3.17	0.00	ITMW2[3]
ITMW4	10.20	0.971	10:06	6.52	6.77	0.25	3.67	15:21	6.49	6.77	0.28	3.70	0.03	ITMW4[2]
ITMW5	8.55	NA	9:58	NA	2.89	NA	5.66	15:19	NA	2.96	NA	5.59	-0.07	
ITMW6	11.76	NA	9:28	NA	7.51	NA	4.26	14:55	NA	7.43	NA	4.33	0.08	
MW1	15.57	0.970	9:12	7.34	8.22	0.88	8.20	15:02	7.36	8.22	0.86	8.18	-0.02	ECPSB2[2]
MW2	15.65	0.970	9:26	7.22	7.56	0.34	8.42	15:06	7.33	7.63	0.3	8.31	-0.11	ECPSB2[3]
MW3	12.06	0.807	10:35	7.50	15.24	7.74	3.06	16:03	7.47	16.2	8.68	2.91	-0.15	MW3[2]
MW4	9.10	0.802	11:04	3.58	3.60	0.02	5.52	15:35	NA	3.56	NA	5.54	0.02	MW13[3]
MW6	11.23	NA	10:56	NA	5.32	NA	5.91	15:31	NA	5.43	NA	5.80	-0.11	
MW7	12.00	0.790	13:50	6.45	7.83	1.38	5.26	16:38	6.30	7.68	1.38	5.41	0.15	MW7[2]
MW8	12.35	0.832	13:45	7.73	21.33	13.6	2.34	16:25	7.61	17.4	9.74	3.1	0.77	MW8[2]
MW9	9.02	NA	11:10	NA	3.63	NA	5.39	15:37	NA	3.61	NA	5.41	0.02	
MW10	11.54	NA	13:40	NA	4.50	NA	7.04	16:47	NA	4.91	NA	6.63	-0.41	
MW11	10.73	NA	13:40	NA	4.85	NA	5.88	16:55	NA	4.89	NA	5.84	-0.04	
MW12	10.24	0.797	12:56	6.02	14.55	8.53	2.49	16:32	6.03	14.5	8.46	2.49	0.00	MW12[2]
MW13	11.66	0.802	--	7.75	17.89	10.14	1.90	15:59	7.48	17.9	10.41	2.12	0.22	MW13[2]
MW14	11.59	NA	13:05	NA	6.24	NA	5.35	15:46	NA	6.25	NA	5.34	-0.01	

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Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Low Tide (10:18) Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	High Tide (16:15) Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Existing Monitoring Wells (continued)														
Shallow														
PKMW1	9.35	0.907	11:26	4.42	5.81	1.39	4.80	16:38	4.40	5.79	1.39	4.82	0.02	EB19[3]
PKMW2	12.29	NA	11:06	NA	7.17	NA	5.12	16:27	NA	7.16	NA	5.13	0.01	
PKMW3	8.73	0.907	11:51	4.56	4.95	0.39	4.13	17:05	4.69	4.98	0.29	4.01	-0.12	EB19[3]
PKMW4	11.99	0.907	11:41	11.50	11.51	0.01	0.49	16:58	10.01	10	0.01	1.98	1.49	EB19[3]
PKMW5	12.33	NA	11:10	NA	12.42	NA	-0.09	16:33	NA	10.3	NA	2.02	2.11	
PKMW6	12.28	NA	11:05	NA	9.30	NA	2.98	16:30	NA	1.63 **	NA	10.65	7.67 **	
PKMW7	13.46	0.885	11:01	NA	11.54	NA	1.92	16:28	11.44	11.5	0.04	2.02	0.10	EB16[3]
PKMW8	13.09	0.945	10:38	5.34	5.55	0.21	7.74	16:02	6.32	5.64	0.32	7.75	0.01	PKMW8[2]
PKMW9	12.72	NA	10:57	NA	5.96	NA	6.76	16:20	NA	5.93	NA	6.79	0.03	
P7MW1	10.84	0.991	10:25	11.60	13.32	1.72	-0.78	15:51	8.36	10	1.66	2.47	3.24	EB62[3]
P7MW2	12.88	0.862	10:32	13.42	15.35	1.93	-0.81	15:49	10.21	12.1	1.87	2.41	3.22	EB59[3]
P8T65	NS	NA	9:28	NA	10.81	NA	NA	15:07	NS	7.80	NA	NA	NA	
† SHERI1	NS	NA	9:23	NA	9.84	NA	NA	15:03	NA	9.89	NA	NA	NA	
† SHERI2	NS	0.852	9:32	11.09	11.10	0.01	NA	15:02	11.13	11.1	Trace	NA	NA	EBR18[3]
SHERI3 ***	NS	0.936	9:37	12.27	12.77	0.5	NA	15:16	11.92	12.4	0.52	NA	NA	
VER1	12.37	0.807	13:15	8.49	19.10	10.61	1.83	15:55	7.75	18	10.24	2.64	0.81	MW3[3]
VER2	13.60	0.807	13:20	9.39	22.22	12.83	1.73	15:52	8.94	20.8	11.84	2.37	0.64	MW3[3]

See last page for footnotes.

Table 4-1. Summary of Water-Level Measurements Collected on December 12, 1994, Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring Point Elevation (ft msl)	Product Density (gm/mL)	Low Tide (10:18) Measuring Time	Low Tide Depth to Product (ft bmp)	Low Tide Depth to Water (ft bmp)	Low Tide Product Thickness (feet)	Low Tide Water-Table Elevation (corrected where applicable) (ft msl)	High Tide (16:15) Measuring Time	High Tide Depth to Product (ft bmp)	High Tide Depth to Water (ft bmp)	High Tide Product Thickness (feet)	High Tide Water-Table Elevation (corrected where applicable) (ft msl)	Water Level [1] Difference with Rising Tide	Comments
Existing Monitoring Wells (continued)														
Intermediate														
PKMW10	12.48	NA	11:01	NA	11.92	NA	0.56	16:23	NA	11.2	NA	1.26	0.70	
PKMW11	10.32	0.882	11:30	8.96	18.25	9.29	0.26	16:48	7.92	17.7	9.8	1.24	0.98	PKMW11[2]
PKMW12	8.96	0.870	11:49	7.42	16.76	9.34	0.33	17:00	6.35	16.3	9.93	1.32	0.99	PKMW12[2]
PKMW13	11.98	NA	11:38	NA	12.04	NA	-0.06	16:50	NA	10.8	NA	1.23	1.29	
PKMW14	12.77	0.920	10:52	11.86	12.61	0.75	0.85	16:15	11.40	12.2	0.75	1.31	0.46	PKMW14[2]
PKMW15	12.28	NA	10:48	NA	10.93	NA	1.35	16:12	NA	10.7	NA	1.59	0.24	

gm/mL Gram per milliliter.
ft msl Feet above mean sea level.
ft bmp Feet below measuring point.
[1] Positive water-level differences indicate water-level increase with rising tide. Negative water-level differences indicate water-level decrease with rising tide.
[2] Density determined by hydrometer analysis at this location.
[3] Well was used on basis for product density determination; density estimated by hydrometer analysis.
NA Not applicable.
NI Not installed.
NS Not surveyed.
-- Measurement not taken.
* Low tide water level for Monitoring Well EBR11 was low due to active pumping from this well.
** Anamolous values.
*** Pump in well on.
† These wells are scheduled to be abandoned.

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Table 4-2. Summary of Water-Level Measurements Collected on April 17, 1995, Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring-Point Elevation (ft msl)	Product Density (gm/mL)	High Tide (9:05 a.m.) Measuring Time	High Tide Depth to Product (ft bmp)	High Tide Depth to Water (ft bmp)	High Tide Product Thickness (feet)	High Tide Water-Table Elevation (corrected where applicable)	Low Tide (2:30 p.m.) Measuring Time	Low Tide Depth to Product (ft bmp)	Low Tide Depth to Water (ft bmp)	Low Tide Product Thickness (feet)	Low Tide Water-Table Elevation (corrected where applicable)	Water-Level[1] Difference with the Falling Tide	Comments
Phase IA RI Monitoring Wells														
Shallow														
GMMW1	9.70	0.885	9:50	3.87	4.35	0.48	5.77	3:06	3.84	4.32	0.48	5.80	0.03	GMMW1[2]
GMMW3	15.17	0.970	10:10	9.27	9.71	0.44	5.89	3:29	9.32	9.68	0.36	5.84	-0.05	ECPSB2[3]
Intermediate														
GMMW21I	13.20	NA	9:38	NA	9.48	NA	3.72	2:57	NA	12.57	NA	0.63	-3.09	
GMMW23I	15.14	NA	10:07	NA	12.17	NA	2.97	3:25	NA	12.11	NA	3.03	0.06	
GMM24I	8.93	NA	10:28	NA	6.40	NA	2.53	3:41	NA	8.70	NA	0.23	-2.30	
Deep														
GMMW21D	12.43	NA	9:41	NA	8.60	NA	3.83	2:59	NA	13.44	NA	-1.01	-4.84	
GMMW22D	10.37	NA	9:55	NA	7.56	NA	2.81	3:09	NA	7.74	NA	2.63	-0.18	
GMMW23D	15.29	NA	10:03	NA	12.04	NA	3.25	3:23	NA	12.94	NA	2.35	-0.90	
GMMW24D	8.85	NA	10:25	NA	4.67	NA	4.18	3:42	NA	8.80	NA	0.05	-4.13	
Existing Monitoring Wells														
Shallow														
EB1	8.92	0.901	9:39	NA	7.11	1.81	3.44	2:55	8.89	8.90	0.01	2.02	-1.42	EB2[3]
EB25*	13.76	0.820	11:20	3.65	3.67	0.02	10.11	--	--	--	--	--	--	AHTFSB1[3]
EB26*	15.17	NA	11:49	4.15	4.16	0.01	11.01	--	--	--	--	--	--	
EB27*	16.23	NA	10:45	5.64	5.65	0.01	10.58	--	--	--	--	--	--	
EB28*	16.06	0.820	10:54	6.29	6.30	0.01	9.77	--	--	--	--	--	--	AHTFSB1[3]
EB29*	17.74	0.820	11:00	NA	3.04	NA	14.70	--	--	--	--	--	--	AHTFSB1[3]
EB30*	13.05	0.820	11:13	NA	2.67	NA	10.38	--	--	--	--	--	--	AHTFSB1[3]
EBR13	10.06	NA	-	8.16	8.18	0.02	1.88	3:43	8.98	9.00	0.02	1.06	-0.82	Trace of product

See last page for footnotes.

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Table 4-2. Summary of Water-Level Measurements Collected on April 17, 1996, Bayonne Plant, Bayonne, New Jersey.

Well Designation	Measuring-Point Elevation (ft msl)	Product Density (gm/mL)	High Tide (9:05 a.m.) Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable)	Low Tide (2:30 p.m.) Measuring Time	Depth to Product (ft bmp)	Depth to Water (ft bmp)	Product Thickness (feet)	Water-Table Elevation (corrected where applicable)	Water-Level[1] Difference with the Falling Tide	Comments
Existing Monitoring Wells (continued)														
Intermediate														
PKMW10	12.48	NA	9:12	NA	11.83	NA	0.65	2:37	NA	11.25	NA	1.23	0.58	
PKMW11	10.32	0.882	--	--	--	--	--	--	--	--	--	--	--	Pump system in well
PKMW12	8.96	0.870	9:15	7.0	16.30	9.30	0.75	7:40	6.79	16.30	9.51	0.93	0.18	PKMW12[2]
PKMW13	11.98	NA	9:20	NA	11.20	NA	0.78	2:42	NA	11.92	NA	0.06	-0.72	
PKMW14	12.77	0.920	9:06	11.85	14.61	2.76	0.70	2:34	11.05	13.74	2.69	1.50	0.81	PKMW14[3]
PKMW15	12.28	NA	9:05	NA	11.28	NA	1.0	2:30	10.43	10.44	0.01	1.84	0.84	EB59[3]

gm/mL Gram per milliliter.
ft msl Feet above mean sea level.
ft bmp Feet below measuring point.
(1) Positive water-level differences indicate water-level decrease with falling tide.
Negative water-level differences indicate water-level increase with falling tide.
(2) Density determined by hydrometer analysis at this location.
(3) Well was used on basis for product density determination; density estimated by hydrometer analysis.
NA Not applicable.
NS Not surveyed.
-- Measurement not taken.
* Groundwater and product measurements from the "A"-Hill Tank Field area were collected after completion of the first round (high tide) of measurements. Only one round was taken.

Table 4-3. Horizontal Hydraulic Gradients, Bayonne Plant, Bayonne, New Jersey. *

Operational Area	Reference Points	Difference in Hydraulic Elevation (ft)	Difference in Horizontal Distance (ft)	Hydraulic Gradient (ft/ft)	Flow Direction
Solvent Tank Field	MW10 SWMP1	7	720	0.0097	Northeast
Solvent Tank Field	MW7 EB77	3	430	0.007	Southeast
Piers and East Side Treatment Plant Area	EB77 EBR12	2	1345	0.0015	East
No. 2 Tank Field	GMMW2 ITMW3	10	600	0.0167	Northeast
Main Building Area	EB28 EB98	9	770	0.0117	Northeast
Pier No. 1 Area	EB12 SWMP6	8	500	0.016	Southwest

* Horizontal hydraulic gradients were calculated along lines drawn perpendicular to the hydraulic head contours shown on Figure 4-6. Lines for calculating the hydraulic gradients originated and terminated near the reference points listed above.

Table 4-4. Vertical Hydraulic Gradients, Bayonne Plant, Bayonne, New Jersey.

Well Pair (Screen Zone/ Open Interval)*	Vertical Distance Between Center Point of Screen/Open Interval (feet)	Groundwater Elevation Difference**	Vertical Gradient (feet/feet)	Vertical Gradient Direction
GMMW21I (Intermediate) GMMW21D (Deep)	66.6	1.64	0.025	Downward
GMMW23I (Intermediate) GMMW23D (Deep)	40.2	0.68	0.017	Downward
GMMW24I (Intermediate) GMMW24D (Deep)	88.6	0.18	0.002	Downward

* All monitoring wells were screened in the overburden material.

** Synoptic groundwater elevations measured on April 17, 1995. Measurements taken at low tide were used for all calculations.

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Table 5-1. Total Petroleum Hydrocarbons in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample ID	Sample Date	Sample Depth (ft bls)	TPH Concentration (mg/kg)
Samples With Concentrations Less Than 10,000			
3TFIRMB3-04	10/6/94	04	2280
3TFIRMB3-14	10/6/94	14	295
3TFIRMB4-02	10/17/94	02	5340
AGTFSB3-02	10/27/94	02	7560
AHTFSB1-02	10/19/94	02	7150
AHTFSB2-02	10/14/94	02	4900
AHTFSB2-06	10/14/94	06	7360
APSB2-02	10/26/94	02	897
APSB2-06	10/26/94	06	1170
APSB4-04	10/21/94	04	3390
APSB5-02	10/12/94	02	2480
DTSB1-06	10/27/94	06	723
DTSB1-08	10/27/94	08	398
DTSB2-04	10/27/94	04	325
DTSB3-04FR2	10/27/94	04	683
ECIRMB1-02	10/24/94	02	671
ECPSB3-04	10/21/94	04	3950
EGTFSB1-04	10/27/94	04	5200
GTFIRMB1-02	10/5/94	02	501
GTFIRMB1-08	10/6/94	08	1980
GTFIRMB2-02	10/17/94	02	4320
GTFIRMB2-08	10/17/94	08	2550
GTFIRMB3-02	11/16/94	02	2870
GTFIRMB3-10	10/5/94	10	8640
GTFIRMB4-02	10/17/94	02	6680
GTFIRMB4-08	10/17/94	08	7190
GTFIRMB5-02	10/5/94	02	3130
GTFIRMB7-08	10/17/94	08	1460
GTFIRMB8-02	10/18/94	02	9670
GTFIRMB9-02	10/5/94	02	4320
GTFIRMB9-06	10/5/94	02	880
GTFSB1-02	10/10/94	02	5900
GTFSB2-02	10/13/94	02	2450
GTFSB3-02	10/10/94	02	776
GTFSB3-08	10/10/94	08	4600
GTFSB4-02	10/13/94	02	1940
GTFSB5-02	10/13/94	02	75.2
GTFSB5-08	10/13/94	08	5130
GTFSB6-02	10/11/94	02	5710
GTFSB7-02	10/13/94	02	3530
GFFSB8-02	10/18/94	02	9670
GTFSB9-02	10/13/94	02	4230
GTFSB9-06	10/5/94	06	880

See last page for footnotes.

Table 5-1. Total Petroleum Hydrocarbons in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample ID	Sample Date	Sample Depth (ft bls)	TPH Concentration (mg/kg)
Samples With Concentrations Less Than 10,000 (continued)			
LAIRMB1-02	10/24/94	02	5320
LAIRMB1-08	10/24/94	08	3460
LOSB3-02	10/24/94	02	2850
LOSB6-04	10/25/94	04	1520
LOSB7-04	10/14/94	04	6030
LOSB11-06	10/25/94	06	6920
LOSB17-02	10/24/94	02	1820
LOSB18-02	10/24/94	02	3370
MBSB2-06	10/21/94	06	9090
MDCSB1-04	10/26/94	04	9730
N2TFB1-04	10/12/94	04	6340
N2TFB2-02	10/19/94	02	520
N2TFB2-06	10/19/94	06	2750
N2TFB3-06	10/19/94	06	596
N2TFB3-10	10/19/94	10	8370
N2TFB6-04	10/19/94	04	453
N2TFB6-06	10/19/94	06	3650
N3TFB2-02	10/19/94	02	9210
N3TFB3-02	10/13/94	02	506
N3TFB4-06	10/17/94	06	1390
N3TFB5-04	10/19/94	04	1090
N3TFB6-06	10/18/94	06	8880
N3TFB8-02	10/18/94	02	4180
N3TFB9-02	11/2/94	02	675
PESTSB2-10	10/20/94	10	5270
PN1SB2-04	11/2/94	04	6060
SSB1-06	10/24/94	06	7900
SSB2-04	10/12/94	04	4280
SSB2-08	10/12/94	08	141
STFSB3-04	10/26/94	04	7180
T998SB1-08	10/12/94	08	1510
Samples With Concentrations Greater Than 10,000 But Less Than 30,000			
3TFIRMB4-06	10/17/94	06	13000
AGTFSB3-06	10/27/94	06	26600
AGTFSB4-02	10/20/94	02	19500
AHTFSB1-04	10/19/94	04	10100
AHTFSB4-02	10/14/94	02	15000
AHTFSB4-08	10/14/94	08	20900
APSB1-06	10/27/94	06	15100

See last page for footnotes.

Table 5-1. Total Petroleum Hydrocarbons in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample ID	Sample Date	Sample Depth (ft bls)	TPH Concentration (mg/kg)
Samples With Concentrations Greater Than 10,000 But Less Than 30,000 (continued)			
APSB1-10	10/27/94	10	22700
DTSB2-08	10/27/94	08	11500
EC2SB1-04	10/27/94	04	14800
EC2SB1-12	10/27/94	12	11900
ECIRMB1-06	10/24/94	06	17300
ECIRMB3-02	10/19/94	02	27300
ECPSB5-02	10/19/94	02	17200
GFSB1-02	10/12/94	02	14000
GFSB1-06	10/12/94	06	11200
GTFIRMB5-02FR	10/5/94	02	13600
GTFIRMB6-04	10/5/94	04	18400
GTFIRMB6-08	10/5/94	08	23600
GTFSB4-08	10/13/94	08	25000
GTFSB8-08	10/13/94	08	29400
LOSB3-04	10/24/94	04	13200
LOSB5-08	10/11/94	08	10600
LOSB8-08	10/24/94	08	11600
LOSB11-02	10/25/94	02	22900
LOSB14-02	10/25/94	02	11200
LOSB14-06	10/25/94	06	24100
LOSB15-02	10/24/94	02	28200
LOSB16-08	10/25/94	08	19200
MBSB1-02	10/25/94	02	28400
MBSB1-08	10/25/94	08	28500
MBSB2-02	10/21/94	02	11300
MBSB4-04	10/21/94	04	12400
MBSB4-10	10/21/94	10	19200
MDCSB2-03	10/11/94	03	14600
MDCSB1-08	10/26/94	08	14300
N2TFB1-08	10/12/94	08	16900
N2TFB5-02	10/19/94	02	29600
N3TFB4-02	10/17/94	02	19200
N3TFB5-08	10/19/94	08	10000
PN1SB2-08	11/2/94	08	12700
PSSB1-02	10/31/94	02	28800
SSB3-06	10/24/94	06	18100
SSB3-10	10/24/94	10	22400
STFSB2-04	10/26/94	04	13400
T998SB1-04	10/12/94	04	14300

See last page for footnotes.

Table 5-1. Total Petroleum Hydrocarbons in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample ID	Sample Date	Sample Depth (ft bls)	TPH Concentration (mg/kg)
Samples With Concentrations Greater Than 30,000			
AGTFSB1-02	10/20/94	02	69200
AGTFSB1-06	10/20/94	06	129000
AGTFSB2-04	10/28/94	04	53800
AGTFSB4-06	10/20/94	06	43000
AHTFSB3-06	10/20/94	06	41400
AHTFSB3-10	10/20/94	10	50600
APSB3-06	10/21/94	06	62100
APSB4-08	10/21/94	08	39700
APSB5-06	10/12/94	06	69000
APSB6-06	10/21/94	06	333000
APSB6-10	10/21/94	10	84700
DTSB3-04	10/27/94	04	74200
DTSB3-04FR1	10/27/94	04	76900
ECIRMB3-06	10/19/94	06	70500
ECPSB1-02	10/20/94	02	44500
ECPSB1-08	10/20/94	08	154000
ECPSB2-06	10/20/94	06	115000
ECPSB2-12	10/20/94	12	125000
ECPSB4-08	10/19/94	08	110000
ECPSB5-08	10/19/94	08	37400
GTFIRMB5-06	10/5/94	06	220000
GTFIRMB7-02	10/17/94	02	33600
GTFIRMB8-08	10/18/94	08	373000
GTFSB1-08	10/10/94	08	479000
GTFSB2-08	10/13/94	08	53500
GTFSB4-08FR	10/13/94	08	30300
GTFSB6-12	10/11/94	12	95400
GTFSB7-08	10/13/94	08	37300
GTFSB8-04	10/13/94	04	52300
GTFSB9-08	10/13/94	08	92200
LOSB1-04	10/25/94	04	86500
LOSB1-08	10/25/94	08	70800
LOSB2-04	10/14/94	04	109000
LOSB2-08	10/14/94	08	96800
LOSB4-02	10/24/94	02	46500
LOSB4-06	10/24/94	06	31700
LOSB5-04	10/11/94	04	51900
LOSB8-02	10/24/94	02	64500
LOSB9-02	10/25/94	02	53000
LOSB9-06	10/25/94	06	110000
LOSB10-04	10/28/94	04	41300
LOSB10-08	10/28/94	08	95900

See last page for footnotes.

Table 5-1. Total Petroleum Hydrocarbons in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample ID	Sample Date	Sample Depth (ft bls)	TPH Concentration (mg/kg)
Samples With Concentrations Greater Than 30,000 (continued)			
LOSB12-02	10/25/94	02	33200
LOSB12-06	10/25/94	06	47900
LOSB13-02	10/31/94	02	83700
LOSB13-02FR1	10/31/94	02	80600
LOSB13-02FR2	10/31/94	02	59100
LOSB13-08	10/31/94	08	81400
LOSB16-04	10/25/94	04	33000
LOSB18-08	10/24/94	08	371000
LOSB18-08FR	10/24/94	08	135000
MBSB3-06	10/25/94	06	47900
MBSB3-10	10/25/94	10	138000
MBSB3-10FR	10/25/94	10	164000
N2TFB4-02	10/28/94	02	49600
N2TFB4-06	10/28/94	06	82900
N2TFB5-06	10/19/94	06	93000
N3TFB1-02	10/18/94	02	61900
N3TFB1-12	10/18/94	12	44300
N3TFB2-06	10/19/94	06	43700
N3TFB2-06FR	10/19/94	06	85000
N3TFB3-08	10/13/94	08	36700
N3TFB6-02	10/18/94	02	126000
N3TFB7-02	10/18/94	02	166000
N3TFB7-06	10/18/94	06	65500
N3TFB8-06	10/18/94	06	146000
PESTSB1-04	10/20/94	04	34400
PSSB1-06	10/31/94	06	42000
SSB1-16	10/24/94	16	65400
STFSB1-02	10/26/94	02	72000
STFSB1-06	10/26/94	06	46500
STFSB2-08	10/26/94	08	51000
Field Blanks			
FBNA1-100594	10/5/94	--	0.3
FBNA2-100694	10/6/94	--	0.25U
FBNA3-101194	10/11/94	--	0.25U
FBNA4-101394	10/13/94	--	0.25U
FBNA5-101994	1019/94	--	0.25U
FBNA6-102094	10/20/94	--	0.25U
FBNA7-102194	10/21/94	--	0.25U
FBNA7-102594	10/25/94	--	0.25U
FBNA8-102594	10/25/94	--	0.25U

See last page for footnotes.

Table 5-1. Total Petroleum Hydrocarbons in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample ID	Sample Date	Sample Depth (ft bls)	TPH Concentration (mg/kg)
Field Blanks (continued)			
FBNA9-102694	10/26/94	--	0.25U
FBNA10-102694	10/26/94	--	0.25U
FBNA11-102794	10/27/94	--	0.25U
FBNA12-102794	10/27/94	--	0.25U
FBNA13-102894	10/28/94	--	0.25U
FBNA14-102894	10/28/94	--	0.25U
FBNA15-102894	10/28/94	--	0.25U
FBNA16-102894	10/28/94	--	0.25U
FBNA17-103194	10/31/94	--	0.25U

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in milligrams per kilogram (mg/kg) (parts per million [ppm]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using New Jersey Modified U.S. Environmental Protection Agency (USEPA) Method 418.1.

TPH Total petroleum hydrocarbons.
FBNA Indicates a field blank associated with non-aqueous samples.
FR Field replicate of previous sample.
ft bls Feet below land surface
mg/kg Milligrams per kilogram
-- Not applicable.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	3TFIRMB4	3TFIRMB4	AGTFSB1	AGTFSB1	AGTFSB2	AGTFSB3	AGTFSB3	AGTFSB4
			Impact to	Depth:	02	06	02	06	04	02	06	02
				Zone**:	N3TF	N3TF	AGTF	AGTF	AGTF	AGTF	AGTF	AGTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/17/94	10/17/94	10/20/94	10/20/94	10/28/94	10/27/94	10/27/94	10/20/94
1,1,1-Trichloroethane	210000	1000000	50000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
1,1,2,2-Tetrachloroethane	34000	70000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
1,1,2-Trichloroethane	22000	420000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
1,1-Dichloroethane	570000	1000000	10000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
1,1-Dichloroethene	8000	150000	10000		12U	1400U	1600U	1600U	1400UJ	12U	61U	12U
1,2-Dibromoethane	--	--	--		24U	2900U	3200U	3200U	2800U	24U	120U	24U
1,2-Dichloroethane	6000	24000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
1,2-Dichloroethene(Total)	1079000	2000000	51000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
1,2-Dichloropropane	10000	43000	--		12U	1400U	1600UJ	1600U	1400UJ	12U	61U	12U
1-Butanol	--	--	--		600U	74000UJ	81000U	280000	71000UJ	600U	3000U	600U
2-Butanol	--	--	--		600U	74000UJ	81000U	81000U	71000U	600U	3000U	600U
2-Butanone	1000000	1000000	50000		12UJ	1400UJ	1600UJ	1600UJ	1400UJ	12U	61UJ	12UJ
2-Hexanone	--	--	--		12U	1400UJ	1600UJ	1600UJ	1400UJ	12U	61U	12U
2-Methyl-2-propanol	--	--	--		600U	74000UJ	81000U	81000U	71000UJ	600U	3000U	600U
2-Propanol	--	--	--		600U	74000UJ	81000U	81000U	71000U	600U	3000UJ	600UJ
4-Methyl-2-pentanone	1000000	1000000	50000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Acetone	1000000	1000000	100000		16U	1400UJ	1600UJ	1600UJ	1400UJ	18U	210UJ	32UJ
Benzene	3000	13000	1000		12U	1400U	1600U	1600U	1400U	12U	12J	4J
Bromodichloromethane	11000	46000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Bromoform	86000	370000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Bromomethane	79000	1000000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Carbon disulfide	--	--	--		12U	1400UJ	1600U	1600U	1400UJ	12U	61U	12U
Carbon tetrachloride	2000	4000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Chlorobenzene	37000	680000	1000		12U	190J	1600U	1600U	1400U	12U	61U	12U
Chloroethane	--	--	--		12U	1400UJ	1600U	1600UJ	1400U	12U	61U	12U
Chloroform	19000	28000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Chloromethane	520000	1000000	10000		12UJ	1400UJ	1600UJ	1600UJ	1400UJ	12U	61U	12U
Dibromochloromethane	110000	1000000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Ethylbenzene	1000000	1000000	100000		12U	1400U	1600U	1600U	190J	12U	61U	1J
Hexane	--	--	--		24U	2900U	3200UJ	3200UJ	2800UJ	2J	28J	10J
Methyl-t-butyl ether	--	--	--		24U	2900U	3200U	3200U	2800U	24U	120U	24U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	3TFIRMB4	3TFIRMB4	AGTFSB1	AGTFSB1	AGTFSB2	AGTFSB3	AGTFSB3	AGTFSB4
				Depth:	02	06	02	06	04	02	06	02
			Impact to	Zone**:	N3TF	N3TF	AGTF	AGTF	AGTF	AGTF	AGTF	AGTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/17/94	10/17/94	10/20/94	10/20/94	10/28/94	10/27/94	10/27/94	10/20/94
Methylene chloride	49000	210000	1000		13U	1400U	1600U	1600U	1400U	28U	130UJ	12U
n-Propylbenzene	--	--	--		24U	1200J	3200U	13000	2800U	24U	720	24U
Styrene	23000	97000	100000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Tetrachloroethene	4000	6000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Toluene	1000000	1000000	500000		12U	1400U	1600U	1600U	1400U	12U	9J	2J
Trichloroethene	23000	54000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Vinyl chloride	2000	7000	10000		12U	1400UJ	1600U	1600UJ	1400U	12U	61U	12U
Xylenes (Total)	410000	1000000	10000		12U	1400U	1600U	1600U	1400U	12U	78	2J
cis-1,3-Dichloropropene	4000	5000	1000		12U	1400U	1600UJ	1600U	1400U	12U	61U	12U
trans-1,3-Dichloropropene	4000	5000	1000		12U	1400U	1600U	1600U	1400U	12U	61U	12U
Total Volatile Organic Compounds					0	1390	0	293000	190	2	847	19

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	AHTFSB1	AHTFSB2	AHTFSB4	AHTFSB4	APSB2	APSB5	APSB5	APSB6
				Depth:	02	02	02	08	02	02	06	06
			Impact to	Zone**:	AHTF	AHTF	AHTF	AHTF	AP	AP	AP	AP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/14/94	10/14/94	10/14/94	10/26/94	10/12/94	10/12/94	10/21/94
1,1,1-Trichloroethane	210000	1000000	50000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
1,1,2,2-Tetrachloroethane	34000	70000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
1,1,2-Trichloroethane	22000	420000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
1,1-Dichloroethane	570000	1000000	10000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
1,1-Dichloroethene	8000	150000	10000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
1,2-Dibromoethane	--	--	--		22U	2900U	2800U	2800U	23U	21U	3200U	22U
1,2-Dichloroethane	6000	24000	1000		11U	1400U	1300UJ	1400U	12U	11U	1500UJ	11U
1,2-Dichloroethene(Total)	1079000	2000000	51000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
1,2-Dichloropropane	10000	43000	--		11U	1400U	1300U	1400U	12U	11U	1500U	11U
1-Butanol	--	--	--		540UJ	72000U	69000U	70000UJ	580U	530UJ	80000U	560U
2-Butanol	--	--	--		540U	72000U	69000U	70000UJ	580U	530UJ	80000U	560U
2-Butanone	1000000	1000000	50000		8J	1400UJ	1300UJ	1400UJ	12UJ	11U	1500UJ	14J
2-Hexanone	--	--	--		11UJ	1400UJ	1300UJ	1400UJ	12U	11U	1500UJ	11U
2-Methyl-2-propanol	--	--	--		540U	72000U	69000U	70000UJ	580U	530UJ	80000U	560U
2-Propanol	--	--	--		540UJ	72000U	69000U	70000UJ	580UJ	530UJ	80000U	560UJ
4-Methyl-2-pentanone	1000000	1000000	50000		11UJ	1400U	1300U	1400U	12U	11U	1500U	11U
Acetone	1000000	1000000	100000		51UJ	1400UJ	1300UJ	1400UJ	13UJ	15U	1500UJ	50UJ
Benzene	3000	13000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	2J
Bromodichloromethane	11000	46000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Bromoform	86000	370000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Bromomethane	79000	1000000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Carbon disulfide	--	--	--		11U	1400UJ	1300UJ	1400UJ	12U	11U	1500UJ	11U
Carbon tetrachloride	2000	4000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Chlorobenzene	37000	680000	1000		11U	1400U	1300U	1400U	12U	11U	390J	11U
Chloroethane	--	--	--		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Chloroform	19000	28000	1000		11U	1400U	1300UJ	1400U	12U	11U	1500UJ	11U
Chloromethane	520000	1000000	10000		11UJ	1400U	1300U	1400U	12U	11U	1500U	11U
Dibromochloromethane	110000	1000000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Ethylbenzene	1000000	1000000	100000		4J	1400U	1300U	980J	12U	11U	1500U	9J
Hexane	--	--	--		22U	2900U	2800U	17000	23U	1J	3200U	22U
Methyl-t-butyl ether	--	--	--		22U	2900U	2800U	2800U	23U	21U	3200U	22U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	AHTFSB1	AHTFSB2	AHTFSB4	AHTFSB4	APSB2	APSB5	APSB5	APSB6
				Depth:	02	02	02	08	02	02	06	08
			Impact to	Zone**:	AHTF	AHTF	AHTF	AHTF	AP	AP	AP	AP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/14/94	10/14/94	10/14/94	10/26/94	10/12/94	10/12/94	10/21/94
Methylene chloride	49000	210000	1000		11UJ	1400U	1300U	1400U	23UJ	18U	2100U	19UJ
n-Propylbenzene	--	--	--		82	1300J	12000	7300	23U	21U	40000	6J
Styrene	23000	97000	100000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Tetrachloroethene	4000	6000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Toluene	1000000	1000000	500000		11U	1400U	1300U	1400U	12U	11U	300J	9J
Trichloroethene	23000	54000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Vinyl chloride	2000	7000	10000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
Xylenes (Total)	410000	1000000	10000		1J	1400U	1300U	610J	12U	11U	1500U	14
cis-1,3-Dichloropropene	4000	5000	1000		11U	1400U	1300U	1400U	12U	11U	1500U	11U
trans-1,3-Dichloropropene	4000	5000	1000		11U	1400U	1300U	1400U	12U	11UJ	1500U	11U
Total Volatile Organic Compounds					95	1300	12000	25890	0	1	40690	54

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	APSB6	DTSB3	DTSB3FR	ECIRMB1	ECIRMB3	ECIRMB3	ECPSB1	ECPSB2	ECPSB2
				Depth:	10	04	04	02	02	06	02	06	12
			Impact to	Zone**:	AP	DT	DT	U	N3TF	N3TF	ECP	ECP	ECP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/21/94	10/27/94	10/27/94	10/24/94	10/19/94	10/19/94	10/20/94	10/20/94	10/20/94
1,1,1-Trichloroethane	210000	1000000	50000		2800	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
1,1,2,2-Tetrachloroethane	34000	70000	1000		1600U	1500U	1500UJ	12U	11U	7900U	1400U	11U	56000U
1,1,2-Trichloroethane	22000	420000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
1,1-Dichloroethane	570000	1000000	10000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
1,1-Dichloroethene	8000	150000	10000		1600U	1500U	1500UJ	12U	11U	7900U	1400U	11U	56000U
1,2-Dibromoethane	--	--	--		3200U	3000U	3000U	23U	22U	16000U	2900U	23U	120000U
1,2-Dichloroethane	6000	24000	1000		1600U	1500UJ	1500U	12U	11U	7900U	1400U	11U	56000U
1,2-Dichloroethene(Total)	1079000	2000000	51000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
1,2-Dichloropropane	10000	43000	--		1600U	1500U	1500UJ	12U	11U	7900U	1400UJ	11U	56000UJ
1-Butanol	--	--	--		81000UJ	76000U	76000UJ	580UJ	560U	410000U	72000U	570UJ	2900000U
2-Butanol	--	--	--		81000UJ	76000U	76000U	580UJ	560U	410000U	72000U	570UJ	2900000U
2-Butanone	1000000	1000000	50000		1600UJ	1500UJ	1500UJ	12UJ	11UJ	7900UJ	1400UJ	11UJ	56000UJ
2-Hexanone	--	--	--		1600UJ	1500UJ	1500UJ	12U	11U	7900UJ	1400UJ	11U	56000UJ
2-Methyl-2-propanol	--	--	--		81000U	76000U	76000U	580UJ	560U	410000U	72000U	570UJ	2900000U
2-Propanol	--	--	--		81000UJ	76000U	76000U	580UJ	560UJ	410000U	72000U	570UJ	2900000U
4-Methyl-2-pentanone	1000000	1000000	50000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Acetone	1000000	1000000	100000		1600UJ	1500UJ	1500UJ	20UJ	11UJ	7900UJ	1400UJ	38UJ	56000UJ
Benzene	3000	13000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	43	56000U
Bromodichloromethane	11000	46000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Bromoform	86000	370000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Bromomethane	79000	1000000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Carbon disulfide	--	--	--		1600U	1500U	1500UJ	12U	11U	7900U	1400UJ	2J	56000UJ
Carbon tetrachloride	2000	4000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Chlorobenzene	37000	680000	1000		6900	1500U	1500U	12U	11U	110000	280J	8100	980000J
Chloroethane	--	--	--		1600UJ	1500U	1500U	12U	11U	7900UJ	1400UJ	11U	56000UJ
Chloroform	19000	28000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Chloromethane	520000	1000000	10000		1600UJ	1500U	1500U	12U	11U	7900UJ	1400UJ	11UJ	56000UJ
Dibromochloromethane	110000	1000000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Ethylbenzene	1000000	1000000	100000		1600U	1500U	1500U	12U	11U	7900U	1400U	100	13000J
Hexane	--	--	--		3200UJ	3000U	3000U	2J	22U	16000UJ	2900U	10J	110000J
Methyl-t-butyl ether	--	--	--		3200U	3000U	3000U	23U	22U	16000U	2900U	23U	120000U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	APSB6	DTSB3	DTSB3FR	ECIRMB1	ECIRMB3	ECIRMB3	ECPSB1	ECPSB2	ECPSB2
				Depth:	10	04	04	02	02	06	02	06	12
			Impact to	Zone**:	AP	DT	DT	U	N3TF	N3TF	ECP	ECP	ECP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/21/94	10/27/94	10/27/94	10/24/94	10/19/94	10/19/94	10/20/94	10/20/94	10/20/94
Methylene chloride	49000	210000	1000		1600U	1500U	1500U	12UJ	11UJ	7900U	1400U	24UJ	56000U
n-Propylbenzene	--	--	--		6800	3000U	3000U	23U	22U	13000J	1100J	120	120000U
Styrene	23000	97000	100000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Tetrachloroethene	4000	6000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Toluene	1000000	1000000	500000		1600U	1500U	1500U	12U	11U	7900U	1400U	10J	11000J
Trichloroethene	23000	54000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Vinyl chloride	2000	7000	10000		1600UJ	1500U	1500U	12U	11U	7900UJ	1400UJ	11UJ	56000UJ
Xylenes (Total)	410000	1000000	10000		1600U	1500U	1500U	12U	11U	1000J	1400U	120	48000J
cis-1,3-Dichloropropene	4000	5000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
trans-1,3-Dichloropropene	4000	5000	1000		1600U	1500U	1500U	12U	11U	7900U	1400U	11U	56000U
Total Volatile Organic Compounds					18500	0	0	2	0	124000	1380	8505	1162000

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	ECPSB4	ECPSB5	GFSB1	GTFIRMB1	GTFIRMB2	GTFIRMB3	GTFIRMB4
			Impact to	Depth:	08	02	02	02	02	02	02
				Zone**:	ECP	ECP	STF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/12/94	10/06/94	10/17/94	10/05/94	10/17/94
1,1,1-Trichloroethane	210000	1000000	50000		12U	17U	1400U	11U	11U	11U	12U
1,1,2,2-Tetrachloroethane	34000	70000	1000		12U	17U	1400U	11U	11U	11U	12U
1,1,2-Trichloroethane	22000	420000	1000		12U	17U	1400U	11U	11U	11U	12U
1,1-Dichloroethane	570000	1000000	10000		12U	17U	1400U	11U	11U	11U	12U
1,1-Dichloroethene	8000	150000	10000		12U	17U	1400U	11U	11U	11U	12U
1,2-Dibromoethane	--	--	--		24U	33U	2800U	22U	23U	22U	24U
1,2-Dichloroethane	6000	24000	1000		12U	17U	1400U	11U	11U	11U	12U
1,2-Dichloroethene(Total)	1079000	2000000	51000		12U	17U	1400U	11U	11U	11U	12U
1,2-Dichloropropane	10000	43000	--		12U	17U	1400U	11U	11U	11U	12U
1-Butanol	--	--	--		600U	830U	71000U	560UJ	570UJ	550UJ	600U
2-Butanol	--	--	--		600U	830U	71000U	560UJ	570UJ	550UJ	600U
2-Butanone	1000000	1000000	50000		12UJ	17UJ	1400UJ	11U	11UJ	11U	2J
2-Hexanone	--	--	--		12U	17U	1400UJ	11U	11U	11U	12U
2-Methyl-2-propanol	--	--	--		600U	830U	71000U	560UJ	570UJ	550UJ	600U
2-Propanol	--	--	--		600UJ	830UJ	71000U	560UJ	570UJ	550UJ	600UJ
4-Methyl-2-pentanone	1000000	1000000	50000		12U	17U	1400U	7J	11U	11U	12U
Acetone	1000000	1000000	100000		19UJ	36UJ	1400UJ	33U	13U	13U	13U
Benzene	3000	13000	1000		11J	4J	1400U	11U	11U	11U	12U
Bromodichloromethane	11000	46000	1000		12U	17U	1400U	11U	11U	11U	12U
Bromoform	86000	370000	1000		12U	17U	1400U	11U	11U	11U	12U
Bromomethane	79000	1000000	1000		12U	17U	1400U	11U	11U	11U	12U
Carbon disulfide	--	--	--		12U	17U	1400U	11U	11U	11U	12U
Carbon tetrachloride	2000	4000	1000		12U	17U	1400UJ	11U	11U	11U	12U
Chlorobenzene	37000	680000	1000		6J	330	1400U	11U	11U	11U	12U
Chloroethane	--	--	--		12U	17U	1400U	11U	11U	11U	12U
Chloroform	19000	28000	1000		12U	17U	1400U	11U	11U	11U	12U
Chloromethane	520000	1000000	10000		12U	17U	1400UJ	11U	11UJ	11U	12U
Dibromochloromethane	110000	1000000	1000		12U	17U	1400U	11U	11U	11U	12U
Ethylbenzene	1000000	1000000	100000		4J	17U	1400U	11U	11U	11U	12U
Hexane	--	--	--		78	4J	2800UJ	1J	2J	3J	1J
Methyl-t-butyl ether	--	--	--		24U	33U	2800U	22U	23U	22U	24U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	ECPSB4	ECPSB5	GFSB1	GTFIRMB1	GTFIRMB2	GTFIRMB3	GTFIRMB4
				Depth:	08	02	02	02	02	02	02
			Impact to	Zone**:	ECP	ECP	STF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/12/94	10/06/94	10/17/94	10/05/94	10/17/94
Methylene chloride	49000	210000	1000		21UJ	33UJ	1400U	27U	18U	27U	15U
n-Propylbenzene	--	--	--		4J	14J	1400J	22U	23U	22U	24U
Styrene	23000	97000	100000		12U	17U	1400U	11U	11U	11U	12U
Tetrachloroethene	4000	6000	1000		12U	17U	1400U	11U	11U	11U	12U
Toluene	1000000	1000000	500000		3J	17U	250J	1J	11U	11U	12U
Trichloroethene	23000	54000	1000		12U	17U	1400U	11U	11U	11U	12U
Vinyl chloride	2000	7000	10000		12U	17U	1400U	11U	11U	11U	12U
Xylenes (Total)	410000	1000000	10000		6J	17U	280J	11U	11U	11U	12U
cis-1,3-Dichloropropene	4000	5000	1000		12UJ	17U	1400U	11U	11U	11U	12U
trans-1,3-Dichloropropene	4000	5000	1000		12U	17U	1400U	11UJ	11U	11UJ	12U
Total Volatile Organic Compounds					112	352	1930	9	2	3	3

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: Depth: Zone**: Date:	GTFIRMB5 02 GTF 10/05/94	GTFIRMB5FR 02 GTF 10/05/94	GTFIRMB6 06 GTF 10/05/94	GTFIRMB6 04 GTF 10/05/94	GTFIRMB7 02 GTF 10/17/94	GTFIRMB8 02 GTF 10/18/94	GTFIRMB8 08 GTF 10/18/94
1,1,1-Trichloroethane	210000	1000000	50000		12U	13U	13U	15U	11U	11U	13U
1,1,2,2-Tetrachloroethane	34000	70000	1000		12U	13U	13U	15U	11U	11U	13U
1,1,2-Trichloroethane	22000	420000	1000		12U	13U	13U	15U	11U	11U	13U
1,1-Dichloroethane	570000	1000000	10000		12U	13U	13U	15U	11U	11U	13U
1,1-Dichloroethene	8000	150000	10000		12U	13U	13U	15U	11U	11U	13U
1,2-Dibromoethane	--	--	--		25U	25U	26U	29U	23U	23U	26U
1,2-Dichloroethane	6000	24000	1000		12U	13U	13U	15U	11U	11U	13U
1,2-Dichloroethene(Total)	1079000	2000000	51000		12U	13U	13U	15U	11U	11U	13U
1,2-Dichloropropane	10000	43000	--		12U	13U	13U	15U	11U	11U	13U
1-Butanol	--	--	--		620U	630U	660UJ	740U	570U	570UJ	650U
2-Butanol	--	--	--		620UJ	630UJ	660UJ	740UJ	570U	570U	650U
2-Butanone	1000000	1000000	50000		42J	14J	55	12J	11UJ	11UJ	13UJ
2-Hexanone	--	--	--		12UJ	13UJ	13U	15UJ	11U	11UJ	13U
2-Methyl-2-propanol	--	--	--		620U	630U	660UJ	740U	570U	570U	650U
2-Propanol	--	--	--		620U	630U	660UJ	740U	570UJ	570UJ	650UJ
4-Methyl-2-pentanone	1000000	1000000	50000		10J	13U	160	15U	11U	11UJ	13U
Acetone	1000000	1000000	100000		170	49U	160	58U	11U	16UJ	150UJ
Benzene	3000	13000	1000		12U	13U	6J	12J	11U	11U	13U
Bromodichloromethane	11000	46000	1000		12U	13U	13U	15U	11U	11U	13U
Bromoform	86000	370000	1000		12U	13U	13U	15U	11U	11U	13U
Bromomethane	79000	1000000	1000		12U	13U	13U	15U	11U	11U	13U
Carbon disulfide	--	--	--		12U	13U	13U	15U	11U	11U	13U
Carbon tetrachloride	2000	4000	1000		12U	13U	13U	15U	11U	11U	13U
Chlorobenzene	37000	680000	1000		12U	13U	13U	3J	11U	11U	40
Chloroethane	--	--	--		12U	13U	13U	15U	11U	11U	13U
Chloroform	19000	28000	1000		12U	13U	13U	15U	11U	43	13U
Chloromethane	520000	1000000	10000		12UJ	13UJ	13U	15UJ	11U	11UJ	13U
Dibromochloromethane	110000	1000000	1000		12U	13U	13U	15U	11U	11U	13U
Ethylbenzene	1000000	1000000	100000		12U	13U	12J	35	11U	11U	13U
Hexane	--	--	--		2J	1J	9J	3J	2J	2J	4J
Methyl-t-butyl ether	--	--	--		25U	25U	26U	29UJ	23U	23U	26U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB5	GTFIRMB5FR	GTFIRMB5	GTFIRMB6	GTFIRMB7	GTFIRMB8	GTFIRMB8
			Impact to	Depth:	02	02	06	04	02	02	08
				Zone**:	GTF	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/05/94	10/05/94	10/05/94	10/05/94	10/17/94	10/18/94	10/18/94
Methylene chloride	49000	210000	1000		29U	13U	25U	32U	19U	25UJ	43UJ
n-Propylbenzene	--	--	--		2J	25U	7J	44	23U	23U	18J
Styrene	23000	97000	100000		12U	13U	13U	15U	11U	11U	13U
Tetrachloroethene	4000	6000	1000		12U	13U	13U	3J	11U	11U	13U
Toluene	1000000	1000000	500000		9J	3J	62	20	11U	11U	13U
Trichloroethene	23000	54000	1000		12U	13U	13U	15U	11U	11U	13U
Vinyl chloride	2000	7000	10000		12U	13U	13U	15U	11U	11U	13U
Xylenes (Total)	410000	1000000	10000		10J	5J	45	42	11U	11U	12J
cis-1,3-Dichloropropene	4000	5000	1000		12U	13U	13U	15U	11U	11U	13UJ
trans-1,3-Dichloropropene	4000	5000	1000		12UJ	13UJ	13UJ	15UJ	11U	11U	13U
Total Volatile Organic Compounds					245	23	516	174	2	45	74

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID: GTFIRMB9	GTFSB1	GTFSB1	GTFSB2	GTFSB3	GTFSB4	GTFSB5	GTFSB6	GTFSB7
				Depth: 02	02	08	02	02	02	02	02	02
			Impact to	Zone**: GTF	GTF	GTF	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date: 10/05/94	10/10/94	10/10/94	10/13/94	10/10/94	10/13/94	10/13/94	10/11/94	10/13/94
1,1,1-Trichloroethane	210000	1000000	50000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
1,1,2,2-Tetrachloroethane	34000	70000	1000	12U	12U	1700U	12U	12UJ	11U	11U	11U	11U
1,1,2-Trichloroethane	22000	420000	1000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
1,1-Dichloroethane	570000	1000000	10000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
1,1-Dichloroethene	8000	150000	10000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
1,2-Dibromoethane	--	--	--	25U	24U	3600U	25U	24U	22U	22U	23U	23U
1,2-Dichloroethane	6000	24000	1000	12U	12U	1700UJ	12U	12U	11U	11U	11U	11U
1,2-Dichloroethene(Total)	1079000	2000000	51000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
1,2-Dichloropropane	10000	43000	--	12U	12U	1700U	12U	12U	11U	11U	11U	11U
1-Butanol	--	--	--	620U	600UJ	91000U	620UJ	590UJ	560UJ	540UJ	570U	570UJ
2-Butanol	--	--	--	620UJ	600UJ	91000U	620UJ	590U	560U	540U	570UJ	570U
2-Butanone	1000000	1000000	50000	12UJ	12U	1700UJ	11J	12U	11UJ	11UJ	11UJ	11UJ
2-Hexanone	--	--	--	12UJ	12U	1700UJ	12U	12U	11U	11U	11UJ	11U
2-Methyl-2-propanol	--	--	--	620U	600UJ	91000U	620UJ	590U	560UJ	540UJ	570U	570UJ
2-Propanol	--	--	--	620U	600UJ	91000U	620UJ	590U	560UJ	540UJ	570U	570UJ
4-Methyl-2-pentanone	1000000	1000000	50000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
Acetone	1000000	1000000	100000	18U	17U	1700UJ	66U	20U	27U	18U	16U	27U
Benzene	3000	13000	1000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
Bromodichloromethane	11000	46000	1000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
Bromoform	86000	370000	1000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
Bromomethane	79000	1000000	1000	12U	12U	1700U	12U	12U	11UJ	11UJ	11U	11UJ
Carbon disulfide	--	--	--	12U	12U	1700UJ	12U	12U	11U	11U	11U	11U
Carbon tetrachloride	2000	4000	1000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
Chlorobenzene	37000	680000	1000	12U	12U	1700U	2J	12U	11U	11U	11U	11U
Chloroethane	--	--	--	12U	12U	1700U	12U	12U	11UJ	11UJ	11U	11UJ
Chloroform	19000	28000	1000	12U	12U	1700UJ	12U	12U	11U	11U	11U	11U
Chloromethane	520000	1000000	10000	12UJ	12U	1700U	12UJ	12U	11UJ	11UJ	11UJ	11UJ
Dibromochloromethane	110000	1000000	1000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
Ethylbenzene	1000000	1000000	100000	12U	12U	1700U	12U	12U	11U	11U	11U	11U
Hexane	--	--	--	2J	24U	3600U	25U	1J	2J	22U	23U	23U
Methyl-t-butyl ether	--	--	--	25U	24U	3600U	25U	24U	22U	22U	23U	23U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB9	GTFSB1	GTFSB1	GTFSB2	GTFSB3	GTFSB4	GTFSB5	GTFSB6	GTFSB7
				Depth:	02	02	08	02	02	02	02	02	02
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/05/94	10/10/94	10/10/94	10/13/94	10/10/94	10/13/94	10/13/94	10/11/94	10/13/94
Methylene chloride	49000	210000	1000		12U	33U	2700U	32U	63U	23U	22U	46U	23U
n-Propylbenzene	--	--	--		25U	24U	3600U	25U	24U	22U	22U	23U	23U
Styrene	23000	97000	100000		12U	12U	1700U	12U	12U	11U	11U	11U	11U
Tetrachloroethene	4000	6000	1000		12U	12U	1700U	12U	12U	11U	11U	11U	11U
Toluene	1000000	1000000	500000		12U	12U	3900	12U	12U	11U	11U	11U	11U
Trichloroethene	23000	54000	1000		12U	12U	1700U	12U	12U	11U	11U	11U	11U
Vinyl chloride	2000	7000	10000		12U	12U	1700U	12U	12U	11UJ	11UJ	11U	11UJ
Xylenes (Total)	410000	1000000	10000		12U	12U	310J	12UJ	12U	11U	11U	11U	11U
cis-1,3-Dichloropropene	4000	5000	1000		12U	12U	1700U	12U	12U	11U	11U	11U	11U
trans-1,3-Dichloropropene	4000	5000	1000		12UJ	12UJ	1700U	12U	12UJ	11U	11U	11UJ	11U
Total Volatile Organic Compounds					2	0	4210	13	1	2	0	0	0

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB7	GTFSB8	GTFSB8	GTFSB9	GTFSB9	LAIRMB1	LOSB1	LOSB1	LOSB2
				Depth:	08	04	08	02	08	02	04	08	04
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/13/94	10/13/94	10/13/94	10/13/94	10/13/94	10/24/94	10/25/94	10/25/94	10/14/94
1,1,1-Trichloroethane	210000	1000000	50000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1,1,2,2-Tetrachloroethane	34000	70000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1,1,2-Trichloroethane	22000	420000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1,1-Dichloroethane	570000	1000000	10000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1,1-Dichloroethene	8000	150000	10000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1,2-Dibromoethane	--	--	--		3400U	23U	27UJ	22U	2900U	27U	23U	2900U	28U
1,2-Dichloroethane	6000	24000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1,2-Dichloroethene(Total)	1079000	2000000	51000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1,2-Dichloropropane	10000	43000	--		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
1-Butanol	--	--	--		86000U	570UJ	680UJ	540UJ	73000U	670UJ	580U	72000U	700UJ
2-Butanol	--	--	--		86000U	570UJ	680UJ	540UJ	73000U	670UJ	580U	72000U	700UJ
2-Butanone	1000000	1000000	50000		1600UJ	10J	14UJ	4J	1400UJ	8J	12UJ	1400UJ	19J
2-Hexanone	--	--	--		1600UJ	11U	14UJ	11UJ	1400UJ	13U	12U	1400UJ	14U
2-Methyl-2-propanol	--	--	--		86000U	570UJ	680UJ	540UJ	73000U	670UJ	580U	72000U	700UJ
2-Propanol	--	--	--		86000U	570UJ	680UJ	540UJ	73000U	670UJ	580UJ	72000U	700UJ
4-Methyl-2-pentanone	1000000	1000000	50000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Acetone	1000000	1000000	100000		1600UJ	47U	23UJ	26UJ	1400UJ	37UJ	31UJ	1400UJ	71U
Benzene	3000	13000	1000		1600U	11U	1J	11U	420J	13U	12U	1400U	14U
Bromodichloromethane	11000	46000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Bromoform	86000	370000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Bromomethane	79000	1000000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	11J
Carbon disulfide	--	--	--		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Carbon tetrachloride	2000	4000	1000		1600UJ	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Chlorobenzene	37000	680000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Chloroethane	--	--	--		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Chloroform	19000	28000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Chloromethane	520000	1000000	10000		1600UJ	11UJ	14UJ	11UJ	1400U	13U	12U	1400U	14U
Dibromochloromethane	110000	1000000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Ethylbenzene	1000000	1000000	100000		1600U	11U	14UJ	11U	6600	13U	4J	650J	4J
Hexane	--	--	--		3400UJ	2J	8J	3J	2900U	27U	5J	2900U	6J
Methyl-t-butyl ether	--	--	--		3400U	23U	27UJ	22U	2900U	27U	23U	2900U	28U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB7	GTFSB8	GTFSB8	GTFSB9	GTFSB9	LAIRMB1	LOSB1	LOSB1	LOSB2
				Depth:	08	04	08	02	08	02	04	08	04
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/13/94	10/13/94	10/13/94	10/13/94	10/13/94	10/24/94	10/25/94	10/25/94	10/14/94
Methylene chloride	49000	210000	1000		1600U	31U	20UJ	42U	1400U	25UJ	12UJ	1400U	32U
n-Propylbenzene	--	--	--		3000J	1J	35J	22U	13000	27U	60	1300J	28U
Styrene	23000	97000	100000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Tetrachloroethene	4000	6000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Toluene	1000000	1000000	500000		1600U	3J	2J	2J	230J	13U	12U	270J	2J
Trichloroethene	23000	54000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Vinyl chloride	2000	7000	10000		1600U	11U	14UJ	11UJ	1400U	13U	12U	1400U	14U
Xylenes (Total)	410000	1000000	10000		1600U	7J	9J	4J	26000	13U	93	3000	24
cis-1,3-Dichloropropene	4000	5000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14UJ
trans-1,3-Dichloropropene	4000	5000	1000		1600U	11U	14UJ	11U	1400U	13U	12U	1400U	14U
Total Volatile Organic Compounds					3000	23	55	13	46250	8	162	5220	66

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: LOSB2 Depth: 08 Zone**: LO Date: 10/14/94	LOSB3 02 LO 10/24/94	LOSB4 02 LO 10/24/94	LOSB4 06 LO 10/24/94	LOSB8 02 SS 10/24/94	LOSB8 08 SS 10/24/94	LOSB9 02 LO 10/25/94	LOSB9 06 LO 10/25/94
1,1,1-Trichloroethane	210000	1000000	50000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1,1,2,2-Tetrachloroethane	34000	70000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1,1,2-Trichloroethane	22000	420000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1,1-Dichloroethane	570000	1000000	10000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1,1-Dichloroethene	8000	150000	10000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1,2-Dibromoethane	--	--	--	4600U	25U	110U	2700UJ	120U	23U	26U	22U
1,2-Dichloroethane	6000	24000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1,2-Dichloroethene(Total)	1079000	2000000	51000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1,2-Dichloropropane	10000	43000	--	2200U	12U	53U	1300UJ	58U	12U	13U	11U
1-Butanol	--	--	--	120000U	620UJ	2700UJ	66000UJ	2900UJ	580U	640UJ	560UJ
2-Butanol	--	--	--	120000U	620UJ	2700UJ	66000UJ	2900UJ	580U	640UJ	560UJ
2-Butanone	1000000	1000000	50000	2200UJ	12UJ	53UJ	1300UJ	82J	12UJ	13UJ	25J
2-Hexanone	--	--	--	2200UJ	12U	53U	1300UJ	58U	12U	13U	11U
2-Methyl-2-propanol	--	--	--	120000U	620UJ	2700UJ	66000UJ	2900UJ	580U	640UJ	560UJ
2-Propanol	--	--	--	120000U	620UJ	2700UJ	66000UJ	2900UJ	580UJ	640UJ	560UJ
4-Methyl-2-pentanone	1000000	1000000	50000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Acetone	1000000	1000000	100000	2200UJ	21UJ	87UJ	1300UJ	230UJ	19UJ	13UJ	60UJ
Benzene	3000	13000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Bromodichloromethane	11000	46000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Bromoform	86000	370000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Bromomethane	79000	1000000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Carbon disulfide	--	--	--	2200UJ	12U	53U	1300UJ	58U	12U	13U	11U
Carbon tetrachloride	2000	4000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Chlorobenzene	37000	680000	1000	2200U	12U	53U	1300UJ	58U	2J	13U	11U
Chloroethane	--	--	--	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Chloroform	19000	28000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Chloromethane	520000	1000000	10000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Dibromochloromethane	110000	1000000	1000	2200U	12U	53U	1300UJ	58U	12U	13U	11U
Ethylbenzene	1000000	1000000	100000	290J	12U	53U	200J	58U	12U	13U	3J
Hexane	--	--	--	4500J	1J	14J	2700UJ	19J	8J	26U	15J
Methyl-t-butyl ether	--	--	--	4600U	25U	110U	2700UJ	120U	23U	26U	22U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB2	LOSB3	LOSB4	LOSB4	LOSB8	LOSB8	LOSB9	LOSB9
				Depth:	08	02	02	06	02	08	02	06
			Impact to	Zone**:	LO	LO	LO	LO	SS	SS	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/14/94	10/24/94	10/24/94	10/24/94	10/24/94	10/24/94	10/25/94	10/25/94
Methylene chloride	49000	210000	1000		2200U	17UJ	140UJ	1300UJ	91UJ	17UJ	39UJ	32UJ
n-Propylbenzene	--	--	--		4600U	25U	110U	3600J	200	110	264	30
Styrene	23000	97000	100000		2200U	12U	53U	1300UJ	58U	12U	13U	11U
Tetrachloroethene	4000	6000	1000		2200U	12U	53U	1300UJ	58U	12U	13U	1J
Toluene	1000000	1000000	500000		260J	12U	53U	1300UJ	58U	12U	13U	2J
Trichloroethene	23000	54000	1000		2200U	12U	53U	1300UJ	58U	12U	13U	11U
Vinyl chloride	2000	7000	10000		2200U	12U	53U	1300UJ	58U	12U	13U	11U
Xylenes (Total)	410000	1000000	10000		1600J	12U	53U	4700J	24J	8J	13U	24
cis-1,3-Dichloropropene	4000	5000	1000		2200U	12U	53U	1300UJ	58U	12U	13U	11U
trans-1,3-Dichloropropene	4000	5000	1000		2200U	12U	53U	1300UJ	58U	12U	13U	11U
Total Volatile Organic Compounds					6650	1	14	8500	325	128	0	100

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID: LOSB10	LOSB10	LOSB11	LOSB12	LOSB12	LOSB13	LOSB13FR
				Depth: 04	08	02	02	06	02	02
			Impact to	Zone**: LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date: 10/28/94	10/28/94	10/25/94	10/25/94	10/25/94	10/31/94	10/31/94
1,1,1-Trichloroethane	210000	1000000	50000	1300U	1400U	13U	14U	1500U	1400U	1400U
1,1,2,2-Tetrachloroethane	34000	70000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
1,1,2-Trichloroethane	22000	420000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
1,1-Dichloroethane	570000	1000000	10000	1300U	1400U	13U	14U	1500U	1400U	1400U
1,1-Dichloroethene	8000	150000	10000	1300U	1400UJ	13U	14U	1500U	1400U	1400U
1,2-Dibromoethane	--	--	--	2800U	2900U	27U	28U	3100U	2900U	2900U
1,2-Dichloroethane	6000	24000	1000	1300U	1400U	13U	14U	1500U	1400UJ	1400UJ
1,2-Dichloroethene(Total)	1079000	2000000	51000	1300U	1400U	13U	14U	1500U	1400U	1400U
1,2-Dichloropropane	10000	43000	--	1300U	1400UJ	13U	14U	1500UJ	1400U	1400U
1-Butanol	--	--	--	70000UJ	73000UJ	670UJ	700UJ	77000U	72000U	72000U
2-Butanol	--	--	--	70000U	73000U	670UJ	700UJ	77000U	72000U	72000U
2-Butanone	1000000	1000000	50000	1300UJ	1400UJ	13UJ	14UJ	1500UJ	1400UJ	1400UJ
2-Hexanone	--	--	--	1300UJ	1400UJ	13U	14U	1500UJ	1400UJ	1400UJ
2-Methyl-2-propanol	--	--	--	70000U	73000UJ	670UJ	700UJ	77000U	72000U	72000U
2-Propanol	--	--	--	70000U	73000U	670U	700UJ	77000U	72000U	72000U
4-Methyl-2-pentanone	1000000	1000000	50000	1300U	1400U	13U	14U	1500U	1400U	1400U
Acetone	1000000	1000000	100000	2500UJ	1400UJ	13UJ	14UJ	1500UJ	1400UJ	1400UJ
Benzene	3000	13000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Bromodichloromethane	11000	46000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Bromoform	86000	370000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Bromomethane	79000	1000000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Carbon disulfide	--	--	--	1300U	1400UJ	13U	14U	1500UJ	1400U	1400U
Carbon tetrachloride	2000	4000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Chlorobenzene	37000	680000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Chloroethane	--	--	--	1300U	1400U	13U	14U	1500UJ	1400U	1400U
Chloroform	19000	28000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Chloromethane	520000	1000000	10000	1300U	1400UJ	13U	14U	1500UJ	1400U	1400U
Dibromochloromethane	110000	1000000	1000	1300U	1400U	13U	14U	1500U	1400U	1400U
Ethylbenzene	1000000	1000000	100000	150J	1400U	13U	14U	1500U	1400U	1400U
Hexane	--	--	--	260J	2900UJ	27U	28U	3100U	2900U	2900U
Methyl-t-butyl ether	--	--	--	2800U	2900U	27U	28U	3100U	2900U	2900U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB10	LOSB10	LOSB11	LOSB12	LOSB12	LOSB13	LOSB13FR
			Impact to	Depth:	04	08	02	02	06	02	02
				Zone**:	LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/28/94	10/28/94	10/25/94	10/25/94	10/25/94	10/31/94	10/31/94
Methylene chloride	49000	210000	1000		1300U	1400U	16U	24UJ	1500U	1400U	1400U
n-Propylbenzene	--	--	--		2800U	6800	4J	28U	3100U	2900U	2900U
Styrene	23000	97000	100000		1300U	1400U	13U	14U	1500U	1400U	1400U
Tetrachloroethene	4000	6000	1000		1300U	1400U	13U	14U	1500U	1400U	1400U
Toluene	1000000	1000000	500000		1300U	1400U	13U	14U	1500U	1400U	1400U
Trichloroethene	23000	54000	1000		1300U	1400U	13U	14U	1500U	1400U	1400U
Vinyl chloride	2000	7000	10000		1300U	1400U	13U	14U	1500UJ	1400U	1400U
Xylenes (Total)	410000	1000000	10000		390J	1400U	13U	14U	1500U	1400U	1400U
cis-1,3-Dichloropropene	4000	5000	1000		1300U	1400U	13U	14U	1500U	1400U	1400U
trans-1,3-Dichloropropene	4000	5000	1000		1300U	1400U	13U	14U	1500U	1400U	1400U
Total Volatile Organic Compounds					800	6800	4	0	0	0	0

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB13	LOSB14	LOSB15	LOSB16	LOSB17	LOSB18	LOSB18	LOSB18FR
			Impact to	Depth:	08	02	02	04	02	02	08	08
				Zone**:	LO	LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/31/94	10/25/94	10/24/94	10/25/94	10/24/94	10/24/94	10/24/94	10/24/94
1,1,1-Trichloroethane	210000	1000000	50000		56U	14U	12U	2700U	12U	11U	13U	13U
1,1,2,2-Tetrachloroethane	34000	70000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
1,1,2-Trichloroethane	22000	420000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
1,1-Dichloroethane	570000	1000000	10000		56U	14U	12U	2700U	12U	11U	13U	13U
1,1-Dichloroethene	8000	150000	10000		56U	14U	12U	2700U	12U	11UJ	13U	13U
1,2-Dibromoethane	--	--	--		110U	27U	23U	5600U	24U	23U	27U	26U
1,2-Dichloroethane	6000	24000	1000		56U	14U	12U	2700UJ	12U	11U	13U	13U
1,2-Dichloroethene(Total)	1079000	2000000	51000		56U	14U	12U	2700U	12U	11U	13U	13U
1,2-Dichloropropane	10000	43000	--		56U	14U	12U	2700U	12U	11U	13U	13U
1-Butanol	--	--	--		2800U	1700J	580UJ	140000U	600UJ	570UJ	670U	650U
2-Butanol	--	--	--		2800U	680UJ	580UJ	140000U	600UJ	570UJ	670U	650U
2-Butanone	1000000	1000000	50000		56UJ	14UJ	5J	2700UJ	3J	11UJ	10J	14J
2-Hexanone	--	--	--		56U	31	12U	2700UJ	12U	11U	13U	13U
2-Methyl-2-propanol	--	--	--		2800U	680UJ	580UJ	140000U	600UJ	570UJ	670U	650U
2-Propanol	--	--	--		2800UJ	680UJ	580UJ	140000U	600UJ	570UJ	670UJ	650UJ
4-Methyl-2-pentanone	1000000	1000000	50000		56U	26	12U	2700U	12U	11U	13U	13U
Acetone	1000000	1000000	100000		170UJ	20UJ	34UJ	2700UJ	22UJ	16UJ	43UJ	51UJ
Benzene	3000	13000	1000		56U	14U	12U	2700U	12U	11UJ	13U	13U
Bromodichloromethane	11000	46000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
Bromoform	86000	370000	1000		56UJ	14U	12U	2700U	12U	11U	13U	13U
Bromomethane	79000	1000000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
Carbon disulfide	--	--	--		56U	14U	12U	2700U	12U	11U	13U	13U
Carbon tetrachloride	2000	4000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
Chlorobenzene	37000	680000	1000		56U	14U	12U	2700U	12U	11UJ	13U	13U
Chloroethane	--	--	--		56U	14U	12U	2700U	12U	11U	13U	13U
Chloroform	19000	28000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
Chloromethane	520000	1000000	10000		56U	14U	12U	2700U	12U	11U	13U	13U
Dibromochloromethane	110000	1000000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
Ethylbenzene	1000000	1000000	100000		9J	14U	12U	2700U	12U	11U	13U	13U
Hexane	--	--	--		21J	27U	1J	5600U	1J	1J	6J	3J
Methyl-t-butyl ether	--	--	--		110U	27U	23U	5600U	24U	23U	27U	26U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB13	LOSB14	LOSB15	LOSB16	LOSB17	LOSB18	LOSB18	LOSB18FR
				Depth:	08	02	02	04	02	02	08	08
			Impact to	Zone**:	LO	LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/31/94	10/25/94	10/24/94	10/25/94	10/24/94	10/24/94	10/24/94	10/24/94
Methylene chloride	49000	210000	1000		74UJ	40UJ	16UJ	2700U	15UJ	15UJ	61UJ	18UJ
n-Propylbenzene	--	--	--		86J	27U	23U	5600U	24U	23U	27U	26U
Styrene	23000	97000	100000		56U	14U	12U	2700U	12U	11U	13U	13U
Tetrachloroethene	4000	6000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
Toluene.	1000000	1000000	500000		56U	14U	12U	2700U	12U	11UJ	13U	13U
Trichloroethene	23000	54000	1000		56U	14U	12U	2700U	12U	11UJ	13U	13U
Vinyl chloride	2000	7000	10000		56U	14U	12U	2700U	12U	11U	13U	13U
Xylenes (Total)	410000	1000000	10000		13J	14U	12U	2700U	12U	11U	13U	2J
cis-1,3-Dichloropropene	4000	5000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
trans-1,3-Dichloropropene	4000	5000	1000		56U	14U	12U	2700U	12U	11U	13U	13U
Total Volatile Organic Compounds					129	1757	6	0	4	1	16	19

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	MBSB1	MBSB2	MBSB3	MBSB3	MBSB3FR	MDCSB2-03	N2TFSB2
			Impact to	Depth:	02	02	06	10	10	03	02
				Zone**:	MB	MB	MB	MB	MB	MDC	N2TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/25/94	10/21/94	10/25/94	10/25/94	10/25/94	10/11/94	10/19/94
1,1,1-Trichloroethane	210000	1000000	50000		11U	12U	15U	1700U	1700U	11U	12U
1,1,2,2-Tetrachloroethane	34000	70000	1000		11U	12U	15U	1700U	1700U	11U	12U
1,1,2-Trichloroethane	22000	420000	1000		11U	12U	15U	1700U	1700U	11U	12U
1,1-Dichloroethane	570000	1000000	10000		11U	12U	15U	1700U	1700U	11U	12U
1,1-Dichloroethene	8000	150000	10000		11U	12U	15U	1700U	1700U	11U	12U
1,2-Dibromoethane	--	--	--		23U	23U	29U	3400U	3300U	22U	25U
1,2-Dichloroethane	8000	24000	1000		11U	12U	15U	1700U	1700U	11U	12U
1,2-Dichloroethene(Total)	1079000	2000000	51000		11U	12U	15U	1700U	1700U	11U	12U
1,2-Dichloropropane	10000	43000	--		11U	12U	15U	1700UJ	1700UJ	11U	12U
1-Butanol	--	--	--		570UJ	580U	740UJ	86000U	83000U	540UJ	620U
2-Butanol	--	--	--		570UJ	580U	740UJ	86000U	83000U	540U	620U
2-Butanone	1000000	1000000	50000		11UJ	12UJ	15UJ	1700UJ	1700UJ	11UJ	12UJ
2-Hexanone	--	--	--		11U	12U	15UJ	1700U	1700UJ	11U	12U
2-Methyl-2-propanol	--	--	--		570UJ	580U	740UJ	86000U	83000U	540UJ	620U
2-Propanol	--	--	--		570UJ	580UJ	740UJ	86000U	83000U	540UJ	620UJ
4-Methyl-2-pentanone	1000000	1000000	50000		11U	12U	15U	1700U	1700U	11U	12U
Acetone	1000000	1000000	100000		61UJ	34UJ	15UJ	1700UJ	1700UJ	14U	22UJ
Benzene	3000	13000	1000		5J	12U	15U	1700U	1700U	11U	12U
Bromodichloromethane	11000	46000	1000		11U	12U	15U	1700U	1700U	11U	12U
Bromoform	86000	370000	1000		11U	12U	15U	1700U	1700U	11U	12U
Bromomethane	79000	1000000	1000		11U	12U	15U	1700U	1700U	11UJ	12U
Carbon disulfide	--	--	--		4J	12U	15U	1700UJ	1700UJ	11U	12U
Carbon tetrachloride	2000	4000	1000		11U	12U	15U	1700U	1700U	11U	12U
Chlorobenzene	37000	680000	1000		7J	12U	15U	530J	460J	11U	12U
Chloroethane	--	--	--		11U	12U	15U	1700UJ	1700UJ	11UJ	12U
Chloroform	19000	28000	1000		11U	12U	15U	1700U	1700U	11U	12U
Chloromethane	520000	1000000	10000		11U	12U	15U	1700UJ	1700UJ	11UJ	12U
Dibromochloromethane	110000	1000000	1000		11U	12U	15U	1700U	1700U	11U	12U
Ethylbenzene	1000000	1000000	100000		3J	8J	15U	1700U	1700U	1J	12U
Hexane	--	--	--		14J	3J	29U	3400U	3300U	1J	5J
Methyl-t-butyl ether	--	--	--		23U	23U	29U	3400U	3300U	22U	25U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: / Depth: / Zone**: / Date:	MBSB1 02 MB 10/25/94	MBSB2 02 MB 10/21/94	MBSB3 06 MB 10/25/94	MBSB3 10 MB 10/25/94	MBSB3FR 10 MB 10/25/94	MDCSB2-03 03 MDC 10/11/94	N2TFSB2 02 N2TF 10/19/94
Methylene chloride	49000	210000	1000		15UJ	26UJ	22UJ	1700U	1700U	25U	25UJ
n-Propylbenzene	--	--	--		31	20J	29U	11000	7800	22U	25U
Styrene	23000	97000	100000		11U	12U	15U	1700U	1700U	11U	12U
Tetrachloroethene	4000	6000	1000		11U	12U	15U	1700U	1700U	11U	12U
Toluene	1000000	1000000	500000		3J	12U	15U	1700U	1700U	2J	12U
Trichloroethene	23000	54000	1000		11U	12U	15U	1700U	1700U	11U	12U
Vinyl chloride	2000	7000	10000		11U	12U	15U	1700UJ	1700UJ	11UJ	12U
Xylenes (Total)	410000	1000000	10000		10J	4J	15U	1700U	1700U	7J	12U
cis-1,3-Dichloropropene	4000	5000	1000		11U	12UJ	15U	1700U	1700U	11U	12U
trans-1,3-Dichloropropene	4000	5000	1000		11U	12U	15U	1700U	1700U	11U	12U
Total Volatile Organic Compounds					77	35	0	11530	8260	11	5

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID: N2TFSB4	N2TFSB4	N2TFSB5	N2TFSB5	N3TFSB1	N3TFSB2
			Impact to	Depth: 02	06	02	06	02	02
				Zone**: N2TF	N2TF	N2TF	N2TF	N3TF	AP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date: 10/28/94	10/28/94	10/19/94	10/19/94	10/18/94	10/19/94
1,1,1-Trichloroethane	210000	1000000	50000	13U	1500U	11U	57U	11U	11U
1,1,2,2-Tetrachloroethane	34000	70000	1000	13U	1500U	11U	57U	11U	11U
1,1,2-Trichloroethane	22000	420000	1000	13U	1500U	11U	57U	11U	11U
1,1-Dichloroethane	570000	1000000	10000	13U	1500U	11U	57U	11U	11U
1,1-Dichloroethene	8000	150000	10000	13U	1500UJ	11U	57U	11U	11U
1,2-Dibromoethane	--	--	--	26U	3100U	23U	110U	23U	23U
1,2-Dichloroethane	6000	24000	1000	13U	1500U	11U	57U	11U	11U
1,2-Dichloroethene(Total)	1079000	2000000	51000	13U	1500U	11U	57U	11U	11U
1,2-Dichloropropane	10000	43000	--	13U	1500UJ	11U	57U	11U	11U
1-Butanol	--	--	--	660U	78000UJ	570UJ	2800U	570U	570U
2-Butanol	--	--	--	660U	78000U	570U	2800U	570U	570U
2-Butanone	1000000	1000000	50000	13UJ	1500UJ	39J	57UJ	25J	14J
2-Hexanone	--	--	--	13U	1500UJ	11UJ	57U	11U	11U
2-Methyl-2-propanol	--	--	--	660U	78000UJ	570U	2800U	570U	570U
2-Propanol	--	--	--	660UJ	78000U	570UJ	2800UJ	570UJ	570UJ
4-Methyl-2-pentanone	1000000	1000000	50000	13U	1500U	11UJ	57U	11U	11U
Acetone	1000000	1000000	100000	13UJ	1500UJ	55UJ	85UJ	120U	86UJ
Benzene	3000	13000	1000	13U	290J	11U	57U	5J	11U
Bromodichloromethane	11000	46000	1000	13U	1500U	11U	57U	11U	11U
Bromoform	86000	370000	1000	13U	1500U	11U	57U	11U	11U
Bromomethane	79000	1000000	1000	13U	1500U	11U	57U	11U	11U
Carbon disulfide	--	--	--	13U	1500UJ	11U	57U	2J	11U
Carbon tetrachloride	2000	4000	1000	13U	1500U	11U	57U	11U	11U
Chlorobenzene	37000	680000	1000	13U	1500U	11U	57U	10J	2J
Chloroethane	--	--	--	13U	1500U	11U	57U	11U	11U
Chloroform	19000	28000	1000	13U	1500U	11U	57U	11U	11U
Chloromethane	520000	1000000	10000	13U	1500UJ	11UJ	57U	11U	11U
Dibromochloromethane	110000	1000000	1000	13U	1500U	11U	57U	11U	11U
Ethylbenzene	1000000	1000000	100000	13U	8700	11U	57U	10J	6J
Hexane	--	--	--	3J	7100J	23U	290	23	4J
Methyl-t-butyl ether	--	--	--	26U	3100U	23U	110U	23U	23U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N2TFSB4	N2TFSB4	N2TFSB5	N2TFSB5	N3TFSB1	N3TFSB2
				Depth:	02	06	02	06	02	02
			Impact to	Zone**:	N2TF	N2TF	N2TF	N2TF	N3TF	AP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/28/94	10/28/94	10/19/94	10/19/94	10/18/94	10/19/94
Methylene chloride	49000	210000	1000		46UJ	1500U	15UJ	120UJ	29U	37UJ
n-Propylbenzene	--	--	--		26U	6300	23U	260	46	23U
Styrene	23000	97000	100000		13U	1500U	11U	57U	11U	11U
Tetrachloroethene	4000	6000	1000		13U	1500U	11U	57U	11U	11U
Toluene	1000000	1000000	500000		13U	5000	11U	57U	3J	11U
Trichloroethene	23000	54000	1000		13U	1500U	11U	57U	11U	11U
Vinyl chloride	2000	7000	10000		13U	1500U	11U	57U	11U	11U
Xylenes (Total)	410000	1000000	10000		3J	36000	11U	11J	11	7J
cis-1,3-Dichloropropene	4000	5000	1000		13U	1500U	11U	57UJ	11UJ	11U
trans-1,3-Dichloropropene	4000	5000	1000		13U	1500U	11U	57U	11U	11U
Total Volatile Organic Compounds					6	63390	39	561	135	33

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB2	N3TFSB2FR	N3TFSB3	N3TFSB4	N3TFSB5	N3TFSB6
			Impact to	Depth:	06	06	02	02	08	02
				Zone**:	AP	AP	N3TF	N3TF	N3TF	N3TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/13/94	10/17/94	10/19/94	10/18/94
1,1,1-Trichloroethane	210000	1000000	50000		68U	66U	12U	12U	1400U	1400U
1,1,2,2-Tetrachloroethane	34000	70000	1000		68U	66U	12U	12U	1400U	1400U
1,1,2-Trichloroethane	22000	420000	1000		68U	66U	12U	12U	1400U	1400U
1,1-Dichloroethane	570000	1000000	10000		68U	66U	12U	12U	1400U	1400U
1,1-Dichloroethene	8000	150000	10000		68U	66U	12U	12U	1400U	1400U
1,2-Dibromoethane	--	--	--		140U	130UJ	24U	24U	2900U	3000U
1,2-Dichloroethane	6000	24000	1000		68U	66U	12U	12U	1400U	1400U
1,2-Dichloroethene(Total)	1079000	2000000	51000		68U	66U	12U	12U	1400U	1400U
1,2-Dichloropropane	10000	43000	--		68U	66U	12U	12U	1400U	1400UJ
1-Butanol	--	--	--		3400UJ	3300UJ	600UJ	600U	74000UJ	74000U
2-Butanol	--	--	--		3400U	3300UJ	600U	600U	74000U	74000U
2-Butanone	1000000	1000000	50000		68UJ	66UJ	12UJ	12UJ	1400UJ	1400UJ
2-Hexanone	--	--	--		68U	66U	12U	12U	1400UJ	1400UJ
2-Methyl-2-propanol	--	--	--		3400U	3300UJ	600UJ	600U	74000U	74000U
2-Propanol	--	--	--		3400UJ	3300UJ	600UJ	600U	74000UJ	74000U
4-Methyl-2-pentanone	1000000	1000000	50000		68U	66U	12U	12U	1400UJ	1400U
Acetone	1000000	1000000	100000		180UJ	180UJ	24U	67U	1400UJ	1400UJ
Benzene	3000	13000	1000		68U	66U	12U	12U	1400U	1400U
Bromodichloromethane	11000	46000	1000		68U	66U	12U	12U	1400U	1400U
Bromoform	86000	370000	1000		68U	66U	12U	12U	1400U	1400U
Bromomethane	79000	1000000	1000		68U	66U	12UJ	12U	1400U	1400U
Carbon disulfide	--	--	--		68U	66U	12U	12U	1400UJ	1400U
Carbon tetrachloride	2000	4000	1000		68U	66U	12U	12U	1400U	1400U
Chlorobenzene	37000	680000	1000		68U	66U	12U	12U	1400U	3500
Chloroethane	--	--	--		68U	66U	12UJ	12U	1400U	1400U
Chloroform	19000	28000	1000		68U	66U	12U	12U	1400U	1400U
Chloromethane	520000	1000000	10000		68UJ	66UJ	12UJ	12UJ	1400UJ	1400UJ
Dibromochloromethane	110000	1000000	1000		68U	66U	12U	12U	1400U	1400U
Ethylbenzene	1000000	1000000	100000		68U	66U	12U	12U	3100J	1400U
Hexane	--	--	--		350J	380J	24U	24U	3000J	10000J
Methyl-t-butyl ether	--	--	--		140U	130UJ	24U	24U	2800U	3000U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB2	N3TFSB2FR	N3TFSB3	N3TFSB4	N3TFSB5	N3TFSB6
			Impact to	Depth:	06	06	02	02	08	02
				Zone**:	AP	AP	N3TF	N3TF	N3TF	N3TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/13/94	10/17/94	10/19/94	10/18/94
Methylene chloride	49000	210000	1000		120UJ	150UJ	26U	56U	1400U	1400U
n-Propylbenzene	--	--	--		3500J	1700J	24U	24U	8800J	14000
Styrene	23000	97000	100000		68U	66U	12U	12U	1400U	1400U
Tetrachloroethene	4000	6000	1000		68U	66U	12U	12U	1400U	1400U
Toluene	1000000	1000000	500000		68U	66U	12U	1J	1400U	1400U
Trichloroethene	23000	54000	1000		68U	66U	12U	12U	1400U	1400U
Vinyl chloride	2000	7000	10000		68UJ	66UJ	12UJ	12U	1400UJ	1400U
Xylenes (Total)	410000	1000000	10000		68U	66U	12U	12U	3400J	1400U
cis-1,3-Dichloropropene	4000	5000	1000		68U	66U	12U	12U	1400U	1400U
trans-1,3-Dichloropropene	4000	5000	1000		68U	66U	12U	12U	1400U	1400U
Total Volatile Organic Compounds					3850	2080	0	1	18300	27500

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB7	N3TFSB7	N3TFSB8	N3TFSB8	N3TFSB9	PN1SB2	PN1SB2
				Depth:	02	06	02	06	02	04	08
			Impact to	Zone**:	N3TF	N3TF	N3TF	N3TF	N3TF	P1	P1
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/18/94	10/18/94	10/18/94	10/18/94	11/02/94	11/02/94	11/02/94
1,1,1-Trichloroethane	210000	1000000	50000		3000U	12U	1400U	1500U	13U	11U	12U
1,1,2,2-Tetrachloroethane	34000	70000	1000		3000U	12U	1400U	1500U	13U	11U	12U
1,1,2-Trichloroethane	22000	420000	1000		3000U	12U	1400U	1500U	13U	11U	12U
1,1-Dichloroethane	570000	1000000	10000		3000U	12U	1400U	1500U	13U	11U	12U
1,1-Dichloroethene	8000	150000	10000		3000U	12U	1400U	1500U	13U	11U	12U
1,2-Dibromoethane	--	--	--		6000U	24U	2800U	3000U	25U	22U	24U
1,2-Dichloroethane	6000	24000	1000		3000U	12U	1400U	1500U	13U	11U	12U
1,2-Dichloroethene(Total)	1079000	2000000	51000		3000U	12U	1400U	1500U	13U	11U	12U
1,2-Dichloropropane	10000	43000	--		3000U	12U	1400U	1500U	13U	11U	12U
1-Butanol	--	--	--		150000UJ	600U	70000UJ	78000UJ	630U	560U	590U
2-Butanol	--	--	--		150000UJ	600U	70000UJ	76000UJ	630U	560U	590U
2-Butanone	1000000	1000000	50000		3000UJ	44J	1400UJ	1500UJ	48J	4J	39J
2-Hexanone	--	--	--		3000UJ	12U	1400UJ	1500UJ	13U	11U	12U
2-Methyl-2-propanol	--	--	--		150000UJ	600U	70000UJ	76000UJ	630U	560U	590U
2-Propanol	--	--	--		150000UJ	600UJ	70000UJ	76000UJ	630UJ	560UJ	17J
4-Methyl-2-pentanone	1000000	1000000	50000		3000U	12U	1400U	1500U	13U	11U	12U
Acetone	1000000	1000000	100000		18000J	34U	1400UJ	1500UJ	180UJ	44UJ	100UJ
Benzene	3000	13000	1000		11000	26	4200	180J	13U	11U	12U
Bromodichloromethane	11000	46000	1000		3000U	12U	1400U	1500U	13U	11U	12U
Bromoform	86000	370000	1000		3000U	12U	1400U	1500U	13U	11U	12U
Bromomethane	79000	1000000	1000		3000U	12U	1400UJ	1500UJ	13U	11U	12U
Carbon disulfide	--	--	--		3000U	12U	1400U	1500U	13U	11U	12U
Carbon tetrachloride	2000	4000	1000		3000U	12U	1400U	1500U	13U	11U	12U
Chlorobenzene	37000	680000	1000		790J	12U	1400U	1500U	13U	11U	12U
Chloroethane	--	--	--		3000U	12U	1400U	1500U	13U	11U	12U
Chloroform	19000	28000	1000		3000U	12U	1400U	1500U	13U	11U	12U
Chloromethane	520000	1000000	10000		3000U	12U	1400U	1500UJ	13U	11U	12U
Dibromochloromethane	110000	1000000	1000		3000U	12U	1400U	1500U	13U	11U	12U
Ethylbenzene	1000000	1000000	100000		36000	52	1400	420J	13U	11U	12U
Hexane	--	--	--		120000J	45	5300	3000U	110J	5J	24U
Methyl-t-butyl ether	--	--	--		6000U	24U	2800U	3000U	25U	22U	24U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: N3TFSB7 Depth: 02 Zone**: N3TF Date: 10/18/94	N3TFSB7 06 N3TF 10/18/94	N3TFSB8 02 N3TF 10/18/94	N3TFSB8 06 N3TF 10/18/94	N3TFSB9 02 N3TF 11/02/94	PN1SB2 04 P1 11/02/94	PN1SB2 08 P1 11/02/94
Methylene chloride	49000	210000	1000	3000U	27U	1400U	1500U	14UJ	38UJ	15UJ
n-Propylbenzene	--	--	--	37000	460J	8800	4800J	75J	22U	25
Styrene	23000	97000	100000	3000U	12U	1400U	1500U	13U	11U	12U
Tetrachloroethene	4000	6000	1000	3000U	12U	1400U	1500U	13U	11U	12U
Toluene	1000000	1000000	500000	430J	2J	190J	1500U	13U	21	12U
Trichloroethene	23000	54000	1000	3000U	12U	1400U	1500U	13U	11U	12U
Vinyl chloride	2000	7000	10000	3000U	12U	1400U	1500UJ	13U	11U	12U
Xylenes (Total)	410000	1000000	10000	42000	56	1700	330J	7J	11U	2J
cis-1,3-Dichloropropene	4000	5000	1000	3000U	12U	1400U	1500U	13U	11U	12U
trans-1,3-Dichloropropene	4000	5000	1000	3000U	12U	1400U	1500U	13U	11U	12U
Total Volatile Organic Compounds				265220	685	21590	785730	240	30	83

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	PSSB1	PSSB1	SSB1	SSB3	SSB3	STFSB1	STFSB1	STFSB2
				Depth:	02	06	16	06	10	02	06	08
			Impact to	Zone**:	MB	MB	SS	SS	SS	STF	STF	STF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/31/94	10/31/94	10/24/94	10/24/94	10/24/94	10/26/94	10/26/94	10/26/94
1,1,1-Trichloroethane	210000	1000000	50000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
1,1,2,2-Tetrachloroethane	34000	70000	1000		1400U	1400U	12U	16U	13U	1400U	1600UJ	1500UJ
1,1,2-Trichloroethane	22000	420000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
1,1-Dichloroethane	570000	1000000	10000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
1,1-Dichloroethene	8000	150000	10000		1400U	1400U	12U	16U	13U	1400U	1600UJ	1500UJ
1,2-Dibromoethane	--	--	--		2900U	2900U	24U	33U	26U	2800U	3300U	3200U
1,2-Dichloroethane	6000	24000	1000		1400UJ	1400U	12U	16U	13U	1400UJ	1600U	1500U
1,2-Dichloroethene(Total)	1079000	2000000	51000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
1,2-Dichloropropane	10000	43000	--		1400U	1400U	12U	16U	13U	1400U	1600UJ	1500UJ
1-Butanol	--	--	--		73000U	73000UJ	590U	820U	660U	70000U	83000UJ	80000UJ
2-Butanol	--	--	--		73000U	73000U	590U	820U	660U	70000U	83000U	80000U
2-Butanone	1000000	1000000	50000		1400UJ	1400UJ	12UJ	16UJ	8J	1400U	1600UJ	1500UJ
2-Hexanone	--	--	--		1400UJ	1400UJ	12U	16U	13U	1400UJ	1600UJ	1500UJ
2-Methyl-2-propanol	--	--	--		73000U	73000U	590U	820U	660U	70000U	83000U	80000U
2-Propanol	--	--	--		73000U	73000U	590UJ	820UJ	660UJ	70000U	83000U	80000U
4-Methyl-2-pentanone	1000000	1000000	50000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Acetone	1000000	1000000	100000		1400UJ	1400UJ	67U	16U	120U	1400UJ	1800UJ	1500UJ
Benzene	3000	13000	1000		1400U	1400U	12U	16U	13U	290J	260J	1500U
Bromodichloromethane	11000	46000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Bromoform	86000	370000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Bromomethane	79000	1000000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Carbon disulfide	--	--	--		1400U	1400U	12U	16U	13U	1400UJ	1600UJ	1500UJ
Carbon tetrachloride	2000	4000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Chlorobenzene	37000	680000	1000		1400U	1400U	1J	16U	13U	1400U	200J	1500U
Chloroethane	--	--	--		1400U	1400U	12U	16U	13U	1400UJ	1600U	1500U
Chloroform	19000	28000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Chloromethane	520000	1000000	10000		1400U	1400U	12U	16U	13U	1400UJ	1600U	1500U
Dibromochloromethane	110000	1000000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Ethylbenzene	1000000	1000000	100000		1400U	570J	12U	16U	13U	350J	480J	1500U
Hexane	--	--	--		2900U	1100J	5J	7J	26U	2800U	6100	3200U
Methyl-t-butyl ether	--	--	--		2900U	2900U	10J	33U	26U	2800U	3300U	3200U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	PSSB1	PSSB1	SSB1	SSB3	SSB3	STFSB1	STFSB1	STFSB2
			Impact to	Depth:	02	06	16	06	10	02	06	08
				Zone**:	MB	MB	SS	SS	SS	STF	STF	STF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/31/94	10/31/94	10/24/94	10/24/94	10/24/94	10/26/94	10/26/94	10/26/94
Methylene chloride	49000	210000	1000		1400U	1400U	45UJ	35UJ	48UJ	1400U	1600U	1500U
n-Propylbenzene	--	--	--		2900U	7300	14J	33U	1J	16000	130000	860J
Styrene	23000	97000	100000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Tetrachloroethene	4000	6000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Toluene	1000000	1000000	500000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Trichloroethene	23000	54000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Vinyl chloride	2000	7000	10000		1400U	1400U	12U	16U	13U	1400UJ	1600U	1500U
Xylenes (Total)	410000	1000000	10000		1400U	1200J	2J	16U	13U	1400U	1600U	1500U
cis-1,3-Dichloropropene	4000	5000	1000		1400U	1400U	12U	16U	13U	1400UJ	1600U	1500U
trans-1,3-Dichloropropene	4000	5000	1000		1400U	1400U	12U	16U	13U	1400U	1600U	1500U
Total Volatile Organic Compounds					0	10170	18	7	8	16640	137040	860

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	FBNA1-100594	FBNA5-101994	FBNA6-102094	FBNA7-102594	FBNA9-102694
				Depth:					
			Impact to	Zone**:					
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/05/94	10/19/94	10/20/94	10/25/94	10/26/94
1,1,1-Trichloroethane	210000	1000000	50000		10U	10U	10U	10U	10U
1,1,2,2-Tetrachloroethane	34000	70000	1000		10U	10U	10U	10U	10U
1,1,2-Trichloroethane	22000	420000	1000		10U	10U	10U	10U	10U
1,1-Dichloroethane	570000	1000000	10000		10U	10U	10U	10U	10U
1,1-Dichloroethene	8000	150000	10000		10U	10U	10U	10U	10U
1,2-Dibromoethane	--	--	--		20U	20U	20U	20U	20U
1,2-Dichloroethane	6000	24000	1000		10U	10U	10U	10U	10U
1,2-Dichloroethene(Total)	1079000	2000000	51000		10U	10U	10U	10U	10U
1,2-Dichloropropane	10000	43000	--		10U	10U	10U	10U	10U
1-Butanol	--	--	--		500U	500U	500U	500U	500U
2-Butanol	--	--	--		500U	500U	500U	500U	500U
2-Butanone	1000000	1000000	50000		10U	10U	10U	10U	10U
2-Hexanone	--	--	--		10U	10U	10U	10U	10U
2-Methyl-2-propanol	--	--	--		500U	500U	500U	500U	500U
2-Propanol	--	--	--		500U	500U	500U	500U	500U
4-Methyl-2-pentanone	1000000	1000000	50000		10U	10U	10U	10U	10U
Acetone	1000000	1000000	100000		140J	10U	10U	10U	10U
Benzene	3000	13000	1000		10U	10U	10U	10U	10U
Bromodichloromethane	11000	46000	1000		10U	10U	10U	10U	10U
Bromoform	86000	370000	1000		10U	10U	10U	10U	10U
Bromomethane	79000	1000000	1000		10U	10U	10U	10U	10U
Carbon disulfide	--	--	--		10U	10U	10U	10U	10U
Carbon tetrachloride	2000	4000	1000		10U	10U	10U	10U	10U
Chlorobenzene	37000	680000	1000		10U	10U	10U	10U	10U
Chloroethane	--	--	--		10U	10U	10U	10U	10U
Chloroform	19000	28000	1000		10U	10U	10U	10U	10U
Chloromethane	520000	1000000	10000		10U	10U	10U	10U	10U
Dibromochloromethane	110000	1000000	1000		10U	10U	10U	10U	10U
Ethylbenzene	1000000	1000000	100000		10U	10U	10U	10U	10U
Hexane	--	--	--		10U	10U	10U	10U	10U
Methyl-t-butyl ether	--	--	--		20U	20U	20U	20U	20U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	FBNA1-100594	FBNA5-101994	FBNA6-102094	FBNA7-102594	FBNA9-102694
			Impact to	Depth:					
				Zone**:					
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/05/94	10/19/94	10/20/94	10/25/94	10/26/94
Methylene chloride	49000	210000	1000		2J	5J	10U	3J	10U
n-Propylbenzene	--	--	--		20U	20U	20U	20U	20U
Styrene	23000	97000	100000		20U	20U	20U	20U	20U
Tetrachloroethene	4000	6000	1000		10U	10U	10U	10U	10U
Toluene	1000000	1000000	500000		10U	10U	10U	10U	10U
Trichloroethene	23000	54000	1000		10U	10U	10U	10U	10U
Vinyl chloride	2000	7000	10000		10U	10U	10U	10U	10U
Xylenes (Total)	410000	1000000	10000		10U	10U	10U	10U	10U
cis-1,3-Dichloropropene	4000	5000	1000		10U	10U	10U	10U	10U
trans-1,3-Dichloropropene	4000	5000	1000		10U	10U	10U	10U	10U
Total Volatile Organic Compounds					0	5	0	3	0

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: Depth: Zone**: Date:	FBNA11-102794 10/27/94	FBNA13-102894 10/28/94	FBNA14-102894 10/28/94	FBNA17-103194 10/31/94
1,1,1-Trichloroethane	210000	1000000	50000		25U	10U	10U	10U
1,1,2,2-Tetrachloroethane	34000	70000	1000		25U	10U	10U	10U
1,1,2-Trichloroethane	22000	420000	1000		25U	10U	10U	10U
1,1-Dichloroethane	570000	1000000	10000		25U	10U	10U	10U
1,1-Dichloroethene	8000	150000	10000		25U	10U	10U	10U
1,2-Dibromoethane	--	--	--		50U	20U	20U	20U
1,2-Dichloroethane	6000	24000	1000		25U	10U	10U	10U
1,2-Dichloroethene(Total)	1079000	2000000	51000		25U	10U	10U	10U
1,2-Dichloropropane	10000	43000	--		25U	10U	10U	10U
1-Butanol	--	--	--		1200U	500U	500U	500U
2-Butanol	--	--	--		1200U	500U	500U	500U
2-Butanone	1000000	1000000	50000		25U	10U	10U	10U
2-Hexanone	--	--	--		25U	10U	10U	10U
2-Methyl-2-propanol	--	--	--		1200U	500U	500U	500U
2-Propanol	--	--	--		1200U	500U	500U	500U
4-Methyl-2-pentanone	1000000	1000000	50000		25U	10U	10U	10U
Acetone	1000000	1000000	100000		330	10U	6J	10U
Benzene	3000	13000	1000		25U	10U	10U	10U
Bromodichloromethane	11000	46000	1000		25U	10U	10U	10U
Bromoform	86000	370000	1000		25U	10U	10U	10U
Bromomethane	79000	1000000	1000		25U	10U	10U	10U
Carbon disulfide	--	--	--		25U	10U	10U	10U
Carbon tetrachloride	2000	4000	1000		25U	10U	10U	10U
Chlorobenzene	37000	680000	1000		25U	10U	10U	10U
Chloroethane	--	--	--		25U	10U	10U	10U
Chloroform	19000	28000	1000		25U	10U	10U	10U
Chloromethane	520000	1000000	10000		25U	10U	10U	10U
Dibromochloromethane	110000	1000000	1000		25U	10U	10U	10U
Ethylbenzene	1000000	1000000	100000		25U	10U	10U	10U
Hexane	--	--	--		25U	10U	10U	10U
Methyl-t-butyl ether	--	--	--		50U	20U	20U	20U

See last page for footnotes.

Table 5-2. Volatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID:	FBNA11-102794	FBNA13-102894	FBNA14-102894	FBNA17-103194
				Depth:				
				Zone**:				
				Date:	10/27/94	10/28/94	10/28/94	10/31/94
Methylene chloride	49000	210000	1000		25U	3J	2J	1J
n-Propylbenzene	--	--	--		50U	20U	20U	20U
Styrene	23000	97000	100000		50U	20U	20U	20U
Tetrachloroethene	4000	6000	1000		25U	10U	10U	10U
Toluene	1000000	1000000	500000		25U	10U	10U	10U
Trichloroethene	23000	54000	1000		25U	10U	10U	10U
Vinyl chloride	2000	7000	10000		25U	10U	10U	10U
Xylenes (Total)	410000	1000000	10000		25U	10U	10U	10U
cis-1,3-Dichloropropene	4000	5000	1000		25U	10U	10U	10U
trans-1,3-Dichloropropene	4000	5000	1000		25U	10U	10U	10U
Total Volatile Organic Compounds					0	3	8	1

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per kilogram (ug/kg) (equivalent to parts per billion (ppb)).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) OLM01.8.
Sample results exceeding the NJDEP impact to groundwater criteria are shown in bold. Sample results exceeding the NJDEP non-residential criteria are underlined.
Sample results exceeding both criteria are shown in bold and underlined.

NJDEP New Jersey Department of Environmental Protection.
FBNA Indicates a field blank associated with non-aqueous samples.
FR Field replicate of previous sample.
U The compound was analyzed for, but not detected at the specific detection limit.
J Estimated result.
-- No applicable criteria.
* NJDEP Soil Cleanup Criteria, February 3, 1992; last revised February 3, 1994.
** Zones as defined in Table 3-2.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria *			Sample ID:	3TFIRMB4	3TFIRMB4	AGTFSB1	AGTFSB1	AGTFSB2	AGTFSB3
				Depth:	02	06	02	06	04	02
				Zone**:	N3TF	N3TF	AGTF	AGTF	AGTF	AGTF
	Residential	Non-Residential	Impact to Groundwater	Date:	10/17/94	10/17/94	10/20/94	10/20/94	10/28/94	10/27/94
1,2,4-Trichlorobenzene	68000	1200000	100000		390U	7800U	8500U	13000UJ	10000U	800U
1,2-Dichlorobenzene	5100000	10000000	50000		240J	7800U	8500U	13000UJ	10000U	800U
1,3-Dichlorobenzene	5100000	10000000	100000		140J	7800U	8500U	13000UJ	10000U	800U
1,4-Dichlorobenzene	570000	10000000	100000		200J	7800U	8500U	13000UJ	10000U	800U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		390U	7800U	8500U	13000UJ	10000U	800U
2,4,5-Trichlorophenol	5600000	10000000	50000		950U	19000U	21000U	32000UJ	26000U	1900U
2,4,6-Trichlorophenol	62000	270000	10000		390U	7800U	8500U	13000UJ	10000U	800U
2,4-Dichlorophenol	170000	3100000	10000		390U	7800U	8500U	13000UJ	10000U	800U
2,4-Dimethylphenol	1100000	10000000	10000		390U	7800U	8500U	13000UJ	10000U	800U
2,4-Dinitrophenol	110000	2100000	10000		950U	19000U	21000U	32000UJ	26000UJ	1900UJ
2,4-Dinitrotoluene	1000	4000	10000		390U	7800U	8500U	13000UJ	10000U	800U
2,6-Dinitrotoluene	1000	4000	10000		390U	7800U	8500U	13000UJ	10000U	800U
2-Chloronaphthalene	--	--	--		390U	7800U	8500U	1900J	10000U	800U
2-Chlorophenol	280000	5200000	10000		390U	7800U	8500U	13000UJ	10000U	800U
2-Methylnaphthalene	--	--	--		46J	24000	9400	45000J	20000	120J
2-Methylphenol	2800000	10000000	--		390U	7800U	8500U	13000UJ	10000U	800U
2-Nitroaniline	--	--	--		950U	19000U	21000U	32000UJ	26000U	1900U
2-Nitrophenol	--	--	--		390U	7800U	8500U	13000UJ	10000U	800U
3,3'-Dichlorobenzidine	2000	6000	100000		390U	7800UJ	8500UJ	13000UJ	10000UJ	800UJ
3-Nitroaniline	--	--	--		950U	19000U	21000U	32000UJ	26000U	1900U
4,6-Dinitro-2-methylphenol	--	--	--		950U	19000UJ	21000UJ	32000UJ	26000UJ	1900UJ
4-Bromophenyl phenyl ether	--	--	--		390U	7800U	8500U	13000UJ	10000U	800U
4-Chloro-3-methylphenol	10000000	10000000	100000		390U	7800U	8500U	13000UJ	10000U	800U
4-Chloroaniline	230000	4200000	--		390U	7800U	8500U	13000UJ	10000U	800U
4-Chlorophenyl phenyl ether	--	--	--		390U	7800U	8500U	13000UJ	10000U	800U
4-Methylphenol	2800000	10000000	--		390U	7800U	8500U	13000UJ	10000U	800U
4-Nitroaniline	--	--	--		950U	19000UJ	21000UJ	32000UJ	26000U	1900U
4-Nitrophenol	--	--	--		950U	19000UJ	21000UJ	32000UJ	26000U	1900UJ
Acenaphthene	3400000	10000000	100000		390U	7800U	8500U	13000UJ	10000U	88J
Acenaphthylene	--	--	--		390U	7800U	8500U	13000UJ	10000U	800U
Anthracene	10000000	10000000	100000		390U	7800U	2100J	1400J	1800J	320J
Benzo(a)anthracene	900	4000	500000		410	1700J	2000J	2000J	9000J	1600J
Benzo(a)pyrene	660	660	100000		270J	1700J	1500J	13000UJ	12000	2200J

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria *			Sample ID:	3TFIRMB4	3TFIRMB4	AGTFSB1	AGTFSB1	AGTFSB2	AGTFSB3
				Depth:	02	06	02	06	04	02
				Zone**:	N3TF	N3TF	AGTF	AGTF	AGTF	AGTF
	Residential	Non-Residential	Impact to Groundwater	Date:	10/17/94	10/17/94	10/20/94	10/20/94	10/28/94	10/27/94
Benzo(b)fluoranthene	900	4000	50000		850J	1800J	1700J	13000UJ	8400J	1700J
Benzo(g,h,i)perylene	--	--	--		390UJ	940J	2100J	13000UJ	6900J	2800J
Benzo(k)fluoranthene	900	4000	500000		990J	1800J	1700J	13000UJ	8700J	1900J
Butyl benzyl phthalate	1100000	10000000	100000		390U	7800U	8500U	13000UJ	10000U	800UJ
Carbazole	--	--	--		390U	7800U	8500U	13000UJ	10000U	800U
Chrysene	9000	40000	500000		1100	3200J	5000J	3300J	12000	2900J
Di-n-butyl phthalate	5700000	10000000	100000		390U	7800U	8500U	13000UJ	10000U	87J
Di-n-octyl phthalate	1100000	10000000	100000		390UJ	7800U	8500U	13000UJ	10000UJ	800UJ
Dibenzo(a,h)anthracene	660	660	100000		180J	7800U	8500U	13000UJ	5400J	800UJ
Dibenzofuran	--	--	--		390U	7800U	8500U	13000UJ	1600J	800U
Diethyl phthalate	10000000	10000000	50000		390U	7800U	8500U	13000UJ	10000U	800U
Dimethyl phthalate	10000000	10000000	50000		390U	7800U	8500U	13000UJ	10000U	800U
Fluoranthene	2300000	10000000	100000		440	2200J	1500J	1400J	5000J	1200
Fluorene	2300000	10000000	100000		390U	5700J	8500U	5000J	3900J	130J
Hexachlorobenzene	660	2000	100000		390U	7800U	8500U	13000UJ	10000U	800U
Hexachlorobutadiene	1000	21000	100000		390U	7800U	8500U	13000UJ	10000U	800U
Hexachlorocyclopentadiene	400000	7300000	100000		390U	7800U	8500U	13000UJ	10000U	800U
Hexachloroethane	6000	100000	100000		390U	7800U	8500U	13000UJ	10000U	800U
Indeno(1,2,3-cd)pyrene	900	4000	500000		150J	850J	500J	13000UJ	4600J	960J
Isophorone	1100000	10000000	50000		390U	7800U	8500U	13000UJ	10000U	800U
N-Nitroso-di-n-propylamine	660	660	10000		390U	7800U	8500U	13000UJ	10000U	800U
N-Nitrosodiphenylamine	140000	600000	100000		390U	7800U	8500U	13000UJ	10000U	800U
Naphthalene	230000	4200000	100000		64J	7800U	8500U	13000UJ	10000U	800U
Nitrobenzene	28000	520000	10000		390U	7800U	8500U	13000UJ	10000U	800U
Pentachlorophenol	6000	24000	100000		950U	19000U	21000U	32000UJ	26000U	1900UJ
Phenanthrene	--	--	--		630	6400J	6800J	13000J	14000	1200
Phenol	10000000	10000000	50000		390U	7800U	8500U	13000UJ	10000U	800U
Pyrene	1700000	10000000	100000		780	3000J	11000	8400J	8900J	3700J
bis(2-Chloroethoxy)methane	--	--	--		390U	7800U	8500U	13000UJ	10000U	800U
bis(2-Chloroethyl)ether	660	3000	10000		390U	7800U	8500U	13000UJ	10000U	800U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		390U	7800U	8500U	13000UJ	10000U	800UJ
Total Semivolatile Compounds					6490	53290	45300	81400	122200	20905

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	AGTFSB3	AGTFSB4	AHTFSB1	AHTFSB2	AHTFSB4	AHTFSB4
				Depth:	06	02	02	02	02	08
			Impact to	Zone**:	AGTF	AGTF	AHTF	AHTF	AHTF	AHTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/27/94	10/20/94	10/19/94	10/14/94	10/14/94	10/14/94
1,2,4-Trichlorobenzene	68000	1200000	100000		24000U	3900U	7100U	3800U	3600U	3800U
1,2-Dichlorobenzene	5100000	10000000	50000		24000U	3900U	7100U	3800U	3600U	3800U
1,3-Dichlorobenzene	5100000	10000000	100000		24000U	3900U	7100U	3800U	3600U	3800U
1,4-Dichlorobenzene	570000	10000000	100000		24000U	3900U	7100U	3800U	3600U	3800U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		24000U	3900U	7100U	3800U	3600U	3800U
2,4,5-Trichlorophenol	5600000	10000000	50000		61000U	9500U	17000U	9200U	8800U	9200U
2,4,6-Trichlorophenol	62000	270000	10000		24000U	3900U	7100U	3800U	3600U	3800U
2,4-Dichlorophenol	170000	3100000	10000		24000U	3900U	7100U	3800U	3600U	3800U
2,4-Dimethylphenol	1100000	10000000	10000		24000U	3900U	7100U	3800U	3600U	3800U
2,4-Dinitrophenol	110000	2100000	10000		61000UJ	9500U	17000UJ	9200UJ	8800UJ	9200U
2,4-Dinitrotoluene	1000	4000	10000		24000U	3900U	7100U	3800U	3600U	3800U
2,6-Dinitrotoluene	1000	4000	10000		24000U	3900U	7100U	3800U	3600U	3800U
2-Chloronaphthalene	--	--	--		24000U	3900U	7100U	3800U	3600U	3800U
2-Chlorophenol	280000	5200000	10000		24000U	3900U	7100U	3800U	3600U	3800U
2-Methylnaphthalene	--	--	--		24000U	3900U	1200J	780J	10000	25000
2-Methylphenol	2800000	10000000	--		24000U	3900U	7100U	3800U	3600U	3800U
2-Nitroaniline	--	--	--		61000U	9500U	17000U	9200UJ	8800UJ	9200U
2-Nitrophenol	--	--	--		24000U	3900U	7100U	3800U	3600U	3800U
3,3'-Dichlorobenzidine	2000	6000	100000		24000U	3900UJ	7100UJ	3800U	3600U	3800U
3-Nitroaniline	--	--	--		61000U	9500U	17000U	9200U	8800U	9200U
4,6-Dinitro-2-methylphenol	--	--	--		61000U	9500UJ	17000U	9200UJ	8800UJ	9200U
4-Bromophenyl phenyl ether	--	--	--		24000U	3900U	7100U	3800U	3600U	3800U
4-Chloro-3-methylphenol	10000000	10000000	100000		24000U	3900U	7100U	3800U	3600U	3800U
4-Chloroaniline	230000	4200000	--		24000UJ	3900U	7100U	3800U	3600U	3800U
4-Chlorophenyl phenyl ether	--	--	--		24000U	3900U	7100U	3800U	3600U	3800U
4-Methylphenol	2800000	10000000	--		24000U	3900U	7100U	3800U	3600U	3800U
4-Nitroaniline	--	--	--		61000U	9500UJ	17000U	9200U	8800U	9200U
4-Nitrophenol	--	--	--		61000U	9500UJ	17000UJ	9200UJ	8800UJ	9200U
Acenaphthene	3400000	10000000	100000		24000U	3900U	7100U	1300J	3600U	3800U
Acenaphthylene	--	--	--		24000U	3900U	7100U	3800U	3600U	3800U
Anthracene	10000000	10000000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Benzo(a)anthracene	900	4000	500000		4000J	3900U	7100U	3800U	3600U	410J
Benzo(a)pyrene	660	660	100000		2500J	1300J	7100U	3800U	3600U	3800U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	AGTFSB3	AGTFSB4	AHTFSB1	AHTFSB2	AHTFSB4	AHTFSB4
				Depth:	06	02	02	02	02	08
			Impact to	Zone**:	AGTF	AGTF	AHTF	AHTF	AHTF	AHTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/27/94	10/20/94	10/19/94	10/14/94	10/14/94	10/14/94
Benzo(b)fluoranthene	900	4000	50000		24000U	1100J	7100U	3800U	3600U	3800U
Benzo(g,h,i)perylene	--	--	--		24000U	960J	7100U	3800UJ	3600UJ	3800U
Benzo(k)fluoranthene	900	4000	500000		24000U	1100J	7100U	3800U	3600U	3800U
Butyl benzyl phthalate	1100000	10000000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Carbazole	--	--	--		24000U	3900U	7100U	3800U	3600U	3800U
Chrysene	9000	40000	500000		7100J	840J	7100U	400J	1200J	1100J
Di-n-butyl phthalate	5700000	10000000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Di-n-octyl phthalate	1100000	10000000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Dibenzo(a,h)anthracene	660	660	100000		24000U	760J	7100U	3800UJ	3600UJ	3800U
Dibenzofuran	--	--	--		24000U	3900U	7100U	960J	3600U	3800U
Diethyl phthalate	10000000	10000000	50000		24000U	3900U	7100U	3800U	3600U	3800U
Dimethyl phthalate	10000000	10000000	50000		24000U	3900U	7100U	3800U	3600U	3800U
Fluoranthene	2300000	10000000	100000		24000U	3900U.	7100U	3800U	3600U	3800U
Fluorene	2300000	10000000	100000		3900J	3900U	7100U	1900J	1000J	3800U
Hexachlorobenzene	660	2000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Hexachlorobutadiene	1000	21000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Hexachlorocyclopentadiene	400000	7300000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Hexachloroethane	6000	100000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Indeno(1,2,3-cd)pyrene	900	4000	500000		24000U	740J	7100U	3800UJ	3600UJ	3800U
Isophorone	1100000	10000000	50000		24000U	3900U	7100U	3800U	3600U	3800U
N-Nitroso-di-n-propylamine	660	660	10000		24000U	3900U	7100U	3800U	3600U	3800U
N-Nitrosodiphenylamine	140000	600000	100000		24000UJ	3900U	7100U	3800U	3600U	3800U
Naphthalene	230000	4200000	100000		24000U	3900U	7100U	470J	550J	3800U
Nitrobenzene	28000	520000	10000		24000U	3900U	7100U	3800U	3600U	3800U
Pentachlorophenol	6000	24000	100000		61000U	9500U	17000UJ	9200U	8800U	9200U
Phenanthrene	--	--	--		9200J	3900U	7100U	4400	2800J	3600J
Phenol	10000000	10000000	50000		24000U	3900U	7100U	3800U	3600U	3800U
Pyrene	1700000	10000000	100000		11000J	690J	7100U	620J	1500J	420J
bis(2-Chloroethoxy)methane	--	--	--		24000U	3900U	7100U	3800U	3600U	3800U
bis(2-Chloroethyl)ether	660	3000	10000		24000U	3900U	7100U	3800U	3600U	3800U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		24000U	3900U	7100U	3800U	3600U	3800U
Total Semivolatile Compounds					37700	7490	1200	10830	17050	30530

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	APSB2	APSB3	APSB5	APSB5	APSB6	APSB6	DTSB3
				Depth:	02	06	02	06	06	10	04
			Impact to	Zone**:	AP	AP	AP	AP	AP	AP	DT
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/26/94	10/21/94	10/12/94	10/12/94	10/21/94	10/21/94	10/27/94
1,2,4-Trichlorobenzene	68000	1200000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
1,2-Dichlorobenzene	5100000	10000000	50000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
1,3-Dichlorobenzene	5100000	10000000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
1,4-Dichlorobenzene	570000	10000000	100000		11000U	17000J	350U	4200U	22000UJ	4000J	37000U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		11000U	61000UJ	350UJ	4200U	22000UJ	24000UJ	37000U
2,4,5-Trichlorophenol	5600000	10000000	50000		26000U	150000UJ	840U	10000U	56000UJ	59000UJ	91000U
2,4,6-Trichlorophenol	62000	270000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2,4-Dichlorophenol	170000	3100000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2,4-Dimethylphenol	1100000	10000000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2,4-Dinitrophenol	110000	2100000	10000		26000U	150000UJ	840UJ	10000U	56000UJ	59000UJ	91000UJ
2,4-Dinitrotoluene	1000	4000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2,6-Dinitrotoluene	1000	4000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2-Chloronaphthalene	--	--	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2-Chlorophenol	280000	5200000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2-Methylnaphthalene	--	--	--		11000U	34000J	350U	7500	2300J	11000J	37000U
2-Methylphenol	2800000	10000000	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
2-Nitroaniline	--	--	--		26000U	150000UJ	840U	10000U	56000UJ	59000UJ	91000U
2-Nitrophenol	--	--	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
3,3'-Dichlorobenzidine	2000	6000	100000		11000UJ	61000UJ	350UJ	4200U	22000UJ	24000UJ	37000U
3-Nitroaniline	--	--	--		26000U	150000UJ	840U	10000U	56000UJ	59000UJ	91000U
4,6-Dinitro-2-methylphenol	--	--	--		26000U	150000UJ	840U	10000U	56000UJ	59000UJ	91000U
4-Bromophenyl phenyl ether	--	--	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
4-Chloro-3-methylphenol	10000000	10000000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
4-Chloroaniline	230000	4200000	--		11000UJ	61000UJ	350U	4200U	22000UJ	24000UJ	37000UJ
4-Chlorophenyl phenyl ether	--	--	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
4-Methylphenol	2800000	10000000	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
4-Nitroaniline	--	--	--		26000U	150000UJ	840U	10000U	56000UJ	59000UJ	91000U
4-Nitrophenol	--	--	--		26000U	150000UJ	840UJ	10000U	56000UJ	59000UJ	91000U
Acenaphthene	3400000	10000000	100000		11000U	61000UJ	350U	4200U	4200J	24000UJ	37000U
Acenaphthylene	--	--	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Anthracene	10000000	10000000	100000		11000U	61000UJ	350U	3100J	22000UJ	24000UJ	50000J
Benzo(a)anthracene	900	4000	500000		11000U	61000UJ	140J	8300	2600J	3000J	37000U
Benzo(a)pyrene	660	660	100000		11000U	61000UJ	R	5300	6000J	24000UJ	37000U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: / Depth: / Zone**: / Date:	APSB2 02 AP 10/26/94	APSB3 06 AP 10/21/94	APSB5 02 AP 10/12/94	APSB5 06 AP 10/12/94	APSB6 06 AP 10/21/94	APSB6 10 AP 10/21/94	DTSB3 04 DT 10/27/94
Benzo(b)fluoranthene	900	4000	50000		11000U	61000UJ	R	3100J	2200J	24000UJ	37000U
Benzo(g,h,i)perylene	--	--	--		11000U	61000UJ	R	2100J	22000UJ	24000UJ	37000U
Benzo(k)fluoranthene	900	4000	500000		11000U	61000UJ	R	2900J	2400J	24000UJ	37000U
Butyl benzyl phthalate	1100000	10000000	100000		11000U	61000UJ	350UJ	4200U	22000UJ	24000UJ	37000U
Carbazole	--	--	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	18000J
Chrysene	9000	40000	500000		11000U	61000UJ	190J	13000	7900J	5600J	4100J
Di-n-butyl phthalate	5700000	10000000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Di-n-octyl phthalate	1100000	10000000	100000		11000U	61000UJ	R	4200U	22000UJ	24000UJ	37000U
Dibenzo(a,h)anthracene	660	660	100000		11000U	61000UJ	R	4200U	22000UJ	24000UJ	37000U
Dibenzofuran	--	--	--		11000U	61000UJ	350U	4200U	4300J	24000UJ	37000U
Diethyl phthalate	10000000	10000000	50000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Dimethyl phthalate	10000000	10000000	50000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Fluoranthene	2300000	10000000	100000		11000U	61000UJ	160J	5800	3900J	24000UJ	4800J
Fluorene	2300000	10000000	100000		11000U	61000UJ	350U	2900J	22000UJ	24000UJ	6300J
Hexachlorobenzene	660	2000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Hexachlorobutadiene	1000	21000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Hexachlorocyclopentadiene	400000	7300000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Hexachloroethane	6000	100000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Indeno(1,2,3-cd)pyrene	900	4000	500000		11000U	61000UJ	R	1800J	22000UJ	24000UJ	37000U
Isophorone	1100000	10000000	50000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
N-Nitroso-di-n-propylamine	660	660	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
N-Nitrosodiphenylamine	140000	600000	100000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000UJ
Naphthalene	230000	4200000	100000		11000U	10000J	350U	4200U	22000UJ	24000UJ	37000U
Nitrobenzene	28000	520000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Pentachlorophenol	6000	24000	100000		1400J	150000UJ	840UJ	10000U	56000UJ	59000UJ	91000U
Phenanthrene	--	--	--		11000U	16000J	87J	16000	17000J	28000J	9000J
Phenol	10000000	10000000	50000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
Pyrene	1700000	10000000	100000		11000U	10000J	620J	11000	12000J	6900J	8000J
bis(2-Chloroethoxy)methane	--	--	--		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
bis(2-Chloroethyl)ether	660	3000	10000		11000U	61000UJ	350U	4200U	22000UJ	24000UJ	37000U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		11000U	61000UJ	940J	4200U	22000UJ	24000UJ	37000U
Total Semivolatile Compounds					1400	87000	2137	82800	64800	58500	100200

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID: DTSB3FR	ECIRMB1	ECIRMB3	ECIRMB3	ECPSB1	ECPSB2
				Depth: 04	02	02	06	02	06
			Impact to	Zone**: DT	U	N3TF	N3TF	ECPS	ECPS
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date: 10/27/94	10/24/94	10/19/94	10/19/94	10/20/94	10/20/94
1,2,4-Trichlorobenzene	68000	1200000	100000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
1,2-Dichlorobenzene	5100000	10000000	50000	37000U	7600U	1600J	66000UJ	7600U	11000UJ
1,3-Dichlorobenzene	5100000	10000000	100000	37000U	7600U	3700U	66000UJ	7600U	1200J
1,4-Dichlorobenzene	570000	10000000	100000	37000U	7600U	530J	16000J	7600U	3600J
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2,4,5-Trichlorophenol	5600000	10000000	50000	91000U	18000U	9000U	160000UJ	18000U	29000UJ
2,4,6-Trichlorophenol	62000	270000	10000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2,4-Dichlorophenol	170000	3100000	10000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2,4-Dimethylphenol	1100000	10000000	10000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2,4-Dinitrophenol	110000	2100000	10000	91000UJ	18000U	9000U	160000UJ	18000U	29000UJ
2,4-Dinitrotoluene	1000	4000	10000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2,6-Dinitrotoluene	1000	4000	10000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2-Chloronaphthalene	--	--	--	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2-Chlorophenol	280000	5200000	10000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2-Methylnaphthalene	--	--	--	37000U	7600U	690J	59000J	930J	12000J
2-Methylphenol	2800000	10000000	--	37000U	7600U	3700U	66000UJ	7600U	11000UJ
2-Nitroaniline	--	--	--	91000U	18000U	9000U	160000UJ	18000U	29000UJ
2-Nitrophenol	--	--	--	37000U	7600U	3700U	66000UJ	7600U	11000UJ
3,3'-Dichlorobenzidine	2000	6000	100000	37000U	7600UJ	3700UJ	66000UJ	7600UJ	11000UJ
3-Nitroaniline	--	--	--	91000U	18000U	9000U	160000UJ	18000U	29000UJ
4,6-Dinitro-2-methylphenol	--	--	--	91000U	18000U	9000U	160000UJ	18000UJ	29000UJ
4-Bromophenyl phenyl ether	--	--	--	37000U	7600U	3700U	66000UJ	7600U	11000UJ
4-Chloro-3-methylphenol	10000000	10000000	100000	37000U	7600U	3700U	66000UJ	7600U	11000UJ
4-Chloroaniline	230000	4200000	--	37000UJ	7600UJ	3700U	66000UJ	7600U	11000UJ
4-Chlorophenyl phenyl ether	--	--	--	37000U	7600U	3700U	66000UJ	7600U	11000UJ
4-Methylphenol	2800000	10000000	--	37000U	7600U	3700U	66000UJ	7600U	11000UJ
4-Nitroaniline	--	--	--	91000U	18000U	9000UJ	160000UJ	18000UJ	29000UJ
4-Nitrophenol	--	--	--	91000U	18000U	9000UJ	160000UJ	18000UJ	29000UJ
Acenaphthene	3400000	10000000	100000	37000U	7600U	580J	66000UJ	7600U	11000UJ
Acenaphthylene	--	--	--	37000U	7600U	3700U	66000UJ	7600U	11000UJ
Anthracene	10000000	10000000	100000	27000J	7600U	3700U	66000UJ	7600U	11000UJ
Benzo(a)anthracene	900	4000	500000	37000U	7600U	1500J	66000UJ	7600U	2900J
Benzo(a)pyrene	660	660	100000	37000U	770J	2500J	66000UJ	7600U	11000UJ

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *									
				Sample ID:	DTSB3FR	ECIRMB1	ECIRMB3	ECIRMB3	ECPSB1	ECPSB2
				Depth:	04	02	02	06	02	06
			Impact to	Zone**:	DT	U	N3TF	N3TF	ECPS	ECPS
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/27/94	10/24/94	10/19/94	10/19/94	10/20/94	10/20/94
Benzo(b)fluoranthene	900	4000	50000		37000U	1200J	2600J	66000UJ	7600U	1400J
Benzo(g,h,i)perylene	--	--	--		37000U	7600U	2600J	66000UJ	7600U	11000UJ
Benzo(k)fluoranthene	900	4000	500000		37000U	1200J	2500J	66000UJ	7600UJ	1400J
Butyl benzyl phthalate	1100000	10000000	100000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Carbazole	--	--	--		7800J	7600U	3700U	66000UJ	7600U	11000UJ
Chrysene	9000	40000	500000		37000U	1400J	3000J	66000UJ	1300J	5600J
Di-n-butyl phthalate	5700000	10000000	100000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Di-n-octyl phthalate	1100000	10000000	100000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Dibenzo(a,h)anthracene	660	660	100000		37000U	7600U	2300J	66000UJ	7600U	11000UJ
Dibenzofuran	--	--	--		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Diethyl phthalate	10000000	10000000	50000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Dimethyl phthalate	10000000	10000000	50000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Fluoranthene	2300000	10000000	100000		37000U	7600U	490J	66000UJ	7600U	11000UJ
Fluorene	2300000	10000000	100000		4700J	7600U	3700U	66000UJ	7600U	2700J
Hexachlorobenzene	660	2000	100000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Hexachlorobutadiene	1000	21000	100000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Hexachlorocyclopentadiene	400000	7300000	100000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Hexachloroethane	6000	100000	100000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Indeno(1,2,3-cd)pyrene	900	4000	500000		37000U	7600U	1800J	66000UJ	7600U	11000UJ
Isophorone	1100000	10000000	50000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
N-Nitroso-di-n-propylamine	660	660	10000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
N-Nitrosodiphenylamine	140000	600000	100000		37000UJ	7600UJ	3700U	66000UJ	7600U	11000UJ
Naphthalene	230000	4200000	100000		37000U	7600U	690J	17000J	7600U	7500J
Nitrobenzene	28000	520000	10000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Pentachlorophenol	6000	24000	100000		91000U	18000U	9000U	160000UJ	18000U	29000UJ
Phenanthrene	--	--	--		6800J	7600U	3700U	15000J	1500J	8000J
Phenol	10000000	10000000	50000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
Pyrene	1700000	10000000	100000		37000U	1100J	960J	66000UJ	970J	2700J
bis(2-Chloroethoxy)methane	--	--	--		37000U	7600U	3700U	66000UJ	7600U	11000UJ
bis(2-Chloroethyl)ether	660	3000	10000		37000U	7600U	3700U	66000UJ	7600U	11000UJ
bis(2-Ethylhexyl)phthalate	49000	210000	100000		37000U	7600U	890J	66000UJ	7600U	11000UJ
Total Semivolatile Compounds					46300	5670	25230	107000	4700	49000

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	ECPSB2	ECPSB4	ECPSB5	GFSB1	GTFIRMB1	GTFIRMB2
				Depth:	12	08	02	02	02	02
			Impact to	Zone**:	ECPS	ECPS	ECPS	STF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/20/94	10/19/94	10/19/94	10/12/94	11/16/94	10/17/94
1,2,4-Trichlorobenzene	68000	1200000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
1,2-Dichlorobenzene	5100000	10000000	50000		4700000J	24000UJ	7600U	3800U	1600U	370U
1,3-Dichlorobenzene	5100000	10000000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
1,4-Dichlorobenzene	570000	10000000	100000		240000J	24000UJ	820J	3800U	1600U	370U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		700000UJ	24000UJ	7600U	3800UJ	1600U	370U
2,4,5-Trichlorophenol	5600000	10000000	50000		1800000UJ	60000UJ	18000U	9100U	3800U	900U
2,4,6-Trichlorophenol	62000	270000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
2,4-Dichlorophenol	170000	3100000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
2,4-Dimethylphenol	1100000	10000000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
2,4-Dinitrophenol	110000	2100000	10000		1800000UJ	60000UJ	18000UJ	9100UJ	3800UJ	900U
2,4-Dinitrotoluene	1000	4000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
2,6-Dinitrotoluene	1000	4000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
2-Chloronaphthalene	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
2-Chlorophenol	280000	5200000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
2-Methylnaphthalene	--	--	--		700000UJ	2500J	7600U	17000	240J	65J
2-Methylphenol	2800000	10000000	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
2-Nitroaniline	--	--	--		1800000UJ	60000UJ	18000U	9100U	3800U	900U
2-Nitrophenol	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
3,3'-Dichlorobenzidine	2000	6000	100000		700000UJ	24000UJ	7600UJ	3800U	1600U	370U
3-Nitroaniline	--	--	--		1800000UJ	60000UJ	18000U	9100U	3800U	900U
4,6-Dinitro-2-methylphenol	--	--	--		1800000UJ	60000UJ	18000UJ	9100U	3800U	900U
4-Bromophenyl phenyl ether	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
4-Chloro-3-methylphenol	10000000	10000000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
4-Chloroaniline	230000	4200000	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
4-Chlorophenyl phenyl ether	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
4-Methylphenol	2800000	10000000	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
4-Nitroaniline	--	--	--		1800000UJ	60000UJ	18000U	9100U	3800U	900U
4-Nitrophenol	--	--	--		1800000UJ	60000UJ	18000U	9100UJ	3800U	900U
Acenaphthene	3400000	10000000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Acenaphthylene	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
Anthracene	10000000	10000000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Benzo(a)anthracene	900	4000	500000		700000UJ	24000UJ	27000	390J	550J	140J
Benzo(a)pyrene	660	660	100000		700000UJ	24000UJ	33000	520J	650J	90J

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	ECPSB2	ECPSB4	ECPSB5	GFSB1	GTFIRMB1	GTFIRMB2
				Depth:	12	08	02	02	02	02
			Impact to	Zone**:	ECPS	ECPS	ECPS	STF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/20/94	10/19/94	10/19/94	10/12/94	11/16/94	10/17/94
Benzo(b)fluoranthene	900	4000	50000		700000UJ	24000UJ	30000J	690J	1200J	250J
Benzo(g,h,i)perylene	--	--	--		700000UJ	24000UJ	13000	3800U	210J	370U
Benzo(k)fluoranthene	900	4000	500000		700000UJ	24000UJ	29000J	740J	1200J	290J
Butyl benzyl phthalate	1100000	10000000	100000		700000UJ	24000UJ	7600U	3800U	220J	370U
Carbazole	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
Chrysene	9000	40000	500000		700000UJ	6100J	29000	3800U	960J	170J
Di-n-butyl phthalate	5700000	10000000	100000		700000UJ	24000UJ	7600U	3800U	1600U	62J
Di-n-octyl phthalate	1100000	10000000	100000		700000UJ	24000UJ	7600U	3800U	1600UJ	370U
Dibenzo(a,h)anthracene	660	660	100000		700000UJ	24000UJ	21000	3800U	1600UJ	370U
Dibenzofuran	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
Diethyl phthalate	10000000	10000000	50000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Dimethyl phthalate	10000000	10000000	50000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Fluoranthene	2300000	10000000	100000		700000UJ	24000UJ	840J	600J	1000J	160J
Fluorene	2300000	10000000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Hexachlorobenzene	660	2000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Hexachlorobutadiene	1000	21000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Hexachlorocyclopentadiene	400000	7300000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Hexachloroethane	6000	100000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Indeno(1,2,3-cd)pyrene	900	4000	500000		700000UJ	24000UJ	13000	3800U	310J	370U
Isophorone	1100000	10000000	50000		700000UJ	24000UJ	7600U	3800U	1600U	370U
N-Nitroso-di-n-propylamine	660	660	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
N-Nitrosodiphenylamine	140000	600000	100000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Naphthalene	230000	4200000	100000		240000J	24000UJ	7600U	2500J	1600U	48J
Nitrobenzene	28000	520000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Pentachlorophenol	6000	24000	100000		1800000UJ	60000UJ	18000U	9100UJ	3800UJ	900U
Phenanthrene	--	--	--		700000UJ	4600J	990J	2000J	270J	120J
Phenol	10000000	10000000	50000		700000UJ	24000UJ	7600U	3800U	1600U	370U
Pyrene	1700000	10000000	100000		700000UJ	3800J	4300J	3200J	1800J	180J
bis(2-Chloroethoxy)methane	--	--	--		700000UJ	24000UJ	7600U	3800U	1600U	370U
bis(2-Chloroethyl)ether	660	3000	10000		700000UJ	24000UJ	7600U	3800U	1600U	370U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		700000UJ	24000UJ	7600U	490J	1600UJ	1200
Total Semivolatile Compounds					5180000	17000	201950	28130	8610	2775

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB3	GTFIRMB4	GTFIRMB5	GTFIRMB6	GTFIRMB7
				Depth:	02	02	06	04	02
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	11/16/94	10/17/94	11/16/94	11/16/94	10/17/94
1,2,4-Trichlorobenzene	68000	1200000	100000		1900U	390U	4000U	4100U	370U
1,2-Dichlorobenzene	5100000	10000000	50000		1900U	390U	4000U	4100U	370U
1,3-Dichlorobenzene	5100000	10000000	100000		1900U	390U	4000U	4100U	370U
1,4-Dichlorobenzene	570000	10000000	100000		1900U	390U	4000U	4100U	370U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		1900U	390U	4000U	4100U	370U
2,4,5-Trichlorophenol	5600000	10000000	50000		4500U	950U	9600U	10000U	900U
2,4,6-Trichlorophenol	62000	270000	10000		1900U	390U	4000U	4100U	370U
2,4-Dichlorophenol	170000	3100000	10000		1900U	390U	4000U	4100U	370U
2,4-Dimethylphenol	1100000	10000000	10000		1900U	390U	4000U	4100U	370U
2,4-Dinitrophenol	110000	2100000	10000		4500UJ	950U	9600UJ	10000UJ	900U
2,4-Dinitrotoluene	1000	4000	10000		1900U	390U	4000U	4100U	370U
2,6-Dinitrotoluene	1000	4000	10000		1900U	390U	4000U	4100U	370U
2-Chloronaphthalene	--	--	--		1900U	390U	4000U	4100U	370U
2-Chlorophenol	280000	5200000	10000		1900U	390U	4000U	4100U	370U
2-Methylnaphthalene	--	--	--		1900U	160J	4000U	26000	370U
2-Methylphenol	2800000	10000000	--		1900U	390U	4000U	4100U	370U
2-Nitroaniline	--	--	--		4500U	950U	9600U	10000U	900U
2-Nitrophenol	--	--	--		1900U	390U	4000U	4100U	370U
3,3'-Dichlorobenzidine	2000	6000	100000		1900U	390U	4000U	4100U	370U
3-Nitroaniline	--	--	--		4500U	950U	9600U	10000U	900U
4,6-Dinitro-2-methylphenol	--	--	--		4500U	950U	9600U	10000U	900U
4-Bromophenyl phenyl ether	--	--	--		1900U	390U	4000U	4100U	370U
4-Chloro-3-methylphenol	10000000	10000000	100000		1900U	390U	4000U	4100U	370U
4-Chloroaniline	230000	4200000	--		1900U	390U	4000U	4100U	370U
4-Chlorophenyl phenyl ether	--	--	--		1900U	390U	4000U	4100U	370U
4-Methylphenol	2800000	10000000	--		1900U	390U	4000U	4100U	370U
4-Nitroaniline	--	--	--		4500U	950U	9600UJ	10000U	900U
4-Nitrophenol	--	--	--		4500U	950U	9600U	10000U	900U
Acenaphthene	3400000	10000000	100000		1900U	390U	4000U	4100U	370U
Acenaphthylene	--	--	--		1900U	390U	4000U	4100U	370U
Anthracene	10000000	10000000	100000		2500	1300	4000U	4100U	50J
Benzo(a)anthracene	900	4000	500000		560J	210J	520J	850J	550
Benzo(a)pyrene	660	660	100000		720J	190J	1100J	670J	430J

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB3	GTFIRMB4	GTFIRMB5	GTFIRMB6	GTFIRMB7
				Depth:	02	02	06	04	02
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	11/16/94	10/17/94	11/16/94	11/16/94	10/17/94
Benzo(b)fluoranthene	900	4000	50000		690J	420J	1100J	2600J	1200J
Benzo(g,h,i)perylene	--	--	--		1900UJ	390UJ	4000UJ	4100UJ	370UJ
Benzo(k)fluoranthene	900	4000	500000		350J	480J	1100J	1900J	1400J
Butyl benzyl phthalate	1100000	10000000	100000		1900U	390U	4000UJ	4100UJ	370U
Carbazole	--	--	--		510J	270J	4000U	4100U	370U
Chrysene	9000	40000	500000		970J	380J	600J	1500J	510
Di-n-butyl phthalate	5700000	10000000	100000		1900U	410	4000U	4100U	93J
Di-n-octyl phthalate	1100000	10000000	100000		1900UJ	390UJ	4000UJ	4100UJ	370UJ
Dibenzo(a,h)anthracene	660	660	100000		1900UJ	390UJ	4000U	4100UJ	73J
Dibenzofuran	--	--	--		1900U	47J	4000U	4100U	370U
Diethyl phthalate	10000000	10000000	50000		1900U	390U	4000U	4100U	370U
Dimethyl phthalate	10000000	10000000	50000		1900U	390U	4000U	4100U	370U
Fluoranthene	2300000	10000000	100000		810J	340J	420J	960J	700
Fluorene	2300000	10000000	100000		1900U	71J	4000U	4100U	370U
Hexachlorobenzene	660	2000	100000		1900U	390U	4000U	4100U	370U
Hexachlorobutadiene	1000	21000	100000		1900U	390U	4000U	4100U	370U
Hexachlorocyclopentadiene	400000	7300000	100000		1900U	390U	4000U	4100U	370U
Hexachloroethane	6000	100000	100000		1900U	390U	4000U	4100U	370U
Indeno(1,2,3-cd)pyrene	900	4000	500000		1900UJ	390UJ	4000U	4100UJ	190J
Isophorone	1100000	10000000	50000		1900U	390U	4000U	4100U	370U
N-Nitroso-di-n-propylamine	660	660	10000		1900U	390U	4000U	4100U	370U
N-Nitrosodiphenylamine	140000	600000	100000		1900U	390U	4000U	4100U	370U
Naphthalene	230000	4200000	100000		1900U	92J	4000U	9700	45J
Nitrobenzene	28000	520000	10000		1900U	390U	4000U	4100U	370U
Pentachlorophenol	6000	24000	100000		4500U	950U	9600UJ	10000UJ	900U
Phenanthrene	--	--	--		780J	350J	560J	1500J	230J
Phenol	10000000	10000000	50000		1900U	390U	4000U	4100U	370U
Pyrene	1700000	10000000	100000		880J	380J	1100J	1400J	700
bis(2-Chloroethoxy)methane	--	--	--		1900U	390U	4000U	4100U	370U
bis(2-Chloroethyl)ether	660	3000	10000		1900U	390U	4000U	4100U	370U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		1900U	540	860J	4100UJ	320J
Total Semivolatile Compounds					8770	5640	7360	47080	6491

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB8	GTFIRMB8	GTFIRMB9	GTFSB1	GTFSB1	GTFSB2
				Depth:	02	08	02	02	08	02
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/18/94	10/18/94	11/16/94	11/16/94	10/10/94	10/13/94
1,2,4-Trichlorobenzene	68000	1200000	100000		370U	12000UJ	R	R	14000U	400U
1,2-Dichlorobenzene	5100000	10000000	50000		370U	12000UJ	R	R	14000U	400U
1,3-Dichlorobenzene	5100000	10000000	100000		370U	12000UJ	R	R	14000U	400U
1,4-Dichlorobenzene	570000	10000000	100000		370U	12000UJ	R	R	14000U	400U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		370U	12000UJ	R	R	14000UJ	400UJ
2,4,5-Trichlorophenol	5600000	10000000	50000		910U	30000UJ	R	R	35000U	980U
2,4,6-Trichlorophenol	62000	270000	10000		370U	12000UJ	R	R	14000U	400U
2,4-Dichlorophenol	170000	3100000	10000		370U	12000UJ	R	R	14000U	400U
2,4-Dimethylphenol	1100000	10000000	10000		370U	12000UJ	R	R	14000U	400U
2,4-Dinitrophenol	110000	2100000	10000		910U	30000UJ	R	R	35000UJ	980UJ
2,4-Dinitrotoluene	1000	4000	10000		370U	12000UJ	R	R	14000U	400U
2,6-Dinitrotoluene	1000	4000	10000		370U	12000UJ	R	R	14000U	400U
2-Chloronaphthalene	--	--	--		370U	12000UJ	R	R	14000U	400U
2-Chlorophenol	280000	5200000	10000		370U	12000UJ	R	R	14000U	400U
2-Methylnaphthalene	--	--	--		370U	12000UJ	R	R	14000U	59J
2-Methylphenol	2800000	10000000	--		370U	12000UJ	R	R	14000U	400U
2-Nitroaniline	--	--	--		910U	30000UJ	R	R	35000U	980U
2-Nitrophenol	--	--	--		370UJ	12000UJ	R	R	14000U	400U
3,3'-Dichlorobenzidine	2000	6000	100000		370UJ	12000UJ	R	R	14000U	400UJ
3-Nitroaniline	--	--	--		910UJ	30000UJ	R	R	35000U	980U
4,6-Dinitro-2-methylphenol	--	--	--		910UJ	30000UJ	R	R	35000U	980U
4-Bromophenyl phenyl ether	--	--	--		370U	12000UJ	R	R	14000U	400U
4-Chloro-3-methylphenol	10000000	10000000	100000		370U	12000UJ	R	R	14000U	400U
4-Chloroaniline	230000	4200000	--		370UJ	12000UJ	R	R	14000U	400U
4-Chlorophenyl phenyl ether	--	--	--		370U	12000UJ	R	R	14000U	400U
4-Methylphenol	2800000	10000000	--		370U	12000UJ	R	R	14000U	400U
4-Nitroaniline	--	--	--		910U	30000UJ	R	R	35000U	980U
4-Nitrophenol	--	--	--		910U	1600J	R	R	35000UJ	980UJ
Acenaphthene	3400000	10000000	100000		370U	12000UJ	R	R	14000U	400U
Acenaphthylene	--	--	--		370U	12000UJ	R	R	14000U	400U
Anthracene	10000000	10000000	100000		370U	12000UJ	R	R	14000U	400U
Benzo(a)anthracene	900	4000	500000		430J	12000UJ	R	R	1500J	300J
Benzo(a)pyrene	660	660	100000		810J	12000UJ	R	R	14000UJ	320J

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB8	GTFIRMB8	GTFIRMB9	GTFSB1	GTFSB1	GTFSB2
				Depth:	02	08	02	02	08	02
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/18/94	10/18/94	11/16/94	11/16/94	10/10/94	10/13/94
Benzo(b)fluoranthene	900	4000	50000		790J	12000UJ	R	R	14000UJ	730J
Benzo(g,h,i)perylene	--	--	--		420J	12000UJ	R	R	14000UJ	R
Benzo(k)fluoranthene	900	4000	500000		910J	12000UJ	R	R	14000UJ	840J
Butyl benzyl phthalate	1100000	10000000	100000		370UJ	12000UJ	R	R	14000U	400UJ
Carbazole	--	--	--		370U	12000UJ	R	R	14000U	400U
Chrysene	9000	40000	500000		780J	12000UJ	R	R	2000J	320J
Di-n-butyl phthalate	5700000	10000000	100000		370U	12000UJ	R	R	14000U	400U
Di-n-octyl phthalate	1100000	10000000	100000		370UJ	12000UJ	R	R	14000UJ	R
Dibenzo(a,h)anthracene	660	660	100000		340J	12000UJ	R	R	14000UJ	R
Dibenzofuran	--	--	--		370U	12000UJ	R	R	14000U	400U
Diethyl phthalate	10000000	10000000	50000		370U	12000UJ	R	R	14000U	400U
Dimethyl phthalate	10000000	10000000	50000		370U	12000UJ	R	R	14000U	400U
Fluoranthene	2300000	10000000	100000		210J	12000UJ	R	R	14000U	380J
Fluorene	2300000	10000000	100000		370UJ	12000UJ	R	R	14000U	400U
Hexachlorobenzene	660	2000	100000		370U	12000UJ	R	R	14000U	400U
Hexachlorobutadiene	1000	21000	100000		370U	12000UJ	R	R	14000U	400U
Hexachlorocyclopentadiene	400000	7300000	100000		370U	12000UJ	R	R	14000U	400U
Hexachloroethane	6000	100000	100000		370U	12000UJ	R	R	14000U	400U
Indeno(1,2,3-cd)pyrene	900	4000	500000		270J	12000UJ	R	R	14000UJ	140J
Isophorone	1100000	10000000	50000		370U	12000UJ	R	R	14000U	400U
N-Nitroso-di-n-propylamine	660	660	10000		370U	12000UJ	R	R	14000U	400U
N-Nitrosodiphenylamine	140000	600000	100000		360J	12000UJ	R	R	14000U	400U
Naphthalene	230000	4200000	100000		84J	12000UJ	R	R	14000U	77J
Nitrobenzene	28000	520000	10000		370U	12000UJ	R	R	14000U	400U
Pentachlorophenol	6000	24000	100000		910U	9200J	R	R	35000UJ	980UJ
Phenanthrene	--	--	--		180J	12000UJ	R	R	14000U	190J
Phenol	10000000	10000000	50000		370U	12000UJ	R	R	14000U	400U
Pyrene	1700000	10000000	100000		550	12000UJ	R	R	4200J	650J
bis(2-Chloroethoxy)methane	--	--	--		370U	12000UJ	R	R	14000U	400U
bis(2-Chloroethyl)ether	660	3000	10000		370U	12000UJ	R	R	14000U	400U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		510J	12000UJ	R	R	14000U	250J
Total Semivolatile Compounds					6644	10800	0	0	7700	4256

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB3	GTFSB4	GTFSB5	GTFSB6	GTFSB7	GTFSB7
				Depth:	02	02	02	02	02	08
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	11/16/94	10/13/94	10/13/94	10/11/94	10/13/94	10/13/94
1,2,4-Trichlorobenzene	68000	1200000	100000		1100U	370U	350U	370U	1900U	4500U
1,2-Dichlorobenzene	5100000	10000000	50000		1100U	370U	350U	370U	1900U	4500U
1,3-Dichlorobenzene	5100000	10000000	100000		1100U	370U	350U	370U	1900U	4500U
1,4-Dichlorobenzene	570000	10000000	100000		1100U	370U	350U	370U	1900U	4500U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		1100U	370UJ	350UJ	370UJ	1900UJ	4500UJ
2,4,5-Trichlorophenol	5600000	10000000	50000		2600U	900U	860U	900U	4600U	11000U
2,4,6-Trichlorophenol	62000	270000	10000		1100U	370U	350U	370U	1900U	4500U
2,4-Dichlorophenol	170000	3100000	10000		1100U	370U	350U	370U	1900U	4500U
2,4-Dimethylphenol	1100000	10000000	10000		1100U	370U	350U	370U	1900U	4500U
2,4-Dinitrophenol	110000	2100000	10000		2600UJ	900UJ	860UJ	900UJ	4600UJ	11000UJ
2,4-Dinitrotoluene	1000	4000	10000		1100U	370U	350U	370U	1900U	4500U
2,6-Dinitrotoluene	1000	4000	10000		1100U	370U	350U	370U	1900U	4500U
2-Chloronaphthalene	--	--	--		1100U	370U	350U	370U	1900U	4500U
2-Chlorophenol	280000	5200000	10000		1100U	370U	350U	370U	1900U	4500U
2-Methylnaphthalene	--	--	--		1100U	140J	350U	370U	200J	4500U
2-Methylphenol	2800000	10000000	--		1100U	370U	350U	370U	1900U	4500U
2-Nitroaniline	--	--	--		2600U	900U	860U	900U	4600U	11000U
2-Nitrophenol	--	--	--		1100U	370U	350U	370U	1900U	4500U
3,3'-Dichlorobenzidine	2000	6000	100000		1100U	370UJ	350U	370UJ	1900U	4500UJ
3-Nitroaniline	--	--	--		2600U	900U	860U	900U	4600U	11000U
4,6-Dinitro-2-methylphenol	--	--	--		2600U	900U	860U	900U	4600U	11000U
4-Bromophenyl phenyl ether	--	--	--		1100U	370U	350U	370U	1900U	4500U
4-Chloro-3-methylphenol	10000000	10000000	100000		1100U	370U	350U	370U	1900U	4500U
4-Chloroaniline	230000	4200000	--		1100U	370U	350U	370U	1900U	4500U
4-Chlorophenyl phenyl ether	--	--	--		1100U	370U	350U	370U	1900U	4500U
4-Methylphenol	2800000	10000000	--		1100U	370U	350U	370U	1900U	4500U
4-Nitroaniline	--	--	--		2600U	900U	860U	900U	4600U	11000U
4-Nitrophenol	--	--	--		2600U	900UJ	860UJ	900UJ	4600UJ	11000UJ
Acenaphthene	3400000	10000000	100000		1100U	370U	350U	370U	1900U	4500U
Acenaphthylene	--	--	--		1100U	370U	350U	370U	1900U	4500U
Anthracene	10000000	10000000	100000		1100U	44J	350U	370U	1900U	1300J
Benzo(a)anthracene	900	4000	500000		1100U	230J	350U	430J	1900U	840J
Benzo(a)pyrene	660	660	100000		220J	240J	350U	160J	1900UJ	4500UJ

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB3	GTFSB4	GTFSB5	GTFSB6	GTFSB7	GTFSB7
				Depth:	02	02	02	02	02	08
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	11/16/94	10/13/94	10/13/94	10/11/94	10/13/94	10/13/94
Benzo(b)fluoranthene	900	4000	50000		810J	390J	88J	710J	1900UJ	4500UJ
Benzo(g,h,i)perylene	--	--	--		1100UJ	R	350U	370UJ	1900UJ	4500UJ
Benzo(k)fluoranthene	900	4000	500000		800J	430J	99J	730J	1900UJ	4500UJ
Butyl benzyl phthalate	1100000	10000000	100000		1100UJ	370UJ	350U	370UJ	1900U	4500UJ
Carbazole	--	--	--		1100U	370U	350U	370U	1900U	4500U
Chrysene	9000	40000	500000		450J	260J	350U	390J	1900U	2700J
Di-n-butyl phthalate	5700000	10000000	100000		1100U	370U	350U	370U	1900U	4500U
Di-n-octyl phthalate	1100000	10000000	100000		1100UJ	R	350U	370UJ	1900UJ	4500UJ
Dibenzo(a,h)anthracene	660	660	100000		1100UJ	R	350U	370UJ	1900UJ	4500UJ
Dibenzofuran	--	--	--		1100U	370U	350U	370U	1900U	4500U
Diethyl phthalate	10000000	10000000	50000		1100U	370U	350U	370U	1900U	4500U
Dimethyl phthalate	10000000	10000000	50000		1100U	370U	350U	370U	1900U	4500U
Fluoranthene	2300000	10000000	100000		670J	250J	350U	200J	280J	900J
Fluorene	2300000	10000000	100000		1100U	370U	350U	370U	1900U	4500U
Hexachlorobenzene	660	2000	100000		1100U	370U	350U	370U	1900U	4500U
Hexachlorobutadiene	1000	21000	100000		1100U	370U	350U	370U	1900U	4500U
Hexachlorocyclopentadiene	400000	7300000	100000		1100U	370U	350U	370U	1900U	4500U
Hexachloroethane	6000	100000	100000		1100UJ	53J	350U	87J	1900UJ	4500UJ
Indeno(1,2,3-cd)pyrene	900	4000	500000		1100U	370U	350U	370U	1900U	4500U
Isophorone	1100000	10000000	50000		1100U	370U	350U	370U	1900U	4500U
N-Nitroso-di-n-propylamine	660	660	10000		1100U	370U	350U	370U	1900U	4500U
N-Nitrosodiphenylamine	140000	600000	100000		1100U	370U	350U	370U	1900U	4500U
Naphthalene	230000	4200000	100000		1100U	90J	350U	370U	1900U	4500U
Nitrobenzene	28000	520000	10000		1100U	370U	350U	370U	1900U	4500U
Pentachlorophenol	6000	24000	100000		2600UJ	900UJ	860UJ	900UJ	4600UJ	11000UJ
Phenanthrene	--	--	--		250J	230J	350U	69J	1900U	4100J
Phenol	10000000	10000000	50000		1100U	370U	350U	370U	1900U	4500U
Pyrene	1700000	10000000	100000		790J	610J	54J	470J	100J	3500J
bis(2-Chloroethoxy)methane	--	--	--		1100U	370U	350U	370U	1900U	4500U
bis(2-Chloroethyl)ether	660	3000	10000		1100U	370U	350U	370U	1900U	4500U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		2300J	430J	120J	370UJ	720J	4500UJ
Total Semivolatile Compounds					6290	3397	361	3246	1300	13340

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB8	GTFSB8	GTFSB9	GTFSB9	LAIRMB1	LOSB1
				Depth:	04	08	02	08	02	04
			Impact to	Zone**:	GTF	GTF	GTF	GTF	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/13/94	10/13/94	10/13/94	11/16/94	10/24/94	10/25/94
1,2,4-Trichlorobenzene	68000	1200000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
1,2-Dichlorobenzene	5100000	10000000	50000		3800U	12000UJ	350U	11000UJ	870U	7600U
1,3-Dichlorobenzene	5100000	10000000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
1,4-Dichlorobenzene	570000	10000000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
2,4,5-Trichlorophenol	5600000	10000000	50000		9100U	29000UJ	860U	28000UJ	2100U	18000U
2,4,6-Trichlorophenol	62000	270000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
2,4-Dichlorophenol	170000	3100000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
2,4-Dimethylphenol	1100000	10000000	10000		3800U	12000UJ	350U	11000UJ	870U	7600UJ
2,4-Dinitrophenol	110000	2100000	10000		9100U	29000UJ	860U	28000UJ	2100U	18000U
2,4-Dinitrotoluene	1000	4000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
2,6-Dinitrotoluene	1000	4000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
2-Chloronaphthalene	--	--	--		3800U	12000UJ	350U	11000UJ	870U	7600U
2-Chlorophenol	280000	5200000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
2-Methylnaphthalene	--	--	--		400J	110000J	150J	56000J	870U	2000J
2-Methylphenol	2800000	10000000	--		3800U	12000UJ	350U	11000UJ	870U	7600U
2-Nitroaniline	--	--	--		9100U	29000UJ	860U	28000UJ	2100U	18000UJ
2-Nitrophenol	--	--	--		3800U	12000UJ	350U	11000UJ	870U	7600U
3,3'-Dichlorobenzidine	2000	6000	100000		3800U	12000UJ	350UJ	11000UJ	870UJ	7600UJ
3-Nitroaniline	--	--	--		9100U	29000UJ	860U	28000UJ	2100U	18000U
4,6-Dinitro-2-methylphenol	--	--	--		9100U	29000UJ	860U	28000UJ	2100U	18000U
4-Bromophenyl phenyl ether	--	--	--		3800U	12000UJ	350U	11000UJ	870U	7600U
4-Chloro-3-methylphenol	10000000	10000000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
4-Chloroaniline	230000	4200000	--		3800U	12000UJ	350U	11000UJ	870UJ	7600UJ
4-Chlorophenyl phenyl ether	--	--	--		3800U	12000UJ	350U	11000UJ	870U	7600U
4-Methylphenol	2800000	10000000	--		3800U	12000UJ	350U	11000UJ	870U	7600U
4-Nitroaniline	--	--	--		9100U	29000UJ	860U	28000UJ	2100U	18000U
4-Nitrophenol	--	--	--		9100U	29000UJ	860U	28000UJ	2100U	18000UJ
Acenaphthene	3400000	10000000	100000		3800U	11000J	350U	4500J	130J	7600U
Acenaphthylene	--	--	--		3800U	12000UJ	350U	11000UJ	180J	7600U
Anthracene	10000000	10000000	100000		3800U	12000UJ	57J	11000UJ	150J	7600U
Benzo(a)anthracene	900	4000	500000		3800U	1500J	290J	1800J	1800	14000
Benzo(a)pyrene	660	660	100000		3800U	12000UJ	220J	11000UJ	1900	1400J

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB8	GTFSB8	GTFSB9	GTFSB9	LAIRMB1	LOSB1
				Depth:	04	08	02	08	02	04
			Impact to	Zone**:	GTF	GTF	GTF	GTF	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/13/94	10/13/94	10/13/94	11/16/94	10/24/94	10/25/94
Benzo(b)fluoranthene	900	4000	50000		3800U	2600J	240J	2700J	3300J	6400J
Benzo(g,h,i)perylene	--	--	--		3800U	12000UJ	R	11000UJ	390J	2300J
Benzo(k)fluoranthene	900	4000	500000		3800U	2800J	420J	2800J	1400J	7000J
Butyl benzyl phthalate	1100000	10000000	100000		3800U	12000UJ	350UJ	11000UJ	870U	7600U
Carbazole	--	--	--		3800U	12000UJ	350U	11000UJ	870U	7600U
Chrysene	9000	40000	500000		1200J	6400J	510J	4800J	1900	22000
Di-n-butyl phthalate	5700000	10000000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
Di-n-octyl phthalate	1100000	10000000	100000		3800U	12000UJ	R	11000UJ	870U	7600U
Dibenzo(a,h)anthracene	660	660	100000		3800U	12000UJ	R	11000UJ	270J	1600J
Dibenzofuran	--	--	--		3800U	12000UJ	350U	11000UJ	870U	7600U
Diethyl phthalate	10000000	10000000	50000		3800U	12000UJ	350U	11000UJ	870U	7600U
Dimethyl phthalate	10000000	10000000	50000		3800U	12000UJ	350U	11000UJ	870U	7600U
Fluoranthene	2300000	10000000	100000		3800U	2300J	240J	2100J	2600	1800J
Fluorene	2300000	10000000	100000		3800U	17000J	350U	5800J	870U	7600U
Hexachlorobenzene	660	2000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
Hexachlorobutadiene	1000	21000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
Hexachlorocyclopentadiene	400000	7300000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
Hexachloroethane	6000	100000	100000		3800U	12000UJ	350U	11000UJ	870U	7600U
Indeno(1,2,3-cd)pyrene	900	4000	500000		3800U	12000UJ	R	11000UJ	690J	1300J
Isophorone	1100000	10000000	50000		3800U	12000UJ	350U	11000UJ	870U	7600U
N-Nitroso-di-n-propylamine	660	660	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
N-Nitrosodiphenylamine	140000	600000	100000		3800U	12000UJ	350U	11000UJ	870UJ	7600U
Naphthalene	230000	4200000	100000		3800U	24000J	350U	13000J	870U	7600U
Nitrobenzene	28000	520000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
Pentachlorophenol	6000	24000	100000		9100U	29000UJ	860U	28000UJ	R	18000U
Phenanthrene	--	--	--		3800U	45000J	340J	9600J	430J	2400J
Phenol	10000000	10000000	50000		3800U	12000UJ	350U	11000UJ	870U	7600U
Pyrene	1700000	10000000	100000		3800U	15000J	500J	5700J	2400	10000
bis(2-Chloroethoxy)methane	--	--	--		3800U	12000UJ	350U	11000UJ	870U	7600U
bis(2-Chloroethyl)ether	660	3000	10000		3800U	12000UJ	350U	11000UJ	870U	7600U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		3800U	12000UJ	200J	2300J	870U	7600U
Total Semivolatile Compounds					1600	237600	3167	111100	17540	72200

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB1	LOSB2	LOSB2	LOSB3	LOSB4	LOSB4	LOSB8
				Depth:	08	04	08	02	02	06	02
			Impact to	Zone**:	LO	LO	LO	LO	LO	LO	SS
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/25/94	11/16/94	10/14/94	10/24/94	10/24/94	10/24/94	10/24/94
1,2,4-Trichlorobenzene	68000	1200000	100000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
1,2-Dichlorobenzene	5100000	10000000	50000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
1,3-Dichlorobenzene	5100000	10000000	100000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
1,4-Dichlorobenzene	570000	10000000	100000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		1900U	29000UJ	60000UJ	2000U	8200U	11000U	58000U
2,4,5-Trichlorophenol	5600000	10000000	50000		4500U	71000UJ	150000U	4900U	20000U	27000U	150000U
2,4,6-Trichlorophenol	62000	270000	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2,4-Dichlorophenol	170000	3100000	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2,4-Dimethylphenol	1100000	10000000	10000		1900UJ	29000UJ	60000U	2000U	8200U	11000U	58000U
2,4-Dinitrophenol	110000	2100000	10000		4500U	71000UJ	150000UJ	4900U	20000UJ	27000UJ	150000UJ
2,4-Dinitrotoluene	1000	4000	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2,6-Dinitrotoluene	1000	4000	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2-Chloronaphthalene	--	--	--		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2-Chlorophenol	280000	5200000	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2-Methylnaphthalene	--	--	--		8000	120000J	60000U	2000U	8200U	11000U	58000U
2-Methylphenol	2800000	10000000	--		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
2-Nitroaniline	--	--	--		4500UJ	71000UJ	150000U	4900U	20000U	27000U	150000U
2-Nitrophenol	--	--	--		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
3,3'-Dichlorobenzidine	2000	6000	100000		1900UJ	29000UJ	60000U	2000UJ	8200U	11000U	58000U
3-Nitroaniline	--	--	--		4500U	71000UJ	150000U	4900U	20000U	27000U	150000U
4,6-Dinitro-2-methylphenol	--	--	--		4500UJ	71000UJ	150000U	4900U	20000U	27000U	150000U
4-Bromophenyl phenyl ether	--	--	--		1900UJ	29000UJ	60000U	2000U	8200U	11000U	58000U
4-Chloro-3-methylphenol	10000000	10000000	100000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
4-Chloroaniline	230000	4200000	--		1900UJ	29000UJ	60000U	2000U	8200UJ	11000UJ	58000UJ
4-Chlorophenyl phenyl ether	--	--	--		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
4-Methylphenol	2800000	10000000	--		210J	29000UJ	60000U	2000U	8200U	11000U	58000U
4-Nitroaniline	--	--	--		4500U	71000UJ	150000U	4900U	20000U	27000U	150000U
4-Nitrophenol	--	--	--		4500UJ	71000UJ	150000UJ	4900U	20000UJ	27000UJ	150000UJ
Acenaphthene	3400000	10000000	100000		720J	29000UJ	60000U	2000U	8200U	11000U	58000U
Acenaphthylene	--	--	--		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Anthracene	10000000	10000000	100000		1300J	29000UJ	60000U	2000U	8200U	11000U	58000U
Benzo(a)anthracene	900	4000	500000		15000J	29000UJ	52000J	2000U	8200U	11000U	58000U
Benzo(a)pyrene	660	660	100000		26000J	3300J	37000J	2000U	8200U	11000U	58000U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *										
				Sample ID:	LOSB1	LOSB2	LOSB2	LOSB3	LOSB4	LOSB4	LOSB8
				Depth:	08	04	08	02	02	06	02
			Impact to	Zone**:	LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/25/94	11/16/94	10/14/94	10/24/94	10/24/94	10/24/94	10/24/94
Benzo(b)fluoranthene	900	4000	50000		14000J	8800J	26000J	2000U	8200U	11000U	58000U
Benzo(g,h,i)perylene	--	--	--		10000J	29000UJ	60000UJ	2000U	8200U	11000U	58000U
Benzo(k)fluoranthene	900	4000	500000		14000J	8800J	27000J	2000U	8200U	11000U	58000U
Butyl benzyl phthalate	1100000	10000000	100000		1900UJ	29000UJ	60000U	2000U	8200U	11000U	58000U
Carbazole	--	--	--		1900UJ	29000UJ	60000U	2000U	8200U	11000U	58000U
Chrysene	9000	40000	500000		23000J	15000J	97000	2000U	8200U	11000U	58000U
Di-n-butyl phthalate	5700000	10000000	100000		1900UJ	29000UJ	60000U	2000U	8200U	11000U	58000U
Di-n-octyl phthalate	1100000	10000000	100000		1900UJ	29000UJ	60000UJ	2000U	8200UJ	11000UJ	58000UJ
Dibenzo(a,h)anthracene	660	660	100000		10000J	29000UJ	60000UJ	2000U	8200U	11000U	58000U
Dibenzofuran	--	--	--		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Diethyl phthalate	10000000	10000000	50000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Dimethyl phthalate	10000000	10000000	50000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Fluoranthene	2300000	10000000	100000		1900J	29000UJ	9300J	2000U	8200U	11000U	58000U
Fluorene	2300000	10000000	100000		940J	29000UJ	60000U	2000U	8200U	11000U	58000U
Hexachlorobenzene	660	2000	100000		1900UJ	29000UJ	60000U	2000U	8200U	11000U	58000U
Hexachlorobutadiene	1000	21000	100000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Hexachlorocyclopentadiene	400000	7300000	100000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Hexachloroethane	6000	100000	100000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Indeno(1,2,3-cd)pyrene	900	4000	500000		7600J	29000UJ	60000UJ	2000U	8200U	11000U	58000U
Isophorone	1100000	10000000	50000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
N-Nitroso-di-n-propylamine	660	660	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
N-Nitrosodiphenylamine	140000	600000	100000		1900UJ	29000UJ	60000U	2000U	8200UJ	11000UJ	58000UJ
Naphthalene	230000	4200000	100000		2100	25000J	60000U	2000U	8200U	11000U	58000U
Nitrobenzene	28000	520000	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Pentachlorophenol	6000	24000	100000		4500UJ	71000UJ	150000UJ	R	20000U	27000U	150000U
Phenanthrene	--	--	--		6200J	15000J	17000J	2000U	8200U	11000U	58000U
Phenol	10000000	10000000	50000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
Pyrene	1700000	10000000	100000		9000J	8100J	69000	210J	8200U	11000U	6900J
bis(2-Chloroethoxy)methane	--	--	--		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
bis(2-Chloroethyl)ether	660	3000	10000		1900U	29000UJ	60000U	2000U	8200U	11000U	58000U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		1900UJ	29000UJ	60000U	2000U	8200U	11000U	58000U
Total Semivolatile Compounds					149970	204000	334300	210	0	0	6900

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB8	LOSB9	LOSB9	LOSB10	LOSB10	LOSB11	LOSB12
				Depth:	08	02	06	04	08	02	02
			Impact to	Zone**:	LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/24/94	10/25/94	10/25/94	10/28/94	10/28/94	10/25/94	10/25/94
1,2,4-Trichlorobenzene	68000	1200000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
1,2-Dichlorobenzene	5100000	10000000	50000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
1,3-Dichlorobenzene	5100000	10000000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
1,4-Dichlorobenzene	570000	10000000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2,4,5-Trichlorophenol	5600000	10000000	50000		18000U	15000U	56000U	28000U	53000U	5300U	5600U
2,4,6-Trichlorophenol	62000	270000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2,4-Dichlorophenol	170000	3100000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2,4-Dimethylphenol	1100000	10000000	10000		7600U	6300UJ	22000U	11000U	21000U	2200UJ	250J
2,4-Dinitrophenol	110000	2100000	10000		18000U	15000U	56000UJ	28000UJ	53000UJ	5300U	5600U
2,4-Dinitrotoluene	1000	4000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2,6-Dinitrotoluene	1000	4000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2-Chloronaphthalene	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2-Chlorophenol	280000	5200000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2-Methylnaphthalene	--	--	--		4200J	6300U	22000U	5200J	4000J	520J	330J
2-Methylphenol	2800000	10000000	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
2-Nitroaniline	--	--	--		18000U	15000UJ	56000U	28000U	53000U	5300UJ	5600U
2-Nitrophenol	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
3,3'-Dichlorobenzidine	2000	6000	100000		7600UJ	6300UJ	22000U	11000UJ	21000UJ	2200UJ	2300U
3-Nitroaniline	--	--	--		18000U	15000U	56000U	28000U	53000U	5300U	5600U
4,6-Dinitro-2-methylphenol	--	--	--		18000U	15000U	56000U	28000UJ	53000UJ	5300U	5600U
4-Bromophenyl phenyl ether	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
4-Chloro-3-methylphenol	10000000	10000000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
4-Chloroaniline	230000	4200000	--		7600UJ	6300UJ	22000UJ	11000U	21000U	2200UJ	2300U
4-Chlorophenyl phenyl ether	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
4-Methylphenol	2800000	10000000	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
4-Nitroaniline	--	--	--		18000U	15000U	56000U	28000U	53000U	5300U	5600U
4-Nitrophenol	--	--	--		18000U	15000UJ	56000U	28000U	53000U	5300UJ	5600UJ
Acenaphthene	3400000	10000000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Acenaphthylene	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Anthracene	10000000	10000000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Benzo(a)anthracene	900	4000	500000		1200J	2000J	22000U	1100J	2500J	340J	350J
Benzo(a)pyrene	660	660	100000		870J	6300U	22000U	11000U	2300J	270J	920J

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB8	LOSB9	LOSB9	LOSB10	LOSB10	LOSB11	LOSB12
				Depth:	08	02	06	04	08	02	02
			Impact to	Zone**:	LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/24/94	10/25/94	10/25/94	10/28/94	10/28/94	10/25/94	10/25/94
Benzo(b)fluoranthene	900	4000	50000		1200J	6300U	22000U	1400J	2200J	630J	890J
Benzo(g,h,i)perylene	--	--	--		7600U	6300U	22000U	1500J	2500J	2200U	1800J
Benzo(k)fluoranthene	900	4000	500000		1300J	6300U	22000U	1400J	2300J	620J	860J
Butyl benzyl phthalate	1100000	10000000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300UJ
Carbazole	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Chrysene	9000	40000	500000		2800J	2600J	5500J	2000J	5800J	580J	1200J
Di-n-butyl phthalate	5700000	10000000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300UJ
Di-n-octyl phthalate	1100000	10000000	100000		7600U	6300U	22000UJ	11000UJ	21000UJ	2200U	R
Dibenzo(a,h)anthracene	660	660	100000		7600U	6300U	22000U	11000UJ	21000UJ	2200U	750J
Dibenzofuran	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Diethyl phthalate	10000000	10000000	50000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Dimethyl phthalate	10000000	10000000	50000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Fluoranthene	2300000	10000000	100000		7600U	2500J	22000U	11000U	21000U	420J	2300U
Fluorene	2300000	10000000	100000		1500J	6300U	22000U	11000U	21000U	2200U	250J
Hexachlorobenzene	660	2000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Hexachlorobutadiene	1000	21000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Hexachlorocyclopentadiene	400000	7300000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300UJ
Hexachloroethane	6000	100000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Indeno(1,2,3-cd)pyrene	900	4000	500000		7600U	6300U	22000U	11000UJ	21000UJ	2200U	570J
Isophorone	1100000	10000000	50000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
N-Nitroso-di-n-propylamine	660	660	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
N-Nitrosodiphenylamine	140000	600000	100000		7600UJ	6300U	22000UJ	11000U	21000U	2200U	2300U
Naphthalene	230000	4200000	100000		7600U	6300U	22000U	11000U	21000U	2200U	300J
Nitrobenzene	28000	520000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Pentachlorophenol	6000	24000	100000		R	15000U	56000U	28000U	53000U	5300U	5600U
Phenanthrene	--	--	--		4000J	2600J	5800J	1600J	12000J	400J	2300U
Phenol	10000000	10000000	50000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
Pyrene	1700000	10000000	100000		1600J	2000J	2600J	1800J	4300J	450J	380J
bis(2-Chloroethoxy)methane	--	--	--		7600U	6300U	22000U	11000U	21000U	2200U	2300U
bis(2-Chloroethyl)ether	660	3000	10000		7600U	6300U	22000U	11000U	21000U	2200U	2300U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		7600U	6300U	22000U	11000U	21000U	2200U	2300UJ
Total Semivolatile Compounds					18670	11700	13900	16000	37900	4230	8850

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB12	LOSB13	LOSB13FR	LOSB13	LOSB14	LOSB15	LOSB16
				Depth:	06	02	02	08	02	02	04
			Impact to	Zone**:	LO	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/25/94	10/31/94	10/31/94	10/31/94	10/25/94	10/24/94	10/25/94
1,2,4-Trichlorobenzene	68000	1200000	100000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
1,2-Dichlorobenzene	5100000	10000000	50000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
1,3-Dichlorobenzene	5100000	10000000	100000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
1,4-Dichlorobenzene	570000	10000000	100000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2,4,5-Trichlorophenol	5600000	10000000	50000		32000U	29000U	28000U	28000U	5300U	150000U	43000U
2,4,6-Trichlorophenol	62000	270000	10000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2,4-Dichlorophenol	170000	3100000	10000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2,4-Dimethylphenol	1100000	10000000	10000		13000U	11000U	11000U	11000U	2200UJ	58000U	17000U
2,4-Dinitrophenol	110000	2100000	10000		32000UJ	29000U	28000UJ	28000UJ	5300U	150000UJ	43000UJ
2,4-Dinitrotoluene	1000	4000	10000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2,6-Dinitrotoluene	1000	4000	10000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2-Chloronaphthalene	--	--	--		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2-Chlorophenol	280000	5200000	10000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2-Methylnaphthalene	--	--	--		13000U	1400J	1200J	3000J	300J	58000U	30000
2-Methylphenol	2800000	10000000	--		13000U	11000U	11000U	11000U	2200U	58000U	17000U
2-Nitroaniline	--	--	--		32000U	29000U	28000U	28000U	5300UJ	150000U	43000U
2-Nitrophenol	--	--	--		13000U	11000U	11000U	11000U	2200U	58000U	17000U
3,3'-Dichlorobenzidine	2000	6000	100000		13000U	11000UJ	11000UJ	11000UJ	2200UJ	58000U	17000UJ
3-Nitroaniline	--	--	--		32000U	29000U	28000U	28000U	5300U	150000U	43000U
4,6-Dinitro-2-methylphenol	--	--	--		32000U	29000U	28000UJ	28000UJ	5300U	150000U	43000UJ
4-Bromophenyl phenyl ether	--	--	--		13000U	11000U	11000U	11000U	2200U	58000U	17000U
4-Chloro-3-methylphenol	10000000	10000000	100000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
4-Chloroaniline	230000	4200000	--		13000UJ	11000UJ	11000UJ	11000U	2200UJ	58000UJ	17000UJ
4-Chlorophenyl phenyl ether	--	--	--		13000U	11000U	11000U	11000U	2200U	58000U	17000U
4-Methylphenol	2800000	10000000	--		13000U	11000U	11000U	11000U	2200U	58000U	17000U
4-Nitroaniline	--	--	--		32000U	29000U	28000U	28000U	5300U	150000U	43000U
4-Nitrophenol	--	--	--		32000U	29000U	28000UJ	28000U	5300UJ	150000UJ	43000UJ
Acenaphthene	3400000	10000000	100000		13000U	11000U	11000U	11000U	2200U	58000U	17000U
Acenaphthylene	--	--	--		13000U	11000U	11000U	11000U	2200U	58000U	17000U
Anthracene	10000000	10000000	100000		13000U	11000U	11000U	11000U	370J	58000U	17000U
Benzo(a)anthracene	900	4000	500000		13000U	11000U	11000U	11000U	870J	58000U	17000U
Benzo(a)pyrene	660	660	100000		2100J	11000U	11000U	11000U	2200U	58000U	17000U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: LOSB12 Depth: 06 Zone**: LO Date: 10/25/94	LOSB13 02 LO 10/31/94	LOSB13FR 02 LO 10/31/94	LOSB13 08 LO 10/31/94	LOSB14 02 LO 10/25/94	LOSB15 02 LO 10/24/94	LOSB16 04 LO 10/25/94
Benzo(b)fluoranthene	900	4000	50000	2100J	1300J	11000U	11000U	1200J	58000U	17000U
Benzo(g,h,i)perylene	--	--	--	2500J	11000U	11000UJ	11000UJ	2200U	58000U	17000UJ
Benzo(k)fluoranthene	900	4000	500000	2300J	1500J	11000U	11000U	1200J	58000U	17000U
Butyl benzyl phthalate	1100000	10000000	100000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Carbazole	--	--	--	13000U	11000U	11000U	11000U	280J	58000U	17000U
Chrysene	9000	40000	500000	3300J	1900J	1600J	2000J	1900J	58000U	17000U
Di-n-butyl phthalate	5700000	10000000	100000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Di-n-octyl phthalate	1100000	10000000	100000	13000U	11000U	11000UJ	11000UJ	2200U	58000UJ	17000UJ
Dibenzo(a,h)anthracene	660	660	100000	1600J	11000U	11000UJ	11000UJ	2200U	58000U	17000UJ
Dibenzofuran	--	--	--	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Diethyl phthalate	10000000	10000000	50000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Dimethyl phthalate	10000000	10000000	50000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Fluoranthene	2300000	10000000	100000	13000U	11000U	11000U	11000U	1300J	58000U	17000U
Fluorene	2300000	10000000	100000	13000U	11000U	11000U	11000U	270J	58000U	17000U
Hexachlorobenzene	660	2000	100000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Hexachlorobutadiene	1000	21000	100000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Hexachlorocyclopentadiene	400000	7300000	100000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Hexachloroethane	6000	100000	100000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Indeno(1,2,3-cd)pyrene	900	4000	500000	1400J	11000U	11000UJ	11000UJ	2200U	58000U	17000UJ
Isophorone	1100000	10000000	50000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
N-Nitroso-di-n-propylamine	660	660	10000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
N-Nitrosodiphenylamine	140000	600000	100000	13000UJ	11000UJ	11000UJ	11000U	2200U	58000UJ	17000UJ
Naphthalene	230000	4200000	100000	13000U	11000U	11000U	11000U	260J	58000U	17000U
Nitrobenzene	28000	520000	10000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Pentachlorophenol	6000	24000	100000	32000U	29000U	28000U	28000U	5300U	150000U	43000U
Phenanthrene	--	--	--	13000U	11000U	11000U	2400J	1700J	58000U	17000U
Phenol	10000000	10000000	50000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
Pyrene	1700000	10000000	100000	1400J	1600J	11000U	1700J	1400J	58000U	17000U
bis(2-Chloroethoxy)methane	--	--	--	13000U	11000U	11000U	11000U	2200U	58000U	17000U
bis(2-Chloroethyl)ether	660	3000	10000	13000U	11000U	11000U	11000U	2200U	58000U	17000U
bis(2-Ethylhexyl)phthalate	49000	210000	100000	13000U	11000U	3500J	9300J	2200U	58000U	17000U
Total Semivolatile Compounds				16700	7700	6300	18400	11050	0	30000

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: LOSB17	LOSB18	LOSB18	LOSB18FR	MBSB1	MBSB2	MBSB3
				Depth: 02	02	08	08	02	02	06
				Zone**: LO	LO	LO	LO	MB	MB	MB
				Date: 10/24/94	10/24/94	10/24/94	10/24/94	10/25/94	10/21/94	10/25/94
1,2,4-Trichlorobenzene	68000	1200000	100000	390U	380U	61000U	65000U	1900U	3800U	9600U
1,2-Dichlorobenzene	5100000	10000000	50000	390U	380U	61000U	65000U	1900U	780J	9600U
1,3-Dichlorobenzene	5100000	10000000	100000	390U	380U	61000U	65000U	1900U	3800U	9600U
1,4-Dichlorobenzene	570000	10000000	100000	390U	380U	61000U	65000U	1900U	3800U	9600UJ
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000	390U	380U	61000U	65000U	1900U	3800U	9600U
2,4,5-Trichlorophenol	5600000	10000000	50000	950U	910U	150000U	160000U	4700U	9300U	23000U
2,4,6-Trichlorophenol	62000	270000	10000	390U	380U	61000U	65000U	1900U	3800U	9600U
2,4-Dichlorophenol	170000	3100000	10000	390U	380U	61000U	65000U	1900U	3800U	9600U
2,4-Dimethylphenol	1100000	10000000	10000	390U	380U	61000U	65000U	1900U	3800U	9600U
2,4-Dinitrophenol	110000	2100000	10000	950U	910UJ	150000UJ	160000UJ	4700U	9300U	23000U
2,4-Dinitrotoluene	1000	4000	10000	390U	380U	61000U	65000U	1900U	3800U	R
2,6-Dinitrotoluene	1000	4000	10000	390U	380U	61000U	65000U	1900U	3800U	9600U
2-Chloronaphthalene	--	--	--	390U	380U	61000U	65000U	1900U	3800U	9600U
2-Chlorophenol	280000	5200000	10000	390U	380U	61000U	65000U	1900U	3800U	9600U
2-Methylnaphthalene	--	--	--	75J	77J	61000U	65000U	730J	490J	1200J
2-Methylphenol	2800000	10000000	--	390U	380U	61000U	65000U	1900U	3800U	9600U
2-Nitroaniline	--	--	--	950U	910U	150000U	160000U	4700U	9300U	23000U
2-Nitrophenol	--	--	--	390U	380U	61000U	65000U	1900U	3800U	9600U
3,3'-Dichlorobenzidine	2000	6000	100000	390UJ	380U	61000U	65000U	1900U	3800UJ	9600U
3-Nitroaniline	--	--	--	950U	910U	150000U	160000U	4700U	9300U	23000U
4,6-Dinitro-2-methylphenol	--	--	--	950U	910U	150000U	160000U	4700U	9300UJ	23000U
4-Bromophenyl phenyl ether	--	--	--	390U	380U	61000U	65000U	1900U	3800U	9600U
4-Chloro-3-methylphenol	10000000	10000000	100000	390U	380U	61000U	65000U	1900U	3800U	9600U
4-Chloroaniline	230000	4200000	--	390UJ	380UJ	61000UJ	65000UJ	1900U	3800U	9600U
4-Chlorophenyl phenyl ether	--	--	--	390U	380U	61000U	65000U	1900U	3800U	9600U
4-Methylphenol	2800000	10000000	--	390U	380U	61000U	65000U	1900U	3800U	9600U
4-Nitroaniline	--	--	--	950U	910U	150000U	160000U	4700U	9300UJ	23000U
4-Nitrophenol	--	--	--	950U	910U	150000UJ	160000UJ	4700U	9300UJ	23000U
Acenaphthene	3400000	10000000	100000	390U	380U	61000U	65000U	1900U	3800U	9600U
Acenaphthylene	--	--	--	390U	380U	61000U	65000U	1900U	3800U	9600U
Anthracene	10000000	10000000	100000	54J	46J	61000U	65000U	1900U	3800U	9600U
Benzo(a)anthracene	900	4000	500000	620	1100	61000U	65000U	390J	3800U	9600U
Benzo(a)pyrene	660	660	100000	1600J	1700	61000U	65000U	370J	3800U	9600U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *										
				Sample ID:	LOSB17	LOSB18	LOSB18	LOSB18FR	MBSB1	MBSB2	MBSB3
				Depth:	02	02	08	08	02	02	06
			Impact to	Zone**:	LO	LO	LO	LO	MB	MB	MB
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/24/94	10/24/94	10/24/94	10/24/94	10/25/94	10/21/94	10/25/94
Benzo(b)fluoranthene	900	4000	50000		1200J	1000J	61000U	65000U	650J	3800U	9600U
Benzo(g,h,i)perylene	--	--	--		1500J	1300	61000U	65000U	350J	3800U	9600U
Benzo(k)fluoranthene	900	4000	500000		1200J	1200J	61000U	65000U	600J	3800UJ	9600U
Butyl benzyl phthalate	1100000	10000000	100000		390U	380U	61000U	65000U	1900UJ	3800U	9600UJ
Carbazole	--	--	--		390U	380U	61000U	65000U	1900U	3800U	9600U
Chrysene	9000	40000	500000		930	1800	61000U	65000U	1100J	620J	9600U
Di-n-butyl phthalate	5700000	10000000	100000		390U	380U	61000U	65000U	1900UJ	3800U	9600UJ
Di-n-octyl phthalate	1100000	10000000	100000		390UJ	380U	61000UJ	65000UJ	1900UJ	3800U	9600UJ
Dibenzo(a,h)anthracene	660	660	100000		1100J	570	61000U	65000U	220J	3800U	9600U
Dibenzofuran	--	--	--		390U	380U	61000U	65000U	1900U	3800U	9600U
Diethyl phthalate	10000000	10000000	50000		390U	380U	61000U	65000U	1900U	3800U	9600U
Dimethyl phthalate	10000000	10000000	50000		390U	380U	61000U	65000U	1900U	3800U	9600U
Fluoranthene	2300000	10000000	100000		170J	160J	61000U	65000U	480J	3800U	9600U
Fluorene	2300000	10000000	100000		390U	380U	61000U	65000U	1900U	3800U	9600U
Hexachlorobenzene	660	2000	100000		390U	380U	61000U	65000U	1900U	3800U	9600U
Hexachlorobutadiene	1000	21000	100000		390U	380U	61000U	65000U	1900U	3800U	9600U
Hexachlorocyclopentadiene	400000	7300000	100000		390U	380U	61000U	65000U	1900UJ	3800U	9600UJ
Hexachloroethane	6000	100000	100000		390U	380U	61000U	65000U	1900U	3800U	9600U
Indeno(1,2,3-cd)pyrene	900	4000	500000		800J	530	61000U	65000U	230J	3800U	9600U
Isophorone	1100000	10000000	50000		390U	380U	61000U	65000U	1900U	3800U	9600U
N-Nitroso-di-n-propylamine	660	660	10000		390U	380U	61000U	65000U	1900U	3800U	R
N-Nitrosodiphenylamine	140000	600000	100000		390UJ	380UJ	61000UJ	65000UJ	1900U	3800U	9600U
Naphthalene	230000	4200000	100000		50J	72J	61000U	65000U	1900U	3800U	9600U
Nitrobenzene	28000	520000	10000		390U	380U	61000U	65000U	1900U	3800U	9600U
Pentachlorophenol	6000	24000	100000		75J	R	150000U	R	R	9300U	23000UJ
Phenanthrene	--	--	--		170J	220J	61000U	65000U	1500J	3800U	9600U
Phenol	10000000	10000000	50000		390U	380U	61000U	65000U	1900U	3800U	9600U
Pyrene	1700000	10000000	100000		390	550	61000U	65000U	1700J	3800U	2000J
bis(2-Chloroethoxy)methane	--	--	--		390U	380U	61000U	65000U	1900U	3800U	9600U
bis(2-Chloroethyl)ether	660	3000	10000		390U	380U	61000U	65000U	1900U	3800U	9600U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		670	740	61000U	65000U	1900UJ	2100J	9600UJ
Total Semivolatile Compounds					10604	11065	0	0	8320	3990	3200

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	MBSB3	MBSB3FR	MDCBSB2	N2TFSB2	N2TFSB4	N2TFSB4
				Depth:	10	10	03	02	02	06
			Impact to	Zone**:	MB	MB	MDC	N2TF	N2TF	N2TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/25/94	10/25/94	10/11/94	10/19/94	10/28/94	10/28/94
1,2,4-Trichlorobenzene	68000	1200000	100000		43000U	69000U	360U	410U	66000U	12000U
1,2-Dichlorobenzene	5100000	10000000	50000		43000U	69000U	360U	410U	66000U	12000U
1,3-Dichlorobenzene	5100000	10000000	100000		43000U	69000U	360U	410U	66000U	12000U
1,4-Dichlorobenzene	570000	10000000	100000		43000U	69000U	360U	410U	66000U	12000U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		43000U	69000U	360UJ	410U	66000U	12000U
2,4,5-Trichlorophenol	5600000	10000000	50000		110000U	170000U	870U	980U	160000U	31000U
2,4,6-Trichlorophenol	62000	270000	10000		43000U	69000U	360U	410U	66000U	12000U
2,4-Dichlorophenol	170000	3100000	10000		43000U	69000U	360U	410U	66000U	12000U
2,4-Dimethylphenol	1100000	10000000	10000		43000U	69000U	360U	410U	66000U	12000U
2,4-Dinitrophenol	110000	2100000	10000		110000UJ	170000UJ	870UJ	980U	160000U	31000UJ
2,4-Dinitrotoluene	1000	4000	10000		43000U	69000U	360U	410U	66000U	12000U
2,6-Dinitrotoluene	1000	4000	10000		43000U	69000U	360U	410U	66000U	12000U
2-Chloronaphthalene	--	--	--		43000U	69000U	360U	410U	66000U	12000U
2-Chlorophenol	280000	5200000	10000		43000U	69000U	360U	410U	66000U	12000U
2-Methylnaphthalene	--	--	--		27000J	27000J	360U	510	31000J	110000
2-Methylphenol	2800000	10000000	--		43000U	69000U	360U	410U	66000U	12000U
2-Nitroaniline	--	--	--		110000U	170000U	870U	980U	160000U	31000U
2-Nitrophenol	--	--	--		43000U	69000U	360U	410UJ	66000U	12000U
3,3'-Dichlorobenzidine	2000	6000	100000		43000U	69000U	360UJ	410UJ	66000U	12000UJ
3-Nitroaniline	--	--	--		110000U	170000U	870U	980UJ	160000U	31000U
4,6-Dinitro-2-methylphenol	--	--	--		110000U	170000U	870U	980UJ	160000U	31000UJ
4-Bromophenyl phenyl ether	--	--	--		43000U	69000U	360U	410U	66000U	12000U
4-Chloro-3-methylphenol	10000000	10000000	100000		43000U	69000U	360U	410U	66000U	12000U
4-Chloroaniline	230000	4200000	--		43000UJ	69000UJ	360U	410UJ	66000UJ	12000U
4-Chlorophenyl phenyl ether	--	--	--		43000U	69000U	360U	410U	66000U	12000U
4-Methylphenol	2800000	10000000	--		43000U	69000U	360U	410U	66000U	12000U
4-Nitroaniline	--	--	--		110000U	170000U	870U	980U	160000U	31000U
4-Nitrophenol	--	--	--		110000U	170000U	870UJ	980U	160000U	31000U
Acenaphthene	3400000	10000000	100000		43000U	69000U	360U	410U	66000U	12000U
Acenaphthylene	--	--	--		43000U	69000U	360U	410U	66000U	12000U
Anthracene	10000000	10000000	100000		43000U	69000U	360U	410U	66000U	12000U
Benzo(a)anthracene	900	4000	500000		43000U	69000U	200J	100J	66000U	12000U
Benzo(a)pyrene	660	660	100000		43000U	69000U	270J	45J	66000U	12000U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *									
				Sample ID:	MBSB3	MBSB3FR	MDCBSB2	N2TFSB2	N2TFSB4	N2TFSB4
				Depth:	10	10	03	02	02	06
			Impact to	Zone**:	MB	MB	MDC	N2TF	N2TF	N2TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/25/94	10/25/94	10/11/94	10/19/94	10/28/94	10/28/94
Benzo(b)fluoranthene	900	4000	50000		43000U	69000U	510J	170J	66000U	12000U
Benzo(g,h,i)perylene	--	--	--		43000U	69000U	R	410U	66000U	12000UJ
Benzo(k)fluoranthene	900	4000	500000		43000U	69000U	490J	190J	66000U	12000U
Butyl benzyl phthalate	1100000	10000000	100000		43000U	69000U	360UJ	410U	66000U	12000U
Carbazole	--	--	--		43000U	69000U	360U	410U	66000U	12000U
Chrysene	9000	40000	500000		4900J	69000U	230J	290J	66000U	2300J
Di-n-butyl phthalate	5700000	10000000	100000		43000U	69000U	360U	410U	66000U	12000U
Di-n-octyl phthalate	1100000	10000000	100000		43000UJ	69000UJ	47J	410U	66000U	12000UJ
Dibenzo(a,h)anthracene	660	660	100000		43000U	69000U	R	53J	66000U	12000UJ
Dibenzofuran	--	--	--		43000U	69000U	360U	410U	66000U	3100J
Diethyl phthalate	10000000	10000000	50000		43000U	69000U	360U	410U	66000U	12000U
Dimethyl phthalate	10000000	10000000	50000		43000U	69000U	360U	410U	66000U	12000U
Fluoranthene	2300000	10000000	100000		43000U	69000U	150J	62J	66000U	12000U
Fluorene	2300000	10000000	100000		43000U	69000U	360U	410UJ	6700J	12000U
Hexachlorobenzene	660	2000	100000		43000U	69000U	360U	410U	66000U	12000U
Hexachlorobutadiene	1000	21000	100000		43000U	69000U	360U	410U	66000U	12000U
Hexachlorocyclopentadiene	400000	7300000	100000		43000U	69000U	360U	410U	66000U	12000U
Hexachloroethane	6000	100000	100000		43000U	69000U	360U	410U	66000U	12000U
Indeno(1,2,3-cd)pyrene	900	4000	500000		43000U	69000U	R	410U	66000U	12000UJ
Isophorone	1100000	10000000	50000		43000U	69000U	360U	410U	66000U	12000U
N-Nitroso-di-n-propylamine	660	660	10000		43000U	69000U	360U	410U	66000U	12000U
N-Nitrosodiphenylamine	140000	600000	100000		43000UJ	69000UJ	360U	410UJ	66000UJ	12000U
Naphthalene	230000	4200000	100000		43000U	69000U	64J	410U	7300J	39000
Nitrobenzene	28000	520000	10000		43000U	69000U	360U	410U	66000U	12000U
Pentachlorophenol	6000	24000	100000		110000U	170000U	870UJ	980U	160000U	31000U
Phenanthrene	--	--	--		23000J	38000J	150J	100J	9300J	19000
Phenol	10000000	10000000	50000		43000U	69000U	360U	410U	66000U	12000U
Pyrene	1700000	10000000	100000		6400J	9800J	480J	67J	14000J	4400J
bis(2-Chloroethoxy)methane	--	--	--		43000U	69000U	360U	410U	66000U	12000U
bis(2-Chloroethyl)ether	660	3000	10000		43000U	69000U	360U	410U	66000U	12000U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		43000U	69000U	1000J	220J	66000U	2000J
Total Semivolatile Compounds					61300	74800	3591	1807	68300	179800

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N2TFSB5	N2TFSB5	N3TFSB1	N3TFSB2	N3TFSB2	N3TFSB2FR
				Depth:	02	06	02	02	06	06
			Impact to	Zone**:	N2TF	N2TF	N3TF	AP	AP	AP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/18/94	10/19/94	10/19/94	10/19/94
1,2,4-Trichlorobenzene	68000	1200000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
1,2-Dichlorobenzene	5100000	10000000	50000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
1,3-Dichlorobenzene	5100000	10000000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
1,4-Dichlorobenzene	570000	10000000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		7400U	11000UJ	7400UJ	3700U	9000U	66000UJ
2,4,5-Trichlorophenol	5600000	10000000	50000		18000U	28000UJ	18000U	9100U	22000U	160000UJ
2,4,6-Trichlorophenol	62000	270000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2,4-Dichlorophenol	170000	3100000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2,4-Dimethylphenol	1100000	10000000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2,4-Dinitrophenol	110000	2100000	10000		18000U	28000UJ	18000UJ	9100U	22000U	160000UJ
2,4-Dinitrotoluene	1000	4000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2,6-Dinitrotoluene	1000	4000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2-Chloronaphthalene	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2-Chlorophenol	280000	5200000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2-Methylnaphthalene	--	--	--		7400U	9300J	1200J	3700U	5500J	15000J
2-Methylphenol	2800000	10000000	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
2-Nitroaniline	--	--	--		18000U	28000UJ	18000U	9100U	22000U	160000UJ
2-Nitrophenol	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
3,3'-Dichlorobenzidine	2000	6000	100000		7400UJ	11000UJ	7400U	3700UJ	9000UJ	66000UJ
3-Nitroaniline	--	--	--		18000U	28000UJ	18000U	9100U	22000U	160000UJ
4,6-Dinitro-2-methylphenol	--	--	--		18000UJ	28000UJ	18000U	9100U	22000U	160000UJ
4-Bromophenyl phenyl ether	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
4-Chloro-3-methylphenol	10000000	10000000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
4-Chloroaniline	230000	4200000	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
4-Chlorophenyl phenyl ether	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
4-Methylphenol	2800000	10000000	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
4-Nitroaniline	--	--	--		18000UJ	28000UJ	18000U	9100UJ	22000UJ	160000UJ
4-Nitrophenol	--	--	--		18000UJ	28000UJ	18000UJ	9100UJ	22000UJ	160000UJ
Acenaphthene	3400000	10000000	100000		7400U	11000UJ	7400U	3700U	3100J	66000UJ
Acenaphthylene	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Anthracene	10000000	10000000	100000		7400U	11000UJ	7400U	3700U	990J	66000UJ
Benzo(a)anthracene	900	4000	500000		7400U	1800J	1500J	460J	3100J	66000UJ
Benzo(a)pyrene	660	660	100000		7400U	11000UJ	840J	970J	4300J	66000UJ

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N2TFSB5	N2TFSB5	N3TFSB1	N3TFSB2	N3TFSB2	N3TFSB2FR
				Depth:	02	06	02	02	06	06
			Impact to	Zone**:	N2TF	N2TF	N3TF	AP	AP	AP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/18/94	10/19/94	10/19/94	10/19/94
Benzo(b)fluoranthene	900	4000	50000		7400U	11000UJ	980J	600J	2800J	66000UJ
Benzo(g,h,i)perylene	--	--	--		7400U	11000UJ	7400UJ	970J	1900J	66000UJ
Benzo(k)fluoranthene	900	4000	500000		7400UJ	11000UJ	1100J	600J	2800J	66000UJ
Butyl benzyl phthalate	1100000	10000000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Carbazole	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Chrysene	9000	40000	500000		7400U	2100J	3000J	710J	8200J	8900J
Di-n-butyl phthalate	5700000	10000000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Di-n-octyl phthalate	1100000	10000000	100000		7400U	11000UJ	7400UJ	3700U	9000U	66000UJ
Dibenzo(a,h)anthracene	660	660	100000		7400U	11000UJ	7400UJ	360J	1100J	66000UJ
Dibenzofuran	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Diethyl phthalate	10000000	10000000	50000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Dimethyl phthalate	10000000	10000000	50000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Fluoranthene	2300000	10000000	100000		7400U	11000UJ	7400U	3700U	2300J	66000UJ
Fluorene	2300000	10000000	100000		7400U	1900J	7400U	3700U	9000U	66000UJ
Hexachlorobenzene	660	2000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Hexachlorobutadiene	1000	21000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Hexachlorocyclopentadiene	400000	7300000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Hexachloroethane	6000	100000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Indeno(1,2,3-cd)pyrene	900	4000	500000		7400U	11000UJ	7400UJ	470J	930J	66000UJ
Isophorone	1100000	10000000	50000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
N-Nitroso-di-n-propylamine	660	660	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
N-Nitrosodiphenylamine	140000	600000	100000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Naphthalene	230000	4200000	100000		7400U	2200J	7400U	3700U	9000U	66000UJ
Nitrobenzene	28000	520000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Pentachlorophenol	6000	24000	100000		18000U	28000UJ	18000UJ	9100U	22000U	160000UJ
Phenanthrene	--	--	--		2000J	4500J	1800J	3700U	3200J	7100J
Phenol	10000000	10000000	50000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
Pyrene	1700000	10000000	100000		1500J	1500J	2900J	500J	5400J	11000J
bis(2-Chloroethoxy)methane	--	--	--		7400U	11000UJ	7400U	3700U	9000U	66000UJ
bis(2-Chloroethyl)ether	660	3000	10000		7400U	11000UJ	7400U	3700U	9000U	66000UJ
bis(2-Ethylhexyl)phthalate	49000	210000	100000		2400J	11000UJ	7400U	590J	1900J	66000UJ
Total Semivolatile Compounds					5900	23300	13320	6230	47520	42000

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB3	N3TFSB4	N3TFSB5	N3TFSB6	N3TFSB7	N3TFSB7
				Depth:	02	02	08	02	02	06
			Impact to	Zone**:	N3TF	N3TF	N3TF	N3TF	N3TF	N3TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/13/94	10/17/94	10/19/94	10/18/94	10/18/94	10/18/94
1,2,4-Trichlorobenzene	68000	1200000	100000		390U	390U	R	60000U	250000U	60000U
1,2-Dichlorobenzene	5100000	10000000	50000		390U	62J	7800U	60000U	250000U	60000U
1,3-Dichlorobenzene	5100000	10000000	100000		390U	390U	7800U	60000U	250000U	60000U
1,4-Dichlorobenzene	570000	10000000	100000		390U	60J	R	60000U	250000U	60000U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		390UJ	390U	7800U	60000UJ	250000UJ	60000UJ
2,4,5-Trichlorophenol	5600000	10000000	50000		950U	940U	19000U	150000U	620000U	150000U
2,4,6-Trichlorophenol	62000	270000	10000		390U	390U	7800U	60000U	250000U	60000U
2,4-Dichlorophenol	170000	3100000	10000		390U	390U	7800U	60000U	250000U	60000U
2,4-Dimethylphenol	1100000	10000000	10000		390U	390U	7800U	60000U	250000U	60000U
2,4-Dinitrophenol	110000	2100000	10000		950UJ	940U	19000U	150000U	620000U	150000U
2,4-Dinitrotoluene	1000	4000	10000		390U	390U	R	60000U	250000U	60000U
2,6-Dinitrotoluene	1000	4000	10000		390U	390U	7800U	60000U	250000U	60000U
2-Chloronaphthalene	--	--	--		390U	390U	7800U	60000U	250000U	60000U
2-Chlorophenol	280000	5200000	10000		390U	390U	R	60000U	250000U	60000U
2-Methylnaphthalene	--	--	--		390U	380J	5500J	25000J	310000	66000
2-Methylphenol	2800000	10000000	--		390U	390U	7800U	60000U	250000U	60000U
2-Nitroaniline	--	--	--		950U	940U	19000U	150000U	620000U	150000U
2-Nitrophenol	--	--	--		390U	390U	7800U	60000U	250000U	60000U
3,3'-Dichlorobenzidine	2000	6000	100000		390U	390U	7800UJ	60000U	250000U	60000U
3-Nitroaniline	--	--	--		950U	940U	19000U	150000U	620000U	150000U
4,6-Dinitro-2-methylphenol	--	--	--		950U	940U	19000U	150000U	620000U	150000U
4-Bromophenyl phenyl ether	--	--	--		390U	390U	7800U	60000U	250000U	60000U
4-Chloro-3-methylphenol	10000000	10000000	100000		390U	390U	R	60000U	250000U	60000U
4-Chloroaniline	230000	4200000	--		390U	390U	7800U	60000UJ	250000UJ	60000UJ
4-Chlorophenyl phenyl ether	--	--	--		390U	390U	7800U	60000U	250000U	60000U
4-Methylphenol	2800000	10000000	--		390U	390U	7800U	60000U	250000U	60000U
4-Nitroaniline	--	--	--		950U	940U	19000UJ	150000U	620000U	150000U
4-Nitrophenol	--	--	--		950UJ	940U	R	150000U	620000U	150000U
Acenaphthene	3400000	10000000	100000		390U	40J	7800U	60000U	250000U	60000U
Acenaphthylene	--	--	--		390U	390U	7800U	60000U	250000U	60000U
Anthracene	10000000	10000000	100000		48J	130J	7800U	60000U	250000U	60000U
Benzo(a)anthracene	900	4000	500000		350J	200J	1000J	60000U	250000U	60000U
Benzo(a)pyrene	660	660	100000		330J	130J	7800U	60000U	250000U	60000U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB3	N3TFSB4	N3TFSB5	N3TFSB6	N3TFSB7	N3TFSB7
				Depth:	02	02	08	02	02	06
			Impact to	Zone**:	N3TF	N3TF	N3TF	N3TF	N3TF	N3TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/13/94	10/17/94	10/19/94	10/18/94	10/18/94	10/18/94
Benzo(b)fluoranthene	900	4000	50000		890J	370J	7800U	60000U	250000U	60000U
Benzo(g,h,i)perylene	--	--	--		390UJ	390UJ	7800U	60000UJ	250000UJ	60000UJ
Benzo(k)fluoranthene	900	4000	500000		850J	420J	7800UJ	60000U	250000U	60000U
Butyl benzyl phthalate	1100000	10000000	100000		390U	390U	7800U	60000U	250000U	60000U
Carbazole	--	--	--		51J	390U	7800U	60000U	250000U	60000U
Chrysene	9000	40000	500000		410	350J	1500J	60000U	250000U	60000U
Di-n-butyl phthalate	5700000	10000000	100000		390U	150J	7800U	60000U	250000U	60000U
Di-n-octyl phthalate	1100000	10000000	100000		390UJ	390UJ	7800U	60000U	250000U	60000U
Dibenzo(a,h)anthracene	660	660	100000		390UJ	110J	7800U	60000UJ	250000UJ	60000UJ
Dibenzofuran	--	--	--		390U	390U	7800U	60000U	250000U	60000U
Diethyl phthalate	10000000	10000000	50000		390U	390U	7800U	60000U	250000U	60000U
Dimethyl phthalate	10000000	10000000	50000		390U	390U	7800U	60000U	250000U	60000U
Fluoranthene	2300000	10000000	100000		710	240J	7800U	60000U	250000U	60000U
Fluorene	2300000	10000000	100000		390U	390U	7800U	60000U	250000U	60000U
Hexachlorobenzene	660	2000	100000		390U	390U	7800U	60000U	250000U	60000U
Hexachlorobutadiene	1000	21000	100000		390U	390U	7800U	60000U	250000U	60000U
Hexachlorocyclopentadiene	400000	7300000	100000		390U	390U	7800U	60000U	250000U	60000U
Hexachloroethane	6000	100000	100000		390U	390U	7800U	60000U	250000U	60000U
Indeno(1,2,3-cd)pyrene	900	4000	500000		150J	89J	7800U	60000UJ	250000UJ	60000UJ
Isophorone	1100000	10000000	50000		390U	390U	7800U	60000U	250000U	60000U
N-Nitroso-di-n-propylamine	660	660	10000		390U	390U	R	60000U	250000U	60000U
N-Nitrosodiphenylamine	140000	600000	100000		390U	390U	7800U	60000UJ	150000J	60000UJ
Naphthalene	230000	4200000	100000		390U	91J	7800U	60000U	91000J	11000J
Nitrobenzene	28000	520000	10000		390U	390U	7800U	60000U	250000U	60000U
Pentachlorophenol	6000	24000	100000		950UJ	940U	19000U	150000U	620000U	150000U
Phenanthrene	--	--	--		310J	340J	1100J	12000J	94000J	7500J
Phenol	10000000	10000000	50000		390U	390U	7800U	60000U	250000U	60000U
Pyrene	1700000	10000000	100000		700	340J	1200J	60000U	250000U	60000U
bis(2-Chloroethoxy)methane	--	--	--		390U	390U	7800U	60000U	250000U	60000U
bis(2-Chloroethyl)ether	660	3000	10000		390U	390U	7800U	60000U	250000U	60000U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		110J	320J	7800U	60000U	250000U	60000U
Total Semivolatile Compounds					4909	3822	10300	37000	645000	84500

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB8	N3TFSB8	N3TFSB9	PN1SB2	PN1SB2	PSSB1
				Depth:	02	06	02	04	08	02
			Impact to	Zone**:	N3TF	N3TF	N3TF	P1	P1	MB
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/18/94	10/18/94	11/02/94	11/02/94	11/02/94	10/31/94
1,2,4-Trichlorobenzene	68000	1200000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
1,2-Dichlorobenzene	5100000	10000000	50000		12000U	8000UJ	13000U	3700U	7700U	23000U
1,3-Dichlorobenzene	5100000	10000000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
1,4-Dichlorobenzene	570000	10000000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
2,4,5-Trichlorophenol	5600000	10000000	50000		29000U	20000UJ	32000U	8900U	19000U	56000U
2,4,6-Trichlorophenol	62000	270000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
2,4-Dichlorophenol	170000	3100000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
2,4-Dimethylphenol	1100000	10000000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
2,4-Dinitrophenol	110000	2100000	10000		29000UJ	20000UJ	32000UJ	8900U	19000U	56000UJ
2,4-Dinitrotoluene	1000	4000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
2,6-Dinitrotoluene	1000	4000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
2-Chloronaphthalene	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
2-Chlorophenol	280000	5200000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
2-Methylnaphthalene	--	--	--		13000	8200J	3300J	3700U	7700U	46000
2-Methylphenol	2800000	10000000	--		12000U	8000UJ	13000U	3700U	7700U	23000U
2-Nitroaniline	--	--	--		29000UJ	20000UJ	32000U	8900UJ	19000UJ	56000U
2-Nitrophenol	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
3,3'-Dichlorobenzidine	2000	6000	100000		12000U	8000UJ	13000UJ	3700U	7700U	23000UJ
3-Nitroaniline	--	--	--		29000U	20000UJ	32000U	8900U	19000U	56000U
4,6-Dinitro-2-methylphenol	--	--	--		29000UJ	20000UJ	32000UJ	8900U	19000U	56000UJ
4-Bromophenyl phenyl ether	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
4-Chloro-3-methylphenol	10000000	10000000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
4-Chloroaniline	230000	4200000	--		12000U	8000UJ	13000U	3700U	7700U	23000UJ
4-Chlorophenyl phenyl ether	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
4-Methylphenol	2800000	10000000	--		12000U	8000UJ	13000U	3700U	7700U	23000U
4-Nitroaniline	--	--	--		29000U	20000UJ	32000U	8900U	19000U	56000U
4-Nitrophenol	--	--	--		29000UJ	20000UJ	32000U	8900U	19000U	56000UJ
Acenaphthene	3400000	10000000	100000		1900J	2100J	13000U	3700U	7700U	23000U
Acenaphthylene	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
Anthracene	10000000	10000000	100000		12000U	8000UJ	13000U	3700U	1200J	23000U
Benzo(a)anthracene	900	4000	500000		12000U	8000UJ	13000U	3700U	5800J	23000U
Benzo(a)pyrene	660	660	100000		12000U	8000UJ	13000U	1200J	4400J	23000U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB8	N3TFSB8	N3TFSB9	PN1SB2	PN1SB2	PSSB1
				Depth:	02	06	02	04	08	02
			Impact to	Zone**:	N3TF	N3TF	N3TF	P1	P1	MB
	Residential	Non-Residential	Groundwater	Date:	10/18/94	10/18/94	11/02/94	11/02/94	11/02/94	10/31/94
Benzo(b)fluoranthene	900	4000	50000		12000U	8000UJ	13000U	1400J	4700J	23000U
Benzo(g,h,i)perylene	--	--	--		12000UJ	8000UJ	13000UJ	1500J	2800J	23000UJ
Benzo(k)fluoranthene	900	4000	500000		12000U	8000UJ	13000U	1400J	4600J	23000U
Butyl benzyl phthalate	1100000	10000000	100000		12000U	8000UJ	13000U	3700UJ	7700UJ	23000U
Carbazole	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
Chrysene	9000	40000	500000		12000U	8000UJ	13000U	980J	8400	23000U
Di-n-butyl phthalate	5700000	10000000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
Di-n-octyl phthalate	1100000	10000000	100000		12000U	8000UJ	13000UJ	3700UJ	7700UJ	23000UJ
Dibenzo(a,h)anthracene	660	660	100000		12000UJ	8000UJ	13000UJ	740J	2000J	23000UJ
Dibenzofuran	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
Diethyl phthalate	10000000	10000000	50000		12000U	8000UJ	13000U	3700U	7700U	23000U
Dimethyl phthalate	10000000	10000000	50000		12000U	8000UJ	13000U	3700U	7700U	23000U
Fluoranthene	2300000	10000000	100000		12000U	8000UJ	13000U	930J	4000J	23000U
Fluorene	2300000	10000000	100000		2600J	3200J	13000U	3700U	1500J	23000U
Hexachlorobenzene	660	2000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
Hexachlorobutadiene	1000	21000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
Hexachlorocyclopentadiene	400000	7300000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
Hexachloroethane	6000	100000	100000		12000U	8000UJ	13000U	3700U	7700U	23000U
Indeno(1,2,3-cd)pyrene	900	4000	500000		12000UJ	8000UJ	13000UJ	790J	2000J	23000UJ
Isophorone	1100000	10000000	50000		12000U	8000UJ	13000U	3700U	7700U	23000U
N-Nitroso-di-n-propylamine	660	660	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
N-Nitrosodiphenylamine	140000	600000	100000		12000U	8000UJ	13000U	3700U	7700U	23000UJ
Naphthalene	230000	4200000	100000		4000J	8300J	13000U	3700U	7700U	23000U
Nitrobenzene	28000	520000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
Pentachlorophenol	6000	24000	100000		29000U	20000UJ	32000U	8900U	19000U	56000U
Phenanthrene	--	--	--		6300J	4200J	13000U	590J	6900J	2900J
Phenol	10000000	10000000	50000		12000U	8000UJ	13000U	3700U	7700U	23000U
Pyrene	1700000	10000000	100000		12000U	8000UJ	13000U	710J	4700J	23000U
bis(2-Chloroethoxy)methane	--	--	--		12000U	8000UJ	13000U	3700U	7700U	23000U
bis(2-Chloroethyl)ether	660	3000	10000		12000U	8000UJ	13000U	3700U	7700U	23000U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		12000U	8000UJ	13000U	3700UJ	7700UJ	2800J
Total Semivolatile Compounds					27800	99800	3300	10240	53000	51700

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	PSSB1	SSB1	SSB3	SSB3	STFSB1	STFSB1	STFSB2
			Impact to	Depth:	06	16	06	10	02	06	08
				Zone**:	MB	SS	SS	SS	STF	STF	STF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/31/94	10/24/94	10/24/94	10/24/94	10/26/94	10/26/94	10/26/94
1,2,4-Trichlorobenzene	68000	1200000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
1,2-Dichlorobenzene	5100000	10000000	50000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
1,3-Dichlorobenzene	5100000	10000000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
1,4-Dichlorobenzene	570000	10000000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2,4,5-Trichlorophenol	5600000	10000000	50000		29000U	29000UJ	13000UJ	11000UJ	29000U	170000U	64000U
2,4,6-Trichlorophenol	62000	270000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2,4-Dichlorophenol	170000	3100000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2,4-Dimethylphenol	1100000	10000000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2,4-Dinitrophenol	110000	2100000	10000		29000UJ	29000UJ	13000UJ	11000UJ	29000U	170000UJ	64000UJ
2,4-Dinitrotoluene	1000	4000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2,6-Dinitrotoluene	1000	4000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2-Chloronaphthalene	--	--	--		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2-Chlorophenol	280000	5200000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2-Methylnaphthalene	--	--	--		14000	1500J	5400UJ	490J	12000	180000	92000
2-Methylphenol	2800000	10000000	--		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
2-Nitroaniline	--	--	--		29000U	29000UJ	13000UJ	11000UJ	29000U	170000U	64000U
2-Nitrophenol	--	--	--		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
3,3'-Dichlorobenzidine	2000	6000	100000		12000UJ	12000UJ	5400UJ	4300UJ	12000UJ	67000UJ	26000UJ
3-Nitroaniline	--	--	--		29000U	29000UJ	13000UJ	11000UJ	29000U	170000U	64000U
4,6-Dinitro-2-methylphenol	--	--	--		29000UJ	29000UJ	13000UJ	11000UJ	29000U	170000UJ	64000UJ
4-Bromophenyl phenyl ether	--	--	--		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
4-Chloro-3-methylphenol	10000000	10000000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
4-Chloroaniline	230000	4200000	--		12000U	12000UJ	5400UJ	4300UJ	12000UJ	67000U	26000U
4-Chlorophenyl phenyl ether	--	--	--		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
4-Methylphenol	2800000	10000000	--		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
4-Nitroaniline	--	--	--		29000U	29000UJ	13000UJ	11000UJ	29000U	170000U	64000U
4-Nitrophenol	--	--	--		29000U	29000UJ	13000UJ	11000UJ	29000U	170000U	64000U
Acenaphthene	3400000	10000000	100000		12000U	12000UJ	2300J	4300UJ	1400J	67000U	6000J
Acenaphthylene	--	--	--		12000U	12000UJ	1100J	480J	12000U	67000U	26000U
Anthracene	10000000	10000000	100000		12000U	1700J	16000J	440J	11000J	11000J	2700J
Benzo(a)anthracene	900	4000	500000		7200J	7200J	64000J	6500J	1400J	67000U	3400J
Benzo(a)pyrene	660	660	100000		6100J	2200J	36000J	5900J	12000U	67000U	2600J

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	PSSB1	SSB1	SSB3	SSB3	STFSB1	STFSB1	STFSB2
				Depth:	06	16	06	10	02	06	08
			Impact to	Zone**:	MB	SS	SS	SS	STF	STF	STF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/31/94	10/24/94	10/24/94	10/24/94	10/26/94	10/26/94	10/26/94
Benzo(b)fluoranthene	900	4000	50000		3700J	2600J	95000J	8400J	1400J	67000U	26000U
Benzo(g,h,i)perylene	--	--	--		6300J	1400J	14000J	2500J	12000U	67000UJ	26000UJ
Benzo(k)fluoranthene	900	4000	500000		3800J	2700J	95000J	8400J	1400J	67000U	26000U
Butyl benzyl phthalate	1100000	10000000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Carbazole	--	--	--		12000U	12000UJ	3600J	4300UJ	4200J	67000U	26000U
Chrysene	9000	40000	500000		12000	14000J	61000J	4900J	2600J	67000U	5700J
Di-n-butyl phthalate	5700000	10000000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Di-n-octyl phthalate	1100000	10000000	100000		12000UJ	12000UJ	5400UJ	4300UJ	12000U	67000UJ	26000UJ
Dibenzo(a,h)anthracene	660	660	100000		3300J	12000UJ	4600J	900J	12000U	67000UJ	26000UJ
Dibenzofuran	--	--	--		12000U	12000UJ	3300J	4300UJ	12000U	67000U	26000U
Diethyl phthalate	10000000	10000000	50000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Dimethyl phthalate	10000000	10000000	50000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Fluoranthene	2300000	10000000	100000		12000U	4000J	1200J	5500J	2400J	67000U	26000U
Fluorene	2300000	10000000	100000		12000U	3400J	5800J	4300UJ	1800J	67000U	26000U
Hexachlorobenzene	660	2000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Hexachlorobutadiene	1000	21000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Hexachlorocyclopentadiene	400000	7300000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Hexachloroethane	6000	100000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Indeno(1,2,3-cd)pyrene	900	4000	500000		2300J	12000UJ	14000J	2400J	12000U	67000UJ	26000UJ
Isophorone	1100000	10000000	50000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
N-Nitroso-di-n-propylamine	660	660	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
N-Nitrosodiphenylamine	140000	600000	100000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Naphthalene	230000	4200000	100000		12000U	12000UJ	5400UJ	2000J	12000U	130000	26000U
Nitrobenzene	28000	520000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Pentachlorophenol	6000	24000	100000		29000U	29000UJ	13000UJ	11000UJ	9600J	170000U	64000U
Phenanthrene	--	--	--		3000J	7500J	84000J	1000J	6400J	11000J	22000J
Phenol	10000000	10000000	50000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Pyrene	1700000	10000000	100000		9800J	5400J	120000J	10000J	3100J	67000U	14000J
bis(2-Chloroethoxy)methane	--	--	--		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
bis(2-Chloroethyl)ether	660	3000	10000		12000U	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		2500J	12000UJ	5400UJ	4300UJ	12000U	67000U	26000U
Total Semivolatile Compounds					74000	53600	620900	59810	58700	332000	148400

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: Depth: Zone**: Date:	FBNA1-100594 10/05/94	FBNA5-101994 10/19/94	FBNA6-102094 10/20/94	FBNA7-102594 10/25/94
1,2,4-Trichlorobenzene	68000	1200000	100000		10U	10U	10U	10U
1,2-Dichlorobenzene	5100000	10000000	50000		10U	10U	10U	10U
1,3-Dichlorobenzene	5100000	10000000	100000		10U	10U	10U	10U
1,4-Dichlorobenzene	570000	10000000	100000		10U	10U	10U	10U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		10U	10U	10U	10U
2,4,5-Trichlorophenol	5600000	10000000	50000		25U	25U	25U	25U
2,4,6-Trichlorophenol	62000	270000	10000		10U	10U	10U	10U
2,4-Dichlorophenol	170000	3100000	10000		10U	10U	10U	10U
2,4-Dimethylphenol	1100000	10000000	10000		10U	10U	10U	10U
2,4-Dinitrophenol	110000	2100000	10000		25U	25U	25U	25U
2,4-Dinitrotoluene	1000	4000	10000		10U	10U	10U	10U
2,6-Dinitrotoluene	1000	4000	10000		10U	10U	10U	10U
2-Chloronaphthalene	--	--	--		10U	10U	10U	10U
2-Chlorophenol	280000	5200000	10000		10U	10U	10U	10U
2-Methylnaphthalene	--	--	--		10U	10U	10U	10U
2-Methylphenol	2800000	10000000	--		10U	10U	10U	10U
2-Nitroaniline	--	--	--		25U	25U	25U	25U
2-Nitrophenol	--	--	--		10U	10U	10U	10U
3,3'-Dichlorobenzidine	2000	6000	100000		10U	10U	10U	10U
3-Nitroaniline	--	--	--		25U	25U	25U	25U
4,6-Dinitro-2-methylphenol	--	--	--		25U	25U	25U	25U
4-Bromophenyl phenyl ether	--	--	--		10U	10U	10U	10U
4-Chloro-3-methylphenol	10000000	10000000	100000		10U	10U	10U	10U
4-Chloroaniline	230000	4200000	--		10U	10U	10U	10U
4-Chlorophenyl phenyl ether	--	--	--		10U	10U	10U	10U
4-Methylphenol	2800000	10000000	--		10U	10U	10U	10U
4-Nitroaniline	--	--	--		25U	25U	25U	25U
4-Nitrophenol	--	--	--		25U	25U	25U	25U
Acenaphthene	3400000	10000000	100000		10U	10U	10U	10U
Acenaphthylene	--	--	--		10U	10U	10U	10U
Anthracene	10000000	10000000	100000		10U	10U	10U	10U
Benzo(a)anthracene	900	4000	500000		10U	10U	10U	10U
Benzo(a)pyrene	660	660	100000		10U	10U	10U	10U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	FBNA1-100594	FBNA5-101994	FBNA6-102094	FBNA7-102594
				Depth:				
			Impact to	Zone**:				
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/05/94	10/19/94	10/20/94	10/25/94
Benzo(b)fluoranthene	900	4000	50000		10U	10U	10U	10U
Benzo(g,h,i)perylene	--	--	--		10U	10U	10U	10U
Benzo(k)fluoranthene	900	4000	500000		10U	10U	10U	10U
Butyl benzyl phthalate	1100000	10000000	100000		10U	10U	10U	10U
Carbazole	--	--	--		10U	10U	10U	10U
Chrysene	9000	40000	500000		10U	10U	10U	10U
Di-n-butyl phthalate	5700000	10000000	100000		1J	3J	2J	2J
Di-n-octyl phthalate	1100000	10000000	100000		10U	10U	10U	10U
Dibenzo(a,h)anthracene	660	660	100000		10U	10U	10U	10U
Dibenzofuran	--	--	--		10U	10U	10U	10U
Diethyl phthalate	10000000	10000000	50000		10U	10U	10U	10U
Dimethyl phthalate	10000000	10000000	50000		10U	10U	10U	10U
Fluoranthene	2300000	10000000	100000		10U	10U	10U	10U
Fluorene	2300000	10000000	100000		10U	10U	10U	10U
Hexachlorobenzene	660	2000	100000		10U	10U	10U	10U
Hexachlorobutadiene	1000	21000	100000		10U	10U	10U	10U
Hexachlorocyclopentadiene	400000	7300000	100000		10U	10U	10U	10U
Hexachloroethane	6000	100000	100000		10U	10U	10U	10U
Indeno(1,2,3-cd)pyrene	900	4000	500000		10U	10U	10U	10U
Isophorone	1100000	10000000	50000		10U	10U	10U	10U
N-Nitroso-di-n-propylamine	660	660	10000		10U	10U	10U	10U
N-Nitrosodiphenylamine	140000	600000	100000		10U	10U	10U	10U
Naphthalene	230000	4200000	100000		10U	10U	10U	10U
Nitrobenzene	28000	520000	10000		10U	10U	10U	10U
Pentachlorophenol	6000	24000	100000		25U	25U	25U	25U
Phenanthrene	--	--	--		10U	10U	10U	10U
Phenol	10000000	10000000	50000		10U	10U	10U	10U
Pyrene	1700000	10000000	100000		10U	10U	10U	10U
bis(2-Chloroethoxy)methane	--	--	--		10U	10U	10U	10U
bis(2-Chloroethyl)ether	660	3000	10000		10U	10U	10U	10U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		10U	1J	10U	10U
Total Semivolatile Compounds					1	4	2	2

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: / Depth: / Zone**: / Date:	FBNA9-102694 10/26/94	FBNA11-102794 10/27/94	FBNA13-102894 10/28/94	FBNA14-102894 10/28/94
1,2,4-Trichlorobenzene	68000	1200000	100000		10U	10U	10U	10U
1,2-Dichlorobenzene	5100000	10000000	50000		10U	10U	10U	10U
1,3-Dichlorobenzene	5100000	10000000	100000		10U	10U	10U	10U
1,4-Dichlorobenzene	570000	10000000	100000		10U	10U	10U	10U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000		10U	10U	10U	10U
2,4,5-Trichlorophenol	5600000	10000000	50000		25U	25U	25U	25U
2,4,6-Trichlorophenol	62000	270000	10000		10U	10U	10U	10U
2,4-Dichlorophenol	170000	3100000	10000		10U	10U	10U	10U
2,4-Dimethylphenol	1100000	10000000	10000		10U	10U	10U	10U
2,4-Dinitrophenol	110000	2100000	10000		25U	25U	25U	25U
2,4-Dinitrotoluene	1000	4000	10000		10U	10U	10U	10U
2,6-Dinitrotoluene	1000	4000	10000		10U	10U	10U	10U
2-Chloronaphthalene	--	--	--		10U	10U	10U	10U
2-Chlorophenol	280000	5200000	10000		10U	10U	10U	10U
2-Methylnaphthalene	--	--	--		10U	10U	10U	10U
2-Methylphenol	2800000	10000000	--		10U	10U	10U	10U
2-Nitroaniline	--	--	--		25U	25U	25U	25U
2-Nitrophenol	--	--	--		10U	10U	10U	10U
3,3'-Dichlorobenzidine	2000	6000	100000		10U	10U	10U	10U
3-Nitroaniline	--	--	--		25U	25U	25U	25U
4,6-Dinitro-2-methylphenol	--	--	--		25U	25U	25U	25U
4-Bromophenyl phenyl ether	--	--	--		10U	10U	10U	10U
4-Chloro-3-methylphenol	10000000	10000000	100000		10U	10U	10U	10U
4-Chloroaniline	230000	4200000	--		10U	10U	10U	10U
4-Chlorophenyl phenyl ether	--	--	--		10U	10U	10U	10U
4-Methylphenol	2800000	10000000	--		10U	10U	10U	10U
4-Nitroaniline	--	--	--		25U	25U	25U	25U
4-Nitrophenol	--	--	--		25U	25U	25U	25U
Acenaphthene	3400000	10000000	100000		10U	10U	10U	10U
Acenaphthylene	--	--	--		10U	10U	10U	10U
Anthracene	10000000	10000000	100000		10U	10U	10U	10U
Benzo(a)anthracene	900	4000	500000		10U	10U	10U	10U
Benzo(a)pyrene	660	660	100000		10U	10U	10U	10U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: Depth: Zone**: Date:	FBNA9-102694 10/26/94	FBNA11-102794 10/27/94	FBNA13-102894 10/28/94	FBNA14-102894 10/28/94
Benzo(b)fluoranthene	900	4000	50000		10U	10U	10U	10U
Benzo(g,h,i)perylene	--	--	--		10U	10U	10U	10U
Benzo(k)fluoranthene	900	4000	500000		10U	10U	10U	10U
Butyl benzyl phthalate	1100000	10000000	100000		10U	10U	10U	10U
Carbazole	--	--	--		10U	10U	10U	10U
Chrysene	9000	40000	500000		10U	10U	10U	10U
Di-n-butyl phthalate	5700000	10000000	100000		10U	1J	2J	10U
Di-n-octyl phthalate	1100000	10000000	100000		10U	10U	10U	10U
Dibenzo(a,h)anthracene	660	660	100000		10U	10U	10U	10U
Dibenzofuran	--	--	--		10U	10U	10U	10U
Diethyl phthalate	10000000	10000000	50000		10U	10U	10U	10U
Dimethyl phthalate	10000000	10000000	50000		10U	10U	10U	10U
Fluoranthene	2300000	10000000	100000		10U	10U	10U	10U
Fluorene	2300000	10000000	100000		10U	10U	10U	10U
Hexachlorobenzene	660	2000	100000		10U	10U	10U	10U
Hexachlorobutadiene	1000	21000	100000		10U	10U	10U	10U
Hexachlorocyclopentadiene	400000	7300000	100000		10U	10U	10U	10U
Hexachloroethane	6000	100000	100000		10U	10U	10U	10U
Indeno(1,2,3-cd)pyrene	900	4000	500000		10U	10U	10U	10U
Isophorone	1100000	10000000	50000		10U	10U	10U	10U
N-Nitroso-di-n-propylamine	660	660	10000		10U	10U	10U	10U
N-Nitrosodiphenylamine	140000	600000	100000		10U	10U	10U	10U
Naphthalene	230000	4200000	100000		10U	10U	10U	10U
Nitrobenzene	28000	520000	10000		10U	10U	10U	10U
Pentachlorophenol	6000	24000	100000		25U	25U	25U	25U
Phenanthrene	--	--	--		10U	10U	10U	10U
Phenol	10000000	10000000	50000		10U	10U	10U	10U
Pyrene	1700000	10000000	100000		10U	10U	10U	10U
bis(2-Chloroethoxy)methane	--	--	--		10U	10U	10U	10U
bis(2-Chloroethyl)ether	660	3000	10000		10U	10U	10U	10U
bis(2-Ethylhexyl)phthalate	49000	210000	100000		10U	10U	10U	3J
Total Semivolatile Compounds					0	1	2	3

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID: FBNA17-103194
				Depth:
			Impact to	Zone**:
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date: 10/31/94
1,2,4-Trichlorobenzene	68000	1200000	100000	10U
1,2-Dichlorobenzene	5100000	10000000	50000	10U
1,3-Dichlorobenzene	5100000	10000000	100000	10U
1,4-Dichlorobenzene	570000	10000000	100000	10U
2,2'-oxybis(1-Chloropropane)	2300000	10000000	10000	10U
2,4,5-Trichlorophenol	5600000	10000000	50000	25U
2,4,6-Trichlorophenol	62000	270000	10000	10U
2,4-Dichlorophenol	170000	3100000	10000	10U
2,4-Dimethylphenol	1100000	10000000	10000	10U
2,4-Dinitrophenol	110000	2100000	10000	25U
2,4-Dinitrotoluene	1000	4000	10000	10U
2,6-Dinitrotoluene	1000	4000	10000	10U
2-Chloronaphthalene	--	--	--	10U
2-Chlorophenol	280000	5200000	10000	10U
2-Methylnaphthalene	--	--	--	10U
2-Methylphenol	2800000	10000000	--	10U
2-Nitroaniline	--	--	--	25U
2-Nitrophenol	--	--	--	10U
3,3'-Dichlorobenzidine	2000	6000	100000	1J
3-Nitroaniline	--	--	--	1J
4,6-Dinitro-2-methylphenol	--	--	--	25U
4-Bromophenyl phenyl ether	--	--	--	10U
4-Chloro-3-methylphenol	10000000	10000000	100000	10U
4-Chloroaniline	230000	4200000	--	4J
4-Chlorophenyl phenyl ether	--	--	--	10U
4-Methylphenol	2800000	10000000	--	10U
4-Nitroaniline	--	--	--	25U
4-Nitrophenol	--	--	--	25U
Acenaphthene	3400000	10000000	100000	10U
Acenaphthylene	--	--	--	10U
Anthracene	10000000	10000000	100000	10U
Benzo(a)anthracene	900	4000	500000	10U
Benzo(a)pyrene	660	660	100000	10U

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID: FBNA17-103194
				Depth:
			Impact to	Zone**:
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date: 10/31/94
Benzo(b)fluoranthene	900	4000	50000	10U
Benzo(g,h,i)perylene	--	--	--	10U
Benzo(k)fluoranthene	900	4000	500000	10U
Butyl benzyl phthalate	1100000	10000000	100000	10U
Carbazole	--	--	--	10U
Chrysene	9000	40000	500000	10U
Di-n-butyl phthalate	5700000	10000000	100000	2J
Di-n-octyl phthalate	1100000	10000000	100000	10U
Dibenzo(a,h)anthracene	660	660	100000	10U
Dibenzofuran	--	--	--	10U
Diethyl phthalate	10000000	10000000	50000	10U
Dimethyl phthalate	10000000	10000000	50000	10U
Fluoranthene	2300000	10000000	100000	10U
Fluorene	2300000	10000000	100000	10U
Hexachlorobenzene	660	2000	100000	10U
Hexachlorobutadiene	1000	21000	100000	10U
Hexachlorocyclopentadiene	400000	7300000	100000	10U
Hexachloroethane	6000	100000	100000	10U
Indeno(1,2,3-cd)pyrene	900	4000	500000	10U
Isophorone	1100000	10000000	50000	10U
N-Nitroso-di-n-propylamine	660	660	10000	10U
N-Nitrosodiphenylamine	140000	600000	100000	10U
Naphthalene	230000	4200000	100000	10U
Nitrobenzene	28000	520000	10000	10U
Pentachlorophenol	6000	24000	100000	25U
Phenanthrene	--	--	--	10U
Phenol	10000000	10000000	50000	10U
Pyrene	1700000	10000000	100000	10U
bis(2-Chloroethoxy)methane	--	--	--	10U
bis(2-Chloroethyl)ether	660	3000	10000	10U
bis(2-Ethylhexyl)phthalate	49000	210000	100000	10U
Total Semivolatile Compounds				8

See last page for footnotes.

Table 5-3. Semivolatile Organic Compounds in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per kilogram (ug/kg) (equivalent to parts per billion [ppb]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) OLM01.8.
Sample results exceeding the NJDEP impact to groundwater criteria are shown in bold. Sample results exceeding the NJDEP non-residential criteria are underlined.
Sample results exceeding both criteria are shown in bold and underlined.

FBNA Indicates a field blank associated with non-aqueous samples.
FR Field replicate of previous sample.
U The compound was analyzed for, but not detected at the specific detection limit.
J Estimated result.
R Rejected result.
-- No applicable criteria.
* NJDEP Soil Cleanup Criteria, February 3, 1992; last revised February 3, 1994.
** Zone as defined in Table 3-2.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	3TFIRMB4	3TFIRMB4	AGTFSB1	AGTFSB1	AGTFSB2	AGTFSB3
				Depth:	02	06	02	06	04	02
			Impact to	Zone**:	N3TF	N3TF	AGTF	AGTF	AGTF	AGTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/17/94	10/17/94	10/20/94	10/20/94	10/28/94	10/27/94
4,4'-DDD	3000	12000	50000		3.9U	3.8UJ	4.3UJ	21UJ	19U	R
4,4'-DDE	2000	9000	50000		84	R	14J	21UJ	19U	20U
4,4'-DDT	2000	9000	500000		R	3.8UJ	R	21UJ	19U	R
Aldrin	40	170	50000		18J	2UJ	2.2UJ	17J	9.6U	10U
Aroclor-1016	490	2000	50000		39U	38UJ	43UJ	210UJ	190U	200U
Aroclor-1221	490	2000	50000		79U	78UJ	87UJ	440UJ	380U	400U
Aroclor-1232	490	2000	50000		39U	38UJ	43UJ	210UJ	190U	200U
Aroclor-1242	490	2000	50000		39U	38UJ	43UJ	210UJ	190U	200U
Aroclor-1248	490	2000	50000		39U	38UJ	43UJ	210UJ	190U	200U
Aroclor-1254	490	2000	50000		39U	38UJ	43UJ	210UJ	190U	200U
Aroclor-1260	490	2000	50000		39U	38UJ	43UJ	210UJ	190U	200U
Dieldrin	42	180	50000		3.9U	3.8UJ	4.3UJ	21UJ	19U	20U
Endosulfan I	--	--	--		2U	2UJ	R	11UJ	9.6U	10U
Endosulfan II	--	--	--		3.9U	3.8UJ	4.3UJ	21UJ	19U	20U
Endosulfan sulfate	--	--	--		R	3.8UJ	4.3UJ	21UJ	19U	20U
Endrin	17000	310000	50000		7.3J	3.8UJ	4.3UJ	21UJ	19U	20UJ
Endrin aldehyde	--	--	--		3.9U	3.8UJ	21J	21UJ	19U	20U
Endrin ketone	--	--	--		11	3.8UJ	4.3UJ	21UJ	19U	20U
Heptachlor	150	650	50000		2U	2UJ	2.2UJ	11UJ	9.6U	10U
Heptachlor epoxide	--	--	--		2U	2UJ	2.2UJ	11UJ	9.6U	10U
Methoxychlor	280000	5200000	50000		20U	210J	170J	110UJ	96U	100U
Toxaphene	100	200	50000		200U	200UJ	220UJ	1100UJ	960U	1000U
alpha-BHC	--	--	--		2U	5.6J	2.2UJ	11UJ	9.6U	10U
alpha-Chlordane	--	--	--		11	2.3J	5J	11UJ	9.6U	10U
beta-BHC	--	--	--		2U	2UJ	2.2UJ	11UJ	9.6U	10U
delta-BHC	--	--	--		2U	2UJ	2.2UJ	11UJ	9.6U	10U
gamma-BHC (Lindane)	520	2200	50000		2U	R	2.2UJ	11UJ	9.6U	10U
gamma-Chlordane	--	--	--		13J	2UJ	2J	11UJ	9.6U	10U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	AGTFSB4	AHTFSB1	AHTFSB2	AHTFSB4	AHTFSB4	APSB2
				Depth:	02	02	02	02	08	02
			Impact to	Zone**:	AGTF	AHTF	AHTF	AHTF	AHTF	AP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/20/94	10/19/94	10/14/94	10/14/94	10/14/94	10/26/94
4,4'-DDD	3000	12000	50000		3.9UJ	6.9J	19U	21	19U	R
4,4'-DDE	2000	9000	50000		3.9UJ	3.6UJ	19U	18U	19U	34
4,4'-DDT	2000	9000	500000		6.9J	4.9J	19U	18U	19U	120
Aldrin	40	170	50000		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
Aroclor-1016	490	2000	50000		39UJ	36UJ	190U	180U	190U	38U
Aroclor-1221	490	2000	50000		79UJ	73UJ	390U	370U	390U	77U
Aroclor-1232	490	2000	50000		39UJ	36UJ	190U	180U	190U	38U
Aroclor-1242	490	2000	50000		39UJ	36UJ	190U	180U	190U	38U
Aroclor-1248	490	2000	50000		39UJ	36UJ	190U	180U	190U	38U
Aroclor-1254	490	2000	50000		39UJ	36UJ	190U	180U	190U	38U
Aroclor-1260	490	2000	50000		39UJ	36UJ	190U	180U	190U	38U
Dieldrin	42	180	50000		3.9UJ	3.6UJ	19U	18U	19U	17
Endosulfan I	--	--	--		3.4J	1.8UJ	9.8U	9.4U	9.8U	2U
Endosulfan II	--	--	--		3.9UJ	3.6UJ	19U	18U	19U	3.8U
Endosulfan sulfate	--	--	--		R	3.6UJ	19U	18U	19U	3.8U
Endrin	17000	310000	50000		3.9UJ	3.6UJ	19U	18U	19U	3.8U
Endrin aldehyde	--	--	--		3.9UJ	3.6UJ	19U	18U	19U	3.8U
Endrin ketone	--	--	--		3.9J	3.6UJ	19U	18U	19U	3.7J
Heptachlor	150	650	50000		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
Heptachlor epoxide	--	--	--		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
Methoxychlor	280000	5200000	50000		20UJ	18UJ	98U	94U	98U	20U
Toxaphene	100	200	50000		200UJ	180UJ	980U	940U	980U	200U
alpha-BHC	--	--	--		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
alpha-Chlordane	--	--	--		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
beta-BHC	--	--	--		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
delta-BHC	--	--	--		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
gamma-BHC (Lindane)	520	2200	50000		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U
gamma-Chlordane	--	--	--		2UJ	1.8UJ	9.8U	9.4U	9.8U	2U

See last page for footnotes.

Table 5-4: Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	APSB5	APSB5	APSB6	APSB6	DTSB3	DTSB3FR
				Depth:	02	06	06	10	04	04
			Impact to	Zone**:	AP	AP	AP	AP	DT	DT
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/12/94	10/12/94	10/21/94	10/21/94	10/27/94	10/27/94
4,4'-DDD	3000	12000	50000		3.5U	21U	18UJ	21UJ	61J	19J
4,4'-DDE	2000	9000	50000		16J	21U	18UJ	21UJ	20UJ	20UJ
4,4'-DDT	2000	9000	500000		81J	21U	18UJ	58J	20UJ	20UJ
Aldrin	40	170	50000		1.8U	11U	9.4UJ	11UJ	10UJ	10UJ
Aroclor-1016	490	2000	50000		35U	210U	180UJ	210UJ	200UJ	200UJ
Aroclor-1221	490	2000	50000		71U	430U	370UJ	430UJ	410UJ	410UJ
Aroclor-1232	490	2000	50000		35U	210U	180UJ	210UJ	200UJ	200UJ
Aroclor-1242	490	2000	50000		35U	210U	180UJ	210UJ	200UJ	200UJ
Aroclor-1248	490	2000	50000		35U	210U	180UJ	210UJ	200UJ	200UJ
Aroclor-1254	490	2000	50000		35U	210U	180UJ	210UJ	200UJ	200UJ
Aroclor-1260	490	2000	50000		77	210U	180UJ	210UJ	200UJ	200UJ
Dieldrin	42	180	50000		8.3J	21U	18UJ	21UJ	20UJ	20UJ
Endosulfan I	--	--	--		1.8U	11U	9.4UJ	11UJ	10UJ	10UJ
Endosulfan II	--	--	--		3.5U	21U	18UJ	21UJ	20UJ	20UJ
Endosulfan sulfate	--	--	--		3.5U	21U	18UJ	21UJ	20UJ	20UJ
Endrin	17000	310000	50000		3.5U	21U	18UJ	21UJ	20UJ	20UJ
Endrin aldehyde	--	--	--		3.5U	88J	18UJ	21UJ	20UJ	20UJ
Endrin ketone	--	--	--		3.5U	36	18UJ	21UJ	10J	20UJ
Heptachlor	150	650	50000		R	11U	9.4UJ	11UJ	10UJ	10UJ
Heptachlor epoxide	--	--	--		1.8U	11U	9.4UJ	11UJ	10UJ	10UJ
Methoxychlor	280000	5200000	50000		18U	270J	94UJ	55J	100UJ	100UJ
Toxaphene	100	200	50000		180U	1100U	940UJ	1100UJ	1000UJ	1000UJ
alpha-BHC	--	--	--		1.8U	11U	9.4UJ	11UJ	10UJ	10UJ
alpha-Chlordane	--	--	--		7	39J	9.4UJ	21J	10UJ	10UJ
beta-BHC	--	--	--		1.8U	11U	9.4UJ	11UJ	10UJ	10UJ
delta-BHC	--	--	--		1.8U	11U	9.4UJ	11UJ	10UJ	10UJ
gamma-BHC (Lindane)	520	2200	50000		1.8U	11U	9.4UJ	11UJ	10UJ	10UJ
gamma-Chlordane	--	--	--		7.4J	11U	9.4UJ	11UJ	12J	10UJ

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	ECIRMB1	ECIRMB3	ECIRMB3	ECPSB1	ECPSB2	ECPSB2
			Impact to	Depth:	02	02	06	02	06	12
				Zone**:	U	N3TF	N3TF	ECP	ECP	ECP
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/24/94	10/19/94	10/19/94	10/20/94	10/20/94	10/20/94
4,4'-DDD	3000	12000	50000		62	4.6J	22UJ	3.8UJ	19UJ	R
4,4'-DDE	2000	9000	50000		8.9J	4.7	22UJ	8.7J	19UJ	23UJ
4,4'-DDT	2000	9000	500000		200	17J	22UJ	R	19UJ	23UJ
Aldrin	40	170	50000		2U	1.9U	11UJ	1.9UJ	9.8UJ	12UJ
Aroclor-1016	490	2000	50000		38U	37U	220UJ	38UJ	190UJ	230UJ
Aroclor-1221	490	2000	50000		78U	75U	440UJ	77UJ	390UJ	470UJ
Aroclor-1232	490	2000	50000		38U	37U	220UJ	38UJ	190UJ	230UJ
Aroclor-1242	490	2000	50000		38U	37U	220UJ	38UJ	190UJ	230UJ
Aroclor-1248	490	2000	50000		38U	37U	220UJ	38UJ	190UJ	230UJ
Aroclor-1254	490	2000	50000		38U	37U	220UJ	38UJ	190UJ	230UJ
Aroclor-1260	490	2000	50000		38U	37U	220UJ	38UJ	190UJ	230UJ
Dieldrin	42	180	50000		27	2.2J	22UJ	3.8UJ	19UJ	R
Endosulfan I	--	--	--		2U	1.9U	11UJ	1.9UJ	9.8UJ	12UJ
Endosulfan II	--	--	--		3.8U	3.7U	22UJ	3.8UJ	19UJ	23UJ
Endosulfan sulfate	--	--	--		3.8U	3.7U	22UJ	3.8UJ	19UJ	23UJ
Endrin	17000	310000	50000		3.8U	3.7U	22UJ	3.8UJ	19UJ	23UJ
Endrin aldehyde	--	--	--		R	3.7U	22UJ	3.8UJ	19UJ	23UJ
Endrin ketone	--	--	--		3.8U	3.7U	22UJ	1.7J	19UJ	23UJ
Heptachlor	150	650	50000		2U	1.9U	11UJ	1.9UJ	9.8UJ	12UJ
Heptachlor epoxide	--	--	--		2U	1.9U	11UJ	1.9UJ	9.8UJ	12UJ
Methoxychlor	280000	5200000	50000		130	19U	110UJ	91J	98UJ	120UJ
Toxaphene	100	200	50000		200U	190U	1100UJ	190UJ	980UJ	1200UJ
alpha-BHC	--	--	--		2U	R	11UJ	R	9.8UJ	12UJ
alpha-Chlordane	--	--	--		3.8U	2.5J	11UJ	1.9UJ	9.8UJ	12UJ
beta-BHC	--	--	--		2U	1.9U	11UJ	1.9UJ	9.8UJ	12UJ
delta-BHC	--	--	--		2U	1.9U	11UJ	1.9UJ	9.8UJ	12UJ
gamma-BHC (Lindane)	520	2200	50000		2U	1.9U	11UJ	1.9UJ	9.8UJ	12UJ
gamma-Chlordane	--	--	--		R	1.9U	11UJ	1.9UJ	9.8UJ	12UJ

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	ECPSB4	ECPSB5	GFSB1	GTFIRMB1	GTFIRMB2	GTFIRMB3
				Depth:	08	02	02	02	02	02
			Impact to	Zone**:	ECP	ECP	STF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/12/94	10/6/94	10/17/94	11/16/94
4,4'-DDD	3000	12000	50000		20UJ	R	72J	R	R	190
4,4'-DDE	2000	9000	50000		46J	5.3J	3.8UJ	8.5J	32J	38
4,4'-DDT	2000	9000	500000		20UJ	3.8UJ	75J	58J	84J	98J
Aldrin	40	170	50000		110J	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
Aroclor-1016	490	2000	50000		200UJ	38UJ	38UJ	37UJ	37UJ	180U
Aroclor-1221	490	2000	50000		400UJ	78UJ	76UJ	74UJ	76UJ	370U
Aroclor-1232	490	2000	50000		200UJ	38UJ	38UJ	37UJ	37UJ	180U
Aroclor-1242	490	2000	50000		200UJ	38UJ	38UJ	37UJ	37UJ	180U
Aroclor-1248	490	2000	50000		200UJ	38UJ	38UJ	37UJ	37UJ	180U
Aroclor-1254	490	2000	50000		200UJ	38UJ	38UJ	37UJ	37UJ	180U
Aroclor-1260	490	2000	50000		200UJ	38UJ	38UJ	37UJ	37UJ	180U
Dieldrin	42	180	50000		20UJ	3.8UJ	3.8UJ	4J	10J	21
Endosulfan I	--	--	--		35J	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
Endosulfan II	--	--	--		20UJ	3.8UJ	3.8UJ	3.7UJ	3.7UJ	18U
Endosulfan sulfate	--	--	--		20UJ	3.8UJ	3.8UJ	3.7UJ	3.7UJ	18U
Endrin	17000	310000	50000		20UJ	3.8UJ	3.8UJ	3.7UJ	3.7UJ	18U
Endrin aldehyde	--	--	--		20UJ	3.8UJ	3.8UJ	3.7UJ	3.7UJ	18U
Endrin ketone	--	--	--		20UJ	15J	6.4J	3.7UJ	3.7UJ	18U
Heptachlor	150	650	50000		10UJ	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
Heptachlor epoxide	--	--	--		10UJ	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
Methoxychlor	280000	5200000	50000		100UJ	20UJ	19UJ	19UJ	19UJ	100
Toxaphene	100	200	50000		1000UJ	200UJ	190UJ	190UJ	190UJ	930U
alpha-BHC	--	--	--		10UJ	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
alpha-Chlordane	--	--	--		39J	R	R	1.9UJ	1.9UJ	9.3U
beta-BHC	--	--	--		10UJ	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
delta-BHC	--	--	--		10UJ	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
gamma-BHC (Lindane)	520	2200	50000		10UJ	2UJ	1.9UJ	1.9UJ	1.9UJ	9.3U
gamma-Chlordane	--	--	--		63J	2UJ	1.9UJ	7.3J	1.9UJ	75

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB4	GTFIRMB5	GTFIRMB5FR	GTFIRMB5	GTFIRMB6
				Depth:	02	02	02	06	04
				Zone**:	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Impact to Groundwater	Date:	10/17/94	10/05/94	10/05/94	11/16/94	11/16/94
4,4'-DDD	3000	12000	50000		22J	4.1U	4.2U	12J	R
4,4'-DDE	2000	9000	50000		23J	4.8J	6.3J	4.3UJ	24U
4,4'-DDT	2000	9000	500000		6.9J	R	R	4.3UJ	24U
Aldrin	40	170	50000		2UJ	R	2.7J	2.2UJ	12U
Aroclor-1016	490	2000	50000		39UJ	41U	42U	43UJ	240U
Aroclor-1221	490	2000	50000		80UJ	83U	85U	88UJ	490U
Aroclor-1232	490	2000	50000		39UJ	41U	42U	43UJ	240U
Aroclor-1242	490	2000	50000		39UJ	41U	42U	43UJ	240U
Aroclor-1248	490	2000	50000		39UJ	41U	42U	43UJ	240U
Aroclor-1254	490	2000	50000		39UJ	41U	42U	43UJ	240U
Aroclor-1260	490	2000	50000		39UJ	41U	42U	43UJ	240U
Dieldrin	42	180	50000		3.9UJ	9.3	9.8	4.3UJ	32J
Endosulfan I	--	--	--		2UJ	5.4J	2.1U	2.2UJ	12U
Endosulfan II	--	--	--		3.9UJ	4.1U	4.2U	4.3UJ	24U
Endosulfan sulfate	--	--	--		3.9UJ	4.1U	4.2U	4.3UJ	24U
Endrin	17000	310000	50000		3.7J	4.1U	4.2U	4.3UJ	R
Endrin aldehyde	--	--	--		3.9UJ	9.6J	4.2UJ	4.4J	24U
Endrin ketone	--	--	--		3.9UJ	4.1U	4.2U	4.3UJ	24U
Heptachlor	150	650	50000		2UJ	2.1U	2.1U	2.2UJ	12U
Heptachlor epoxide	--	--	--		2UJ	R	5.1	2.2UJ	12J
Methoxychlor	280000	5200000	50000		20UJ	110J	83J	22UJ	210
Toxaphene	100	200	50000		200UJ	210U	210U	220UJ	1200U
alpha-BHC	--	--	--		2UJ	2.1U	2.1U	2.2UJ	12U
alpha-Chlordane	--	--	--		2UJ	2.1U	2.1U	2.2UJ	12U
beta-BHC	--	--	--		2UJ	2.1U	2.1U	2.2UJ	12U
delta-BHC	--	--	--		2UJ	2.1U	2.1U	2.2UJ	12U
gamma-BHC (Lindane)	520	2200	50000		2UJ	2.1U	2.1U	2.2UJ	12U
gamma-Chlordane	--	--	--		3.6J	23	23	R	R

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFIRMB7	GTFIRMB8	GTFIRMB8	GTFIRMB9	GTFSB1
			Impact to	Depth:	02	02	08	02	02
				Zone**:	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/17/94	10/18/94	10/18/94	10/05/94	10/10/94
4,4'-DDD	3000	12000	50000		3.7U	8.2J	4.3UJ	7.8J	18J
4,4'-DDE	2000	9000	50000		3.7U	3.8UJ	4.3UJ	7.3	4UJ
4,4'-DDT	2000	9000	500000		13J	3.8UJ	11J	35	4.6J
Aldrin	40	170	50000		1.9U	2UJ	2.2UJ	2.1U	2UJ
Aroclor-1016	490	2000	50000		37U	38UJ	43UJ	41U	40UJ
Aroclor-1221	490	2000	50000		76U	77UJ	87UJ	83U	81UJ
Aroclor-1232	490	2000	50000		37U	38UJ	43UJ	41U	40UJ
Aroclor-1242	490	2000	50000		37U	38UJ	43UJ	41U	40UJ
Aroclor-1248	490	2000	50000		37U	38UJ	43UJ	41U	40UJ
Aroclor-1254	490	2000	50000		37U	38UJ	43UJ	41U	40UJ
Aroclor-1260	490	2000	50000		37U	38UJ	43UJ	41U	40UJ
Dieldrin	42	180	50000		4.4	3.8UJ	11J	4.1U	4UJ
Endosulfan I	--	--	--		1.9U	2UJ	2.2UJ	2.1U	2UJ
Endosulfan II	--	--	--		3.7U	3.8UJ	4.3UJ	4.1U	4UJ
Endosulfan sulfate	--	--	--		3.7U	3.8UJ	4.3UJ	4.1U	R
Endrin	17000	310000	50000		3.7U	3.8UJ	4.3UJ	4.1U	4UJ
Endrin aldehyde	--	--	--		3.7U	.79J	4.3UJ	4.1U	R
Endrin ketone	--	--	--		3.7U	3.8UJ	4.3UJ	4.1U	4UJ
Heptachlor	150	650	50000		1.9U	2UJ	2.2UJ	2.1U	2UJ
Heptachlor epoxide	--	--	--		5.3J	2UJ	2.2UJ	24	2UJ
Methoxychlor	280000	5200000	50000		19U	20UJ	22UJ	21U	R
Toxaphene	100	200	50000		190U	200UJ	220UJ	210U	200UJ
alpha-BHC	--	--	--		1.9U	2UJ	2.2UJ	2.1U	2UJ
alpha-Chlordane	--	--	--		1.9U	1.5J	R	2.1U	2UJ
beta-BHC	--	--	--		1.9U	2UJ	2.2UJ	2.1U	2UJ
delta-BHC	--	--	--		1.9U	2UJ	2.2UJ	2.1U	2UJ
gamma-BHC (Lindane)	520	2200	50000		1.9U	2UJ	2.2UJ	2.1U	2UJ
gamma-Chlordane	--	--	--		12J	3.3J	6.8J	35	2.5J

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB1	GTFSB2	GTFSB3	GTFSB4	GTFSB5	GTFSB6
				Depth:	08	02	02	02	02	02
			Impact to	Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/10/94	10/13/94	10/10/94	10/13/94	10/13/94	10/11/94
4,4'-DDD	3000	12000	50000		R	20U	3.9U	81	3.5UJ	14
4,4'-DDE	2000	9000	50000		R	20U	6.1	17	3.5UJ	18
4,4'-DDT	2000	9000	500000		R	100J	20	360	3.5UJ	120
Aldrin	40	170	50000		R	10U	2U	3J	1.8UJ	1.9U
Aroclor-1016	490	2000	50000		R	200U	39U	37U	35UJ	37U
Aroclor-1221	490	2000	50000		R	410U	79U	75U	72UJ	76U
Aroclor-1232	490	2000	50000		R	200U	39U	37U	35UJ	37U
Aroclor-1242	490	2000	50000		R	200U	39U	37U	35UJ	37U
Aroclor-1248	490	2000	50000		R	200U	39U	37U	35UJ	37U
Aroclor-1254	490	2000	50000		R	200U	39U	37U	35UJ	37U
Aroclor-1260	490	2000	50000		R	200U	39U	37U	35UJ	37U
Dieldrin	42	180	50000		R	20U	3.9U	12	3.5UJ	6.4
Endosulfan I	--	--	--		R	10U	2U	1.9U	1.8UJ	1.9U
Endosulfan II	--	--	--		R	20U	3.9U	3.7U	3.5UJ	3.7U
Endosulfan sulfate	--	--	--		R	20U	3.9U	3.7U	3.5UJ	3.7U
Endrin	17000	310000	50000		R	20U	3.9U	3.7U	3.5UJ	3.7U
Endrin aldehyde	--	--	--		R	20U	3.9U	3.7U	3.5UJ	3.7U
Endrin ketone	--	--	--		R	20U	3.9U	4.4	3.5UJ	94
Heptachlor	150	650	50000		R	10U	2U	1.9U	1.8UJ	1.9U
Heptachlor epoxide	--	--	--		R	10U	2U	R	1.8UJ	1.9U
Methoxychlor	280000	5200000	50000		R	100U	20U	19U	18UJ	19U
Toxaphene	100	200	50000		R	1000U	200U	190U	180UJ	190U
alpha-BHC	--	--	--		R	10U	2U	1.9U	1.8UJ	1.9U
alpha-Chlordane	--	--	--		R	10U	2U	9.6	1.8UJ	9.6
beta-BHC	--	--	--		R	10U	2U	1.9U	1.8UJ	1.9U
delta-BHC	--	--	--		R	10U	2U	1.9U	1.8UJ	1.9U
gamma-BHC (Lindane)	520	2200	50000		R	10U	2U	1.9U	1.8UJ	1.9U
gamma-Chlordane	--	--	--		R	10U	2U	27J	1.8UJ	2.2J

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	GTFSB7	GTFSB7	GTFSB8	GTFSB8	GTFSB9	GTFSB9
				Depth:	02	08	04	08	02	08
				Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (ug/kg)	Residential	Non-Residential	Impact to Groundwater	Date:	10/11/94	10/13/94	10/13/94	10/13/94	10/13/94	11/16/94
4,4'-DDD	3000	12000	50000		15	22U	19U	22U	17J	19U
4,4'-DDE	2000	9000	50000		3.8U	22U	19U	22U	12	19U
4,4'-DDT	2000	9000	500000		3.8U	22U	19U	22U	19	19U
Aldrin	40	170	50000		2U	12U	9.8U	11U	3.9	9.9U
Aroclor-1016	490	2000	50000		38U	220U	190U	220U	36U	190U
Aroclor-1221	490	2000	50000		77U	460U	390U	450U	73U	390U
Aroclor-1232	490	2000	50000		38U	220U	190U	220U	36U	190U
Aroclor-1242	490	2000	50000		38U	220U	190U	220U	36U	190U
Aroclor-1248	490	2000	50000		38U	220U	190U	220U	36U	190U
Aroclor-1254	490	2000	50000		38U	220U	190U	220U	36U	190U
Aroclor-1260	490	2000	50000		38U	220U	190U	220U	36U	190U
Dieldrin	42	180	50000		3.8U	22U	19U	22U	3.6U	19U
Endosulfan I	--	--	--		2U	12U	9.8U	11U	1.8U	9.9U
Endosulfan II	--	--	--		3.8U	22U	19U	22U	3.6U	19U
Endosulfan sulfate	--	--	--		3.8U	22U	19U	22U	3.6U	19U
Endrin	17000	310000	50000		3.8U	22U	19U	22U	3.6U	19U
Endrin aldehyde	--	--	--		3.8U	22U	19U	22U	3.6U	26J
Endrin ketone	--	--	--		3.8U	22U	19U	22U	3.6U	19U
Heptachlor	150	650	50000		2U	12U	9.8U	11U	1.8U	9.9U
Heptachlor epoxide	--	--	--		2U	12U	9.8U	11U	1.8U	9.9U
Methoxychlor	280000	5200000	50000		20U	120U	98U	110U	18U	99U
Toxaphene	100	200	50000		200U	1200U	980U	1100U	180U	990U
alpha-BHC	--	--	--		2U	12U	9.8U	11U	1.8U	9.9U
alpha-Chlordane	--	--	--		2.4	12U	9.8U	11U	1.8U	9.9U
beta-BHC	--	--	--		2U	12U	9.8U	11U	1.8U	9.9U
delta-BHC	--	--	--		2U	12U	9.8U	11U	1.8U	9.9U
gamma-BHC (Lindane)	520	2200	50000		2U	12U	9.8U	11U	1.8U	9.9U
gamma-Chlordane	--	--	--		2U	12U	9.8U	12J	1.8U	9.9U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LAIRMB1	LOSB1	LOSB1	LOSB2	LOSB2	LOSB3
				Depth:	02	04	08	04	08	02
			Impact to	Zone**:	LO	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/24/94	10/25/94	10/25/94	10/14/94	10/14/94	10/24/94
4,4'-DDD	3000	12000	50000		86000	19UJ	19U	43	31U	4U
4,4'-DDE	2000	9000	50000		R	19UJ	19U	23U	31U	4U
4,4'-DDT	2000	9000	500000		46000	19UJ	19U	23U	130	4U
Aldrin	40	170	50000		450U	32J	9.8U	12U	16U	2.1U
Aroclor-1016	490	2000	50000		8800U	190UJ	190U	230U	310U	40U
Aroclor-1221	490	2000	50000		18000U	390UJ	390U	470U	620U	82U
Aroclor-1232	490	2000	50000		8800U	190UJ	190U	230U	310U	40U
Aroclor-1242	490	2000	50000		8800U	190UJ	190U	230U	310U	40U
Aroclor-1248	490	2000	50000		8800U	190UJ	190U	230U	310U	40U
Aroclor-1254	490	2000	50000		8800U	190UJ	190U	230U	310U	40U
Aroclor-1260	490	2000	50000		8800U	190UJ	190U	230U	310U	40U
Dieldrin	42	180	50000		5600J	19UJ	19U	23U	31U	4U
Endosulfan I	--	--	--		450U	9.9UJ	9.8U	12U	16U	2.1U
Endosulfan II	--	--	--		880U	19UJ	19U	23U	31U	4U
Endosulfan sulfate	--	--	--		880U	19UJ	19U	23U	31U	4U
Endrin	17000	310000	50000		880U	19UJ	19U	23U	31U	4U
Endrin aldehyde	--	--	--		880U	R	19U	23U	R	4U
Endrin ketone	--	--	--		R	19UJ	19U	23U	74J	4U
Heptachlor	150	650	50000		450U	9.9UJ	9.8U	12U	16U	2.1U
Heptachlor epoxide	--	--	--		450U	9.9UJ	9.8U	12U	16U	2.1U
Methoxychlor	280000	5200000	50000		4500U	99UJ	98U	120U	160U	21U
Toxaphene	100	200	50000		45000U	990UJ	980U	1200U	1600U	210U
alpha-BHC	--	--	--		450U	9.9UJ	9.8U	12U	16U	2.1U
alpha-Chlordane	--	--	--		R	31J	12J	12U	16U	2.1U
beta-BHC	--	--	--		450U	9.9UJ	9.8U	12U	16U	2.1U
delta-BHC	--	--	--		450U	9.9UJ	9.8U	12U	16U	2.1U
gamma-BHC (Lindane)	520	2200	50000		450U	9.9UJ	9.8U	12U	16U	2.1U
gamma-Chlordane	--	--	--		1800	22J	9.8U	12U	16U	2.1U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB4	LOSB4	LOSB8	LOSB9	LOSB9	LOSB10	LOSB10	LOSB11
				Depth:	02	06	02	02	06	04	08	02
				Zone**:	LO	LO	SS	LO	LO	LO	LO	LO
Analyte (ug/kg)	Residential	Non-Residential	Impact to Groundwater	Date:	10/24/94	10/24/94	10/24/94	10/25/94	10/25/94	10/28/94	10/28/94	10/25/94
4,4'-DDD	3000	12000	50000		52	18UJ	3.8UJ	21UJ	18UJ	76J	19U	230
4,4'-DDE	2000	9000	50000		5.4J	18UJ	3.8UJ	21UJ	18UJ	18U	19U	31J
4,4'-DDT	2000	9000	500000		3.5U	18UJ	3.8UJ	21UJ	18UJ	18U	19U	22U
Aldrin	40	170	50000		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
Aroclor-1016	490	2000	50000		35U	180UJ	38UJ	210UJ	180UJ	180U	190U	220U
Aroclor-1221	490	2000	50000		71U	360UJ	77UJ	430UJ	370UJ	370U	390U	440U
Aroclor-1232	490	2000	50000		35U	180UJ	38UJ	210UJ	180UJ	180U	190U	220U
Aroclor-1242	490	2000	50000		35U	180UJ	38UJ	210UJ	180UJ	180U	190U	220U
Aroclor-1248	490	2000	50000		35U	180UJ	38UJ	210UJ	180UJ	180U	190U	220U
Aroclor-1254	490	2000	50000		35U	180UJ	38UJ	210UJ	180UJ	180U	190U	220U
Aroclor-1260	490	2000	50000		35U	180UJ	38UJ	210UJ	180UJ	180U	190U	220U
Dieldrin	42	180	50000		3.8	18UJ	14J	21UJ	18UJ	18U	19U	22U
Endosulfan I	--	--	--		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
Endosulfan II	--	--	--		3.5U	18UJ	3.8UJ	21UJ	18UJ	18U	19U	22U
Endosulfan sulfate	--	--	--		3.5U	18UJ	3.8UJ	21UJ	18UJ	18U	19U	22U
Endrin	17000	310000	50000		3.5U	18UJ	3.8UJ	21UJ	18UJ	18U	19U	22U
Endrin aldehyde	--	--	--		R	18UJ	R	21UJ	18UJ	18U	19U	22U
Endrin ketone	--	--	--		3.5U	18UJ	3.8UJ	21UJ	18UJ	18U	19U	22U
Heptachlor	150	650	50000		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
Heptachlor epoxide	--	--	--		1.8U	9UJ	8.6J	11UJ	9.4UJ	9.5U	9.9U	11U
Methoxychlor	280000	5200000	50000		18U	90UJ	20UJ	110UJ	94UJ	95U	99U	110U
Toxaphene	100	200	50000		180U	900UJ	200UJ	1100UJ	940UJ	950U	990U	1100U
alpha-BHC	--	--	--		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
alpha-Chlordane	--	--	--		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
beta-BHC	--	--	--		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
delta-BHC	--	--	--		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
gamma-BHC (Lindane)	520	2200	50000		1.8U	9UJ	2UJ	11UJ	9.4UJ	9.5U	9.9U	11U
gamma-Chlordane	--	--	--		1.8U	9UJ	4J	11UJ	9.4UJ	9.5U	9.9U	11U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/kg)	NJDEP Soil Cleanup Criteria * Residential	Non-Residential	Impact to Groundwater	Sample ID: LOSB12 Depth: 02 Zone**: LO Date: 10/25/94	LOSB12 06 LO 10/25/94	LOSB13 02 LO 10/31/94	LOSB13FR 02 LO 10/31/94	LOSB13 08 LO 10/31/94	LOSB14 02 LO 10/25/94
4,4'-DDD	3000	12000	50000	4.6UJ	26J	19U	19U	19U	4.4UJ
4,4'-DDE	2000	9000	50000	4.6UJ	21UJ	21	20	19U	4.4UJ
4,4'-DDT	2000	9000	500000	4.6UJ	21UJ	19U	19U	19U	R
Aldrin	40	170	50000	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
Aroclor-1016	490	2000	50000	46UJ	210UJ	190U	190U	190U	44UJ
Aroclor-1221	490	2000	50000	94UJ	430UJ	390U	390U	380U	90UJ
Aroclor-1232	490	2000	50000	46UJ	210UJ	190U	190U	190U	44UJ
Aroclor-1242	490	2000	50000	46UJ	210UJ	190U	190U	190U	44UJ
Aroclor-1248	490	2000	50000	46UJ	210UJ	190U	190U	190U	44UJ
Aroclor-1254	490	2000	50000	46UJ	210UJ	190U	190U	190U	44UJ
Aroclor-1260	490	2000	50000	46UJ	210UJ	190U	190U	190U	44UJ
Dieldrin	42	180	50000	4.6UJ	21UJ	19U	19U	19U	4.4UJ
Endosulfan I	--	--	--	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
Endosulfan II	--	--	--	4.6UJ	21UJ	19U	19U	19U	4.4UJ
Endosulfan sulfate	--	--	--	4.6UJ	21UJ	19U	19U	19U	4.4UJ
Endrin	17000	310000	50000	4.6UJ	21UJ	19U	19U	19U	4.4UJ
Endrin aldehyde	--	--	--	4.9J	21UJ	19U	19U	19U	R
Endrin ketone	--	--	--	R	21UJ	19U	19U	19U	4.4UJ
Heptachlor	150	650	50000	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
Heptachlor epoxide	--	--	--	R	11UJ	9.8U	9.8U	9.6U	2.3UJ
Methoxychlor	280000	5200000	50000	24UJ	110UJ	98U	98U	96U	93J
Toxaphene	100	200	50000	240UJ	1100UJ	980U	980U	960U	230UJ
alpha-BHC	--	--	--	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
alpha-Chlordane	--	--	--	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
beta-BHC	--	--	--	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
delta-BHC	--	--	--	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
gamma-BHC (Lindane)	520	2200	50000	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ
gamma-Chlordane	--	--	--	2.4UJ	11UJ	9.8U	9.8U	9.6U	2.3UJ

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	LOSB15	LOSB16	LOSB17	LOSB18	LOSB18	LOSB18FR	MBSB1
				Depth:	02	04	02	02	08	08	02
				Zone**:	LO	LO	LO	LO	LO	LO	MB
Analyte (ug/kg)	Residential	Non-Residential	Impact to Groundwater	Date:	10/24/94	10/25/94	10/24/94	10/24/94	10/24/94	10/24/94	10/25/94
4,4'-DDD	3000	12000	50000		210	18U	3.9U	4.1	22UJ	4.2UJ	19UJ
4,4'-DDE	2000	9000	50000		21J	18U	3.9U	3.8U	22UJ	4.2UJ	19UJ
4,4'-DDT	2000	9000	500000		7.6U	18U	3.9U	3.8U	22UJ	R	19UJ
Aldrin	40	170	50000		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
Aroclor-1016	490	2000	50000		76U	180U	39U	38U	220UJ	42UJ	190UJ
Aroclor-1221	490	2000	50000		160U	370U	79U	76U	440UJ	86UJ	380UJ
Aroclor-1232	490	2000	50000		76U	180U	39U	38U	220UJ	42UJ	190UJ
Aroclor-1242	490	2000	50000		76U	180U	39U	38U	220UJ	42UJ	190UJ
Aroclor-1248	490	2000	50000		76U	180U	39U	38U	220UJ	42UJ	190UJ
Aroclor-1254	490	2000	50000		76U	180U	39U	38U	220UJ	42UJ	190UJ
Aroclor-1260	490	2000	50000		76U	180U	39U	38U	220UJ	42UJ	190UJ
Dieldrin	42	180	50000		24	18U	3.9U	3.8U	22UJ	4.2UJ	19UJ
Endosulfan I	--	--	--		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
Endosulfan II	--	--	--		7.6U	18U	3.9U	3.8U	22UJ	4.2UJ	19UJ
Endosulfan sulfate	--	--	--		7.6U	18U	3.9U	3.8U	22UJ	4.2UJ	19UJ
Endrin	17000	310000	50000		7.6U	18U	3.9U	3.8U	22UJ	4.2UJ	19UJ
Endrin aldehyde	--	--	--		9.3	18U	3.9U	3.8U	22UJ	R	19UJ
Endrin ketone	--	--	--		11J	18U	3.9U	3.8U	22UJ	6.5J	19UJ
Heptachlor	150	650	50000		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
Heptachlor epoxide	--	--	--		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
Methoxychlor	280000	5200000	50000		39U	94U	20U	19U	110UJ	22UJ	97UJ
Toxaphene	100	200	50000		390U	940U	200U	190U	1100UJ	220UJ	970UJ
alpha-BHC	--	--	--		R	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
alpha-Chlordane	--	--	--		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
beta-BHC	--	--	--		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
delta-BHC	--	--	--		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
gamma-BHC (Lindane)	520	2200	50000		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ
gamma-Chlordane	--	--	--		3.9U	9.4U	2U	1.9U	11UJ	2.2UJ	9.7UJ

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	MBSB2	MBSB3	MBSB3	MBSB3FR	MDCBSB2	N2TFSB2
			Impact to	Depth:	02	06	10	10	03	02
				Zone**:	MB	MB	MB	MB	MDC	N2TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/21/94	10/25/94	10/25/94	10/25/94	10/11/94	10/19/94
4,4'-DDD	3000	12000	50000		7.9J	24UJ	23U	23UJ	3.6U	4.1U
4,4'-DDE	2000	9000	50000		3.8UJ	24U	23U	23UJ	3.6U	48
4,4'-DDT	2000	9000	500000		3.8UJ	R	23U	23UJ	3.6U	54
Aldrin	40	170	50000		2UJ	R	12U	12UJ	1.8U	2.5J
Aroclor-1016	490	2000	50000		38UJ	240UJ	230U	230UJ	36U	41U
Aroclor-1221	490	2000	50000		77UJ	490UJ	470U	460UJ	73U	83U
Aroclor-1232	490	2000	50000		38UJ	240UJ	230U	230UJ	36U	41U
Aroclor-1242	490	2000	50000		38UJ	240UJ	230U	230UJ	36U	41U
Aroclor-1248	490	2000	50000		38UJ	240UJ	230U	230UJ	36U	41U
Aroclor-1254	490	2000	50000		38UJ	240UJ	230U	230UJ	36U	41U
Aroclor-1260	490	2000	50000		38UJ	240UJ	230U	230UJ	36U	41U
Dieldrin	42	180	50000		3.8UJ	R	23U	23UJ	3.6U	4.1U
Endosulfan I	--	--	--		2UJ	12UJ	12U	12UJ	1.8U	2.1U
Endosulfan II	--	--	--		3.8UJ	24UJ	23U	23UJ	3.6U	4.1U
Endosulfan sulfate	--	--	--		3.8UJ	24UJ	23U	23UJ	3.6U	4.1U
Endrin	17000	310000	50000		3.8UJ	R	23U	23UJ	3.6U	4.1U
Endrin aldehyde	--	--	--		3.8UJ	24UJ	23U	23UJ	3.6U	4.1U
Endrin ketone	--	--	--		3.8UJ	24UJ	23U	23UJ	3.6U	4.1U
Heptachlor	150	650	50000		2UJ	R	12U	12UJ	1.8U	2.1U
Heptachlor epoxide	--	--	--		2UJ	12UJ	12U	12UJ	1.8U	2.1U
Methoxychlor	280000	5200000	50000		20UJ	120UJ	120U	26J	18U	21U
Toxaphene	100	200	50000		200UJ	1200UJ	1200U	1200UJ	180U	210U
alpha-BHC	--	--	--		2UJ	12UJ	12U	12UJ	1.8U	2.1U
alpha-Chlordane	--	--	--		2UJ	12UJ	13J	12UJ	1.8U	2.1U
beta-BHC	--	--	--		2UJ	57J	12U	12UJ	1.8U	2.1U
delta-BHC	--	--	--		2UJ	12UJ	12U	12UJ	1.8U	2.1U
gamma-BHC (Lindane)	520	2200	50000		2UJ	R	12U	12UJ	1.8U	2.1U
gamma-Chlordane	--	--	--		2UJ	12UJ	12U	12UJ	1.8U	2.1U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N2TFSB4	N2TFSB4	N2TFSB5	N2TFSB5	N3TFSB1	N3TFSB2
				Depth:	02	06	02	06	02	02
				Zone**:	N2TF	N2TF	N2TF	N2TF	N3TF	AP
Analyte (ug/kg)	Residential	Non-Residential	Impact to Groundwater	Date:	10/28/94	10/28/94	10/19/94	10/19/94	10/18/94	10/19/94
4,4'-DDD	3000	12000	50000		R	21U	3.7UJ	3.7U	260	130
4,4'-DDE	2000	9000	50000		22U	21U	3.7UJ	7.7J	39	3.7UJ
4,4'-DDT	2000	9000	500000		22U	21U	3.7UJ	3.7U	R	R
Aldrin	40	170	50000		11U	11U	1.9UJ	1.9U	1.9U	1.9UJ
Aroclor-1016	490	2000	50000		220U	210U	37UJ	37U	37U	37UJ
Aroclor-1221	490	2000	50000		440U	420U	76UJ	76U	75U	76UJ
Aroclor-1232	490	2000	50000		220U	210U	37UJ	37U	37U	37UJ
Aroclor-1242	490	2000	50000		220U	210U	37UJ	37U	37U	37UJ
Aroclor-1248	490	2000	50000		220U	210U	37UJ	37U	37U	37UJ
Aroclor-1254	490	2000	50000		220U	210U	37UJ	37U	37U	45J
Aroclor-1260	490	2000	50000		220U	210U	37UJ	37U	37U	37UJ
Dieldrin	42	180	50000		22U	21U	3.7UJ	3.7U	R	5.9J
Endosulfan I	--	--	--		11U	11U	1.9UJ	1.9U	1.9U	1.9UJ
Endosulfan II	--	--	--		22U	21U	3.7UJ	3.7U	3.7U	3.7UJ
Endosulfan sulfate	--	--	--		24	21U	R	3.7U	3.7U	3.7UJ
Endrin	17000	310000	50000		22U	21U	3.7UJ	3.7U	R	3.7UJ
Endrin aldehyde	--	--	--		R	21U	3.7UJ	3.7U	10J	3.7UJ
Endrin ketone	--	--	--		22U	21U	3.7UJ	3.7U	3.7U	3.7UJ
Heptachlor	150	650	50000		11U	11U	1.9UJ	1.9U	1.9U	1.9UJ
Heptachlor epoxide	--	--	--		11U	11U	R	1.9U	1.9U	1.9UJ
Methoxychlor	280000	5200000	50000		110U	110U	19UJ	120J	230J	19UJ
Toxaphene	100	200	50000		1100U	1100U	190UJ	190U	190U	190UJ
alpha-BHC	--	--	--		11U	11U	1.9UJ	1.9U	R	1.9UJ
alpha-Chlordane	--	--	--		R	11U	1.9UJ	3J	2.8J	1.9UJ
beta-BHC	--	--	--		11U	11U	1.9UJ	5.1J	4.2J	1.9UJ
delta-BHC	--	--	--		11U	11U	1.9UJ	1.9U	1.9U	1.9UJ
gamma-BHC (Lindane)	520	2200	50000		11U	11U	1.9UJ	1.9U	1.9U	1.9UJ
gamma-Chlordane	--	--	--		R	11U	1.9UJ	1.9U	5J	1.9UJ

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB2	N3TFSB2FR	N3TFSB3	N3TFSB4	N3TFSB5	N3TFSB6
				Depth:	06	06	02	02	08	02
			Impact to	Zone**:	AP	AP	N3TF	N3TF	N3TF	N3TF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/19/94	10/19/94	10/13/94	10/17/94	10/19/94	10/18/94
4,4'-DDD	3000	12000	50000		4.5UJ	47J	R	3.9U	3.9U	99
4,4'-DDE	2000	9000	50000		4.5U	21U	39	21J	3.9U	54
4,4'-DDT	2000	9000	500000		4.5U	21U	57J	24J	3.9U	20U
Aldrin	40	170	50000		2.3U	11U	2.1	2U	2UJ	10U
Aroclor-1016	490	2000	50000		45U	210U	40U	39U	39U	200U
Aroclor-1221	490	2000	50000		91U	430U	81U	79U	79U	400U
Aroclor-1232	490	2000	50000		45U	210U	40U	39U	39U	200U
Aroclor-1242	490	2000	50000		45U	210U	40U	39U	39U	200U
Aroclor-1248	490	2000	50000		45U	210U	40U	39U	39U	200U
Aroclor-1254	490	2000	50000		45U	210U	40U	39U	39U	200U
Aroclor-1260	490	2000	50000		45U	210U	40U	39U	39U	200U
Dieldrin	42	180	50000		4.5U	21U	9.1	3.9U	3.9U	20U
Endosulfan I	--	--	--		2.3U	11U	2U	2U	2U	10U
Endosulfan II	--	--	--		20	21U	4U	3.9U	3.9U	20U
Endosulfan sulfate	--	--	--		4.5U	21U	4U	3.9U	3.9U	20U
Endrin	17000	310000	50000		4.5U	21U	4U	3.9U	3.9U	20U
Endrin aldehyde	--	--	--		4.5U	21U	4U	3.9U	3.9U	20U
Endrin ketone	--	--	--		8.8J	21U	4U	3.9U	3.9U	20U
Heptachlor	150	650	50000		2.3U	11U	2U	R	2U	10U
Heptachlor epoxide	--	--	--		2.3U	11U	2U	2U	2U	10U
Methoxychlor	280000	5200000	50000		23U	110U	20U	20U	20U	100U
Toxaphene	100	200	50000		230U	1100U	200U	200U	200U	1000U
alpha-BHC	--	--	--		2.3U	11U	2U	2U	2U	10U
alpha-Chlordane	--	--	--		2.3U	11U	2U	R	R	10U
beta-BHC	--	--	--		2.3U	11U	2U	2U	2U	10U
delta-BHC	--	--	--		2.3U	11U	2U	2U	2U	10U
gamma-BHC (Lindane)	520	2200	50000		2.3U	11U	2U	2U	2U	10U
gamma-Chlordane	--	--	--		2.3U	11U	7.9J	2U	2U	10U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	N3TFSB7	N3TFSB8	N3TFSB8	N3TFSB9	PN1SB2	PN1SB2
				Depth:	02	02	06	02	04	08
			Impact to	Zone**:	N3TF	N3TF	N3TF	N3TF	P1	P1
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/18/94	10/18/94	10/18/94	11/02/94	11/02/94	11/02/94
4,4'-DDD	3000	12000	50000		35J	19U	4UJ	240J	26	19U
4,4'-DDE	2000	9000	50000		62J	22	4.3J	260	18U	19U
4,4'-DDT	2000	9000	500000		4.1U	19U	4UJ	290J	18U	19U
Aldrin	40	170	50000		41J	10U	2.1UJ	11U	9.5U	9.9U
Aroclor-1016	490	2000	50000		41U	190U	40UJ	210U	180U	190U
Aroclor-1221	490	2000	50000		83U	390U	81UJ	420U	370U	390U
Aroclor-1232	490	2000	50000		41U	190U	40UJ	210U	180U	190U
Aroclor-1242	490	2000	50000		41U	190U	40UJ	210U	180U	190U
Aroclor-1248	490	2000	50000		41U	190U	40UJ	210U	180U	190U
Aroclor-1254	490	2000	50000		41U	190U	40UJ	210U	180U	190U
Aroclor-1260	490	2000	50000		41U	190U	40UJ	210U	180U	190U
Dieldrin	42	180	50000		4.1U	19U	4UJ	21U	18U	19U
Endosulfan I	--	--	--		2.1U	10U	2.1UJ	11U	9.5U	9.9U
Endosulfan II	--	--	--		4.1U	19U	4UJ	21U	18U	19U
Endosulfan sulfate	--	--	--		4.1U	19U	4UJ	21U	18U	19U
Endrin	17000	310000	50000		4.1U	19U	4UJ	21U	26J	19U
Endrin aldehyde	--	--	--		4.1U	19U	4UJ	21U	18U	19U
Endrin ketone	--	--	--		R	19U	4UJ	21U	18U	19U
Heptachlor	150	650	50000		2.1U	10U	2.1UJ	11U	9.5U	9.9U
Heptachlor epoxide	--	--	--		2.1U	10U	2.1UJ	11U	9.5U	9,9U
Methoxychlor	280000	5200000	50000		21U	100U	21UJ	110U	95U	99U
Toxaphene	100	200	50000		210U	1000U	210UJ	1100U	950U	990U
alpha-BHC	--	--	--		2.1U	10U	2.1UJ	11U	9.5U	9.9U
alpha-Chlordane	--	--	--		R	10U	3.1J	11U	9.5U	9.9U
beta-BHC	--	--	--		R	10U	2.1UJ	11U	9.5U	9.9U
delta-BHC	--	--	--		R	10U	2.1UJ	11U	9.5U	9.9U
gamma-BHC (Lindane)	520	2200	50000		2.1U	10U	2.1UJ	11U	9.5U	9.9U
gamma-Chlordane	--	--	--		23J	10U	2.1UJ	11U	9.5U	9.9U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	PSSB1	PSSB1	SSB1	SSB3	SSB3	STFSB1	STFSB1
				Depth:	02	06	16	06	10	02	06
			Impact to	Zone**:	MB	MB	SS	SS	SS	STF	STF
Analyte (ug/kg)	Residential	Non-Residential	Groundwater	Date:	10/31/94	10/31/94	10/24/94	10/24/94	10/24/94	10/26/94	10/26/94
4,4'-DDD	3000	12000	50000		7.2	19U	3.8UJ	27UJ	4.3UJ	3.8UJ	22U
4,4'-DDE	2000	9000	50000		3.8U	19U	R	27UJ	4.3UJ	3.8UJ	22U
4,4'-DDT	2000	9000	500000		3.8U	19U	3.8UJ	27UJ	4.3UJ	3.8UJ	22U
Aldrin	40	170	50000		2U	9.9U	2UJ	14UJ	2.2UJ	1.9UJ	11U
Aroclor-1016	490	2000	50000		38U	190U	38UJ	270UJ	43UJ	38UJ	220U
Aroclor-1221	490	2000	50000		78U	390U	78UJ	550UJ	88UJ	77UJ	450U
Aroclor-1232	490	2000	50000		38U	190U	38UJ	270UJ	43UJ	38UJ	220U
Aroclor-1242	490	2000	50000		38U	190U	38UJ	270UJ	43UJ	38UJ	220U
Aroclor-1248	490	2000	50000		38U	190U	38UJ	270UJ	43UJ	38UJ	220U
Aroclor-1254	490	2000	50000		38U	190U	38UJ	270UJ	43UJ	38UJ	220U
Aroclor-1260	490	2000	50000		38U	190U	38UJ	270UJ	43UJ	38UJ	220U
Dieldrin	42	180	50000		3.8U	19U	15J	27UJ	4.3UJ	3.8UJ	22U
Endosulfan I	--	--	--		2U	9.9U	R	14UJ	2.2UJ	18J	11U
Endosulfan II	--	--	--		3.8U	19U	3.8UJ	27UJ	4.3UJ	3.8UJ	22U
Endosulfan sulfate	--	--	--		3.8U	19U	3.8UJ	27UJ	4.3UJ	24J	22U
Endrin	17000	310000	50000		3.8U	19U	3.8UJ	13J	4.3UJ	10J	22U
Endrin aldehyde	--	--	--		3.8U	19U	3.8UJ	9J	4.3UJ	3.8UJ	22U
Endrin ketone	--	--	--		3.8U	19U	3.8UJ	69J	R	7.4J	22U
Heptachlor	150	650	50000		2U	9.9U	2UJ	14UJ	2.2UJ	1.9UJ	11U
Heptachlor epoxide	--	--	--		2U	9.9U	2UJ	14UJ	16J	1.9UJ	11U
Methoxychlor	280000	5200000	50000		20U	99U	20UJ	150UJ	22UJ	19UJ	110U
Toxaphene	100	200	50000		200U	990U	200UJ	1400UJ	220UJ	190UJ	1100U
alpha-BHC	--	--	--		2U	9.9U	2UJ	14UJ	2.2UJ	1.9UJ	11U
alpha-Chlordane	--	--	--		2U	9.9U	2UJ	14UJ	2.2UJ	1.9UJ	11U
beta-BHC	--	--	--		2U	9.9U	2UJ	14UJ	2.2UJ	1.9UJ	11U
delta-BHC	--	--	--		2U	9.9U	2UJ	14UJ	2.2UJ	1.9UJ	11U
gamma-BHC (Lindane)	520	2200	50000		2U	9.9U	2UJ	14UJ	2.2UJ	1.9UJ	11U
gamma-Chlordane	--	--	--		2U	9.9U	2UJ	14UJ	R	1.9UJ	11U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID: STFSB2	FBNA1-100594	FBNA5-101994	FBNA6-102094	FBNA7-102594
				Depth: 08				
				Zone**: STF				
Analyte (ug/kg)	Residential	Non-Residential	Impact to Groundwater	Date: 10/26/94	10/05/94	10/19/94	10/20/94	10/25/94
4,4'-DDD	3000	12000	50000	21U	0.1U	0.1U	0.1U	0.1U
4,4'-DDE	2000	9000	50000	21U	0.1U	0.1U	0.1U	0.1U
4,4'-DDT	2000	9000	500000	R	0.1U	0.1U	0.1U	0.1U
Aldrin	40	170	50000	11U	0.05U	0.05U	0.05U	0.05U
Aroclor-1016	490	2000	50000	210U	1U	1U	1U	1U
Aroclor-1221	490	2000	50000	430U	2U	2U	2U	2U
Aroclor-1232	490	2000	50000	210U	1U	1U	1U	1U
Aroclor-1242	490	2000	50000	210U	1U	1U	1U	1U
Aroclor-1248	490	2000	50000	210U	1U	1U	1U	1U
Aroclor-1254	490	2000	50000	210U	1U	1U	1U	1U
Aroclor-1260	490	2000	50000	210U	1U	1U	1U	1U
Dieldrin	42	180	50000	21U	0.1U	0.1U	0.1U	0.1U
Endosulfan I	--	--	--	11U	0.05U	0.05U	0.05U	0.05U
Endosulfan II	--	--	--	21U	0.1U	0.1U	0.1U	0.1U
Endosulfan sulfate	--	--	--	21U	0.1U	0.1U	0.1U	0.1U
Endrin	17000	310000	50000	21U	0.1U	0.1U	0.1U	0.1U
Endrin aldehyde	--	--	--	22	0.1U	0.1U	0.1U	0.1U
Endrin ketone	--	--	--	21U	0.1U	0.1U	0.1U	0.1U
Heptachlor	150	650	50000	11U	0.05U	0.05U	0.05U	0.05U
Heptachlor epoxide	--	--	--	11U	0.05U	0.05U	0.05U	0.05U
Methoxychlor	280000	5200000	50000	110U	0.5U	0.5U	0.5U	0.5U
Toxaphene	100	200	50000	1100U	5U	5U	5U	5U
alpha-BHC	--	--	--	11U	0.05U	0.05U	0.05U	0.05U
alpha-Chlordane	--	--	--	30J	0.05U	0.05U	0.05U	0.05U
beta-BHC	--	--	--	11U	0.0081J	0.05U	0.05U	0.05U
delta-BHC	--	--	--	11U	0.05U	0.05U	0.05U	0.05U
gamma-BHC (Lindane)	520	2200	50000	11U	0.05U	0.05U	0.05U	0.05U
gamma-Chlordane	--	--	--	11U	0.05U	0.05U	0.05U	0.05U

See last page for footnotes.

Table 5-4. Pesticide and Polychlorinated Biphenyl Compounds in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *			Sample ID:	FBNA9-102694	FBNA11-102794	FBNA13-102894	FBNA14-102894	FBNA17-103194
Analyte (ug/kg)	Residential	Non-Residential	Impact to Groundwater	Zone**: Date:	10/26/94	10/27/94	10/28/94	10/28/94	10/31/94
4,4'-DDD	3000	12000	50000		0.1U	0.1U	0.1U	0.1U	0.1U
4,4'-DDE	2000	9000	50000		0.1U	0.1U	0.1U	0.1U	0.1U
4,4'-DDT	2000	9000	500000		0.1U	0.1U	0.1U	0.1U	0.1U
Aldrin	40	170	50000		0.05U	0.05U	0.05U	0.05U	0.05U
Aroclor-1016	490	2000	50000		1U	1U	1U	1U	1U
Aroclor-1221	490	2000	50000		2U	2U	2U	2U	2U
Aroclor-1232	490	2000	50000		1U	1U	1U	1U	1U
Aroclor-1242	490	2000	50000		1U	1U	1U	1U	1U
Aroclor-1248	490	2000	50000		1U	1U	1U	1U	1U
Aroclor-1254	490	2000	50000		1U	1U	1U	1U	1U
Aroclor-1260	490	2000	50000		1U	1U	1U	1U	1U
Dieldrin	42	180	50000		0.1U	0.1U	0.1U	0.1U	0.1U
Endosulfan I	--	--	--		0.05U	0.05U	0.05U	0.05U	0.05U
Endosulfan II	--	--	--		0.1U	0.1U	0.1U	0.1U	0.1U
Endosulfan sulfate	--	--	--		0.1U	0.1U	0.1U	0.1U	0.1U
Endrin	17000	310000	50000		0.1U	0.1U	0.1U	0.1U	0.1U
Endrin aldehyde	--	--	--		0.1U	0.1U	0.1U	0.1U	0.1U
Endrin ketone	--	--	--		0.1U	0.1U	0.1U	0.1U	0.1U
Heptachlor	150	650	50000		0.05U	0.05U	0.05U	0.05U	0.05U
Heptachlor epoxide	--	--	--		0.05U	0.05U	0.05U	0.05U	0.05U
Methoxychlor	280000	5200000	50000		0.5U	0.5U	0.5U	0.5U	0.5U
Toxaphene	100	200	50000		5U	5U	5U	5U	5U
alpha-BHC	--	--	--		0.05U	0.05U	0.05U	0.05U	0.05U
alpha-Chlordane	--	--	--		0.05U	0.05U	0.05U	0.05U	0.05U
beta-BHC	--	--	--		0.05U	0.05U	0.05U	0.05U	0.05U
delta-BHC	--	--	--		0.05U	0.05U	0.05U	0.05U	0.05U
gamma-BHC (Lindane)	520	2200	50000		0.05U	0.05U	0.05U	0.05U	0.05U
gamma-Chlordane	--	--	--		0.05U	0.05U	0.05U	0.05U	0.05U

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per kilogram (ug/kg) (equivalent to parts per billion [ppb]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) OLM01.8 and New Jersey modified 418.1 for total petroleum hydrocarbon (TPH).
Sample results exceeding the NJDEP impact to groundwater criteria are shown in bold. Sample results exceeding the NJDEP non-residential criteria are underlined.
Sample results exceeding both criteria are shown in bold and underlined.

NJDEP New Jersey Department of Environmental Protection.
FBNA Indicates a field blank associated with non-aqueous samples.
FR Field replicate of previous sample.
U The compound was analyzed for, but not detected at the specific detection limit.
J Estimated result.
R Rejected result.
-- No applicable criteria.
* NJDEP Soil Cleanup Criteria, Februrary 3, 1992; last revised February 3, 1994.
** Zones as defined in Table 3-2.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	3TFIRMB4	3TFIRMB4	AGTFSB1	AGTFSB1	AGTFSB2	AGTFSB3	AGTFSB4
			Depth:	02	06	02	06	04	02	02
			Zone**:	N3TF	N3TF	AGTF	AGTF	AGTF	AGTF	AGTF
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/17/94	10/17/94	10/20/94	10/20/94	10/28/94	10/27/94	10/20/94
Aluminum	--	--		12100	1710	3290J	1810J	4750	7500	3030
Antimony	14	340		17.4J	4.5J	2.4UJ	59.7J	0.32UJ	7.9J	2.7J
Arsenic	20	20		10.7	37.3	12.2	237	5J	27.9J	27
Barium	700	47000		59.5	73.4	36.7J	49J	34.1J	75.5	67.9
Beryllium	1	1		0.27J	0.23U	0.3J	0.05U	0.64J	2	1.4
Cadmium	1	100		R	0.25U	0.35J	0.08U	0.48J	R	R
Calcium	--	--		40700J	1830J	2400J	478J	2050	19100	3370J
Cobalt	--	--		54	35.8	6.5J	4.5J	14.5	26.8	18.3
Copper	600	600		63.3J	712	84J	264J	175J	156J	354
Cyanide	1100	21000		0.6U	0.59U	0.65U	0.65U	0.57U	0.6U	0.6U
Iron	--	--		36700	8190	12800	13100	18900	46600	25000
Lead	400	600		158	55.8	293J	792J	170	5150	473
Magnesium	--	--		19700	710J	1210J	269J	1680	7150	1610
Manganese	--	--		322	43	59.1J	12.1J	132	309	255
Mercury	14	270		0.55	0.17	0.89	0.99	0.17J	0.53J	0.59
Nickel	250	2400		263	2650	32.1J	15.5J	111	140	94.7
Potassium	--	--		798J	240J	507J	500J	893J	751J	477J
Selenium	63	3100		0.77UJ	3.2	1.3	4.3	1.2	0.82UJ	1J
Silver	110	4100		0.54U	0.81J	0.13U	0.53J	0.11U	0.28J	0.56U
Sodium	--	--		R	151U	362U	685U	283U	345U	549UJ
Thallium	2	2		1UJ	1UJ	0.78U	3.4	0.68U	0.72UJ	1UJ
Vanadium	370	7100		288	14.8	46.1J	10.5J	33.5	171	82.3J
Zinc	1500	1500		131	93.5	145J	158J	333J	373J	933

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	AHTFSB1	AHTFSB2	AHTFSB4	AHTFSB4	APSB2	APSB5	APSB5	APSB6
			Depth:	02	02	02	08	02	02	06	06
			Zone**:	AHTF	AHTF	AHTF	AHTF	AP	AP	AP	AP
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/19/94	10/14/94	10/14/94	10/14/94	10/26/94	10/12/94	10/12/94	10/21/94
Aluminum	--	--		3730	4820	4190	6710	4000J	9840	1910	2550J
Antimony	14	340		0.26UJ	0.61J	0.41J	2.7J	1.6J	4.1J	0.64J	0.77J
Arsenic	20	20		9	12.9	23.3	88.8	18.4J	7.7	13.5	35.1J
Barium	700	47000		39.7J	63.8	32.6J	65.6	74	96.5	41.4J	103
Beryllium	1	1		0.42J	0.34J	0.21J	0.28J	0.24J	0.36J	0.21J	0.17J
Cadmium	1	100		0.17U	R	0.07UJ	0.12J	0.07UJ	R	0.15J	R
Calcium	--	--		469J	618J	1450J	1040J	5310J	21400	1340J	3070J
Cobalt	--	--		4.6J	4.9J	5.4J	6.5J	7J	24.1	7.9J	7J
Copper	600	600		100	445J	60.1J	89J	234J	84.2	65.1J	461J
Cyanide	1100	21000		0.54U	0.58U	0.56U	0.57U	0.58U	0.53U	0.64U	0.55U
Iron	--	--		15800	23400	20200	13600	15400	23000	19200	38000
Lead	400	600		260	512	93.6	156	197J	184	116	416J
Magnesium	--	--		784J	1020J	1150	1950	1350J	6150	611J	4360J
Manganese	--	--		54.5	94.3	81.5	64.2	266	250J	63.2	161
Mercury	14	270		0.12	0.55	0.11U	0.75	0.29	0.29J	1	1.7
Nickel	250	2400		17.9	18.7	13.7	54.2	34.9J	87.1	51.3	62.7J
Potassium	--	--		675J	581J	540J	1110J	568J	882J	263J	585J
Selenium	63	3100		1J	0.78UJ	0.76UJ	0.78UJ	0.79U	0.59UJ	1.5J	1.5J
Silver	110	4100		0.52U	0.55U	0.53U	0.55U	0.12J	0.19J	0.61U	0.17J
Sodium	--	--		203U	R	258U	425U	225U	1210J	456U	780J
Thallium	2	2		0.97UJ	1UJ	1U	1U	0.7U	0.63UJ	1.1U	0.67UJ
Vanadium	370	7100		20	22J	23.2	25.2	41J	112	102	95.1J
Zinc	1500	1500		89	224	43	82.4	48.2	159	124	562

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	APSB6	DTSB3	DTSB3FR	ECIRMB1	ECIRMB3	ECIRMB3	ECPSB1	ECPSB2
			Depth:	10	04	04	02	02	06	02	06
			Zone**:	AP	DT	DT	U	N3TF	N3TF	ECP	ECP
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/21/94	10/27/94	10/27/94	10/24/94	10/19/94	10/19/94	10/20/94	10/20/94
Aluminum	--	--		1320J	5310J	3800J	787J	6500	608J	2110J	649J
Antimony	14	340		2.7J	0.72J	R	0.28UJ	4.7J	4.9J	2.7UJ	3UJ
Arsenic	20	20		63.3J	16.5J	7J	4.3	48.2	92.9	39.5	71.5
Barium	700	47000		56.1	76.7J	45.5J	9.4J	85.2	25.2J	60.4	6J
Beryllium	1	1		0.14J	0.36J	0.22J	0.47J	0.45J	0.03U	0.19J	0.08U
Cadmium	1	100		0.08UJ	0.28J	0.07UJ	0.07U	R	0.08U	0.36J	0.07U
Calcium	--	--		883J	1480J	1620J	254J	5100J	656J	1880J	307J
Cobalt	--	--		6.5J	29.3J	77.5J	2.1J	16.1	8.2J	4.4J	5J
Copper	600	600		159J	472J	1220J	17.7J	153	332J	1490J	193J
Cyanide	1100	21000		0.65U	0.61UJ	0.61UJ	0.58U	0.56U	0.66U	0.58U	0.58U
Iron	--	--		5460	15200J	7850J	2940	27100	21200	12700	9580
Lead	400	600		532J	129J	59.4J	122J	525	25.3J	380J	25.6J
Magnesium	--	--		318J	2800J	1090J	106J	3660	129J	545J	53.9J
Manganese	--	--		75.9	352J	187J	14.7J	219	113J	97.6J	48J
Mercury	14	270		0.56	0.81J	0.34J	0.12U	1.7	0.13U	0.92	0.24
Nickel	250	2400		92.8J	197J	520J	19.4J	79.7	62.3J	30.9J	34.6J
Potassium	--	--		288U	1120J	895J	136UJ	1130J	286J	439J	159UJ
Selenium	63	3100		2	1.3J	2.3J	0.79U	1.1J	0.88U	1.4	0.77U
Silver	110	4100		0.16J	0.44J	0.5J	0.12U	0.53U	0.17J	0.47J	0.11U
Sodium	--	--		464U	1510J	4340J	202U	R	330U	638U	287U
Thallium	2	2		0.77U	0.73UJ	0.73UJ	0.7U	1UJ	0.78U	0.68U	0.68U
Vanadium	370	7100		18.6J	62.8J	35.6J	51.1J	157	11.7J	24.4J	10.1J
Zinc	1500	1500		71.4	549J	58J	27.1J	421	45.4J	116J	475J

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	ECPSB2	ECPSB4	ECPSB5	GFSB1	GTFIRMB1	GTFIRMB1	GTFIRMB2
			Depth:	12	08	02	02	02	08	02
			Zone**:	ECP	ECP	ECP	STF	GTF	GTF	GTF
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/20/94	10/19/94	10/19/94	10/12/94	10/06/94	10/06/94	10/17/94
Aluminum	--	--		2430J	3870J	3560	23300	7900	19000	5470
Antimony	14	340		42.5J	0.29UJ	1.8J	4.1J	1.6J	0.29UJ	2.3J
Arsenic	20	20		207J	11	38.3	46.7	8.5	1.8J	8.1
Barium	700	47000		93	54.9	99.8	170	108	105	121
Beryllium	1	1		.07J	0.23J	0.22U	0.91J	0.34J	0.69J	0.36J
Cadmium	1	100		.08UJ	0.07U	R	R	0.46J	0.07UJ	0.81J
Calcium	--	--		471J	20300J	4520J	6930	6820	6270	19400J
Cobalt	--	--		5.5J	4.6J	8.8J	397	37.5	642	10.9J
Copper	600	600		284J	214J	110	1330	170	1510	74.3J
Cyanide	1100	21000		.7U	0.59U	0.66	0.57U	0.55U	0.62U	0.57U
Iron	--	--		12200	10100	24600	30900	18400	22300	20900
Lead	400	600		256J	78.8J	279	324	153	11	241
Magnesium	--	--		392J	3060J	2470	6320	4290	4440	4290
Manganese	--	--		16.2	71.4J	107	281J	237J	312J	454
Mercury	14	270		2	0.12U	0.5	1.3J	0.45J	0.11U	0.87
Nickel	250	2400		21.2J	70.9J	43	909	153	1520	74.9
Potassium	--	--		712J	1630J	649J	5090	1330	4120	983J
Selenium	63	3100		2.8	0.93J	1.3J	2.4J	0.61UJ	1.8J	0.76UJ
Silver	110	4100		.39J	0.16J	0.54U	0.56J	0.24J	0.41J	0.53U
Sodium	--	--		769J	6800	250UJ	36300J	4100J	35400J	535U
Thallium	2	2		2.7J	0.71U	1UJ	0.67UJ	0.65UJ	0.73UJ	1U
Vanadium	370	7100		14.8J	368J	62.9	93.6	55.8	30.2	158
Zinc	1500	1500		113	41.7J	133	167	179	47.4J	173

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	GTFIRMB2	GTFIRMB3	GTFIRMB3	GTFIRMB4	GTFIRMB4	GTFIRMB5
			Depth:	08	02	10	02	08	02
			Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/17/94	10/05/94	10/05/94	10/17/94	10/17/94	10/05/94
Aluminum	--	--		1490	9100	2180	9200	3510	6190
Antimony	14	340		0.32UJ	2.1J	0.32UJ	9.5J	0.28UJ	4.6J
Arsenic	20	20		33.9	15.5	28.2	10.1	5.2J	11.8
Barium	700	47000		39.9J	145	42J	50.6	24.5J	297
Beryllium	1	1		0.27U	0.48J	0.13J	0.22J	0.18U	0.43J
Cadmium	1	100		0.08U	0.66J	0.08UJ	R	0.16U	1.4
Calcium	--	--		1160J	4560	1280J	27700J	936J	5830J
Cobalt	--	--		3J	82.3	8.3J	51.9	28.5	7.8J
Copper	600	600		49.1	343	47.8	99.8J	265	250
Cyanide	1100	21000		0.68U	0.55U	0.68U	0.6U	0.6U	0.67
Iron	--	--		7370	19800	26700	29600	7950	19600
Lead	400	600		14.9	437	88.1	117	54.7	1180
Magnesium	--	--		334J	2990	485J	13600	993J	2320
Manganese	--	--		45.2	189J	53.9J	311	65	226J
Mercury	14	270		0.27	0.82J	0.13U	0.25	0.16	1.5J
Nickel	250	2400		15	256	33.7	200	421	49.9
Potassium	--	--		300J	1740	490J	803J	707J	1120J
Selenium	63	3100		0.9U	0.74J	1.4J	0.82UJ	0.8U	1.5J
Silver	110	4100		0.64U	0.28J	0.11U	0.58U	0.56U	1.2J
Sodium	--	--		357U	6920J	728UJ	3030J	3120	783UJ
Thallium	2	2		1.2UJ	0.66UJ	0.81UJ	1.1UJ	1.1UJ	0.74UJ
Vanadium	370	7100		12.3J	193	45.3	223	14.8	80.9
Zinc	1500	1500		17.9J	268	30.4J	126	93.9	535

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	GTFIRMB5FR	GTFIRMB5	GTFIRMB6	GTFIRMB6	GTFIRMB7	GTFIRMB7
			Depth:	02	06	04	08	02	08
			Zone**:	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/05/94	10/05/94	10/05/94	10/05/94	10/17/94	10/17/94
Aluminum	--	--		5670	3840	8890	6340	4360	3770
Antimony	14	340		2.6J	1.6J	1.1J	4J	4.5J	9.8J
Arsenic	20	20		11.3	4.6J	10.3	22.5	12.5	12
Barium	700	47000		279	138	232	5290	324	417
Beryllium	1	1		0.41J	0.15J	0.35J	0.58U	0.32J	0.48J
Cadmium	1	100		1.4	0.96J	1.1J	4.7	R	1.1J
Calcium	--	--		10900J	6000	9710	5340	4670J	14600J
Cobalt	--	--		8.2J	5.2J	5.8J	15.2	8.5J	4.6J
Copper	600	600		244	69	186	281	221J	542
Cyanide	1100	21000		0.66	0.66U	0.85	1.9	0.87	1.7
Iron	--	--		19600	11900	25100	24500	29800	12100
Lead	400	600		904	311	5110	7590	1040	1730
Magnesium	--	--		1920	1510	1940	1830	1760	1000J
Manganese	--	--		179J	80.6J	220J	295J	263	98
Mercury	14	270		2.3J	0.69J	0.73J	3.4J	1.9	1.1
Nickel	250	2400		38.2	22.7	36	104	28.3	19.3
Potassium	--	--		966J	539J	912J	1040	567J	604J
Selenium	63	3100		1.5J	2.2J	2J	9.3J	1.8J	3.8
Silver	110	4100		1J	0.41J	0.73J	1.3J	1.3J	2.1J
Sodium	--	--		885J	853UJ	1240J	1510J	R	587U
Thallium	2	2		0.76UJ	0.79UJ	0.86UJ	0.82UJ	1UJ	1.1UJ
Vanadium	370	7100		69.1	48.6	30.8	42.6	44.4J	22.9
Zinc	1500	1500		501	334	360	3210	618	429

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	GTFIRMB8	GTFIRMB8	GTFIRMB9	GTFIRMB9	GTFSB1	GTFSB1	GTFSB2
			Depth:	02	08	02	06	02	08	02
			Zone**:	GTF	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/18/94	10/18/94	10/05/94	10/05/94	10/10/94	10/10/94	10/13/94
Aluminum	--	--		3350	3840	4830	4330	4620	4060	3790
Antimony	14	340		11.7J	239J	12.6J	14J	3.6J	1.2J	4.9J
Arsenic	20	20		30.7	24.5	42.2	37.5	10.6	11.6	10.9
Barium	700	47000		501	259	899	593	297	290	277
Beryllium	1	1		0.39J	0.36J	0.43J	0.39J	0.42J	0.44J	0.5J
Cadmium	1	100		6.1	3.1	R	18.4J	R	0.43J	1.2J
Calcium	--	--		4080J	2940J	6910	9150	3510	4580	2420J
Cobalt	--	--		9.5J	7.7J	9J	13.7J	9.9J	8.4J	7.6J
Copper	600	600		421	483J	588	511	662	135	237J
Cyanide	1100	21000		0.91	0.65U	0.62U	0.84U	0.64	0.78	0.62U
Iron	--	--		104000	24000	45500	58300	34000	23400	19700
Lead	400	600		1360	2410	2710	2410	787	544	790
Magnesium	--	--		736J	859J	2290	1200J	2970	470J	1900
Manganese	--	--		293	145	474J	422J	214J	127J	123
Mercury	14	270		1.8	2.9	6J	5.1J	1.3J	0.54J	3
Nickel	250	2400		48.8	43.1	54	162	59.5	27.3	48.8
Potassium	--	--		600J	635J	802J	786J	789J	542J	795J
Selenium	63	3100		5.4J	3J	3J	5J	1.8J	7.9J	1.6J
Silver	110	4100		2.7U	4.5	3	2.5J	0.95J	1.3J	0.93J
Sodium	--	--		612U	423U	R	1450J	R	505UJ	1720
Thallium	2	2		5UJ	1.1U	0.74UJ	1UJ	0.72UJ	0.88UJ	1.1U
Vanadium	370	7100		30.1J	48.8	92.3J	400	43.9J	30.1	42.3
Zinc	1500	1500		1400	1010	1510	8080	674	631	561

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	GTFSB3	GTFSB4	GTFSB5	GTFSB6	GTFSB7	GTFSB7	GTFSB8	GTFSB8
			Depth:	02	02	02	02	02	08	04	08
			Zone**:	GTF	GTF	GTF	GTF	GTF	GTF	GTF	GTF
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/10/94	10/13/94	10/13/94	10/11/94	10/13/94	10/13/94	10/13/94	10/13/94
Aluminum	--	--		3080	6150	10300	2600	5440	3110	3260	7380
Antimony	14	340		1.5J	2.6J	0.27J	1.7J	2.1J	1.4J	0.31J	0.32UJ
Arsenic	20	20		6.9	13.9	9	7.2	7.9	4.2	10.2	3.1
Barium	700	47000		123	247	56.8	158	207	346	30.9J	32.4J
Beryllium	1	1		0.27J	0.46J	0.54J	0.27J	1.3	0.29J	0.22J	0.47J
Cadmium	1	100		0.35J	R	R	0.44J	R	0.3J	R	0.08UJ
Calcium	--	--		2230	4150	3610	2990	4950J	12700J	862J	1250J
Cobalt	--	--		7.4J	45	21.1	6.5J	16.3	5.2J	20.5	66.3
Copper	600	600		74	340	29.4	115	197J	399J	67.5J	138J
Cyanide	1100	21000		0.83	1.2	0.54U	2.2	0.57U	0.68U	0.57U	0.67U
Iron	--	--		17000	23700	38800	11800	26000	18400	39100	14700
Lead	400	600		333	714	34.3	392	404	492	69.1	64.9
Magnesium	--	--		449J	8960	28100	547J	3030	846J	964J	2360
Manganese	--	--		79.6J	419J	390J	79.3J	237	83.8	212	129
Mercury	14	270		0.44J	1.9J	0.14J	1.1J	3	2.4	0.1U	0.13U
Nickel	250	2400		35.3	181	312	24.2	75.1	18.5	50.7	104
Potassium	--	--		703J	1460	6100	495J	449J	527J	689J	1800J
Selenium	63	3100		1.1J	0.83J	0.6UJ	1.4J	1.2J	1.7J	0.78UJ	0.91UJ
Silver	110	4100		0.39J	1.1J	0.09U	0.6J	1.5J	0.65U	0.55U	0.65U
Sodium	--	--		209UJ	4490J	R	295UJ	R	643U	648UJ	3350
Thallium	2	2		0.71UJ	0.68UJ	0.65UJ	0.68UJ	1UJ	1.2U	1UJ	1.2U
Vanadium	370	7100		44.9	101	60.6J	62.4	42.8J	35.7	50.9J	31.5
Zinc	1500	1500		274	398	99.1	196	545	288	117	52.7

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	GTFSB9	GTFSB9	LAIRMB1	LOSB1	LOSB1	LOSB2	LOSB2	LOSB3
			Depth:	02	08	02	04	08	04	08	02
			Zone**:	GTF	GTF	LO	LO	LO	LO	LO	LO
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/13/94	10/13/94	10/24/94	10/25/94	10/25/94	10/14/94	10/14/94	10/24/94
Aluminum	--	--		5380	1070	4710J	652	335U	19000	5980	3740J
Antimony	14	340		2J	3.4J	3.8J	1.2UJ	0.27UJ	4.6J	8.1J	0.98UJ
Arsenic	20	20		5.1	5.1	52.3	12.7J	12.9J	54.8	138	49.9
Barium	700	47000		62.2	35J	259	26J	29.1J	302	141	63.4
Beryllium	1	1		0.22J	0.15J	0.35J	0.02U	0.02U	0.98J	0.17J	0.23J
Cadmium	1	100		0.08J	0.07UJ	R	0.07U	0.07U	16.6	0.2J	0.78J
Calcium	--	--		8140J	1190J	2250J	780J	343U	4890J	21500J	1180J
Cobalt	--	--		81.9	12	10.9J	1.2J	3J	15.9	10.7J	7.7J
Copper	600	600		272J	476J	256J	23.7J	70.2J	322J	78.2J	106J
Cyanide	1100	21000		0.55U	0.58U	0.66U	0.58U	0.57U	0.7U	0.92U	0.61U
Iron	--	--		13000	5230	69200J	1940U	1910U	21900	13500	15100
Lead	400	600		97.2	217	520J	71.6	24.2	640	125	122J
Magnesium	--	--		2190	373J	2780J	546J	188J	3280	758J	718J
Manganese	--	--		152	25.9	247J	16.6U	8.6U	96.3	42	97.7J
Mercury	14	270		0.23	0.12	2	0.12UJ	0.1J	5.5	0.18U	.8
Nickel	250	2400		248	302	59.6J	2.4J	5.6J	72.4	18.9	35.8J
Potassium	--	--		1110J	495J	745J	274J	175J	6500J	2760J	490J
Selenium	63	3100		0.82J	1.6J	1.9J	1J	0.76U	2.7J	33.3	1.9
Silver	110	4100		0.52U	0.54U	0.52J	0.12U	0.11U	0.67U	0.88U	0.12U
Sodium	--	--		6950	864U	346U	363U	210U	5950	1390J	178U
Thallium	2	2		0.98U	1U	0.78UJ	0.7U	1.5J	2.6J	1.6U	0.72U
Vanadium	370	7100		50.5	31.6	210J	4.7J	3.1J	20.2	40	18.1J
Zinc	1500	1500		55.2	35.6	561J	3.5UJ	24.6J	703	22.7	302J

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (mg/kg)	NJDEP Soil Cleanup Criteria * Residential	NJDEP Soil Cleanup Criteria * Non-Residential	Sample ID:	LOSB4	LOSB4	LOSB8	LOSB9	LOSB9	LOSB10	LOSB10	LOSB11	LOSB12
			Depth:	02	06	02	02	06	04	08	02	02
			Zone**:	LO	LO	SS	LO	LO	LO	LO	LO	LO
			Date:	10/24/94	10/24/94	10/24/94	10/25/94	10/25/94	10/28/94	10/28/94	10/25/94	10/25/94
Aluminum	--	--		5490J	9140J	4400J	7800J	1470	2780	2210	3140J	4220J
Antimony	14	340		0.54UJ	0.43UJ	1.1UJ	0.66UJ	0.67UJ	1.3UJ	0.28UJ	0.48UJ	2.7UJ
Arsenic	20	20		18.8	7J	34.9	13.1J	35.3J	36.9J	15J	4J	28.3J
Barium	700	47000		263	164	69.9	49.7J	33.3J	75	32.3J	25.2J	142
Beryllium	1	1		0.17J	0.18J	0.25J	0.15J	0.05U	0.16J	0.13J	0.16J	0.23J
Cadmium	1	100		R	R	R	0.31J	0.11J	0.73J	0.56J	0.19J	5J
Calcium	--	--		3470J	7210J	9130J	6700J	932J	1630	1020J	2210J	3120J
Cobalt	--	--		7.7J	13.2	7.6J	12.1J	2.5J	3.9J	6.9J	5J	8.4J
Copper	600	600		62J	56.5J	221J	70.1J	26.3J	66.6J	38.9J	42.1J	177J
Cyanide	1100	21000		0.53U	0.53U	0.58U	0.64U	0.56U	3.8	0.58U	0.66U	0.71U
Iron	--	--		24100	22400	50100	24300	7370	17000	11500	10200	43500
Lead	400	600		277J	163J	347J	144J	217	579	89.7	63.2J	292J
Magnesium	--	--		3260J	6900J	2170J	5780J	886J	1140	410J	1180J	2020J
Manganese	--	--		305J	295	202J	274	31	116	45.9	74.3	213
Mercury	14	270		0.38	0.46	4.8	4.1	0.24J	2.8J	0.25J	0.46	9.8J
Nickel	250	2400		20.8J	22.8J	37.8J	19.9J	5.8J	14.2	11.9	11.6J	35J
Potassium	--	--		563J	398J	732J	429J	252J	502J	308J	304J	493J
Selenium	63	3100		0.71UJ	0.72UJ	1.2J	0.86U	0.74U	1.2	1.3	0.88U	1.2J
Silver	110	4100		0.13J	0.18J	0.17J	0.13U	0.11U	0.11U	0.12U	0.13U	0.22J
Sodium	--	--		328U	53.8U	527U	1480	354U	465U	458U	333U	530U
Thallium	2	2		0.63UJ	0.64UJ	0.7UJ	0.76U	0.65U	0.68U	0.69U	0.78U	0.85UJ
Vanadium	370	7100		31J	49.6J	74.7J	49.2J	13.4	24.5	9.4J	37.3J	73.2J
Zinc	1500	1500		116J	61	549J	121	41.9J	208J	201J	216	1100

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	LOSB12	LOSB13	LOSB13FR	LOSB13	LOSB14	LOSB15	LOSB16	LOSB17
			Depth:	06	02	02	08	02	02	04	02
			Zone**:	LO	LO	LO	LO	LO	LO	LO	LO
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/25/94	10/31/94	10/31/94	10/31/94	10/25/94	10/24/94	10/25/94	10/24/94
Aluminum	--	--		1170	3550	3780	3290J	6280J	6430J	1940	3370J
Antimony	14	340		0.54UJ	3.4J	1.8UJ	1.6J	1.5UJ	4.4J	0.44UJ	0.55UJ
Arsenic	20	20		8.7J	<u>249J</u>	<u>51.3J</u>	<u>64.3J</u>	18J	<u>23.4</u>	<u>69.8J</u>	<u>27.3</u>
Barium	700	47000		26.5J	60	67.1	48.3	83.9	152	144	53.4
Beryllium	1	1		0.05U	0.21J	0.27J	0.2J	0.4J	0.55J	0.1U	0.2J
Cadmium	1	100		0.17J	0.9J	1.1J	R	R	R	3.7	1.2
Calcium	--	--		1580	5580J	3250J	6720J	5180J	4800J	1090J	19700J
Cobalt	--	--		4.1J	4.5J	4.9J	5.2J	5.6J	27.7	5.9J	5.3J
Copper	600	600		28.4J	112J	78.6J	52.3J	95.2J	190J	70.8J	72.2J
Cyanide	1100	21000		0.64U	0.57U	0.57U	0.56UJ	0.67U	0.58U	0.56U	0.6U
Iron	--	--		13200	18800	18700	24800	33700	35500	7690	16100
Lead	400	600		75.1	<u>792J</u>	458J	257J	<u>671J</u>	455J	449	<u>1010J</u>
Magnesium	--	--		1120J	1930	1160	3290J	1160J	2250J	708J	1070J
Manganese	--	--		43.7	129	202	280	418	196J	35.3	157J
Mercury	14	270		0.47J	1.7J	1.6J	1.3	0.7	1	0.29J	0.67
Nickel	250	2400		14.6	19.5	19.1	11.2J	22.5J	91.3J	21.4	41.7J
Potassium	--	--		251J	403J	472J	423J	791J	1060J	322J	526J
Selenium	63	3100		0.98J	2.1	1.9	2J	0.91UJ	1.8J	0.75U	1.5
Silver	110	4100		0.13U	0.18J	0.18J	0.13J	0.13UJ	0.33J	0.11U	0.12J
Sodium	--	--		267U	178U	461U	197U	748J	2050	327U	1650
Thallium	2	2		0.76U	0.69U	0.67U	0.67UJ	0.8UJ	0.7UJ	0.66U	0.72U
Vanadium	370	7100		23.9	34.6	35	16.8J	69J	64.1J	12.1	13.2J
Zinc	1500	1500		32.5J	174J	213J	137	76.9	221J	887J	290J

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *										
			Sample ID:	LOSB18-02	LOSB18	LOSB18FR	MBSB01	MBSB02	MBSB03	MBSB03	MBSB03FR
			Depth:	02	08	08	02	02	06	10	10
			Zone**:	LO	LO	LO	MB	MB	MB	MB	MB
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/24/94	10/24/94	10/24/94	10/25/94	10/21/94	10/25/94	10/25/94	10/25/94
Aluminum	--	--		3660J	999J	1130J	5540J	2710J	21400J	2780J	2090J
Antimony	14	340		1.2UJ	0.38UJ	0.31UJ	1.2UJ	0.28UJ	R	4.5J	3UJ
Arsenic	20	20		26.4	30.8	25.6	17.2	9.4	10.7J	225J	160J
Barium	700	47000		55.7	19.9J	18J	63.1	33.5J	61.3	22.9J	14.6J
Beryllium	1	1		0.23J	0.09U	0.12U	0.22J	0.52J	0.84J	0.23J	0.19J
Cadmium	1	100		0.37J	0.08U	0.08U	R	0.1J	0.25J	0.09UJ	0.08UJ
Calcium	--	--		10600J	748J	693J	15100J	1640J	15500J	1150J	1250J
Cobalt	--	--		5.2J	2.7J	3.2J	29.9	8.9J	5.9J	14.9	6.8J
Copper	600	600		57.2J	16.8J	14.9J	182J	81.2J	97.5J	24100J	17100J
Cyanide	1100	21000		0.57U	0.67U	0.65U	0.57U	0.58U	0.74U	0.72U	0.69U
Iron	--	--		11600	3840	5570	27000	10200	20200	20300	17000
Lead	400	600		111J	4.9J	4.4J	219J	120J	47.3J	675J	505J
Magnesium	--	--		1230J	159J	160J	2270J	1240J	19800J	465J	376J
Manganese	--	--		133J	8.9J	9.7J	193J	62.9J	230	65.7	72.7
Mercury	14	270		0.38	0.13U	0.13U	0.51	0.37	0.18	0.22	0.16
Nickel	250	2400		26.9J	9.3J	10.3J	106J	32.3J	24.8J	125J	49J
Potassium	--	--		591J	286J	329J	993J	345J	3550	300J	247J
Selenium	63	3100		1.1J	0.9U	0.88U	0.77U	0.78U	1U	1.5	1.4J
Silver	110	4100		0.11U	0.13U	0.13U	0.11UJ	0.13J	0.15U	5.1J	3.6J
Sodium	--	--		525U	458U	526U	3400	622U	1670	325U	283U
Thallium	2	2		0.69UJ	0.79U	0.78U	0.68UJ	0.69U	0.89U	0.86U	0.83U
Vanadium	370	7100		21.4J	7J	6.7J	35.5J	72.9J	60.7J	18.2J	14.1J
Zinc	1500	1500		98.4J	10.8UJ	13.1J	107J	160J	53.6	298	169

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	MDCSB02	N2TFSB2	N2TFSB4	N2TFSB4	N2TFSB5	N2TFSB5	N3TFSB2
			Depth:	03	02	02	06	02	06	02
			Zone**:	MDC	N2TF	N2TF	N2TF	N2TF	N2TF	AP
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/11/94	10/19/94	10/28/94	10/28/94	10/19/94	10/19/94	10/19/94
Aluminum	--	--		7030	7530	14600	2520	8270	5490J	3570
Antimony	14	340		0.82J	10.4J	19.2J	6.1J	10.7J	1.3UJ	0.96J
Arsenic	20	20		10	9.8	7.1J	8.1J	5.5J	5.8	18.3
Barium	700	47000		107	77.7	68.7	19J	45.9	20.4J	32.2J
Beryllium	1	1		0.18J	0.26J	0.36J	0.74J	0.33J	0.31J	0.17U
Cadmium	1	100		0.52J	R	R	0.8J	R	0.07U	R
Calcium	--	--		21200	27300J	44800	4760	15600J	1950J	141000J
Cobalt	--	--		6.9J	35	74.6	12.7	32.3	8.9J	4.1J
Copper	600	600		85.3	71.6	119J	43.9J	73.1	36.1J	71.2
Cyanide	1100	21000		.55U	0.74	0.66U	0.63U	0.57U	0.57U	0.57U
Iron	--	--		19800	36200	53200	12000	26400	14100	25500
Lead	400	600		526	342	357	951	119	40.7J	159
Magnesium	--	--		4190	10900	22500	2530	7660	2080J	1620
Manganese	--	--		154J	227	402	77.2	201	90.7J	257
Mercury	14	270		0.88J	15.4	0.55J	0.21J	0.14	0.11U	1.4
Nickel	250	2400		51.6	154	301	43	118	28.5J	67.1
Potassium	--	--		851J	586J	607J	343J	723J	906J	1000J
Selenium	63	3100		0.61UJ	0.84UJ	0.89UJ	1.3	0.76UJ	0.76U	0.76UJ
Silver	110	4100		0.1J	0.59U	0.25J	0.79J	0.53U	0.11U	0.54U
Sodium	--	--		1510J	R	55.6U	186U	442UJ	220U	R
Thallium	2	2		0.66UJ	1.1UJ	1.2J	3.7	1UJ	0.67U	1UJ
Vanadium	370	7100		37.6	188	373	53.9	159	47.3J	34.4J
Zinc	1500	1500		111	134	308J	76.3J	178	54.7J	101

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (mg/kg)	NJDEP Soil Cleanup Criteria * Residential	NJDEP Soil Cleanup Criteria * Non-Residential	Sample ID: N3TFSB2	N3TFSB2FR	N3TFSB1	N3TFSB3	N3TFSB4	N3TFSB5	N3TFSB6
		Depth:	06	06	02	02	02	08	02
		Zone**:	AP	AP	N3TF	N3TF	N3TF	N3TF	N3TF
		Date:	10/19/94	10/19/94	10/18/94	10/13/94	10/17/94	10/19/94	10/18/94
Aluminum	--	--	4830	3480	10000	12400	13900	4110	7590
Antimony	14	340	1.1J	0.8J	1.1J	17.1J	26.5J	2.1J	12.1J
Arsenic	20	20	120J	47.4J	9.7	7.3	8.9	2J	27.9
Barium	700	47000	35.5J	21.4J	76.7	36.9J	49.6	7.6J	66.1
Beryllium	1	1	0.2U	0.14U	0.42J	0.14J	0.22J	0.3J	0.12U
Cadmium	1	100	0.38U	0.25U	R	R	R	0.11U	R
Calcium	--	--	3220J	2310J	2880J	29400J	57400J	229J	26800J
Cobalt	--	--	6.5J	7.7J	7	125	77.7	4.3J	34.2
Copper	600	600	70.5	51.5	48.6	48.6J	43.6J	13	107
Cyanide	1100	21000	0.68U	0.66U	0.57U	0.6U	0.6U	0.58U	0.6U
Iron	--	--	10900	10600	23300	65100	51200	10700	27500
Lead	400	600	770J	170J	110	70.9	83.9	5.1	131
Magnesium	--	--	5010J	2520J	2010	39400	29800	1250	9240
Manganese	--	--	71.8	74.7	194	492	480	82.9	219
Mercury	14	270	0.4	0.63	0.29	0.17	0.38	0.12U	0.16
Nickel	250	2400	64.5	62.7	46.8	485	331	30.7	172
Potassium	--	--	1000J	452J	868J	330J	610J	937J	532J
Selenium	63	3100	0.91UJ	1.5J	0.75UJ	0.8UJ	0.81UJ	0.79U	0.81UJ
Silver	110	4100	0.64U	0.61U	0.53U	0.56U	0.57U	0.56U	0.57U
Sodium	--	--	777U	202U	275UJ	50.1U	R	130U	R
Thallium	2	2	1.2UJ	1.1UJ	0.99UJ	1.1UJ	1.1UJ	1UJ	1.1UJ
Vanadium	370	7100	28.1	23.5	53.4	613	409	12.2	197
Zinc	1500	1500	103	64.7	226	240	168	57.2	136

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	N3TFSB7	N3TFSB8	N3TFSB8	N3TFSB9	PN1SB2	PN1SB2	PSSB1	PSSB1
			Depth:	02	02	06	02	04	08	02	06
			Zone**:	N3TF	N3TF	N3TF	N3TF	P1	P1	MB	MB
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/18/94	10/18/94	10/18/94	11/02/94	11/02/94	11/02/94	10/31/94	10/31/94
Aluminum	--	--		10900	12700	10500J	5510	1860	5770	4140	1360
Antimony	14	340		17.4J	30.9J	0.29UJ	108J	0.26UJ	1.1UJ	0.27UJ	1.3UJ
Arsenic	20	20		23.7	372	4.9	361J	7.1J	37.4J	25.2J	76.6J
Barium	700	47000		57.5	53.5	25.4J	102	51.3	45.2J	29.8J	26.5J
Beryllium	1	1		0.19U	1.5	0.44J	0.1U	0.12J	0.38J	0.22J	0.08U
Cadmium	1	100		R	R	0.07U	R	0.51J	1.6	0.68J	0.28J
Calcium	--	--		37800J	31500J	355J	17100	5730	110000	15900	2070
Cobalt	--	--		53.9	88.3	4.3J	23.9	5.2J	7.5J	3.7J	3.3J
Copper	600	600		52.9	104	97.3J	99J	53.7J	143J	86.1J	118J
Cyanide	1100	21000		0.63U	0.59U	0.61U	0.63U	0.59	0.59U	0.58U	0.58U
Iron	--	--		41800	51900	19200	48900	8800	16300	9190	7200
Lead	400	600		180	261	7.9J	2460	98	262	105J	159
Magnesium	--	--		20700	28700	2240J	9280	759J	5660	1830	443J
Manganese	--	--		321	400	107J	212	52.6	660	116	34.6
Mercury	14	270		0.17	0.24	0.12U	7.9J	21.9J	2.3J	0.11UJ	0.21J
Nickel	250	2400		343	378	22.4J	143	15.1	14.6	15.8	20.7
Potassium	--	--		669J	869J	1370J	469J	417J	903J	575J	347J
Selenium	63	3100		0.82UJ	0.8UJ	0.82U	9.2J	1.3	0.8U	0.77U	2
Silver	110	4100		0.58U	0.57U	0.12U	0.7J	0.11U	0.41J	0.11U	0.11U
Sodium	--	--		652UJ	7120J	355U	225U	243U	233U	942U	333U
Thallium	2	2		1.1UJ	1.6J	0.72U	1.1J	0.66U	0.7U	0.68U	0.67U
Vanadium	370	7100		314	384	20.9J	269	13.7	23.4	30.6	11.4
Zinc	1500	1500		105	412	120J	131J	122J	261J	212J	131J

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	SSB1	SSB3	SSB3	STFSB1	STFSB1	STFSB2
			Depth:	16	06	10	02	06	08
			Zone**:	SS	SS	SS	STF	STF	STF
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/24/94	10/24/94	10/24/94	10/26/94	10/26/94	10/26/94
Aluminum	--	--		3020J	1050J	6000J	8560J	4300	3220
Antimony	14	340		0.81UJ	5.6J	0.93U	2.6J	0.66UJ	0.3UJ
Arsenic	20	20		104J	60.4J	42.8J	8J	9.3J	2J
Barium	700	47000		39.2J	28.8J	61.5	138	46J	18.4J
Beryllium	1	1		0.18J	0.09J	0.63J	0.57J	0.22J	0.16J
Cadmium	1	100		0.07UJ	0.1UJ	0.46J	0.34J	0.08J	0.08UJ
Calcium	--	--		16700J	3370J	53700J	18500J	3970	510U
Cobalt	--	--		4J	4.2J	10.6J	36.6	37.1	19.2
Copper	600	600		44.6J	84.1J	165	129J	133J	103J
Cyanide	1100	21000		0.59U	0.82U	30.7	0.58U	0.67U	0.64U
Iron	--	--		10500	14300	16600	17500	12100	9080
Lead	400	600		331J	178J	155J	116J	71.3	20.8
Magnesium	--	--		1830J	525J	6290J	6880J	1820	1010J
Manganese	--	--		248	30.3	194	189	83.2	51.3
Mercury	14	270		1.3	2.6	1.9	0.24	0.16J	0.12UJ
Nickel	250	2400		10.5J	6.5J	16.7J	118J	90.6	93.9
Potassium	--	--		697J	461J	1370	890J	892J	807J
Selenium	63	3100		0.89J	4.8	2.2	0.79U	1.3J	0.86U
Silver	110	4100		0.12U	0.54J	0.19J	0.12U	0.13U	0.13U
Sodium	--	--		599J	299U	465U	780U	1050U	3010
Thallium	2	2		0.7U	0.98U	0.79U	0.7U	0.78U	0.76U
Vanadium	370	7100		12.5J	14.1J	15.9J	81.3J	42.4	21.2
Zinc	1500	1500		76.9	36.1	208	165	38J	40.9J

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (mg/kg)	NJDEP Soil Cleanup Criteria * Residential	NJDEP Soil Cleanup Criteria * Non-Residential	Sample ID: FBNA1-100594	FBNA5-101994	FBNA6-102094	FBNA7-102594	FBNA9-102694
Depth:							
Zone**:							
Date:			10/05/94	10/19/94	10/20/94	10/25/94	10/26/94
Aluminum	--	--	82.2J	82.5J	82.4J	88.5J	334
Antimony	14	340	1.2U	1.2U	1.2U	2.8J	1.2U
Arsenic	20	20	5U	2.4U	2.4U	2.4U	2.4U
Barium	700	47000	1.7J	0.3J	0.97J	1.2J	3.1J
Beryllium	1	1	0.1U	0.1U	0.1U	0.1U	0.1U
Cadmium	1	100	0.3U	0.3U	0.3U	0.3U	0.3U
Calcium	--	--	19.9J	2.8U	2.8U	29.9J	488J
Cobalt	--	--	0.5U	0.5U	0.5U	0.5U	0.5U
Copper	600	600	0.3U	0.3U	0.3U	0.35J	5.9J
Cyanide	1100	21000	10U	10U	10U	10U	10U
Iron	--	--	7U	15.8J	19.6J	43.7J	2000
Lead	400	600	1.4U	1.4U	1.4U	1.4U	4.4
Magnesium	--	--	6.7J	3.6U	3.6U	9J	81.1J
Manganese	--	--	0.2U	0.2U	1.4J	0.35J	20.6
Mercury	14	270	0.2U	0.2U	0.2U	0.2U	0.2U
Nickel	250	2400	0.7U	0.7U	6.7J	0.7U	2.8J
Potassium	--	--	61.1J	51.3J	41.7J	52.4J	186J
Selenium	63	3100	3.4U	3.4U	3.4U	3.4U	3.4U
Silver	110	4100	2.4U	0.5U	0.5U	0.5U	0.5U
Sodium	--	--	373J	213U	215J	297J	914J
Thallium	2	2	4.5U	3U	3U	3U	3U
Vanadium	370	7100	0.53J	0.4U	0.4U	0.4U	0.71J
Zinc	1500	1500	2.3J	1.1J	2J	8.8J	7.3J

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	NJDEP Soil Cleanup Criteria *		Sample ID:	FBNA11-102794	FBNA13-102894	FBNA14-102894	FBNA17-103194
			Depth:				
			Zone**:				
Analyte (mg/kg)	Residential	Non-Residential	Date:	10/27/94	10/28/94	10/28/94	10/31/94
Aluminum	--	--		168J	151J	114J	166J
Antimony	14	340		1.2U	1.2U	1.2U	1.2U
Arsenic	20	20		2.4U	2.4U	2.4U	2.4U
Barium	700	47000		1.1J	0.85J	0.65J	0.27J
Beryllium	1	1		0.1U	0.1U	0.1U	0.1U
Cadmium	1	100		0.3U	0.3U	0.3U	0.3U
Calcium	--	--		63.2J	65.2J	35.7J	21.1J
Cobalt	--	--		0.5U	0.5U	0.5U	0.5U
Copper	600	600		0.3U	0.3U	0.3U	1.6J
Cyanide	1100	21000		10U	10U	10U	10U
Iron	--	--		66.3J	31.4J	41.9J	7U
Lead	400	600		1.4U	1.4U	1.4U	1.4U
Magnesium	--	--		15.6J	21.9J	17.1J	11.8J
Manganese	--	--		2.1J	0.45J	0.57J	0.25J
Mercury	14	270		0.2U	0.2U	0.2U	0.2U
Nickel	250	2400		0.7U	0.7U	0.7U	1.7J
Potassium	--	--		128J	136J	114J	151J
Selenium	63	3100		3.4U	3.4U	3.4U	3.4U
Silver	110	4100		0.5U	0.5U	0.5U	0.5U
Sodium	--	--		672J	771J	699J	769J
Thallium	2	2		3U	3U	3U	3U
Vanadium	370	7100		0.4U	0.4U	0.4U	0.4U
Zinc	1500	1500		1.5J	8.1J	6.9J	0.74J

See last page for footnotes.

Table 5-5. Metals and Cyanide in Soil Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in milligrams per kilogram (mg/kg) (equivalent to parts per million [ppm]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) ILM03.
Sample results exceeding the NJDEP non-residential criteria are underlined.
Chromium results are reported separately in Table 5-6.

FBNA	Indicates a field blank associated with non-aqueous samples.
PQL	Practical quantitation level.
FR	Field replicate of previous sample.
U	The compound was analyzed for, but not detected at the specific detection limit.
J	Estimated result.
R	Rejected result.
--	No applicable criteria.
*	NJDEP soil cleanup criteria, February 3, 1992; last revised February 3, 1994.
**	Zones as defined in Table 3-2.

Table 5-6. Total and Hexavalent Chromium in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample Location	Zone*	Sample Date	Sample Depth (ft bls)	Total Chromium Comparative Criteria of 10,000 mg/kg	Hexavalent Chromium Comparative Criteria of 100 mg/kg	Hexavalent Chromium Comparative Criteria of 10 mg/kg
3TFIRMB3	N3TF	10/6/94	04	225J	NA	NA
3TFIRMB3	N3TF	10/6/94	14	17.9J	NA	NA
3TFIRMB4	N3TF	10/17/94	02	3100	9.2J	9.2J
3TFIRMB4	N3TF	10/17/94	06	678	NA	NA
AGTFSB1	AGTF	10/20/94	02	418	2.57UJ	2.57UJ
AGTFSB1	AGTF	10/20/94	06	16.2	R	R
AGTFSB2	AGTF	10/28/94	04	129	2.29UJ	2.29UJ
AGTFSB3	AGTF	10/27/94	02	1670	79.81J	79.81J
AGTFSB3	AGTF	10/27/94	06	1300	2.49UJ	2.49UJ
AGTFSB4	AGTF	10/20/94	02	284	7.04J	7.04J
AGTFSB4	AGTF	10/20/94	06	154	R	R
AHTFSB1	AHTF	10/19/94	02	10.9	R	R
AHTFSB1	AHTF	10/19/94	04	10.9J	2.31UJ	2.31UJ
AHTFSB2	AHTF	10/14/94	02	30.4	15J	15J
AHTFSB2	AHTF	10/14/94	06	26.6J	NA	NA
AHTFSB3	AHTF	10/20/94	06	9.3	R	R
AHTFSB3	AHTF	10/20/94	10	9	R	R
AHTFSB4	AHTF	10/14/94	02	10.8	7.5J	7.5J
AHTFSB4	AHTF	10/14/94	08	47	NA	NA
APSB1	AP	10/27/94	06	10.9	2.4UJ	2.4UJ
APSB1	AP	10/27/94	10	3.9	2.4UJ	2.4UJ
APSB2	AP	10/26/94	02	177	5.7J	5.7J
APSB2	AP	10/26/94	06	219	9.66J	9.66J
APSB3	AP	10/21/94	06	18J	2.44UJ	2.44UJ
APSB4	AP	10/21/94	04	18.2J	2.57UJ	2.57UJ
APSB4	AP	10/21/94	08	7J	2.41UJ	2.41UJ
APSB5	AP	10/12/94	02	685J	5.6J	5.6J
APSB5	AP	10/12/94	06	107	NA	NA
APSB6	AP	10/21/94	06	37.1	7.05J	7.05J
APSB6	AP	10/21/94	10	5.3	2.61UJ	2.61UJ
DTSB1	DT	10/27/94	06	38.1	2.18UJ	2.18UJ
DTSB1	DT	10/27/94	08	22.2	2.27UJ	2.27UJ
DTSB2	DT	10/27/94	04	8.8	2.26UJ	2.26UJ
DTSB2	DT	10/27/94	08	8.9	2.28UJ	2.28UJ
DTSB3	DT	10/27/94	04	56.1	2.44UJ	2.44UJ
DTSB3FR1	DT	10/27/94	4	41.6	2.46UJ	2.46UJ
DTSB3FR2	DT	10/28/94	4	NA	2.37UJ	2.37UJ
EC2SB1	ECP	10/27/94	04	13.9	2.31UJ	2.31UJ

See last page for footnotes.

Table 5-6. Total and Hexavalent Chromium in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample Location	Zone*	Sample Date	Sample Depth (ft bls)	Total Chromium Comparative Criteria of 10,000 mg/kg	Hexavalent Chromium Comparative Criteria of	
					100 mg/kg	10 mg/kg
EC2SB1	ECP	10/27/94	12	15.6	2.21UJ	2.21UJ
ECIRMB1	U	10/24/94	02	3.7	2.34UJ	2.34UJ
ECIRMB1	U	10/24/94	06	8.9J	3.38UJ	3.38UJ
ECIRMB3	N3TF	10/19/94	02	358	R	R
ECIRMB3	N3TF	10/19/94	06	10	2.63UJ	2.63UJ
ECPSB1	ECP	10/20/94	02	8.2	11.94J	11.94J
ECPSB1	ECP	10/20/94	08	3.8	R	R
ECPSB2	ECP	10/20/94	06	6.2	R	R
ECPSB2	ECP	10/20/94	12	24.9	R	R
ECPSB3	ECP	10/21/94	04	26.1	2.39UJ	2.39UJ
ECPSB4	ECP	10/19/94	08	13.3	R	R
ECPSB5	ECP	10/19/94	02	130	R	R
ECPSB5	ECP	10/19/94	08	8	2.28UJ	2.28UJ
EGTFSB1	GTF	10/27/94	04	6.1	2.53UJ	2.53UJ
GFSB1	STF	10/12/94	02	65.9J	NA	NA
GFSB1	STF	10/12/94	06	13.9	NA	NA
GTFIRMB1	GTF	11/16/94	02	255J	2.37UJ	2.37UJ
GTFIRMB1	GTF	10/6/94	08	36.3	NA	NA
GTFIRMB2	GTF	10/17/94	02	326	3.3J	3.3J
GTFIRMB2	GTF	10/17/94	08	7.9	NA	NA
GTFIRMB3	GTF	11/16/94	02	190J	2.28UJ	2.28UJ
GTFIRMB3	GTF	10/5/94	10	13.5J	NA	NA
GTFIRMB4	GTF	10/17/94	02	1680	48.1J	48.1J
GTFIRMB4	GTF	10/17/94	08	27.2	NA	NA
GTFIRMB5	GTF	10/5/94	02	65.9J	7J	7J
GTFIRMB5FR	GTF	10/5/94	2	40.6J	R	R
GTFIRMB5	GTF	10/5/94	06	22.3J	NA	NA
GTFIRMB6	GTF	10/5/94	04	19.5J	NA	NA
GTFIRMB6	GTF	10/5/94	08	75.1J	NA	NA
GTFIRMB7	GTF	10/17/94	02	63.3	12.8J	12.8J
GTFIRMB7	GTF	10/17/94	08	40.9	NA	NA
GTFIRMB8	GTF	10/18/94	02	104	2.32UJ	2.32UJ
GTFIRMB8	GTF	10/18/94	08	85.4	2.55UJ	2.55UJ
GTFIRMB9	GTF	10/5/94	02	173J	2.62UJ	2.62UJ
GTFIRMB9	GTF	10/5/94	06	44.5J	NA	NA
GTFSB1	GTF	10/10/94	02	42.9J	19.8J	19.8J
GTFSB1	GTF	10/10/94	08	15.4J	NA	NA
GTFSB2	GTF	10/13/94	02	41.2	16J	16J

See last page for footnotes.

Table 5-6. Total and Hexavalent Chromium in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample Location	Zone*	Sample Date	Sample Depth (ft bls)	Total Chromium Comparative Criteria of 10,000 mg/kg	Hexavalent Chromium Comparative Criteria of 100 mg/kg	Hexavalent Chromium Comparative Criteria of 10 mg/kg
GTFSB2	GTF	10/13/94	08	19.2	NA	NA
GTFSB3	GTF	10/10/94	02	21.9J	1J	1J
GTFSB3	GTF	10/10/94	08	250	NA	NA
GTFSB4	GTF	10/13/94	02	132J	1.2J	1.2J
GTFSB4	GTF	10/13/94	08	34.3	NA	NA
GTFSB4FR	GTF	10/13/94	8	57.1	NA	NA
GTFSB5	GTF	10/13/94	02	59.3J	2.2UJ	2.2UJ
GTFSB5	GTF	10/13/94	08	29.8J	NA	NA
GTFSB6	GTF	10/11/94	02	24.9J	1.7J	1.7J
GTFSB6	GTF	10/11/94	12	20.1	NA	NA
GTFSB7	GTF	10/13/94	02	68.3	2.63UJ	2.63UJ
GTFSB7	GTF	10/13/94	08	16	NA	NA
GTFSB8	GTF	10/13/94	04	35.1	NA	NA
GTFSB8	GTF	10/13/94	08	20.8	NA	NA
GTFSB9	GTF	10/13/94	02	342	7.2J	7.2J
GTFSB9	GTF	10/13/94	08	573	2.28UJ	2.28UJ
LAIRMB1	LO	10/24/94	02	38.9	4.17J	4.17J
LAIRMB1	LO	10/24/94	08	17.7J	3UJ	3UJ
LOSB1	LO	10/25/94	04	2.3J	2.32UJ	2.32UJ
LOSB1	LO	10/25/94	08	1.4J	2.29UJ	2.29UJ
LOSB2	LO	11/16/94	04	21.6	NA	NA
LOSB2	LO	10/14/94	08	30.9	NA	NA
LOSB3	LO	10/24/94	02	8.5	2.48UJ	2.48UJ
LOSB3	LO	10/24/94	04	13J	2.64UJ	2.64UJ
LOSB4	LO	10/24/94	02	19.2	2.14UJ	2.14UJ
LOSB4	LO	10/24/94	06	30.2	2.16UJ	2.16UJ
LOSB5	LO	10/11/94	04	6J	NA	NA
LOSB5	LO	10/11/94	08	6.4J	NA	NA
LOSB6	LO	10/25/94	04	8.3J	2.69UJ	2.69UJ
LOSB7	LO	10/14/94	04	5.5J	NA	NA
LOSB8	SS	10/24/94	02	22.4	2.31UJ	2.31UJ
LOSB8	SS	10/24/94	08	11.4J	2.69UJ	2.69UJ
LOSB9	LO	10/25/94	02	19.2	2.5UJ	2.5UJ
LOSB9	LO	10/25/94	06	4.4U	2.22UJ	2.22UJ
LOSB10	LO	10/28/94	04	26.5	2.26UJ	2.26UJ
LOSB10	LO	10/28/94	08	5.7U	2.36UJ	2.36UJ
LOSB11	LO	10/25/94	02	44.7	2.62UJ	2.62UJ
LOSB11	LO	10/25/94	06	12.6	2.65UJ	2.65UJ

See last page for footnotes.

Table 5-6. Total and Hexavalent Chromium in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample Location	Zone*	Sample Date	Sample Depth (ft bls)	Total Chromium Comparative Criteria of 10,000 mg/kg	Hexavalent Chromium Comparative Criteria of 100 mg/kg	Hexavalent Chromium Comparative Criteria of 10 mg/kg
LOSB12	LO	10/25/94	02	53.6	2.79UJ	2.79UJ
LOSB12	LO	10/25/94	06	32.3	2.58UJ	2.58UJ
LOSB13	LO	10/31/94	02	86.5	2.26UJ	2.26UJ
LOSB13-FR	LO	10/31/94	2	73	2.32UJ	2.32UJ
LOSB13	LO	10/31/94	08	14.7	2.26UJ	2.26UJ
LOSB14	LO	10/25/94	02	68.7	2.71UJ	2.71UJ
LOSB14	LO	10/25/94	06	40.5	2.21UJ	2.21UJ
LOSB15	LO	10/24/94	02	96.2	2.35UJ	2.35UJ
LOSB16	LO	10/25/94	04	53.8	2.19UJ	2.19UJ
LOSB16	LO	10/25/94	08	138	2.33UJ	2.33UJ
LOSB17	LO	10/24/94	02	9.5	2.42UJ	2.42UJ
LOSB18	LO	10/24/94	02	8.9	2.3UJ	2.3UJ
LOSB18	LO	10/24/94	08	2.7	2.69UJ	2.69UJ
LOSB18FR	LO	10/24/94	08	3.1	2.59UJ	2.59UJ
MBSB1	MB	10/25/94	02	94.5	2.31UJ	2.31UJ
MBSB1	MB	10/25/94	08	20.1J	2.31UJ	2.31UJ
MBSB2	MB	10/21/94	02	53.4	2.34UJ	2.34UJ
MBSB2	MB	10/21/94	06	7.9J	2.35UJ	2.35UJ
MBSB3	MB	10/25/94	06	54.7	2.96UJ	2.96UJ
MBSB3	MB	10/25/94	10	5.4	2.38UJ	2.38UJ
MBSB3FR	MB	10/25/94	10	4.2	2.78UJ	2.78UJ
MBSB4	MB	10/21/94	04	1050J	13J	13J
MBSB4	MB	10/21/94	10	1830	23.96J	23.96J
MDCSB1	MDC	10/26/94	04	8.2	2.33UJ	2.33UJ
MDCSB1	MDC	10/26/94	08	11.4	2.36UJ	2.36UJ
MDCSB2	MDC	10/11/94	03	37.5J	NA	NA
N2TFSB1	N2TF	11/17/94	02	NA	11.8J	11.8J
N2TFSB1	N2TF	10/12/94	04	1580	NA	NA
N2TFSB1	N2TF	10/12/94	08	624	NA	NA
N2TFSB2	N2TF	10/19/94	02	1820	R	R
N2TFSB2	N2TF	10/19/94	06	24.8J	2.42UJ	2.42UJ
N2TFSB3	N2TF	10/19/94	06	5150	255J	255J
N2TFSB3	N2TF	10/19/94	10	610	8.46J	8.46J
N2TFSB4	N2TF	10/28/94	02	3890	2.61UJ	2.61UJ
N2TFSB4	N2TF	10/28/94	06	443	2.48UJ	2.48UJ
N2TFSB5	N2TF	10/19/94	02	1840	R	R
N2TFSB5	N2TF	10/19/94	06	266	2.31UJ	2.31UJ
N2TFSB6	N2TF	10/19/94	04	2420	73.8J	73.8J

See last page for footnotes.

Table 5-6. Total and Hexavalent Chromium in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample Location	Zone*	Sample Date	Sample Depth (ft bls)	Total Chromium Comparative Criteria of 10,000 mg/kg	Hexavalent Chromium Comparative Criteria of 100 mg/kg	Hexavalent Chromium Comparative Criteria of 10 mg/kg
N2TFSB6	N2TF	10/19/94	06	721	R	R
N3TFSB1	N3TF	10/18/94	02	180	2.27UJ	2.27UJ
N3TFSB1	N3TF	10/18/94	12	32.4J	2.25UJ	2.25UJ
N3TFSB2	AP	10/19/94	02	51.7	R	R
N3TFSB2	AP	10/19/94	06	31.9	R	R
N3TFSB2FR	AP	10/19/94	6	28.7	R	R
N3TFSB3	N3TF	10/13/94	02	3040	175J	175J
N3TFSB3	N3TF	10/13/94	08	3980J	NA	NA
N3TFSB4	N3TF	10/17/94	02	4570	2.12UJ	2.12UJ
N3TFSB4	N3TF	10/17/94	06	386J	NA	NA
N3TFSB5	N3TF	10/19/94	04	552	14.3J	14.3J
N3TFSB5	N3TF	10/19/94	08	386	14.1J	14.1J
N3TFSB6	N3TF	10/18/94	02	2060	2.42UJ	2.42UJ
N3TFSB6	N3TF	10/18/94	06	211J	2.69UJ	2.69UJ
N3TFSB7	N3TF	10/18/94	02	2980	2.49UJ	2.49UJ
N3TFSB7	N3TF	10/18/94	06	63.8	2.37UJ	2.37UJ
N3TFSB8	N3TF	10/18/94	02	4490	293J	293J
N3TFSB8	N3TF	10/18/94	06	24.8	2.46UJ	2.46UJ
N3TFSB9	N3TF	11/2/94	02	2760	2.58UJ	2.58UJ
PESTSB1	PEST	10/20/94	04	23.9	14.81J	14.81J
PESTSB2	PEST	10/20/94	10	28.6	3.64UJ	3.64UJ
PN1SB2	P1	11/2/94	04	7.4U	2.23UJ	2.23UJ
PN1SB2	P1	11/2/94	08	13.6	2.33UJ	2.33UJ
PSSB1	MB	10/31/94	02	9.2U	2.31UJ	2.31UJ
PSSB1	MB	10/31/94	06	5.6U	2.31UJ	2.31UJ
SSB1	SS	10/24/94	06	241J	2.25UJ	2.25UJ
SSB1	SS	10/24/94	16	16.6	2.31UJ	2.31UJ
SSB2	SS	10/12/94	04	29.1	NA	NA
SSB2	SS	10/12/94	08	8.7J	NA	NA
SSB3	SS	10/24/94	06	458	3.28UJ	3.28UJ
SSB3	SS	10/24/94	10	65.1	2.63UJ	2.63UJ
STFSB1	STF	10/26/94	02	424	2.37UJ	2.37UJ
STFSB1	STF	10/26/94	06	215	2.69UJ	2.69UJ
STFSB2	STF	10/26/94	04	45	2.19UJ	2.19UJ
STFSB2	STF	10/26/94	08	9.5U	2.61UJ	2.61UJ
STFSB3	STF	10/26/94	04	19.8	2.56UJ	2.56UJ
T998SB1	U	10/12/94	04	6J	NA	NA
T998SB1	U	10/12/94	08	12.7J	NA	NA

See last page for footnotes.

Table 5-6. Total and Hexavalent Chromium in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Sample Location	Zone*	Sample Date	Sample Depth (ft bls)	Total Chromium Comparative Criteria of 10,000 mg/kg	Hexavalent Chromium Comparative Criteria of 100 mg/kg	Hexavalent Chromium Comparative Criteria of 10 mg/kg
FBNA1-100594		10/5/94	--	0.7U	NA	NA
FBNA2-100694		10/6/94	--	0.7U	NA	NA
FBNA3-101194		10/11/94	--	0.7U	NA	NA
FBNA4-101394		10/13/94	--	0.76J	NA	NA
FBNA5-101994		1019/94	--	0.7U	2U	2U
FBNA6-102094		10/20/94	--	0.83J	2U	2U
FBNA7-102194		10/21/94	--	5.4U	2U	2U
FBNA7-102594		10/25/94	--	0.7U	2U	2U
FBNA9-102694		10/26/94	--	9.6J	2U	2U
FBNA10-102694		10/26/94	--	NA	2U	2U
FBNA11-102794		10/27/94	--	0.7U	2U	2U
FBNA13-102894		10/28/94	--	0.7U	2U	2U
FBNA14-102894		10/28/94	--	0.7U	2U	2U
FBNA17-103194		10/31/94	--	0.7U	2U	2U
FBNA18-111694		11/16/94	--	NA	2U	2U

Analyte concentrations and comparative criteria in milligrams per kilogram (mg/kg) (equivalent to parts per million [ppm]).

Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) ILM03.0 for total chromium and New Jersey Modified USEPA 3060A/7196 for hexavalent chromium

Some samples were analyzed for total chromium only and not for the remaining metals that constitute the target analyte list for metals. In these cases, the total chromium was analyzed using SW846 Method 6010.

Exceedances of comparative criteria are shown in bold and are underlined.

FBNA	Indicates a field blank associated with a non-aqueous samples.
FR	Field replicate of previous sample.
U	The compound was analyzed for, but not detected at the specified detection limit.
J	Estimated result
R	Rejected result
--	Not applicable
NA	Not analyzed
ft bls	Feet below land surface
*	Zones as defined in Table 3-2.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Totals for All Areas (breakdowns for individual areas follow)										
Volatile Organic Compounds (ug/kg)										
1,1,1-Trichloroethane	2800.00	2800.00	2800.00	1	108	1	0	0	0	0
1-Butanol	1700.00	353800.00	780000.00	3	108	3	0	0	0	0
2-Butanone	2.00	22.13	82.00	24	108	22	0	0	0	0
2-Hexanone	31.00	31.00	31.00	1	108	1	0	0	0	0
2-Propanol	17.00	17.00	17.00	1	108	1	0	0	0	0
4-Methyl-2-pentanone	7.00	50.75	160.00	4	108	4	0	0	0	0
Acetone	160.00	6110.00	18000.00	3	108	3	0	0	0	0
Benzene	1.00	882.88	11000.00	19	108	18	0	2	0	2
Carbon disulfide	2.00	4.75	11.00	4	108	4	0	0	0	0
Chlorobenzene	1.00	52919.24	980000.00	21	108	19	1	6	1	5
Chloroform	43.00	43.00	43.00	1	108	1	0	0	0	0
Ethylbenzene	1.00	2222.58	36000.00	33	108	31	0	0	0	0
Hexane	1.00	4680.41	120000.00	61	108	58	0	0	0	0
Methyl-t-butyl ether	10.00	10.00	10.00	1	108	1	0	0	0	0
Tetrachloroethene	1.00	2.00	3.00	2	108	2	0	0	0	0
Toluene	1.00	733.27	11000.00	30	108	28	0	0	0	0
Xylenes (Total)	1.00	3721.22	48000.00	46	108	43	0	4	0	4
n-Propylbenzene	1.00	6956.20	130000.00	54	108	50	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
1,2-Dichlorobenzene	62.00	940536.40	4700000.00	5	108	5	0	1	0	1
1,3-Dichlorobenzene	140.00	670.00	1200.00	2	107	2	0	0	0	0
1,4-Dichlorobenzene	60.00	31356.67	240000.00	8	108	8	0	1	0	1
2,4-Dimethylphenol	250.00	250.00	250.00	1	108	1	0	0	0	0
2-Chloronaphthalene	1900.00	1900.00	1900.00	1	108	1	0	0	0	0
2-Methylnaphthalene	48.00	24186.89	310000.00	70	108	65	0	0	0	0
4-Methylphenol	210.00	210.00	210.00	1	108	1	0	0	0	0
4-Nitrophenol	1600.00	1600.00	1600.00	1	108	1	0	0	0	0
Acenaphthene	40.00	2623.87	11000.00	15	108	14	0	0	0	0
Acenaphthylene	180.00	586.67	1100.00	3	108	3	0	0	0	0
Anthracene	44.00	4114.78	50000.00	27	108	25	0	0	0	0
Benzo(a)anthracene	100.00	4437.58	64000.00	62	108	57	11	0	10	0
Benzo(a)pyrene	45.00	4158.40	37000.00	53	108	49	36	0	33	0
Benzo(b)fluoranthene	86.00	4560.14	95000.00	59	108	55	9	1	8	1
Benzo(g,h,i)perylene	210.00	3126.43	14000.00	28	108	26	0	0	0	0
Benzo(k)fluoranthene	92.00	4564.56	95000.00	59	108	55	9	0	8	0
Butyl benzyl phthalate	220.00	220.00	220.00	1	108	1	0	0	0	0
Carbazole	51.00	3844.43	18000.00	7	108	7	0	0	0	0
Chrysene	170.00	5907.98	97000.00	79	108	73	2	0	2	0
Di-n-butyl phthalate	62.00	180.40	410.00	5	108	5	0	0	0	0
Di-n-octyl phthalate	47.00	47.00	47.00	1	108	1	0	0	0	0
Dibenzo(a,h)anthracene	53.00	2471.92	21000.00	24	108	22	16	0	14	0
Dibenzofuran	47.00	2217.83	4300.00	6	108	6	0	0	0	0
Fluoranthene	62.00	1615.14	9300.00	51	108	47	0	0	0	0
Fluorene	71.00	3448.44	17000.00	25	108	23	0	0	0	0
Indeno(1,2,3-cd)pyrene	53.00	1928.09	14000.00	32	108	30	4	0	4	0
N-Nitrosodiphenylamine(1)	380.00	75180.00	150000.00	2	108	2	0	1	0	1
Naphthalene	45.00	18532.77	240000.00	35	108	32	0	2	0	2
Pentachlorophenol	75.00	5069.75	9600.00	4	108	4	0	0	0	0

See last page for footnotes.

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TIERRA-B-000881

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Totals for All Areas (continued)										
Semivolatile Organic Compounds (ug/kg) (continued)										
Phenanthrene	69.00	8043.04	94000.00	81	108	76	0	0	0	0
Pyrene	54.00	5705.83	120000.00	86	108	80	0	1	0	1
bis(2-Ethylhexyl)phthalate	110.00	1335.17	9300.00	29	108	27	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	4.10	2720.58	95000.00	32	105	30	1	1	1	1
4,4'-DDE	4.30	31.02	260.00	33	105	31	0	0	0	0
4,4'-DDT	4.80	1779.53	46000.00	27	105	26	1	0	1	0
Aldrin	2.10	25.50	110.00	9	105	9	0	0	0	0
Aroclor-1254	45.00	45.00	45.00	1	105	1	0	0	0	0
Aroclor-1260	77.00	77.00	77.00	1	105	1	0	0	0	0
Dieldrin	2.20	291.82	5800.00	20	105	19	1	0	1	0
Endosulfan I	3.40	15.45	35.00	4	105	4	0	0	0	0
Endosulfan II	20.00	20.00	20.00	1	105	1	0	0	0	0
Endosulfan sulfate	24.00	24.00	24.00	2	105	2	0	0	0	0
Endrin	3.70	12.00	26.00	5	105	5	0	0	0	0
Endrin aldehyde	0.79	18.64	68.00	11	105	10	0	0	0	0
Endrin ketone	1.70	18.11	74.00	15	105	14	0	0	0	0
Heptachlor epoxide	5.30	13.18	24.00	5	105	5	0	0	0	0
Methoxychlor	55.00	253.00	1500.00	13	105	12	0	0	0	0
alpha-BHC	5.60	5.60	5.60	1	105	1	0	0	0	0
alpha-Chlordane	1.50	13.07	39.00	18	105	17	0	0	0	0
beta-BHC	4.20	22.10	67.00	3	105	3	0	0	0	0
gamma-Chlordane	2.00	94.30	1800.00	23	105	22	0	0	0	0
Inorganics (mg/kg)										
Aluminum	606.00	5484.64	23300.00	111	112	99	0	0	0	0
Antimony	0.27	11.76	239.00	69	112	62	0	0	0	0
Arsenic	1.60	38.39	372.00	112	112	100	49	0	44	0
Barium	8.00	154.14	5290.00	112	112	100	0	0	0	0
Beryllium	0.07	0.38	2.00	92	112	82	4	0	4	0
Cadmium	0.08	1.66	18.40	48	112	43	0	0	0	0
Calcium	229.00	10781.71	141000.00	110	112	98	0	0	0	0
Chromium	1.40	378.19	5150.00	176	181	97	0	0	0	0
Cobalt	1.20	26.32	642.00	112	112	100	0	0	0	0
Copper	13.00	414.02	24100.00	112	112	100	6	0	5	0
Cyanide	0.59	3.07	30.70	16	112	14	0	0	0	0
Hexavalent chromium	1.00	36.813	293.00	32	141	23	17	17	12	12
Iron	2940.00	22971.73	104000.00	110	112	98	0	0	0	0
Lead	4.90	537.87	7590.00	112	112	100	22	0	20	0
Magnesium	53.90	4146.87	39400.00	112	112	100	0	0	0	0
Manganese	6.90	178.70	660.00	110	112	98	0	0	0	0
Mercury	0.10	1.64	21.90	96	112	86	0	0	0	0
Nickel	2.40	125.35	2650.00	112	112	100	1	0	1	0
Potassium	175.00	910.56	6500.00	109	112	97	0	0	0	0
Selenium	0.74	2.68	33.30	63	112	56	0	0	0	0
Silver	0.10	0.79	5.10	50	112	45	0	0	0	0
Sodium	598.00	5040.87	36300.00	30	112	27	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Totals for All Areas (continued)										
Inorganics (mg/kg) (continued)										
Thallium	1.10	2.23	3.70	8	112	7	4	0	4	0
Vanadium	3.10	77.78	613.00	112	112	100	0	0	0	0
Zinc.	17.90	352.01	8080.00	110	112	98	3	0	3	0
"A"-Hill Tank Area										
Volatile Organic Compounds (ug/kg)										
2-Butanone	8.00		8.00	1	4	25	0	0	0	0
Ethylbenzene	4.00		980.00	2	4	50	0	0	0	0
Hexane	17000.00		17000.00	1	4	25	0	0	0	0
Xylenes (Total)	1.00		610.00	2	4	50	0	0	0	0
n-Propylbenzene	82.00		12000.00	4	4	100	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
2-Methylnaphthalene	780.00		25000.00	4	4	100	0	0	0	0
Acenaphthene	1300.00		1300.00	1	4	25	0	0	0	0
Benzo(a)anthracene	410.00		410.00	1	4	25	0	0	0	0
Chrysene	400.00		1200.00	3	4	75	0	0	0	0
Dibenzofuran	960.00		960.00	1	4	25	0	0	0	0
Fluorene	1000.00		1900.00	2	4	50	0	0	0	0
Naphthalene	470.00		650.00	2	4	50	0	0	0	0
Phenanthrene	2800.00		4400.00	3	4	75	0	0	0	0
Pyrene	420.00		1500.00	3	4	75	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	6.90		21.00	2	4	50	0	0	0	0
4,4'-DDT	4.90		4.90	1	4	25	0	0	0	0
Inorganics (mg/kg)										
Aluminum	3730.00		6710.00	4	4	100	0	0	0	0
Antimony	0.41		2.70	3	4	75	0	0	0	0
Arsenic	9.00		88.80	4	4	100	2	0	50	0
Barium	32.60		65.60	4	4	100	0	0	0	0
Beryllium	0.21		0.42	4	4	100	0	0	0	0
Cadmium	0.12		0.12	1	4	25	0	0	0	0
Calcium	469.00		1450.00	4	4	100	0	0	0	0
Chromium	9.00		47.00	8	8	--	0	0	0	0
Cobalt	4.60		6.50	4	4	100	0	0	0	0
Copper	60.10		445.00	4	4	100	0	0	0	0
Hexavalent chromium	7.60		15.00	2	8	33	1	1	17	17
Manganese	54.50		84.30	4	4	100	0	0	0	0
Mercury	0.12		0.75	3	4	75	0	0	0	0
Nickel	13.70		54.20	4	4	100	0	0	0	0
Iron	13600.00		23400.00	4	4	100	0	0	0	0
Lead	93.60		512.00	4	4	100	0	0	0	0
Magnesium	784.00		1950.00	4	4	100	0	0	0	0
Potassium	540.00		1110.00	4	4	100	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
"A"-Hill Tank Area (continued)										
Inorganics (mg/kg) (continued)										
Selenium	1.00		1.00	1	4	25	0	0	0	0
Vanadium	20.00		25.20	4	4	100	0	0	0	0
Zinc	43.00		224.00	4	4	100	0	0	0	0
Lube Oil Area										
Volatile Organic Compounds (ug/kg)										
1-Butanol	1700.00		1700.00	1	25	4	0	0	0	0
2-Butanone	3.00		82.00	7	25	28	0	0	0	0
2-Hexanone	31.00		31.00	1	25	4	0	0	0	0
4-Methyl-2-pentanone	28.00		28.00	1	25	4	0	0	0	0
Carbon disulfide	11.00		11.00	1	25	4	0	0	0	0
Chlorobenzene	2.00		2.00	1	25	4	0	0	0	0
Ethylbenzene	3.00		650.00	8	25	32	0	0	0	0
Hexane	1.00		4500.00	14	25	56	0	0	0	0
Tetrachloroethene	1.00		1.00	1	25	4	0	0	0	0
Toluene	2.00		270.00	4	25	16	0	0	0	0
Xylenes (Total)	5.00		4700.00	10	25	40	0	0	0	0
n-Propylbenzene	4.00		6800.00	9	25	36	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
2,4-Dimethylphenol	250.00		250.00	1	25	4	0	0	0	0
2-Methylnaphthalene	75.00		120000.00	14	25	56	0	0	0	0
4-Methylphenol	210.00		210.00	1	25	4	0	0	0	0
Acenaphthene	130.00		720.00	2	25	8	0	0	0	0
Acenaphthylene	180.00		180.00	1	25	4	0	0	0	0
Anthracene	46.00		1300.00	5	25	20	0	0	12	0
Benzo(a)anthracene	340.00		52000.00	13	25	52	3	0	44	0
Benzo(a)pyrene	81.00		37000.00	12	25	48	11	0	16	0
Benzo(b)fluoranthene	290.00		28000.00	15	25	60	4	0	0	0
Benzo(g,h,i)perylene	390.00		10000.00	9	25	36	0	0	16	0
Benzo(k)fluoranthene	92.00		27000.00	15	25	60	4	0	0	0
Carbazole	280.00		280.00	1	25	4	0	0	4	0
Chrysene	580.00		97000.00	18	25	72	1	0	20	0
Dibenzo(a,h)anthracene	270.00		10000.00	7	25	28	5	0	0	0
Fluoranthene	160.00		9300.00	9	25	36	0	0	0	0
Fluorene	250.00		1500.00	4	25	16	0	0	4	0
Indeno(1,2,3-cd)pyrene	530.00		7600.00	7	25	28	1	0	0	0
Naphthalene	50.00		25000.00	6	25	24	0	0	0	0
Pentachlorophenol	75.00		75.00	1	25	4	0	0	0	0
Phenanthrene	170.00		17000.00	15	25	60	0	0	0	0
Pyrene	210.00		69000.00	20	25	80	0	0	0	0
bis(2-Ethylhexyl)phthalate	670.00		9300.00	3	25	12	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	4.10		85000.00	8	24	33	1	1	4	4
4,4'-DDE	5.40		31.00	4	24	17	0	0	0	0
4,4'-DDT	130.00		48000.00	2	24	8	1	0	4	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Lube Oil Area (continued)										
Pesticides/PCBs (ug/kg) (continued)										
Aldrin	32.00		32.00	1	24	4	0	0	0	0
Dieldrin	3.80		5600.00	4	24	17	1	0	4	0
Endrin aldehyde	4.80		9.30	2	24	8	0	0	0	0
Endrin ketone	11.00		74.00	2	24	8	0	0	0	0
Heptachlor epoxide	8.60		8.60	1	24	4	0	0	0	0
Methoxychlor	93.00		93.00	1	24	4	0	0	0	0
alpha-Chlordane	12.00		31.00	2	24	8	0	0	0	0
gamma-Chlordane	4.00		1800.00	3	24	13	0	0	0	0
Inorganics (mg/kg)										
Aluminum	652.00		19000.00	23	24	96	0	0	0	0
Antimony	1.60		8.10	6	24	25	0	0	0	0
Arsenic	4.00		249.00	24	24	100	15	0	63	0
Barium	19.90		302.00	24	24	100	0	0	0	0
Beryllium	0.13		0.98	18	24	75	0	0	0	0
Cadmium	0.11		16.60	14	24	58	0	0	0	0
Calcium	748.00		21500.00	23	24	96	0	0	0	0
Chromium	1.40		136.00	32	34	–	0	0	0	0
Cobalt	1.20		27.70	24	24	100	0	0	0	0
Copper	16.80		322.00	24	24	100	0	0	0	0
Cyanide	3.90		3.80	1	24	4	0	0	0	0
Hexavalent chromium	4.17		4.17	1	28	4	0	0	0	0
Iron	3840.00		69200.00	22	24	92	0	0	0	0
Lead	4.90		1010.00	24	24	100	4	0	17	0
Magnesium	159.00		6900.00	24	24	100	0	0	0	0
Manganese	8.80		418.00	22	24	92	0	0	0	0
Mercury	0.10		9.80	21	24	88	0	0	0	0
Nickel	2.40		91.30	24	24	100	0	0	0	0
Potassium	176.00		6500.00	24	24	100	0	0	0	0
Selenium	0.98		33.30	15	24	63	0	0	0	0
Silver	0.12		0.52	9	24	38	0	0	0	0
Sodium	748.00		5950.00	6	24	25	0	0	0	0
Thallium	1.50		2.60	2	24	8	1	0	4	0
Vanadium	3.10		210.00	24	24	100	0	0	0	0
Zinc	22.70		1100.00	22	24	–	0	0	0	0
Pier No. 1 Area										
Volatile Organic Compounds (ug/kg)										
2-Butenone	4.00		39.00	2	2	100	0	0	0	0
2-Propanol	17.00		17.00	1	2	50	0	0	0	0
Hexane	5.00		5.00	1	2	50	0	0	0	0
Toluene	21.00		21.00	1	2	50	0	0	0	0
Xylenes (Total)	2.00		2.00	1	2	50	0	0	0	0
n-Propylbenzene	25.00		25.00	1	2	50	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

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Pier No. 1 Area (continued)										
Semivolatile Organic Compounds (ug/kg)										
Anthracene	1200.00		1200.00	1	2	50	0	0	0	0
Benzo(a)anthracene	5800.00		5900.00	1	2	50	1	0	50	0
Benzo(a)pyrene	1200.00		4400.00	2	2	100	2	0	100	0
Benzo(b)fluoranthene	1400.00		4700.00	2	2	100	1	0	50	0
Benzo(g,h,i)perylene	1500.00		2800.00	2	2	100	0	0	0	0
Benzo(k)fluoranthene	1400.00		4600.00	2	2	100	1	0	50	0
Chrysene	980.00		8400.00	2	2	100	0	0	0	0
Dibenzo(a,h)anthracene	740.00		2000.00	2	2	100	2	0	100	0
Fluoranthene	930.00		4000.00	2	2	100	0	0	0	0
Fluorene	1500.00		1500.00	1	2	50	0	0	0	0
Indeno(1,2,3-cd)pyrene	790.00		2000.00	2	2	100	0	0	0	0
Phenanthrene	590.00		6900.00	2	2	100	0	0	0	0
Pyrene	710.00		4700.00	2	2	100	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	26.00		26.00	1	2	50	0	0	0	0
Endrin	26.00		26.00	1	2	50	0	0	0	0
Inorganics (mg/kg)										
Aluminum	1860.00		5770.00	2	2	100	0	0	0	0
Arsenic	7.10		37.40	2	2	100	1	0	50	0
Barium	45.20		51.30	2	2	100	0	0	0	0
Beryllium	0.12		0.38	2	2	100	0	0	0	0
Cadmium	0.51		1.60	2	2	100	0	0	0	0
Calcium	5730.00		110000.00	2	2	100	0	0	0	0
Chromium	13.60		13.60	1	2	50	0	0	0	0
Cobalt	5.20		7.50	2	2	100	0	0	0	0
Copper	53.70		143.00	2	2	100	0	0	0	0
Cyanide	0.59		0.59	1	2	50	0	0	0	0
Iron	8800.00		16300.00	2	2	100	0	0	0	0
Lead	98.00		262.00	2	2	100	0	0	0	0
Magnesium	759.00		5660.00	2	2	100	0	0	0	0
Manganese	52.60		660.00	2	2	100	0	0	0	0
Mercury	2.30		21.90	2	2	100	0	0	0	0
Nickel	14.60		15.10	2	2	100	0	0	0	0
Potassium	417.00		903.00	2	2	100	0	0	0	0
Selenium	1.30		1.30	1	2	50	0	0	0	0
Silver	0.41		0.41	1	2	50	0	0	0	0
Vanadium	13.70		23.40	2	2	100	0	0	0	0
Zinc	122.00		261.00	2	2	100	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

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No. 2 Tank Field										
Volatile Organic Compounds (ug/kg)										
2-Butanone	39.00		39.00	1	5	20	0	0	0	0
Benzene	290.00		290.00	1	5	20	0	0	0	0
Ethylbenzene	8700.00		9700.00	1	5	20	0	0	0	0
Hexane	3.00		7100.00	4	5	80	0	0	0	0
Toluene	5000.00		5000.00	1	5	20	0	0	0	0
Xylenes (Total)	3.00		36000.00	3	5	60	0	1	0	20
n-Propylbenzene	280.00		6300.00	2	5	40	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
2-Methylnaphthalene	510.00		110000.00	4	5	80	0	0	0	0
Benzo(a)anthracene	100.00		1800.00	2	5	40	0	0	0	0
Benzo(a)pyrene	45.00		45.00	1	5	20	0	0	0	0
Benzo(b)fluoranthene	170.00		170.00	1	5	20	0	0	0	0
Benzo(k)fluoranthene	180.00		180.00	1	5	20	0	0	0	0
Chrysene	290.00		2300.00	3	5	60	0	0	0	0
Dibenzo(a,h)anthracene	53.00		53.00	1	5	20	0	0	0	0
Dibenzofuran	3100.00		3100.00	1	5	20	0	0	0	0
Fluoranthene	62.00		62.00	1	5	20	0	0	0	0
Fluorene	1800.00		8700.00	2	5	40	0	0	0	0
Naphthalene	2200.00		39000.00	3	5	60	0	0	0	0
Phenanthrene	100.00		18000.00	5	5	100	0	0	0	0
Pyrene	67.00		14000.00	5	5	100	0	0	0	0
bis(2-Ethylhexyl)phthalate	220.00		2400.00	3	5	60	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDE	7.70		48.00	2	5	40	0	0	0	0
4,4'-DDT	54.00		54.00	1	5	20	0	0	0	0
Aldrin	2.60		2.60	1	5	20	0	0	0	0
Endosulfan sulfate	24.00		24.00	1	5	20	0	0	0	0
Methoxychlor	120.00		120.00	1	5	20	0	0	0	0
alpha-Chlordane	3.00		3.00	1	5	20	0	0	0	0
beta-BHC	5.10		5.10	1	5	20	0	0	0	0
Inorganics (mg/kg)										
Aluminum	2520.00		14600.00	5	5	100	0	0	0	0
Antimony	6.10		19.20	4	5	80	0	0	0	0
Arsenic	5.50		9.80	5	5	100	0	0	0	0
Barium	19.00		77.70	5	5	100	0	0	0	0
Beryllium	0.26		0.74	5	5	100	0	0	0	0
Cadmium	0.60		0.80	1	5	20	0	0	0	0
Calcium	1850.00		44800.00	5	5	100	0	0	0	0
Chromium	24.80		5160.00	12	12	100	0	0	0	0
Cobalt	8.90		74.60	5	5	100	0	0	0	0
Copper	36.10		119.00	5	5	100	0	0	0	0
Cyanide	0.74		0.74	1	5	20	0	0	0	0
Hexavalent chromium	8.46		255.00	4	10	40	3	3	30	30
Iron	12000.00		53200.00	5	5	100	0	0	0	0
Lead	40.70		951.00	5	5	100	1	0	20	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

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No. 2 Tank Field (continued)										
Inorganics (mg/kg) (continued)										
Magnesium	2080.00		22500.00	5	5	100	0	0	0	0
Manganese	77.20		402.00	5	5	100	0	0	0	0
Mercury	0.14		15.40	4	5	80	0	0	0	0
Nickel	28.50		301.00	5	5	100	0	0	0	0
Potassium	343.00		906.00	5	5	100	0	0	0	0
Selenium	1.30		1.30	1	5	20	0	0	0	0
Silver	0.25		0.79	2	5	40	0	0	0	0
Thallium	1.20		3.70	2	5	40	1	0	20	0
Vanadium	47.30		373.00	5	5	100	0	0	0	0
Zinc	54.70		309.00	5	5	100	0	0	0	0
Asphalt Plant Area										
Volatile Organic Compounds (ug/kg)										
1,1,1-Trichloroethane	2800.00		2800.00	1	7	14	0	0	0	0
2-Butanone	14.00		14.00	2	7	29	0	0	0	0
Benzene	2.00		2.00	1	7	14	0	0	0	0
Chlorobenzene	2.00		6900.00	3	7	43	0	1	0	14
Ethylbenzene	6.00		9.00	2	7	29	0	0	0	0
Hexane	1.00		350.00	3	7	43	0	0	0	0
Toluene	9.00		300.00	2	7	29	0	0	0	0
Xylenes (Total)	7.00		14.00	2	7	29	0	0	0	0
n-Propylbenzene	6.00		40000.00	4	7	57	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
1,4-Dichlorobenzene	4000.00		17000.00	2	8	25	0	0	0	0
2-Methylnaphthalene	2300.00		34000.00	5	8	63	0	0	0	0
Acenaphthene	3100.00		4200.00	2	8	25	0	0	0	0
Anthracene	890.00		3100.00	2	8	25	0	0	0	0
Benzo(a)anthracene	140.00		8300.00	6	8	75	1	0	13	0
Benzo(a)pyrene	870.00		6000.00	4	8	50	4	0	50	0
Benzo(b)fluoranthene	600.00		3100.00	4	8	50	0	0	0	0
Benzo(g,h,i)perylene	870.00		2100.00	3	8	38	0	0	0	0
Benzo(k)fluoranthene	600.00		2900.00	4	8	50	0	0	0	0
Chrysene	190.00		13000.00	6	8	75	0	0	0	0
Dibenzo(a,h)anthracene	360.00		1100.00	2	8	25	1	0	13	0
Dibenzofuran	4300.00		4300.00	1	8	13	0	0	0	0
Fluoranthene	160.00		5800.00	4	8	50	0	0	0	0
Fluorene	2900.00		2900.00	1	8	13	0	0	0	0
Indeno(1,2,3-cd)pyrene	470.00		1800.00	3	8	38	0	0	0	0
Naphthalene	10000.00		10000.00	1	8	13	0	0	0	0
Pentachlorophenol	1400.00		1400.00	1	8	13	0	0	0	0
Phenanthrene	97.00		29000.00	6	8	75	0	0	0	0
Pyrene	500.00		12000.00	7	8	88	0	0	0	0
bis(2-Ethylhexyl)phthalate	590.00		1900.00	3	8	38	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Asphalt Plant Area (continued)										
<u>Pesticides/PCBs (ug/kg)</u>										
4,4'-DDD	130.00		130.00	1	7	14	0	0	0	0
4,4'-DDE	16.00		34.00	2	7	29	0	0	0	0
4,4'-DDT	58.00		120.00	3	7	43	0	0	0	0
Aroclor-1254	45.00		45.00	1	7	14	0	0	0	0
Aroclor-1260	77.00		77.00	1	7	14	0	0	0	0
Dieldrin	5.90		17.00	3	7	43	0	0	0	0
Endosulfan II	20.00		20.00	1	7	14	0	0	0	0
Endrin aldehyde	88.00		88.00	1	7	14	0	0	0	0
Endrin ketone	3.70		36.00	3	7	43	0	0	0	0
Methoxychlor	55.00		270.00	2	7	29	0	0	0	0
alpha-Chlordane	7.00		39.00	3	7	43	0	0	0	0
gamma-Chlordane	7.40		7.40	1	7	14	0	0	0	0
<u>Inorganics (mg/kg)</u>										
Aluminum	1320.00		9640.00	7	7	100	0	0	0	0
Antimony	0.64		4.10	7	7	100	0	0	0	0
Arsenic	7.70		120.00	7	7	100	3	0	43	0
Barium	32.20		103.00	7	7	100	0	0	0	0
Beryllium	0.14		0.36	5	7	71	0	0	0	0
Cadmium	0.15		0.15	1	7	14	0	0	0	0
Calcium	883.00		141000.00	7	7	100	0	0	0	0
Chromium	3.90		885.00	13	13	100	0	0	0	0
Cobalt	4.10		24.10	7	7	100	0	0	0	0
Copper	65.10		481.00	7	7	100	0	0	0	0
Hexavalent chromium	5.60		9.66	4	12	33	0	0	0	0
Iron	5460.00		38000.00	7	7	100	0	0	0	0
Lead	116.00		770.00	7	7	100	1	0	14	0
Magnesium	318.00		6150.00	7	7	100	0	0	0	0
Manganese	63.20		266.00	7	7	100	0	0	0	0
Mercury	0.29		1.70	7	7	100	0	0	0	0
Nickel	34.90		92.80	7	7	100	0	0	0	0
Potassium	263.00		1000.00	6	7	86	0	0	0	0
Selenium	1.50		2.00	3	7	43	0	0	0	0
Silver	0.12		0.19	4	7	57	0	0	0	0
Sodium	780.00		1210.00	2	7	29	0	0	0	0
Vanadium	18.60		112.00	7	7	100	0	0	0	0
Zinc	48.20		562.00	7	7	100	0	0	0	0
AV-Gas Tank Field										
<u>Volatile Organic Compounds (ug/kg)</u>										
1-Butanol	280000.00		280000.00	1	6	17	0	0	0	0
Benzene	4.00		12.00	2	6	33	0	0	0	0
Ethylbenzene	1.00		190.00	2	6	33	0	0	0	0
Hexane	2.00		28.00	3	6	50	0	0	0	0
Toluene	2.00		9.00	2	6	33	0	0	0	0
Xylenes (Total)	2.00		78.00	2	6	33	0	0	0	0
n-Propylbenzene	720.00		13000.00	2	6	33	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
AV-Gas Tank Field (continued)										
Semivolatile Organic Compounds (ug/kg)										
2-Chloronaphthalene	1900.00		1900.00	1	6	17	0	0	0	0
2-Methylnaphthalene	120.00		45000.00	4	6	67	0	0	0	0
Acenaphthene	88.00		88.00	1	6	17	0	0	0	0
Anthracene	320.00		2100.00	4	6	67	0	0	0	0
Benzo(a)anthracene	1600.00		9000.00	5	6	83	1	0	17	0
Benzo(a)pyrene	1300.00		12000.00	5	6	83	5	0	83	0
Benzo(b)fluoranthene	1100.00		8400.00	4	6	67	1	0	17	0
Benzo(g,h,i)perylene	960.00		6900.00	4	6	67	0	0	0	0
Benzo(k)fluoranthene	1100.00		9700.00	4	6	67	1	0	17	0
Chrysene	840.00		12000.00	6	6	100	0	0	0	0
Di-n-butyl phthalate	87.00		87.00	1	6	17	0	0	0	0
Dibenzo(a,h)anthracene	760.00		5400.00	2	6	33	2	0	33	0
Dibenzofuran	1600.00		1600.00	1	6	17	0	0	0	0
Fluoranthene	1200.00		5000.00	4	6	67	0	0	0	0
Fluorene	130.00		5000.00	4	6	67	0	0	0	0
Indeno(1,2,3-cd)pyrene	500.00		4600.00	4	6	67	1	0	17	0
Phenanthrene	1200.00		14000.00	5	6	83	0	0	0	0
Pyrene	690.00		11000.00	6	6	100	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDE	14.00		14.00	1	5	20	0	0	0	0
4,4'-DDT	6.90		6.90	1	5	20	0	0	0	0
Aldrin	17.00		17.00	1	5	20	0	0	0	0
Endosulfan I	3.40		3.40	1	5	20	0	0	0	0
Endrin aldehyde	21.00		21.00	1	5	20	0	0	0	0
Endrin ketone	3.90		3.90	1	5	20	0	0	0	0
Methoxychlor	170.00		170.00	1	5	20	0	0	0	0
alpha-Chlordane	5.00		5.00	1	5	20	0	0	0	0
gamma-Chlordane	2.00		2.00	1	5	20	0	0	0	0
Inorganics (mg/kg)										
Aluminum	1610.00		7500.00	5	5	100	0	0	0	0
Antimony	2.70		59.70	3	5	60	0	0	0	0
Arsenic	5.00		237.00	5	5	100	3	0	60	0
Barium	34.10		75.50	5	5	100	0	0	0	0
Beryllium	0.30		2.00	4	5	80	2	0	40	0
Cadmium	0.35		0.48	2	5	40	0	0	0	0
Calcium	478.00		19100.00	5	5	100	0	0	0	0
Chromium	16.20		1670.00	7	7	100	0	0	0	0
Cobalt	4.50		26.80	5	5	100	0	0	0	0
Copper	94.00		354.00	5	5	100	0	0	0	0
Hexavalent chromium	7.04		79.81	2	6	33	1	1	17	17
Iron	12800.00		46600.00	5	5	100	0	0	0	0
Lead	170.00		5150.00	5	5	100	2	0	40	0
Magnesium	269.00		7150.00	5	5	100	0	0	0	0
Manganese	12.10		309.00	5	5	100	0	0	0	0
Mercury	0.17		0.99	5	5	100	0	0	0	0
Nickel	15.60		140.00	5	6	100	0	0	0	0
Potassium	477.00		893.00	5	5	100	0	0	0	0

See last page for footnotes.

Table 6-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
AV-Gas Tank Field (continued)										
Inorganics (mg/kg)										
Selenium	1.00		4.30	4	5	80	0	0	0	0
Silver	0.28		0.53	2	5	40	0	0	0	0
Thallium	3.40		3.40	1	5	20	1	0	20	0
Vanadium	10.60		171.00	5	5	100	0	0	0	0
Zinc	146.00		933.00	5	5	100	0	0	0	0
Exxon Chemicals Plant										
Volatile Organic Compounds (ug/kg)										
Benzene	4.00		43.00	3	5	60	0	0	0	0
Carbon disulfide	2.00		2.00	1	5	20	0	0	0	0
Chlorobenzene	6.00		980000.00	5	5	100	1	2	20	40
Ethylbenzene	4.00		13000.00	3	5	60	0	0	0	0
Hexane	4.00		110000.00	4	5	80	0	0	0	0
Toluene	3.00		11000.00	3	5	60	0	0	0	0
Xylenes (Total)	6.00		48000.00	3	5	60	0	1	0	20
n-Propylbenzene	4.00		1100.00	4	5	80	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
1,2-Dichlorobenzene	4700000.00		4700000.00	1	5	20	0	1	0	20
1,3-Dichlorobenzene	1200.00		1200.00	1	5	20	0	0	0	0
1,4-Dichlorobenzene	820.00		240000.00	3	5	60	0	1	0	20
2-Methylnaphthalene	830.00		12000.00	3	5	60	0	0	0	0
Benzo(a)anthracene	2900.00		27000.00	2	5	40	1	0	20	0
Benzo(a)pyrene	33000.00		33000.00	1	5	20	1	0	20	0
Benzo(b)fluoranthene	1400.00		30000.00	2	5	40	1	0	20	0
Benzo(g,h,i)perylene	13000.00		13000.00	1	5	20	0	0	0	0
Benzo(k)fluoranthene	1400.00		28000.00	2	5	40	1	0	20	0
Chrysene	1300.00		29000.00	4	5	80	0	0	0	0
Dibenzo(a,h)anthracene	21000.00		21000.00	1	5	20	1	0	20	0
Fluoranthene	840.00		840.00	1	5	20	0	0	0	0
Fluorene	2700.00		2700.00	1	5	20	0	0	0	0
Indeno(1,2,3-cd)pyrene	13000.00		13000.00	1	5	20	1	0	20	0
Naphthalene	7500.00		240000.00	2	5	40	0	1	0	20
Phenanthrene	990.00		8000.00	4	5	80	0	0	0	0
Pyrene	970.00		4300.00	4	5	80	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDE	5.30		46.00	3	5	60	0	0	0	0
Aldrin	110.00		110.00	1	5	20	0	0	0	0
Endosulfan I	35.00		35.00	1	5	20	0	0	0	0
Endrin ketone	1.70		15.00	2	5	40	0	0	0	0
Methoxychlor	91.00		91.00	1	5	20	0	0	0	0
alpha-Chlordane	39.00		39.00	1	5	20	0	0	0	0
gamma-Chlordane	63.00		63.00	1	5	20	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

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Exxon Chemicals Plant (continued)										
Inorganics (mg/kg)										
Aluminum	649.00		3870.00	5	5	100	0	0	0	0
Antimony	1.80		42.50	2	5	40	0	0	0	0
Arsenic	11.00		207.00	5	5	100	4	0	80	0
Barium	6.00		99.80	5	5	100	0	0	0	0
Beryllium	0.07		0.23	3	5	60	0	0	0	0
Cadmium	0.36		0.36	1	5	20	0	0	0	0
Calcium	307.00		20300.00	5	5	100	0	0	0	0
Chromium	3.80		130.00	8	8	100	0	0	0	0
Cobalt	4.40		8.80	5	5	100	0	0	0	0
Copper	110.00		1490.00	5	5	100	1	0	20	0
Cyanide	0.66		0.66	1	5	20	0	0	0	0
Hexavalent chromium	11.94		11.94	1	7	14	1	1	14	14
Iron	9680.00		24600.00	5	5	100	0	0	0	0
Lead	25.60		380.00	5	5	100	0	0	0	0
Magnesium	53.90		3060.00	5	5	100	0	0	0	0
Manganese	18.20		107.00	5	5	100	0	0	0	0
Mercury	0.24		2.00	4	5	80	0	0	0	0
Nickel	21.20		70.90	5	5	100	0	0	0	0
Potassium	439.00		1630.00	4	5	80	0	0	0	0
Selenium	0.93		2.80	4	5	80	0	0	0	0
Silver	0.16		0.47	3	5	60	0	0	0	0
Sodium	789.00		6900.00	2	5	40	0	0	0	0
Thallium	2.70		2.70	1	5	20	1	0	20	0
Vanadium	10.10		368.00	5	5	100	0	0	0	0
Zinc	41.70		475.00	5	5	100	0	0	0	0
No. 3 Tank Field										
Volatile Organic Compounds (ug/kg)										
1-Butanol	780000.00		780000.00	1	14	7	0	0	0	0
2-Butanone	25.00		48.00	3	14	21	0	0	0	0
Acetone	18000.00		18000.00	1	14	7	0	0	0	0
Benzene	5.00		11000.00	5	14	36	0	2	0	14
Carbon disulfide	2.00		2.00	1	14	7	0	0	0	0
Chlorobenzene	10.00		110000.00	5	14	36	0	2	0	14
Ethylbenzene	10.00		36000.00	6	14	43	0	0	0	0
Hexane	23.00		120000.00	7	14	50	0	0	0	0
Toluene	1.00		430.00	5	14	36	0	0	0	0
Xylenes (Total)	7.00		42000.00	8	14	57	0	1	0	7
n-Propylbenzene	46.00		37000.00	10	14	71	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
1,2-Dichlorobenzene	62.00		1600.00	3	14	21	0	0	0	0
1,3-Dichlorobenzene	140.00		140.00	1	14	7	0	0	0	0
1,4-Dichlorobenzene	60.00		16000.00	4	14	29	0	0	0	0
2-Methylnaphthalene	46.00		310000.00	13	14	93	0	0	0	0
Acenaphthene	40.00		2100.00	4	14	29	0	0	0	0

See last page for footnotes.

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No. 3 Tank Field (continued)										
Semivolatile Organic Compounds (ug/kg)										
Anthracene	48.00		130.00	2	14	14	0	0	0	0
Benzo(a)anthracene	200.00		1700.00	7	14	50	0	0	0	0
Benzo(a)pyrene	130.00		2500.00	6	14	43	3	0	21	0
Benzo(b)fluoranthene	370.00		2600.00	6	14	43	0	0	0	0
Benzo(g,h,i)perylene	940.00		2600.00	2	14	14	0	0	0	0
Benzo(k)fluoranthene	420.00		2500.00	6	14	43	0	0	0	0
Carbazole	51.00		51.00	1	14	7	0	0	0	0
Chrysene	350.00		3200.00	7	14	50	0	0	0	0
Di-n-butyl phthalate	150.00		150.00	1	14	7	0	0	0	0
Dibenzo(a,h)anthracene	110.00		2300.00	3	14	21	1	0	7	0
Fluoranthene	240.00		2200.00	5	14	36	0	0	0	0
Fluorene	2800.00		5700.00	3	14	21	0	0	0	0
Indeno(1,2,3-cd)pyrene	89.00		1800.00	5	14	36	0	0	0	0
N-Nitrosodiphenylamine(1)	150000.00		150000.00	1	14	7	0	1	0	7
Naphthalene	64.00		81000.00	8	14	57	0	0	0	0
Phenanthrene	310.00		94000.00	12	14	86	0	0	0	0
Pyrene	340.00		3000.00	7	14	50	0	0	0	0
bis(2-Ethylhexyl)phthalate	110.00		890.00	3	14	21	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	4.80		260.00	5	13	38	0	0	0	0
4,4'-DDE	4.30		260.00	10	13	77	0	0	0	0
4,4'-DDT	17.00		290.00	4	13	31	0	0	0	0
Aldrin	2.10		41.00	3	13	23	0	0	0	0
Dieldrin	2.20		9.10	2	13	15	0	0	0	0
Endrin	7.30		7.30	1	13	8	0	0	0	0
Endrin aldehyde	10.00		10.00	1	13	8	0	0	0	0
Endrin ketone	11.00		11.00	1	13	8	0	0	0	0
Methoxychlor	210.00		230.00	2	13	15	0	0	0	0
alpha-BHC	5.60		5.60	1	13	8	0	0	0	0
alpha-Chlordane	2.30		11.00	5	13	38	0	0	0	0
beta-BHC	4.20		4.20	1	13	8	0	0	0	0
gamma-Chlordane	5.00		23.00	4	13	31	0	0	0	0
Inorganics (mg/kg)										
Aluminum	608.00		13900.00	13	13	100	0	0	0	0
Antimony	1.10		108.00	12	13	92	0	0	0	0
Arsenic	2.00		372.00	13	13	100	7	0	54	0
Barium	7.60		102.00	13	13	100	0	0	0	0
Beryllium	0.14		1.50	8	13	62	1	0	8	0
Calcium	229.00		57400.00	13	13	100	0	0	0	0
Chromium	10.00		4570.00	21	21	100	0	0	0	0
Cobalt	4.30		125.00	13	13	100	0	0	0	0
Copper	13.00		712.00	13	13	100	1	0	8	0
Hexavalent chromium	9.20		293.00	5	16	31	4	4	25	25
Iron	8190.00		65100.00	13	13	100	0	0	0	0
Lead	5.10		2460.00	13	13	100	1	0	8	0
Magnesium	129.00		39400.00	13	13	100	0	0	0	0
Manganese	43.00		492.00	13	13	100	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
No. 3 Tank Field (continued)										
Inorganics (mg/kg) (continued)										
Mercury	0.16		7.90	10	13	77	0	0	0	0
Nickel	22.40		2650.00	13	13	100	1	0	8	0
Potassium	240.00		1370.00	13	13	100	0	0	0	0
Selenium	1.10		9.20	3	13	23	0	0	0	0
Silver	0.17		0.91	3	13	23	0	0	0	0
Sodium	7120.00		7120.00	1	13	8	0	0	0	0
Thallium	1.10		1.60	2	13	15	0	0	0	0
Vanadium	11.70		613.00	13	13	100	0	0	0	0
Zinc	46.40		421.00	13	13	100	0	0	0	0
General Tank Field										
Volatile Organic Compounds (ug/kg)										
2-Butanone	2.00		55.00	7	24	29	0	0	0	0
4-Methyl-2-pentanone	0.00		160.00	3	24	13	0	0	0	0
Acetone	0.00		170.00	2	24	8	0	0	0	0
Benzene	1.00		420.00	4	24	17	0	0	0	0
Chlorobenzene	2.00		40.00	3	24	13	0	0	0	0
Chloroform	0.00		43.00	1	24	4	0	0	0	0
Ethylbenzene	0.00		6600.00	3	24	13	0	0	0	0
Hexane	1.00		9.00	16	24	67	0	0	0	0
Tetrachloroethene	0.00		3.00	1	24	4	0	0	0	0
Toluene	1.00		3900.00	9	24	38	0	0	0	0
Xylenes (Total)	4.00		26000.00	9	24	39	0	1	0	4
n-Propylbenzene	1.00		13000.00	8	24	33	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
2-Methylnaphthalene	59.00		110000.00	11	23	47	0	0	0	0
4-Nitrophenol	0.00		1600.00	1	23	4	0	0	0	0
Acenaphthene	4500.00		11000.00	2	23	9	0	0	0	0
Anthracene	44.00		2500.00	6	23	26	0	0	0	0
Benzo(a)anthracene	140.00		1900.00	16	23	70	0	0	0	0
Benzo(a)pyrene	90.00		1100.00	13	23	57	4	0	17	0
Benzo(b)fluoranthene	88.00		2700.00	16	23	70	0	0	0	0
Benzo(g,h,i)perylene	0.00		420.00	2	23	9	0	0	0	0
Benzo(k)fluoranthene	99.00		2800.00	16	23	70	0	0	0	0
Butyl benzyl phthalate	0.00		220.00	1	23	4	0	0	0	0
Carbazole	0.00		510.00	2	23	9	0	0	0	0
Chrysene	170.00		5400.00	18	23	78	0	0	0	0
Di-n-butyl phthalate	0.00		410.00	3	23	13	0	0	0	0
Dibenzo(a,h)anthracene	0.00		340.00	2	23	9	0	0	0	0
Dibenzofuran	0.00		47.00	1	23	4	0	0	0	0
Fluoranthene	190.00		2300.00	17	23	74	0	0	0	0
Fluorene	71.00		17000.00	3	23	13	0	0	0	0
Indeno(1,2,3-cd)pyrene	53.00		310.00	6	23	26	0	0	0	0
N-Nitrosodiphenylamine(1)	0.00		360.00	1	23	4	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
General Tank Field (continued)										
Semivolatile Organic Compounds (ug/kg) (continued)										
Naphthalene	45.00		24000.00	9	23	39	0	0	0	0
Pentachlorophenol	0.00		9200.00	1	23	4	0	0	0	0
Phenanthrene	69.00		45000.00	16	23	70	0	0	0	0
Pyrene	54.00		15000.00	19	23	83	0	0	0	0
bis(2-Ethylhexyl)phthalate	120.00		2300.00	12	23	52	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	7.80		190.00	10	24	42	0	0	0	0
4,4'-DDE	4.80		38.00	10	24	42	0	0	0	0
4,4'-DDT	4.80		360.00	13	24	54	0	0	0	0
Aldrin	3.00		3.90	2	24	8	0	0	0	0
Dieldrin	4.00		32.00	9	24	38	0	0	0	0
Endosulfan I	0.00		5.40	1	24	4	0	0	0	0
Endrin	0.00		3.70	1	24	4	0	0	0	0
Endrin aldehyde	0.00		26.00	4	24	17	0	0	0	0
Endrin ketone	0.00		9.40	2	24	8	0	0	0	0
Heptachlor epoxide	0.00		24.00	3	24	13	0	0	0	0
Methoxychlor	0.00		210.00	3	24	13	0	0	0	0
alpha-Chlordane	1.50		9.60	3	24	13	0	0	0	0
gamma-Chlordane	2.20		75.00	12	24	50	0	0	0	0
Inorganics (mg/kg)										
Aluminum	1070.00		19000.00	31	31	100	0	0	0	0
Antimony	0.27		239.00	26	31	84	0	0	0	0
Arsenic	1.60		42.20	31	31	100	7	0	23	0
Barium	24.50		5290.00	31	31	100	0	0	0	0
Beryllium	0.13		1.30	28	31	90	1	0	3	0
Cadmium	0.08		18.40	17	31	55	0	0	0	0
Calcium	862.00		27700.00	31	31	100	0	0	0	0
Chromium	6.10		1680.00	38	38	100	0	0	0	0
Cobalt	3.00		642.00	31	31	100	0	0	0	0
Copper	29.40		1510.00	31	31	100	2	0	6	0
Cyanide	0.64		2.20	11	31	35	0	0	0	0
Hexavalent chromium	1.00		48.10	10	19	53	4	4	21	21
Iron	5230.00		104000.00	31	31	100	0	0	0	0
Lead	11.00		7590.00	31	31	100	12	0	39	0
Magnesium	334.00		28100.00	31	31	100	0	0	0	0
Manganese	25.90		474.00	31	31	100	0	0	0	0
Mercury	0.12		6.00	27	31	87	0	0	0	0
Nickel	15.00		1520.00	31	31	100	0	0	0	0
Potassium	300.00		6100.00	31	31	100	0	0	0	0
Selenium	0.74		9.30	23	31	74	0	0	0	0
Silver	0.24		4.50	19	31	61	0	0	0	0
Sodium	1240.00		36400.00	12	31	39	0	0	0	0
Vanadium	12.30		400.00	31	31	100	0	0	0	0
Zinc	17.90		8080.00	31	31	100	3	0	10	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Solvent Tank Field										
Volatile Organic Compounds (ug/kg)										
Benzene	260.00		280.00	2	4	50	0	0	0	0
Chlorobenzene	200.00		200.00	1	4	25	0	0	0	0
Ethylbenzene	350.00		480.00	2	4	50	0	0	0	0
Hexane	6100.00		6100.00	1	4	25	0	0	0	0
Toluene	250.00		250.00	1	4	25	0	0	0	0
Xylenes (Total)	280.00		280.00	1	4	25	0	0	0	0
n-Propylbenzene	980.00		13000.00	4	4	100	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
2-Methylnaphthalene	12000.00		180000.00	4	4	100	0	0	0	0
Acenaphthene	1400.00		6000.00	2	4	50	0	0	0	0
Anthracene	2700.00		11000.00	3	4	75	0	0	0	0
Benzo(a)anthracene	390.00		3400.00	3	4	75	0	0	0	0
Benzo(a)pyrene	520.00		2600.00	2	4	50	1	0	25	0
Benzo(b)fluoranthene	690.00		1400.00	2	4	50	0	0	0	0
Benzo(k)fluoranthene	740.00		1400.00	2	4	50	0	0	0	0
Carbazole	4200.00		4200.00	1	4	25	0	0	0	0
Chrysene	2600.00		5700.00	2	4	50	0	0	0	0
Fluoranthene	600.00		2400.00	2	4	50	0	0	0	0
Fluorene	1800.00		1800.00	1	4	25	0	1	0	25
Naphthalene	2500.00		130000.00	2	4	50	0	0	0	0
Pentachlorophenol	9600.00		9600.00	1	4	25	0	0	0	0
Phenanthrene	2000.00		22000.00	4	4	100	0	0	0	0
Pyrene	3100.00		14000.00	3	4	75	0	0	0	0
bis(2-Ethylhexyl)phthalate	490.00		490.00	1	4	25	0	0		
Pesticides/PCBs (ug/kg)										
4,4'-DDD	72.00		72.00	1	4	25	0	0	0	0
4,4'-DDT	75.00		75.00	1	4	25	0	0	0	0
Endosulfan I	18.00		18.00	1	4	25	0	0	0	0
Endosulfan sulfate	24.00		24.00	1	4	25	0	0	0	0
Endrin	10.00		10.00	1	4	25	0	0	0	0
Endrin aldehyde	22.00		22.00	1	4	25	0	0	0	0
Endrin ketone	6.40		7.40	2	4	50	0	0	0	0
alpha-Chlordane	30.00		30.00	1	4	25	0	0	0	0
Inorganics (mg/kg)										
Aluminum	3220.00		23300.00	4	4	100	0	0	0	0
Antimony	2.60		4.10	2	4	50	0	0	0	0
Arsenic	2.00		46.70	4	4	100	1	0	25	0
Barium	18.40		170.00	4	4	100	0	0	0	0
Beryllium	0.16		0.91	4	4	100	0	0	0	0
Cadmium	0.08		0.34	2	4	50	0	0	0	0
Calcium	3970.00		18600.00	3	4	75	0	0	0	0
Chromium	13.90		424.00	6	7	86	0	0	0	0
Cobalt	19.20		397.00	4	4	100	0	0	0	0
Copper	103.00		1330.00	4	4	100	1	0	25	

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

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Solvent Tank Field (continued)										
Inorganics (mg/kg) (continued)										
Iron	9080.00		30900.00	4	4	100	0	0	0	0
Lead	20.80		324.00	4	4	100	0	0	0	0
Magnesium	1010.00		6880.00	4	4	100	0	0	0	0
Manganese	51.30		281.00	4	4	100	0	0	0	0
Mercury	0.16		1.30	3	4	75	0	0	0	0
Nickel	90.60		909.00	4	4	100	0	0	0	0
Potassium	807.00		5090.00	4	4	100	0	0	0	0
Selenium	1.30		2.40	2	4	50	0	0	0	0
Silver	0.56		0.56	1	4	25	0	0	0	0
Sodium	3010.00		36300.00	2	4	50	0	0	0	0
Vanadium	21.20		83.60	4	4	100	0	0	0	0
Zinc	38.00		167.00	4	4	100	0	0	0	0
Piers and East Side Treatment Plant Area										
Inorganics (mg/kg)										
Chromium	23.90		28.60	2	2	100	0	0	0	0
Hexavalent chromium	14.61		14.61	1	2	50	1	1	50	50
Domestic Trade Area										
Semivolatile Organic Compounds (ug/kg)										
Anthracene	50000.00		50000.00	1	1	100	0	0	0	0
Carbazole	18000.00		18000.00	1	1	100	0	0	0	0
Chrysene	4100.00		4100.00	1	1	100	0	0	0	0
Fluoranthene	4800.00		4800.00	1	1	100	0	0	0	0
Fluorene	6300.00		6300.00	1	1	100	0	0	0	0
Phenanthrene	9000.00		9000.00	1	1	100	0	0	0	0
Pyrene	8000.00		8000.00	1	1	100	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	61.00		61.00	1	1	100	0	0	0	0
Endrin ketone	10.00		10.00	1	1	100	0	0	0	0
gamma-Chlordane	12.00		12.00	1	1	100	0	0	0	0
Inorganics (mg/kg)										
Aluminum	5310.00		5310.00	1	1	100	0	0	0	0
Antimony	0.72		0.72	1	1	100	0	0	0	0
Arsenic	16.50		16.50	1	1	100	0	0	0	0
Barium	76.70		76.70	1	1	100	0	0	0	0
Beryllium	0.36		0.36	1	1	100	0	0	0	0
Cadmium	0.28		0.28	1	1	100	0	0	0	0
Calcium	1460.00		1460.00	1	1	100	0	0	0	0
Chromium	8.80		56.10	5	5	100	0	0	0	0
Cobalt	29.30		29.30	1	1	100	0	0		

See last page for footnotes.

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Domestic Trade Area (continued)										
Inorganics (mg/kg) (continued)										
Copper	472.00		472.00	1	1	100	0	0	0	0
Iron	15200.00		15200.00	1	1	100	0	0	0	0
Lead	129.00		129.00	1	1	100	0	0	0	0
Magnesium	2800.00		2800.00	1	1	100	0	0	0	0
Manganese	352.00		352.00	1	1	100	0	0	0	0
Mercury	0.81		0.81	1	1	100	0	0	0	0
Nickel	197.00		187.00	1	1	100	0	0	0	0
Potassium	1120.00		1120.00	1	1	100	0	0	0	0
Selenium	1.30		1.30	1	1	100	0	0	0	0
Silver	0.44		0.44	1	1	100	0	0	0	0
Sodium	1510.00		1510.00	1	1	100	0	0	0	0
Vanadium	82.80		62.80	1	1	100	0	0	0	0
Zinc	549.00		549.00	1	1	100	0	0	0	0
Utilities Area										
Volatile Organic Compounds (ug/kg)										
Hexene	2.00		2.00	1	1	100	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
Benzo(a)pyrene	770.00		770.00	1	1	100	1	0	100	0
Benzo(b)fluoranthene	1200.00		1200.00	1	1	100	0	0	0	0
Benzo(k)fluoranthene	1200.00		1200.00	1	1	100	0	0	0	0
Chrysene	1400.00		1400.00	1	1	100	0	0	0	0
Pyrene	1100.00		1100.00	1	1	100	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	82.00		62.00	1	1	100	0	0	0	0
4,4'-DDE	8.90		8.90	1	1	100	0	0	0	0
4,4'-DDT	200.00		200.00	1	1	100	0	0	0	0
Dieldrin	27.00		27.00	1	1	100	0	0	0	0
Methoxychlor	130.00		130.00	1	1	100	0	0	0	0
Inorganics (mg/kg)										
Aluminum	787.00		787.00	1	1	100	0	0	0	0
Arsenic	4.30		4.30	1	1	100	0	0	0	0
Barium	9.40		9.40	1	1	100	0	0	0	0
Beryllium	0.47		0.47	1	1	100	0	0	0	0
Calcium	254.00		254.00	1	1	100	0	0	0	0
Chromium	3.70		15.60	6	6	100	0	0	0	0
Cobalt	2.10		2.10	1	1	100	0	0	0	0
Copper	17.70		17.70	1	1	100	0	0	0	0
Iron	2940.00		2840.00	1	1	100	0	0	0	0
Lead	122.00		122.00	1	1	100	0	0	0	0
Magnesium	106.00		106.00	1	1	100	0	0	0	0
Manganese	14.70		14.70	1	1	100	0	0	0	0
Nickel	19.40		18.40	1	1	100	0	0	0	0
Vanadium	51.10		61.10	1	1	100	0	0	0	0
Zinc	27.10		27.10	1	1	100	0	0	0	0

See last page for footnotes.

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Main Building Area										
Volatile Organic Compounds (ug/kg)										
Benzene	6.00		6.00	1	6	17	0	0	0	0
Carbon disulfide	4.00		4.00	1	6	17	0	0	0	0
Chlorobenzene	7.00		530.00	2	6	33	0	0	0	0
Ethylbenzene	3.00		570.00	3	6	50	0	0	0	0
Hexane	3.00		1100.00	3	6	50	0	0	0	0
Toluene	3.00		3.00	1	6	17	0	0	0	0
Xylenes (Total)	4.00		1200.00	3	6	50	0	0	0	0
n-Propylbenzene	20.00		11000.00	4	6	67	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
1,2-Dichlorobenzene	780.00		780.00	1	6	17	0	0	0	0
2-Methylnaphthalene	490.00		46000.00	6	6	100	0	0	0	0
Benzo(a)anthracene	390.00		7200.00	2	6	33	1	0	17	0
Benzo(a)pyrene	370.00		6100.00	2	6	33	1	0	17	0
Benzo(b)fluoranthene	850.00		3700.00	2	6	33	0	0	0	0
Benzo(g,h,i)perylene	350.00		6300.00	2	6	33	0	0	0	0
Benzo(k)fluoranthene	600.00		3800.00	2	6	33	0	0	0	0
Chrysene	620.00		12000.00	4	6	67	0	0	0	0
Dibenzo(a,h)anthracene	220.00		3300.00	2	6	33	1	0	17	0
Fluoranthene	480.00		480.00	1	6	17	0	0	0	0
Indeno(1,2,3-cd)pyrene	230.00		2300.00	2	6	33	0	0	0	0
Phenanthrene	1600.00		23000.00	4	6	67	0	0	0	0
Pyrene	1700.00		9800.00	4	6	67	0	0	0	0
bis(2-Ethylhexyl)phthalate	2100.00		2800.00	3	6	50	0	0	0	0
Pesticides/PCBs (ug/kg)										
4,4'-DDD	7.20		7.80	2	6	33	0	0	0	0
alpha-Chlordane	13.00		13.00	1	6	17	0	0	0	0
beta-BHC	57.00		57.00	1	6	17	0	0	0	0
Inorganics (mg/kg)										
Aluminum	1380.00		21400.00	6	6	100	0	0	0	0
Antimony	4.50		4.50	1	6	17	0	0	0	0
Arsenic	9.40		225.00	6	6	100	3	0	50	0
Barium	22.90		63.10	6	6	100	0	0	0	0
Beryllium	0.22		0.84	5	6	83	0	0	0	0
Cadmium	0.10		0.69	4	6	67	0	0	0	0
Calcium	1150.00		15900.00	6	6	100	0	0	0	0
Chromium	5.40		1830.00	8	10	80	0	0	0	0
Cobalt	3.30		29.90	6	6	100	0	0	0	0
Copper	81.20		24100.00	6	6	100	1	0	17	0
Hexavalent chromium	13.00		23.98	2	10	20	2	2	20	20
Iron	7200.00		27000.00	6	6	100	0	0	0	0
Lead	47.30		675.00	6	6	100	1	0	17	0
Magnesium	443.00		18800.00	6	6	100	0	0	0	0
Manganese	34.60		230.00	6	6	100	0	0	0	0
Mercury	0.18		0.51	5	6	83	0	0	0	0
Nickel	15.80		125.00	6	6	100	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Main Building Area (continued)										
Inorganics (mg/kg) (continued)										
Potassium	300.00		3560.00	6	6	100	0	0	0	0
Selenium	1.50		2.00	2	6	33	0	0	0	0
Silver	0.13		5.10	2	6	33	0	0	0	0
Sodium	1670.00		3400.00	2	6	33	0	0	0	0
Vanadium	11.40		72.90	6	6	100	0	0	0	0
Zinc	53.60		298.00	6	6	100	0	0	0	0
Stockpile Area										
Volatile Organic Compounds (ug/kg)										
2-Butanone	8.00		8.00	1	3	33	0	0	0	0
Chlorobenzene	1.00		1.00	1	3	33	0	0	0	0
Hexane	5.00		7.00	2	3	67	0	0	0	0
Methyl-t-butyl ether	10.00		10.00	1	3	33	0	0	0	0
Xylenes (Total)	2.00		2.00	1	3	33	0	0	0	0
n-Propylbenzene	1.00		14.00	2	3	67	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
2-Methylnaphthalene	490.00		1600.00	2	3	67	0	0	0	0
Acenaphthene	2300.00		2300.00	1	3	33	0	0	0	0
Acenaphthylene	490.00		1100.00	2	3	67	0	0	0	0
Anthracene	440.00		16000.00	3	3	100	0	0	0	0
Benzo(a)anthracene	6500.00		64000.00	3	3	100	3	0	100	0
Benzo(a)pyrene	2200.00		36000.00	3	3	100	3	0	100	0
Benzo(b)fluoranthene	2600.00		95000.00	3	3	100	2	1	67	33
Benzo(g,h,i)perylene	1400.00		14000.00	3	3	100	0	0	0	0
Benzo(k)fluoranthene	2700.00		95000.00	3	3	100	2	0	67	0
Carbazole	3600.00		3600.00	1	3	33	0	0	0	0
Chrysene	4800.00		61000.00	3	3	100	1	0	33	0
Dibenzo(a,h)anthracene	900.00		4600.00	2	3	67	2	0	67	0
Dibenzofuran	3300.00		3300.00	1	3	33	0	0	0	0
Fluoranthene	1200.00		5500.00	3	3	100	0	0	0	0
Fluorene	3400.00		5800.00	2	3	67	0	0	0	0
Indeno(1,2,3-cd)pyrene	2400.00		14000.00	2	3	67	1	0	33	0
Naphthalene	2000.00		2000.00	1	3	33	0	0	0	0
Phenanthrene	1000.00		84000.00	3	3	100	0	0	0	0
Pyrene	5400.00		120000.00	3	3	100	0	1	0	33
Pesticide/PCBs (ug/kg)										
Dieldrin	15.00		15.00	1	3	33	0	0	0	0
Endrin	13.00		13.00	1	3	33	0	0	0	0
Endrin aldehyde	9.00		9.00	1	3	33	0	0	0	0
Endrin ketone	69.00		69.00	1	3	33	0	0	0	0
Heptachlor epoxide	16.00		16.00	1	3	33	0	0	0	0
Methoxychlor	1500.00		1500.00	1	3	33	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
Stockpile Area (continued)										
Inorganics (mg/kg)										
Aluminum	1050.00		6000.00	3	3	100	0	0	0	0
Antimony	5.60		5.60	1	3	33	0	0	0	0
Arsenic	42.80		104.00	3	3	100	3	0	100	0
Barium	28.80		61.50	3	3	100	0	0	0	0
Beryllium	0.09		0.63	3	3	100	0	0	0	0
Cadmium	0.46		0.46	1	3	33	0	0	0	0
Calcium	3370.00		53700.00	3	3	100	0	0	0	0
Chromium	8.70		458.00	6	6	100	0	0	0	0
Cobalt	4.00		10.60	3	3	100	0	0	0	0
Copper	44.60		165.00	3	3	100	0	0	0	0
Cyanide	30.70		30.70	1	3	33	0	0	0	0
Iron	10500.00		16600.00	3	3	100	0	0	0	0
Lead	155.00		331.00	3	3	100	0	0	0	0
Magnesium	525.00		6280.00	3	3	100	0	0	0	0
Manganese	30.30		249.00	3	3	100	0	0	0	0
Mercury	1.30		2.60	3	3	100	0	0	0	0
Nickel	6.50		16.70	3	3	100	0	0	0	0
Potassium	461.00		1370.00	3	3	100	0	0	0	0
Selenium	0.69		4.80	3	3	100	0	0	0	0
Silver	0.19		0.54	2	3	67	0	0	0	0
Sodium	599.00		599.00	1	3	33	0	0	0	0
Vanadium	12.50		15.90	3	3	100	0	0	0	0
Zinc	36.10		208.00	3	3	100	0	0	0	0
MDC Building Area										
Volatile Organic Compounds (ug/kg)										
Ethylbenzene	1.00		1.00	1	1	100	0	0	0	0
Hexane	1.00		1.00	1	1	100	0	0	0	0
Toluene	2.00		2.00	1	1	100	0	0	0	0
Xylenes (Total)	7.00		7.00	1	1	100	0	0	0	0
Semivolatile Organic Compounds (ug/kg)										
Benzo(a)anthracene	200.00		200.00	1	1	100	0	0	0	0
Benzo(a)pyrene	270.00		270.00	1	1	100	0	0	0	0
Benzo(b)fluoranthene	510.00		510.00	1	1	100	0	0	0	0
Benzo(k)fluoranthene	490.00		490.00	1	1	100	0	0	0	0
Chrysene	230.00		230.00	1	1	100	0	0	0	0
Di-n-octyl phthalate	47.00		47.00	1	1	100	0	0	0	0
Fluoranthene	150.00		150.00	1	1	100	0	0	0	0
Naphthalene	64.00		64.00	1	1	100	0	0	0	0
Phenanthrene	150.00		150.00	1	1	100	0	0	0	0
Pyrene	480.00		480.00	1	1	100	0	0	0	0
bis(2-Ethylhexyl)phthalate	1000.00		1000.00	1	1	100	0	0	0	0
Aluminum	7030.00		7030.00	1	1	100	0	0	0	0
Antimony	0.82		0.82	1	1	100	0	0	0	0
Arsenic	10.00		10.00	1	1	100	0	0	0	0
Barium	107.00		107.00	1	1	100	0	0	0	0

See last page for footnotes.

Table 5-7. Summary of Detected Concentrations of All Constituents in Soil Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric[1] Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Non-Residential Soil Criteria	Number of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria	Percent of Samples Exceeding NJDEP Non-Residential Soil Criteria	Percent of Samples Exceeding NJDEP Impact to Groundwater Soil Criteria
MDC Building Area (continued)										
Inorganics (mg/kg) (continued)										
Beryllium	0.18		0.18	1	1	100	0	0	0	0
Cadmium	0.52		0.52	1	1	100	0	0	0	0
Calcium	21200.00		21200.00	1	1	100	0	0	0	0
Chromium	8.20		37.50	3	3	100	0	0	0	0
Cobalt	6.90		6.90	1	1	100	0	0	0	0
Copper	85.30		85.30	1	1	100	0	0	0	0
Iron	19800.00		19800.00	1	1	100	0	0	0	0
Lead	526.00		526.00	1	1	100	0	0	0	0
Magnesium	4190.00		4190.00	1	1	100	0	0	0	0
Manganese	154.00		154.00	1	1	100	0	0	0	0
Mercury	0.88		0.88	1	1	100	0	0	0	0
Nickel	51.60		51.60	1	1	100	0	0	0	0
Potassium	851.00		851.00	1	1	100	0	0	0	0
Silver	0.10		0.10	1	1	100	0	0	0	0
Sodium	1510.00		1510.00	1	1	100	0	0	0	0
Vanadium	37.60		37.60	1	1	100	0	0	0	0
Zinc	111.00		111.00	1	1	100	0	0	0	0

Ranges of concentrations and exceedances do not include quality assurance/quality control samples such as replicates, field blanks, and matrix spike/matrix spike duplicates.

NJDEP New Jersey Department of Environmental Protection.

PCBs Polychlorinated biphenyls.

mg/kg Milligram per kilogram (parts per million).

ug/kg Microgram per kilogram (parts per billion).

1 Geometric mean provided only for whole site summary, not for individual area data.

Table 5-8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	Borehole and Soil Measurements/Observations			Temporary Well Point Measurements/Observations					
Boring Identification/ Well Designation	Depth of Borehole (ft bls)	Description of Hydrocarbon Observations in Soil	Depth to Saturated Soil (ft bls)	Screened Interval (ft bls)	Days [1] After Installation	Depth [1] to Water (ft bmp)	Depth [1] to NAPL (ft bmp)	Maximum [2] Apparent NAPL Thickness (ft)	NAPL Observations
"A" -Hill Tank Area									
AHTFSB1	14	HC 3.0 to 3.5 ft bls; at 10.0 to 14.0 ft bls; strong odor.	4	0-10	6	7.38	4.2	3.28	Light brown product.
AHTFSB2	12	HC 0.0 to 6.0 ft bls.	6	0-12	6	4.13	4.03	0.11	Clear light brown product.
AHTFSB3	18	No HC observed; location initially selected for groundwater sample.	10	0-15	14	15.20	14.32	0.88	Clear oil.
AHTFSB4	14	No HC observed.	6	0-10	6	9.16	3.19	6.83	Light brown, clear product.
Lube Oil Area									
LOSB1	16	Trace HC and trace sheen on water 4.0 to 10.0 ft bls.	8	0-10	9	6.89	5.89	1.0	Light brown, clear product.
LOSB2	12	Light HC residuum 2.5 to 3.0 ft bls; semi-residuum 6.0 to 9.0 ft bls.	2.5	0-11	12	3.4	NS	0.05	Brownish/green product.
LOSB3	12	HC 4.0 to 12.0 ft bls.	3	0-10	10	6.24	6.01	0.23	Light brown product.
LOSB4	14	HC 4.0 to 6.0 ft bls. Trace droplets of brown oil.	4	0-10	14	6.29	NS	Trace	No NAPL observed.
LOSB5/ (W) GMMW1	14	Brown HC residuum 2.0 to 10.0 ft bls.	3.7	2.5-12.5	10	4.5	4.0	1.71	Brown clear to dark brown product.
LOSB6	12	No HC observed.	3.5	A				0	No NAPL observed.
LOSB7	8	Brown HC residuum in soil and sheen 2.0 to 6.0 ft bls.	4.3	0-5	12	1.78	NS	Trace	No NAPL observed.
LOSB8	16	HC 2.0 to 12.0 ft bls.	8	0-15	10	10.42	8.42	3.23	Light brown product.
LOSB9	14	Black oily HC-like material with wax-like material 6.0 to 8.0 ft bls.	5.8	0-10	13	6.43	NS	Trace	Thick black oil on bailer, trace floating.
LOSB10	16	HC in sands, 12.0 to 13.5 ft bls.	12	0-10	10	6.23	6.22	0.30	
LOSB11	14	HC 3.0 to 7.0 ft bls.	8.5	0-14	15	4.22	4.1	0.12	Light brown weathered oil.
LOSB12	14	HC on soil 2.0 to 6.0 ft bls; brown fluid HC 6.0 to 12.0 ft bls.	5	0-14	13	5.71	NS	Trace	Brown weathered oil, thin film on probe.
LOSB13	16	HC stains 0.0 to 8.0 ft bls.	8	0-10	9	6.43	NS	0.02	Thick, brown oil on probe.
LOSB14	15	HC 7.0 to 8.5 ft bls. Brown oil.	7	0-15	15	4.42	NS	Trace	No NAPL observed.
LOSB15	12	No HC observed.	2	A				0	No NAPL observed.

See last page for footnotes.

Table 5- 8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	Borehole and Soil Measurements/Observations			Temporary Well Point Measurements/Observations					
Boring Identification/ Well Designation	Depth of Borehole (ft bls)	Description of Hydrocarbon Observations in Soil	Depth to Saturated Soil (ft bls)	Screened Interval (ft bls)	Days[1] After Installation	Depth[1] to Water (ft bmp)	Depth[1] to NAPL (ft bmp)	Maximum[2] Apparent NAPL Thickness (ft)	NAPL Observations
Lube Oil Area (continued)									
LOSB16	14	Trace HC 10.0 to 12.0 ft bls. HC 5.0 to 6.0 ft bls.	10	3-13	15	7.21	7.18	0.03	Brown weathered oil.
LOSB17	3	No HC observed.	NA	A				0	No NAPL observed.
LOSB18	14	Wax bits 2.0 to 10.0 ft bls.	NA	A				0	No NAPL observed.
* LAIRMB1	12	Brown HC residuum 4.0 to 10.0 ft bls.	4	0-10	2	1.87	1.85	0.02	Clear to light brown product.
* LAIRMB2	9	Oil at 1.5 ft bls; spoons coated with oil/water/silt and heavy sheen 4.0 to 8.0 ft bls; odor and sheen.	1.5	0-9	14	4.07	NS	Trace	Light brown product.
* LAIRMB3	12	No HC observed.	4	A				0	No NAPL observed.
* LAIRMB4/ (S) GMMW-19	12	Clayey-like sludge has heavy sheen when wetted 2.0 .	6	0-10	10	3.45	3.32	0.15	Light brown, clear product.
* LAIRMB5	12	Odor, brown HC residuum droplets on spoon 4.0 to 6.0 ft bls; sheen 6.0 to 10.0 ft bls; 10.0 to 12.0 spoon coated with HC residuum. Dark brown, greenish product.	9	0-10	14	5.68	NS	Trace	No NAPL observed.
* LAIRMB6	12	Trace sheen at 12.0 ft bls.	8	A				0	No NAPL observed.
* LAIRMB7	20	Sheens and brown to green HC residuum 8.0 to 16.0 ft bls. Dark brown, greenish product.	7.9	0-15	14	8.15	NS	Trace	No NAPL observed.
Pier No. 1 Area									
PN1SB2	16	HC staining 0.0 to 10.0 ft bls.	8	0-10	7	4.98	NS	0.19	Trace light brown product.
No. 2 Tank Field									
N2TFSB1/ (W) GMMW2	18	Visual HC at 6.0 ft bls. Brown product.	6	6-16	17	4.11	NS	Trace	No NAPL observed.
N2TFSB2	12	Trace HC 4.0 to 8.0 ft bls; saturated 8.0 to 10.0 ft bls.	6	0-10	15	6.14	NS	0.03	Light brown, clear product.
N2TFSB3	14	HC 8.0 to 13.0; trace.	6	0-14	15	7.20	NS	Trace	Trace droplets.
N2TFSB4	12	HC 0.0 to 11.5 ft bls. Sheen of light brown product.	2	0-10	10	5.57	5.54	0.04	Light brown oil.
N2TFSB5	16	HC 4.0 to 8.0 ft bls.	6	0-10	15	7.47	NS	Trace	No NAPL observed.
N2TFSB6	14	No HC observed; stains observed.	6	0-10	15	6.94	6.93	0.02	Droplets of clear product.
APSB1	16	HC 6.0 to 12.0 ft bls. Black product.	10	0-16	12	9.4	NS	Trace	No NAPL observed.

See last page for footnotes.

Table 5-8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	Borehole and Soil Measurements/Observations			Temporary Well Point Measurements/Observations					
Boring Identification/ Well Designation	Depth of Borehole (ft bls)	Description of Hydrocarbon Observations in Soil	Depth to Saturated Soil (ft bls)	Screened Interval (ft bls)	Days [1] After Installation	Depth [1] to Water (ft bmp)	Depth [1] to NAPL (ft bmp)	Maximum [2] Apparent NAPL Thickness (ft)	NAPL Observations
Asphalt Plant Area									
APSB2/ (W) GMMW3	20	HC and water 6.0 to 16.0 ft bls.	8	7-17	14	9.02	8.02	3.07	Black thick product.
APSB3	16	Tar-like HC 4.5 to 4.7 ft bls; trace HC residuum and sheen 5.5 to 7.0 ft bls; HC droplets 15.9 to 16.0 ft bls.	6	0-10	13	8.89	NS	Trace	Sheen.
APSB4	12	Tar-like HC 3.5 to 4.0 ft bls; brown HC droplets. Semi-viscous HC residuum, 6.0 to 10.0 ft bls.	8	0-10	11	7.1	6.9	0.2	Thick black weathered oil.
APSB5/ (W) GMMW4	14	Black, thick HC 5.0 to 6.0 ft bls.	9	4-14	17	5.63	NS	Trace	No NAPL observed.
APSB6	20	Hard black HC 3.5 to 6.0 ft bls; saturated with brown HC residuum 8.0 to 10.5 ft bls.	9.5	0-15	10	8.40	8.35	0.05	Thick black tar.
AV.-Gas Tank Field									
AGTFSB1	18	HC 0.0 to 4.0 ft bls; saturated HC 4.0 to 14.0 ft bls.	7	0-15	5	10.93	8.94	1.99	Black oil, weathered.
AGTFSB2	12	Black HC 2.0 to 4.0 ft bls.	2	0-10	7	8.46	7.42	2.94	Thick, black product.
AGTFSB3	16	Sheen and HC 2.0 to 9.0 ft bls.	8	0-10	13	6.58	6.52	1.09	Light brown product.
AGTFSB4	14	HC 4.0 to 12.0 ft bls.	7	0-10	15	9.06	8.34	0.72	Black weathered oil.
Exxon Chemical Plant									
ECPSB1	20	Droplets to saturated with brown HC residuum 10.0 to 12.0 ft bls.	11	0-15	5	10.32	8.8	1.52	Light brown, clear product.
ECPSB2	20	Sheen and trace black to brown HC residuum 4.0 to 12.0 ft bls, and at 20.0 ft bls.	10	0-20	14	10.36	8.78	1.58	Brown oil.
ECPSB3	4	No HC observed; Refusal at 4.0 ft bls.	NA	A				0	No NAPL observed.
ECPSB4	8	Stiff tar and black viscous residuum; sheen on water 6.0 to 8.0 ft bls; called trace on field forms. Droplets.	6	0-8	14	7.72	NS	Trace	No NAPL observed.
ECPSB5	18	Saturated with brown HC residuum 6.0 to 14.0 ft bls.	6	0-10	13	6.48	NS	0.11	Black oil.
* ECIRMB1	16	No HC observed.	6	A				0	No NAPL observed.
* ECIRMB2/ (S) GMMW-18	12	Sheens and trace black to green HC residuum 2.0 to 8.0 ft bls.	4	0-10	7	5.09	4.59	0.55	Brown to light brown semi-clear oil.

See last page for footnotes.

Table 3-8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Boring Identification/ Well Designation	Borehole and Soil Measurements/Observations: Depth of Borehole (ft bls)	Description of Hydrocarbon Observations in Soil	Depth to Saturated Soil (ft bls)	Temporary Well Point Measurements/Observations: Screened Interval (ft bls)	Days[1] After Installation	Depth[1] to Water (ft bmp)	Depth[1] to NAPL (ft bmp)	Maximum[2] Apparent NAPL Thickness (ft)	NAPL Observations
Exxon Chemical Plant (continued)									
* ECIRMB3	12	Brown HC residuum 3.5 to 6.6 ft bls.	4	0-10	5	4.34	3.96	0.38	Light clear product.
EC2SB1	16	HC 2.0 to 12.0 ft bls.	14	5-15	10	9.20	8.04	1.16	
No. 3 Tank Field									
N3TFSB1/ (W) GMMW5	14	Sheen 4.0 to 6.0 ft bls; HC residuum 8.0 to 13.0 ft bls.	10	3-13	21	11.63	4.32	8.29	Light brown product.
N3TFSB2	12	Saturated with brown HC residuum 4.0 to 11.5 ft bls.	5	0-9	15	6.12	NS	Trace	No NAPL observed.
N3TFSB3/ (W) GMMW6	16	Light brown weathered product.	6.5	4-14	18	10.10	NS	Trace	No NAPL observed.
N3TFSB4	14	Very trace sheen; groundwater sample collected but standpipe left in ground to measure HC, if present.	4.5	0-10				0	No NAPL observed.
N3TFSB5	12	No HC observed.	8	A				0	No NAPL observed.
N3TFSB6	12	Saturated with HC residuum 3.5 to 6.0 ft bls; sheens 2.3 to 8.0 ft bls. Sheen.	2.3	3-8	17	5.1	NS	Trace	No NAPL observed.
N3TFSB7	12	Slippery soil, sheen, and trace HC 4.0 to 6.0 ft bls. Light brown clear product.	3.5	0-10	17	2.01	NS	Trace	No NAPL observed.
N3TFSB8/ (W) GMMW7	16	Red to brown HC residuum 4.0 to 6.0 ft bls; sheen 6.0 to 10.0 ft bls.	4	3-13	21	7.70	3.05	4.65	Light brown clear product. After well development, product more readily entered well.
N3TFSB9	8	No HC observed.	NA	0-8	5	2.46	NS	0	No NAPL observed.
* 3TFIRMB1/ (S) GMMW-16	16	Light brown HC residuum coating drill rods; HC is difficult to see on soil which is a brown sand.	2.5	0-15	6	10.23	5.21	6.1	Light brown, clear.
* 3TFIRMB2	12	Brown HC residuum mixed with water, HC residuum, and sheens 4.0 to 9.0 ft bls.	4	0-8	4	6.68	6.03	0.65	Light brown, clear product.
* 3TFIRMB3/ (S) GMMW-17	18	Cinders saturated with light black HC residuum 2.5 to 4.0 ft bls.	2.5	0-10	13	3.27	3.11	0.16	Similar to product in 3TFIRMB1.
* 3TFIRMB4	12	Brown HC residuum and residuum droplets 4.0 to 10.0 ft bls.	4	0-10	4	5.88	5.47	0.41	Light brown clear product.
General Tank Field									
GTFSB1/ (W) GMMW8	20	Saturated with HC 6.0 to 8.0 ft bls; field log states possible 2 ft floating product. Semi-viscous brown HC residuum. Black oil, weathered, tar-like, heavy black oil.	6	3-16	16	5.19	NS	Trace	No NAPL observed.

See last page for footnotes.

Table 5-8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Boring Identification/ Well Designation	Borehole and Soil Measurements/Observations: Depth of Borehole (ft bls)	Description of Hydrocarbon Observations in Soil	Depth to Saturated Soil (ft bls)	Temporary Well Point Measurements/Observations: Screened Interval (ft bls)	Days[1] After Installation	Depth[1] to Water (ft bmp)	Depth[1] to NAPL (ft bmp)	Maximum[2] Apparent NAPL Thickness (ft)	NAPL Observations
General Tank Field (continued)									
GTFSB2	16	Saturated with brown HC residuum 3.0 to 8.0 ft bls; sheen and droplets 8.0 to 13.0 ft bls. (Black oil.)	6	0-14	11	5.63	5.39	0.24	Black oil
GTFSB3/ (W) GMMW9	16	Heavy sheens 4.0 to 12.0 ft bls; HC saturation 7.5 to 8.0 ft bls. Residuum, droplets.	7.5	3-13	16	5.16	5.15	0.01	Black oil.
GTFSB4	16	Sticky tar-like black HC, sheen, droplets 5.5 to 13.9 ft bls. (Black oil.)	5	0-15	13	7.33	NS	Trace	No NAPL observed.
GTFSB5	16	Trace sheen droplets 8.0 to 15.0 ft bls. Black oil.	8	0-15	13	7.08	NS	Trace	No NAPL observed.
GTFSB6/ (W) GMMW10	16	Saturated with coal tar 6.0 to 13.8 ft bls.	6	3-13	15	5.2	5.1	0.3	Semi-viscous brown HC residuum. Tar-like; black oil, very viscous.
GTFSB7	16	Tar 7.3 to 10.0 ft bls; sheen and droplets 10.0 to 12.0 ft bls.	5.7	0-15	13	5.96	NS	0.02	Black oil.
GTFSB8	16	Gummy HC 2.0 to 6.0 ft bls; coal tar saturated 6.0 to 10.5 ft bls.	6	0-15	5	8.2	NS	1.2	Black viscous oil.
GTFSB9	16	Saturated with tar 4.0 to 10.0 ft bls; heavy sheen 10.0 to 16.0 ft bls.	5.8	0-15	7 *	8.18	6.15	2.07	Semi-viscous brown HC residuum. Black viscous oil, measured with tape and probe.
EGTFSB1	14	Visual HC and staining 6.0 to 10.0 ft bls. Sheen on water table, strong odor.	6	0-14	11	4.33	NS	Trace	No NAPL observed.
* GTFIRMB1	16	Brown HC residuum stains spoon, moist, 6.3 to 7.2 ft bls. (black thick product).	7.2	0-10	14	6.54	NS	Trace	No NAPL observed.
* GTFIRMB2	14	HC visible on drill rods, on soil, and on water 4.0 to 9.0 ft bls. (black oil).	4	0-5	17	8.84	NS	Trace	No NAPL observed.
* GTFIRMB3	16	Cinders are lightly coated with brown HC residuum, trace sheen 8.0 to 13.0 ft bls. (black thick product).	10	0-10	15	8.39	NS	Trace	No NAPL observed.
* GTFIRMB4	18	Pinkish oil HC 4.0 to 8.0 ft bls. (droplets and black oily material).	6	0-10	17	6.87	NS	Trace	No NAPL observed.
* GTFIRMB5/ (S) GMMW-20	24	Adhesive tar-like stiff black HC 4.0 to 6.0 ft bls; heavy sheen on water 4.0 to 10.0 ft bls; pure brown HC residuum 6.0 to 22.0 ft bls.	2	0-20	14	5.89	NS	0.03	Black HC droplets on bailer; dark black tar-like HC on probe.
* GTFIRMB6	20	Silty black to grey metallic luster material 2.0 to 4.0 ft bls; clear to brown HC residuum gives sheen; sheen on water 10.0 to 19.0 ft bls.	9	0-15	14	5.34	NS	0.02	Black, viscous product.

See last page for footnotes.

Table 5-8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	Borehole and Soil Measurements/Observations			Temporary Well Point Measurements/Observations					
Boring Identification/ Well Designation	Depth of Borehole (ft bls)	Description of Hydrocarbon Observations in Soil	Depth to Saturated Soil (ft bls)	Screened Interval (ft bls)	Days[1] After Installation	Depth[1] to Water (ft bmp)	Depth[1] to NAPL (ft bmp)	Maximum[2] Apparent NAPL Thickness (ft)	NAPL Observations
General Tank Field (continued)									
* GTFIRMB7	20	HC saturated 6.0 to 8.0 ft bls. HC droplets.	8	5-10	9	4.70	NS	Trace	No NAPL observed.
* GTFIRMB8	20	HC 7.5 to 12.0 ft bls; sheen on water and spoon 12.0 to 20.0 ft bls. (black, thick).	10	5-15	10	7.16	NS	Trace	No NAPL observed.
* GTFIRMB9	12	No HC observed; groundwater sample was collected from this IRM boring.	6	A				0	No NAPL observed.
* GTFIRMB10	16	No HC observed.	6	A				0	No NAPL observed.
* GTFIRMB11	8	No HC observed.	4	A				0	No NAPL observed.
* GTFIRMB12	12	No HC observed.	6	A				0	No NAPL observed.
* GTFIRMB13	16	No HC observed.	6.5	A				0	No NAPL observed.
* GTFIRMB14	18	No HC observed.	8	A				0	No NAPL observed.
* GTFIRMB15	12	Trace black bound HC smears on gloves 2.0 to 4.0 ft bls and 8.0 to 10.0 ft bls.	4	A				0	No NAPL observed.
* GTFIRMB16	12	Very trace sheen on water pouring from spoons 6.0 to 12.0 ft bls.	4	0-10	13	4.42	4.41	Trace	Sheen.
* GTFIRMB17	10	No HC observed.	5.5	A				0	No NAPL observed.
* GTFIRMB18	18	Black to brown HC in soil 6.0 to 12.0 ft bls.	6	0-10	13	4.7	NS	Trace	No NAPL observed.
Solvent Tank Field									
STFSB1	14	Visual HC 2.0 to 12.0 ft bls.	2	0-10	13	6.24	6.17	0.11	
STFSB2	16	Visual HC 4.0 to 14 ft bls.	4	0-10	12	4.28	4.26	0.02	
STFSB3	14	Visual HC 4.0 to 10.0 ft bls.	4	0-10	12	4.96	NS	0.01	
GFSB1/ (W) GMMW14	16	Heavy black oil and oily cinders 4.0 to 8.0 ft bls.	7	4-14	14	5.35	NS	Trace	No NAPL observed.
Piers and East Side Treatment Plant Area									
PESTSB1	20	HC residuum, irridescent sheen 4.0 to 8.0 ft bls.	10	0-10	6	7.11	7.1	0.01	
PESTSB2	20	HC residuum is a silty slurry 8.0 to 12.0 ft bls.	10	0-10	6	6.54	6.38	0.16	

See last page for footnotes.

Table 5- 8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

	Borehole and Soil Measurements/Observations			Temporary Well Point Measurements/Observations					
Boring Identification/ Well Designation	Depth of Borehole (ft bls)	Description of Hydrocarbon Observations in Soil	Depth to Saturated Soil (ft bls)	Screened Interval (ft bls)	Days[1] After Installation	Depth[1] to Water (ft bmp)	Depth[1] to NAPL (ft bmp)	Maximum[2] Apparent NAPL Thickness (ft)	NAPL Observations
Domestic Trade Area									
DTSB1/ (W) GMMW11	18	No visual HC observed.	8	5.5-15	13	7.3	NS	Trace	No NAPL observed.
DTSB2	18	HC staining .0 to 4 ft bls; visual HC 6.0 to 6.5 ft bls.	6	0-15	13	6.19	6.05	0.3	
DTSB3	14	Black HC 2 to 6.0 ft bls.	2	0-14	11	4.42	NS	Trace	No NAPL observed.
Main Building Area									
MBSB1	16	Visual HC 6.0 to 10.0 ft bls.	6	0-15				0	No NAPL observed.
MBSB2	24	HC 8.0 to 22.0 ft bls coating inside and outside of spoons and squeezed from soils.	16	0-20	13	16.62	8.99	8	No NAPL observed.
MBSB3	22	Droplets to trace brown to black HC residuum in soils 8.0 to 12.0 ft bls; spoon full of HC residuum 12.0 to 21.0 ft bls.	12	0-20	14	13.47	13.39	0.11	
MBSB4	16	HC 7.0 to 12.0 ft bls; sheen 12.0 to 14.0 ft bls.	10	0-15	17	14.2	NS	Trace	No NAPL observed.
PSSB1	6	HC 0.0 to 4.0 ft bls.	5	0-10	9	6.97	NS	Trace	No NAPL observed.
Stockpile Area									
SSB1	24	Trace HC 10.0 to 16.0 ft bls.	18	0-20	15	19.11	18.21	1.25	
SSB2/ (W) GMMW12	16	Greenish HC 2.0 to 10.0 ft bls.	4	3-13	9	7.34	NS	Trace	
SSB3	12	Trace HC 8.0 to 9.5 ft bls.	8.5	0-10	11	6.62	NS	Trace	No NAPL observed.
Utilities Area									
T998SB1/ (W) GMMW13	16	HC residuum 2.0 to 8.0 ft bls.	2	3-13	9	5.01	NS	Trace	
MDC Building Area									
MDCSB1	14		8	0-10	13	7.04	7.0	0.14	
MDCSB2/ (W) GMMW15	17	HC-stained-cinders below water table.	10	6-16	15	6.73	6.68	0.05	

See last page for footnotes.

Table 5- 8. Hydrocarbon and NAPL Observations in Soil and Temporary Well Points Installed During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Unless otherwise noted, all soil borings and monitoring wells listed in this table were installed during the Phase IA RI.

'	Depth to NAPL and depth to water as measured in a well point or monitoring well on the last measurement event prior to borehole abandonment or conversion to a monitoring well.
'	Maximum apparent NAPL thickness measured during the monitoring period (periodic measurements were collected at various intervals throughout the approximately 2-week monitoring period).
*	Denotes a soil boring and/or monitoring well installed as part of the NAPL IRM investigation at the General Tank Field, No. 3 Tank Field, Exxon Chemical Plant (Utilities Area), and Lube Oil Area.
NAPL	Non-aqueous phase liquid.
ft bls	Feet below land surface.
ft bmp	Feet below measuring point, which is the top of the temporary well point at approximately land surface.
ft	Feet.
HC	Hydrocarbon. Descriptions in this table are based primarily on visual observations made by the field geologist, with assistance from other knowledgeable field personnel. Most descriptions of hydrocarbons in soil are augmented by field screening data collected using an organic vapor analyzer (OVA).
NS	No signal from product interface probe, indicating that NAPL is not present or is not measureable with the probe. The probe usually cannot indicate/measure a NAPL layer that is too thin or that is in separate globules or droplets.
Trace	Trace less than 0.01 foot; represented by a sheen; not measurable using an oil/water interface probe.
A	Temporary drivepoint installed.
(S)	Temporary well point.
(W)	Well.
IRM	Interim Remedial Measure.

NAPL measurements for Monitoring Wells GMMW1 through GMMW15 were taken only from the 4-inch permanent monitoring well that was installed immediately after the boring was drilled.

NAPL measurements for Monitoring Wells GMMW16 through GMMW20 were initially taken from the 2-inch temporary well point that was installed immediately after the boring was drilled (measurements indicated by S).

NOTE: In certain instances, NAPL was observed in a temporary drivepoint intended for groundwater sampling. In these instances, groundwater samples were not obtained and the drivepoint was measured for NAPL in the same fashion as the temporary well points.

Table 5-9. Hydrometer Test Results, Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Location I.D.	Apparent[1] NAPL Thickness (ft)	Specific Gravity
GMMW1	0.73	0.885
GMMW5	4.67	0.853
GMMW7	4.81	0.841
GMMW16	4.12	0.830
GMMW18	0.95	0.870
AHTFSB1	3.28	0.820
AHTFSB4	6.83	0.820
MBSB2	8.0	0.820
GTFSB9	2.07	0.960
EC2SB1	1.16	0.968
ECPSB2	1.58	0.970
AGTFSB3	1.09	0.965
AGTFSB4	0.72	0.970
SSB1	1.25	0.916
ITMW1	9.90	0.830
ITMW2	2.98	0.870
ITMW4	0.25	0.971
P7MW1	1.72	0.900
SHERI3	0.5	0.936
MW3	7.74	0.807
MW7	1.38	0.790
MW8	13.6	0.832
MW12	8.53	0.797
MW13	10.14	0.802
PKMW8	0.21	0.945
PKMW11	9.29	0.882
PKMW12	9.34	0.870
PKMW14	0.75	0.920
EB2	1.05	0.901
EB3	1.08	0.901
EB12	4.18	0.910
EB13	0.52	0.995
EB16	1.71	0.885
EB17	0.02	0.918
EB19	2.01	0.907
EB24	0.13	0.895
EB59	1.01	0.862
EB62	2.45	0.991
EB69	3.57	0.990

See last page for footnotes.

Table 5-9. Hydrometer Test Results, Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Location I.D.	Apparent[1] NAPL Thickness (ft)	Specific Gravity
EB72	0.64	0.851
EB73	0.54	0.940
EB76	0.74	0.889
EB80	3.9	0.800
EB81	0.15	0.990
EB104	0.73	0.917
EB106	0.70	0.927
EBR5	1.7	0.885
EBR12	1.03	0.865
EBR18	1.05	0.852

1 NAPL samples were collected from RI/IRM standpipes or monitoring wells. Presented NAPL thicknesses are the maximum NAPL thickness measured at each location from temporary well points or at monitoring wells during the December 12, 1994 low-tide synoptic water/NAPL measuring event.

NAPL Non-aqueous phase liquid.
ft Feet.
RI Remedial investigation.
IRM Interim remedial measure.

Table 5-10. Summary of NAPL Findings, Bayonne Plant, Bayonne, New Jersey

Descriptive Location or Operational Area	Plume No. (See Figure 5-5)	Apparent NAPL Thickness Range (feet)	Specific Gravity Range	Inferred NAPL Type *	Currently Subject to IRM	Deferred to RI
Pier 5 and East Side, Treatment Plant Area, and MDC Building Area	1, 2, and 3	0.16 - 3.57	0.851 - 0.991	Degraded gasolines and diesel, kerosene, No. 5 and No. 6 fuel oils, and high viscosity lube base stock..	X	--
Low Sulfur and Solvent Tank Fields	4	0.15 - 13.6	0.797 - 0.99	Gasoline and heavy fuel oils (e.g., No. 6 fuel oil).	X	--
General Tank Field	5 and 6	0.24 - 2.07	0.960	No. 6 fuel oil.	--	X
AV-Gas Tank Field and Domestic Trade Area (includes southern part of Interceptor Trench)	7	0.20 - 9.9	0.83 - 0.970	Diesel/aviation fuel; lube oil and No. 6 fuel oils.	X	--
Asphalt Plant and Exxon Chemicals Plant (includes Utilities Area)	8 and 9	0.11 - 4.67	0.853 - 0.970	Lube oil, No. 6 oil, and asphalt.	X	X
No. 3 Tank Field	10	0.16 - 4.81	0.830 - 0.841	Kerosene or cutback naphtha/powerformer feedstock.	X	--
No. 2 Tank Field and Main Building Area (includes northern Interceptor Trench area	11 and 12	0.10 - 2.98	0.87 - 0.971	Diesel; No. 2 and No. 6 fuel oils.	X	--
"A"-Hill Tank Field	13	0.11 - 8.0	0.82	Diesel.	--	X
Lube Oil and Stockpile Area (includes Platty Kill Canal)	14, 15, and 16	0.11 - 3.23	0.885 - 0.945	Lube oil and No. 2 fuel oil.	X	X
Pier No. 1 (includes Helipad Area)	17	0.38 - 4.18	0.885 - 0.995	Lube oil/No. 6 oil.	X	--

* Based on specific gravity measurements and operating characteristics.
NAPL Non-aqueous phase liquid.
IRM Interim remedial investigation.
RI Remedial investigation.
AV Aviation gasoline.
MDC Metropolitan Distribution Center.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: EB1	EB29	EB51	EB68	EBR13	EBR19	GMMW2	GMMW3	GMMW4	GMMW6	GMMW8
		Date: 01/26/95	01/26/95	01/25/95	01/24/95	01/27/95	01/24/95	01/25/95	01/25/95	01/25/95	01/25/95	01/23/95
Total Petroleum Hydrocarbons (mg/L)	1.0 **	17.4	6.62	25.3	10.7	10.2	12.9	16.9	42.1	13.9	16.6	21.6
Volatile Organic Compounds (ug/L)												
1,1,1-Trichloroethane	30	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,1,2,2-Tetrachloroethane	2	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ
1,1,2-Trichloroethane	3	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,1-Dichloroethane	70	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,1-Dichloroethene	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,2-Dibromoethane	--	20U	20U	20U	20UJ	20U	20UJ	20U	20U	20U	20U	20U
1,2-Dichloroethane	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,2-Dichloroethene(Total)	110	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,2-Dichloropropane	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1-Butanol	--	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U
2-Butanol	--	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U
2-Butanone	300	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ
2-Hexanone	100 **	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ
2-Methyl-2-propanol	500 **	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U
2-Propanol	--	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U
4-Methyl-2-pentanone	400	10U	10U	10U	10UJ	10U	10UJ	10U	10U	10U	10U	10U
Acetone	700	10UJ	10UJ	10UJ	10UJ	49J	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ
Benzene	1	10U	10U	10U	10U	10U	10U	8J	27	10U	10U	10U
Bromodichloromethane	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Bromoform	4	10UJ	10UJ	10U	10U	10U	10U	10UJ	10U	10U	10U	10U
Bromomethane	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Carbon disulfide	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Carbon tetrachloride	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Chlorobenzene	4	10U	10U	11U	18	10U	10U	3U	7100	12U	10U	10U
Chloroethane	100 **	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Chloroform	6	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Chloromethane	30	10U	10U	10UJ	10U	10UJ	10U	10U	10UJ	10UJ	10UJ	10U
cis-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Dibromochloromethane	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: EB1	EB29	EB51	EB68	EBR13	EBR19	GMMW2	GMMW3	GMMW4	GMMW6	GMMW8
		Date: 01/26/95	01/26/95	01/25/95	01/24/95	01/27/95	01/24/95	01/26/95	01/25/95	01/25/95	01/25/95	01/23/95
Ethylbenzene	700	10U	10U	10U	10U	10U	10U	19	9J	10U	10U	10U
Hexane	--	20UJ	20UJ	20U	20UJ	20U	20UJ	28J	20U	20U	20U	20U
Methyl-t-butyl ether	700 **	20U	20U	20U	20UJ	20U	20UJ	20U	20U	20U	20U	20U
Methylene chloride	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
n-Propylbenzene	--	2J	20U	20U	20U	20U	20U	16J	4J	20U	20U	20U
Styrene	100	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Tetrachloroethene	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Toluene	100	10U	10U	10U	10U	10U	10U	5J	2J	10U	10U	10U
trans-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Trichloroethene	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Vinyl chloride	5	10U	10U	10UJ	10U	10U	10U	10U	10UJ	10UJ	10UJ	10U
Xylenes (Total)	40	10U	10U	10U	10U	10U	10U	<u>59</u>	5J	10U	10U	10U
Total VOCs		2	0	0	18	49	0	138	7147	0	0	0

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW9 Date: 01/23/95	GMMW10 01/23/95	GMMW11 01/25/95	GMMW13 01/27/95	GMMW14 01/23/95	GMMW15 01/24/95	GMMW17 01/25/95	GMMW19 01/27/95	GMMW20 01/23/95	GMMW21I 01/26/95	GMMW21D 01/24/95
Total Petroleum Hydrocarbons (mg/L)	1.0 **	5.02	121	4.25	24.2	4.43	40.2	7.25	19.2	6.64	1.65	0.68
Volatile Organic Compounds (ug/L)												
1,1,1-Trichloroethane	30	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
1,1,2,2-Tetrachloroethane	2	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	100	310UJ
1,1,2-Trichloroethane	3	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
1,1-Dichloroethane	70	10U	10U	10U	64	10U	10U	10U	10U	10U	62J	310U
1,1-Dichloroethene	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
1,2-Dibromoethane	--	20U	20U	20U	20U	20U	20U	20U	20U	20U	200U	620U
1,2-Dichloroethane	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
1,2-Dichloroethene(Total)	110	10U	10U	10U	7J	7J	10U	10U	10U	10U	830	310U
1,2-Dichloropropane	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
1-Butanol	--	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	24000J
2-Butanol	--	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	16000UJ
2-Butanone	300	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	100	310UJ
2-Hexanone	100 **	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	100	310UJ
2-Methyl-2-propanol	500 **	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	16000UJ
2-Propanol	--	500U	500U	500U	500U	500U	500U	500U	500U	500U	500U	16000UJ
4-Methyl-2-pentanone	400	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Acetone	700	10UJ	10UJ	10UJ	10UJ	10UJ	19J	10UJ	10UJ	10UJ	100	4300J
Benzene	1	10U	10U	10U	6J	73	10	5J	12	2J	11J	310U
Bromodichloromethane	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Bromoform	4	10U	10U	10U	10U	10U	10U	10U.	10U	10U	100	310U
Bromomethane	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Carbon disulfide	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Carbon tetrachloride	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Chlorobenzene	4	2J	10U	10U	10U	2J	10U	1U	10U	10U	100	310U
Chloroethane	100 **	10U	10U	10U	65	10U	10U	10U	10U	10U	100	310U
Chloroform	6	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310UJ
Chloromethane	30	10U	10U	10UJ	10UJ	10U	10U	10U	10UJ	10U	100	310UJ
cis-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Dibromochloromethane	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW9 Date: 01/23/95	GMMW10 01/23/95	GMMW11 01/25/95	GMMW13 01/27/95	GMMW14 01/23/95	GMMW15 01/24/95	GMMW17 01/25/95	GMMW19 01/27/95	GMMW20 01/23/95	GMMW21I 01/26/95	GMMW21D 01/24/95
Ethylbenzene	700	10U	10U	10U	10U	3J	10U	10U	10U	2J	100	620U
Hexane	--	20U	20U	20U	20U	20U	20U	20U	20U	20U	200U	620U
Methyl-t-butyl ether	700 **	20U	20U	20U	20U	20U	20UJ	20UJ	20U	20U	200U	310U
Methylene chloride	2	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
n-Propylbenzene	--	20U	6J	20U	20U	20U	7J	20U	20U	20U	200U	620U
Styrene	100	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Tetrachloroethene	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	820	310U
Toluene	100	1J	10U	10U	10U	2J	2J	10U	2J	10U	100	310U
trans-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U	10U	10U	10U	100	310U
Trichloroethene	1	1J	10U	10U	10U	10U	10U	10U	10U	10U	1100	310U
Vinyl chloride	5	10U	10U	10UJ	10U	3J	10U	10U	10U	10U	370	310U
Xylenes (Total)	40	10U	10U	10U	10U	2J	7J	3J	4J	7J	100	310U
Total VOCs		4	6	0	142	92	45	9	18	11	3193	28300

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW22D Date: 01/27/95	GMMW23I 01/26/95	GMMW23D 01/26/95	GMMW23DFR 01/26/95	GMMW24I 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95	MW6 01/24/95	MW9 01/24/95	MW10 01/23/95
Total Petroleum Hydrocarbons (mg/L)	1.0 **	1.1	3.37	1.15	1.31	14.1	10.7	3.08	21	27	27.8
Volatile Organic Compounds (ug/L)											
1,1,1-Trichloroethane	30	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
1,1,2,2-Tetrachloroethane	2	10UJ	10UJ	10UJ	10UJ	710UJ	200UJ	10UJ	710UJ	17UJ	100
1,1,2-Trichloroethane	3	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
1,1-Dichloroethane	70	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
1,1-Dichloroethene	2	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
1,2-Dibromoethane	--	20U	20U	20U	20U	1400U	400U	20UJ	1400U	33U	2000U
1,2-Dichloroethane	2	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
1,2-Dichloroethene(Total)	110	10U	10U	10U	10U	710U	200U	10U	11000	17U	100
1,2-Dichloropropane	1	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
1-Butanol	--	500U	500U	500U	500U	36000UJ	100	500U	36000UJ	840UJ	500U
2-Butanol	--	500U	500U	500U	500U	26000J	42000J	500U	36000UJ	840UJ	500U
2-Butanone	300	10UJ	10UJ	10UJ	10UJ	2800J	3000J	10UJ	710UJ	17UJ	100
2-Hexanone	100 **	10UJ	10UJ	10UJ	10UJ	710UJ	200UJ	10UJ	710UJ	17UJ	100
2-Methyl-2-propanol	500 **	500U	500U	500U	500U	36000UJ	100	500U	36000UJ	840UJ	500U
2-Propanol	--	500U	500U	500U	500U	36000UJ	7000J	500U	36000UJ	840UJ	500U
4-Methyl-2-pentanone	400	10U	10U	10U	10U	710U	200U	10UJ	710U	17U	100
Acetone	700	10UJ	10UJ	10UJ	10UJ	710UJ	480J	10UJ	710UJ	17UJ	100
Benzene	1	10U	13	10U	10U	710U	200U	10U	710	170	100
Bromodichloromethane	1	2J	10U	10U	10U	710U	200U	10	710U	17U	100
Bromoform	4	10U	10UJ	10U	10U	710U	200U	10U	710U	17UJ	100
Bromomethane	10	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Carbon disulfide	--	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Carbon tetrachloride	2	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Chlorobenzene	4	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Chloroethane	100 **	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Chloroform	6	16	2J	12	16J	710U	200U	40	710U	17U	100
Chloromethane	30	10UJ	10U	10UJ	10UJ	710U	200U	10U	710U	17U	100
cis-1,3-Dichloropropene	0.02	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Dibromochloromethane	10	10U	10U	10U	10U	710U	200U	10U	710U	17U	100

See last page for footnotes.

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Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW22D Date: 01/27/95	GMMW23I 01/26/95	GMMW23D 01/26/95	GMMW23DFR 01/26/95	GMMW24I 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95	MW6 01/24/95	MW9 01/24/95	MW10 01/23/95
Ethylbenzene	700	10U	3J	10U	1J	710U	200U	10U	710U	17U	12000
Hexane	--	20U	9J	20U	20U	1400U	400U	20UJ	1400U	33UJ	2000U
Methyl-t-butyl ether	700 **	20U	20U	20U	20U	1400UJ	400UJ	20UJ	1400UJ	33U	2000U
Methylene chloride	2	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
n-Propylbenzene	--	20U	14J	5J	20U	1400U	400U	20U	1400U	33U	2000U
Styrene	100	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Tetrachloroethene	1	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Toluene	100	10U	1J	10U	10U	710U	200U	10U	510J	17U	100
trans-1,3-Dichloropropene	0.02	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Trichloroethene	1	10U	10U	10U	10U	710U	200U	10U	710U	17U	100
Vinyl chloride	5	10U	10U	10UJ	10U	710U	200U	10U	3700	17U	100
Xylenes (Total)	40	10U	4J	10U	10U	710U	22J	10U	2300	17U	38000
Total VOCs		18	46	17	34	28800	52502	50	18220	170	500

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: PKMW-4 Date: 01/27/95	GTFIRMB9 DP10 10/21/94	LOSB6 DP10 10/25/94	LOSB15 DP08 10/24/94	LOSB18 DP09 10/24/94	MBSB4 DP16 11/02/94	MBSB4FR DP16 11/02/94	N2TFSB2 DP12 11/08/94	N2TFSB3 DP10 11/08/94
Total Petroleum Hydrocarbons (mg/L)	1.0 **	25.3	NA	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (ug/L)										
1,1,1-Trichloroethane	30	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
1,1,2,2-Tetrachloroethane	2	10UJ	10U	10U	25U	10U	10U	10U	25UJ	10U
1,1,2-Trichloroethane	3	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
1,1-Dichloroethane	70	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
1,1-Dichloroethene	2	10U	10U	10U	25U	10U	10U	10U	25UJ	10UJ
1,2-Dibromoethane	--	20U	20U	20U	50U	20U	20U	20U	50UJ	20U
1,2-Dichloroethane	2	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
1,2-Dichloroethene(Total)	110	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
1,2-Dichloropropane	1	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
1-Butanol	--	500U	500U	500U	1200UJ	500U	500U	500U	1200UJ	500U
2-Butanol	--	500U	500U	500U	1200U	500U	500U	500U	1200UJ	500U
2-Butanone	300	10UJ	10UJ	10UJ	25UJ	10UJ	10UJ	10UJ	25UJ	10UJ
2-Hexanone	100 **	10UJ	10UJ	10UJ	25UJ	10UJ	10UJ	10UJ	25UJ	10UJ
2-Methyl-2-propanol	500 **	500U	500U	500U	1200U	500U	500U	500U	1200UJ	500U
2-Propanol	--	500U	500U	500U	1200UJ	500U	500U	500U	1200UJ	500U
4-Methyl-2-pentanone	400	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Acetone	700	140J	10UJ	10UJ	25UJ	10UJ	16UJ	16UJ	25UJ	10UJ
Benzene	1	10U	10U	10U	11J	10U	2J	2J	25UJ	10U
Bromodichloromethane	1	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Bromoform	4	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Bromomethane	10	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Carbon disulfide	--	10U	10U	10U	25U	10U	10U	10U	25UJ	10UJ
Carbon tetrachloride	2	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Chlorobenzene	4	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Chloroethane	100 **	10U	10UJ	10UJ	25UJ	10UJ	10U	10U	25UJ	10UJ
Chloroform	6	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Chloromethane	30	10UJ	10UJ	10UJ	25UJ	10UJ	10U	10U	25UJ	10U
cis-1,3-Dichloropropene	0.02	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Dibromochloromethane	10	10U	10U	10U	25U	10U	10U	10U	25UJ	10U

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: PKMW-4	GTFIRMB9	LOSB6	LOSB15	LOSB18	MBSB4	MBSB4FR	N2TFSB2	N2TFSB3
			DP10	DP10	DP08	DP09	DP16	DP16	DP12	DP10
		Date: 01/27/95	10/21/94	10/25/94	10/24/94	10/24/94	11/02/94	11/02/94	11/08/94	11/08/94
Ethylbenzene	700	10U	10U	10U	25U	10U	10U	10U	25UJ	4J
Hexane	--	20U	20UJ	20UJ	50UJ	20UJ	20UJ	20UJ	4700J	77J
Methyl-t-butyl ether	700 **	260	20U	20U	50U	20U	20U	20U	50UJ	20U
Methylene chloride	2	10U	10U	10U	25U	10U	69	68	25UJ	10U
n-Propylbenzene	--	20U	20U	20U	110	20U	20U	20U	2800J	24
Styrene	100	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Tetrachloroethene	1	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Toluene	100	10U	10U	10U	25U	2J	10U	10U	25UJ	10U
trans-1,3-Dichloropropene	0.02	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Trichloroethene	1	10U	10U	10U	25U	10U	10U	10U	25UJ	10U
Vinyl chloride	5	10U	10UJ	10UJ	25UJ	10UJ	10U	10U	25UJ	10U
Xylenes (Total)	40	10U	10U	10U	25U	4J	10U	10U	25UJ	3J
Total VOCs		400	0	0	121	6	71	70	7500	108

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte.	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: N3TFSB4 DP10 Date: 10/17/94	N3TFSB5 DP09 10/19/94	N3TFSB6 DP12 11/02/94	PESTSB1 DP10 11/08/94	PSSB1 DP10 11/08/94	PSSB1-FR DP10 11/08/94	STFSB3 DP10 11/08/94	FBA1-110294 11/02/94
Total Petroleum Hydrocarbons (mg/L)	1.0 **	NA	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (ug/L)									
1,1,1-Trichloroethane	30	250U	560UJ	170U	25U	20U	10U	20U	10U
1,1,2,2-Tetrachloroethane	2	250U	560UJ	170U	25U	20U	10U	20U	10U
1,1,2-Trichloroethane	3	250U	560UJ	170U	25U	20U	10U	20U	10U
1,1-Dichloroethane	70	250U	560UJ	170U	25U	20U	10U	20U	10U
1,1-Dichloroethene	2	250U	560UJ	170U	25U	20U	10UJ	20U	10U
1,2-Dibromoethane	--	500	1100	330U	50U	40U	20U	40U	20U
1,2-Dichloroethane	2	250U	560UJ	170U	25U	20U	10U	20U	10U
1,2-Dichloroethene(Total)	110	250U	560UJ	170U	25U	20U	10U	20U	10U
1,2-Dichloropropane	1	250U	560UJ	170U	25U	20U	10U	20U	10U
1-Butanol	--	12000U	28000UJ	8300U	1200UJ	100	500U	100	500U
2-Butanol	--	12000U	28000UJ	8300U	1200U	100	500U	100	500U
2-Butanone	300	250UJ	560UJ	170UJ	25U	20U	10UJ	20U	10U
2-Hexanone	100 **	250UJ	560UJ	170UJ	25U	20U	10UJ	20U	10U
2-Methyl-2-propanol	500 **	12000U	28000UJ	8300U	1200UJ	100	500U	100	500U
2-Propanol	--	12000U	28000UJ	8300U	1200U	100	500U	100	500U
4-Methyl-2-pentanone	400	250U	560UJ	170U	25UJ	20UJ	10U	20UJ	10U
Acetone	700	250UJ	560UJ	240UJ	45U	55U	24UJ	38U	6J
Benzene	1	170J	560UJ	28J	140	5J	7J	20U	10U
Bromodichloromethane	1	250U	560UJ	170U	25U	20U	10U	20U	10U
Bromoform	4	250U	560UJ	170U	25U	20U	10U	20U	10U
Bromomethane	10	250U	560UJ	170U	25U	20U	10U	20U	10U
Carbon disulfide	--	250UJ	560UJ	170U	25U	20U	10UJ	20U	10U
Carbon tetrachloride	2	250U	560UJ	170U	25U	20U	10U	20U	10U
Chlorobenzene	4	14000	1100J	270	200	20U	10U	20U	10U
Chloroethane	100 **	250U	560UJ	170U	25U	20U	10UJ	20U	10U
Chloroform	6	250U	560UJ	170U	25U	20U	10U	20U	10U
Chloromethane	30	250U	560UJ	170U	25UJ	20UJ	10U	20UJ	10U
cis-1,3-Dichloropropene	0.02	250U	560UJ	170U	25U	20U	10U	20U	10U
Dibromochloromethane	10	250U	560UJ	170U	25U	20U	10U	20U	10U

See last page for footnotes.

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TIERRA-B-000922

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: / Date:	N3TFSB4 DP10	N3TFSB5 DP09	N3TFSB6 DP12	PESTSB1 DP10	PSSB1 DP10	PSSB1-FR DP10	STFSB3 DP10	FBA1-110294
		Date:	10/17/94	10/19/94	11/02/94	11/08/94	11/08/94	11/08/94	11/08/94	11/02/94
Ethylbenzene	700		250U	560UJ	170U	410	20U	3J	20U	10U
Hexane	--		500	4600J	1800J	130	230	280J	340	20U
Methyl-t-butyl ether	700 **		500	1100UJ	330U	520J	40U	20U	40U	20U
Methylene chloride	2		250U	560UJ	170U	25U	20U	10U	20U	2J
n-Propylbenzene	--		500	2000J	420	180J	110J	130	29J	20U
Styrene	100		250U	560UJ	170U	25U	20U	10U	20U	10U
Tetrachloroethene	1		250U	560UJ	170U	25U	20U	10U	20U	10U
Toluene	100		250U	560UJ	170U	17J	20U	1J	20U	10U
trans-1,3-Dichloropropene	0.02		250U	560UJ	170U	25U	20U	10U	20U	10U
Trichloroethene	1		250U	560UJ	170U	25U	20U	10U	20U	10U
Vinyl chloride	5		250U	560UJ	170U	25U	20U	10U	20U	10U
Xylenes (Total)	40		250U	560UJ	170U	330	3J	8J	20U	10U
Total VOCs			14170	7700	2518	1927	348	499	369	8

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: FBA2-110894 Date: 11/08/94	FBA1-012395 01/23/95	FBA2-012495 01/24/95	FBA3-012595 01/25/95	FBA4-012695 01/26/95	FBA5-012795 01/27/95
Total Petroleum Hydrocarbons (mg/L)	1.0 **	NA	0.25U	0.25U	0.25U	0.25U	0.25U
Volatile Organic Compounds (ug/L)							
1,1,1-Trichloroethane	30	10U	10U	10U	10U	10U	10U
1,1,2,2-Tetrachloroethane	2	10U	10U	10U	10U	10U	10U
1,1,2-Trichloroethane	3	10U	10U	10U	10U	10U	10U
1,1-Dichloroethane	70	10U	10U	10U	10U	10U	10U
1,1-Dichloroethene	2	10U	10U	10U	10U	10U	10U
1,2-Dibromoethane	--	20U	20U	20U	20U	20U	20U
1,2-Dichloroethane	2	10U	10U	10U	10U	10U	10U
1,2-Dichloroethene(Total)	110	10U	10U	10U	10U	10U	10U
1,2-Dichloropropane	1	10U	10U	10U	10U	10U	10U
1-Butanol	--	500U	500U	500U	500U	500U	500U
2-Butanol	--	500U	500U	500U	500U	500U	500U
2-Butanone	300	10U	10U	10U	10U	10U	10U
2-Hexanone	100 **	10U	10U	10U	10U	10U	10U
2-Methyl-2-propanol	500 **	500U	500U	500U	500U	500U	500U
2-Propanol	--	500U	500U	500U	500U	500U	500U
4-Methyl-2-pentanone	400	10U	10U	10U	10U	10U	10U
Acetone	700	8J	10U	10U	10U	10U	10U
Benzene	1	10U	10U	10U	10U	10U	10U
Bromodichloromethane	1	10U	10U	10U	10U	10U	10U
Bromoform	4	10U	10U	10U	10U	10U	10U
Bromomethane	10	10U	10U	10U	10U	10U	10U
Carbon disulfide	--	10U	10U	10U	10U	10U	10U
Carbon tetrachloride	2	10U	10U	10U	10U	10U	10U
Chlorobenzene	4	10U	10U	10U	<u>18</u>	10U	2J
Chloroethane	100 **	10U	10U	10U	10U	10U	10U
Chloroform	6	10U	10U	10U	10U	10U	10U
Chloromethane	30	10U	10U	10U	10U	10U	10U
cis-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U
Dibromochloromethane	10	10U	10U	10U	10U	10U	10U

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: FBA2-110894 Date: 11/08/94	FBA1-012395 01/23/95	FBA2-012495 01/24/95	FBA3-012595 01/25/95	FBA4-012695 01/26/95	FBA5-012795 01/27/95
Ethylbenzene	700	10U	10U	10U	10U	10U	10U
Hexane	--	20U	20U	20U	20U	20U	20U
Methyl-t-butyl ether	700 **	20U	20U	20U	20U	20U	20U
Methylene chloride	2	2J	1J	1J	2J	1J	1J
n-Propylbenzene	--	20U	20U	20U	20U	20U	20U
Styrene	100	10U	10U	10U	10U	10U	10U
Tetrachloroethene	1	10U	10U	10U	10U	10U	10U
Toluene	100	10U	10U	10U	10U	10U	10U
trans-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U
Trichloroethene	1	10U	10U	10U	10U	10U	10U
Vinyl chloride	5	10U	10U	10U	10U	10U	10U
Xylenes (Total)	40	10U	10U	10U	10U	10U	10U
Total VOCs		10	1	1	20	1	3

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: TB-101994 Date: 10/19/94	TB-102094 10/20/94	TB-102194 10/21/94	TB-102594 10/24/94	TB-110294 11/02/94	TB-110894 11/08/94	TB1-012395 01/23/95
Total Petroleum Hydrocarbons (mg/L)	1.0 **	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (ug/L)								
1,1,1-Trichloroethane	30	10U	10U	10U	10U	10U	10U	10U
1,1,2,2-Tetrachloroethane	2	10U	10U	10U	10U	10U	10U	10U
1,1,2-Trichloroethane	3	10U	10U	10U	10U	10U	10U	10U
1,1-Dichloroethane	70	10U	10U	10U	10U	10U	10U	10U
1,1-Dichloroethene	2	10U	10U	10U	10U	10U	10U	10U
1,2-Dibromoethane	--	20U	20U	20U	20U	20U	20U	20U
1,2-Dichloroethane	2	10U	10U	10U	10U	10U	10U	10U
1,2-Dichloroethene(Total)	110	10U	10U	10U	10U	10U	10U	10U
1,2-Dichloropropane	1	10U	10U	10U	10U	10U	10U	10U
1-Butanol	--	500U	500U	500U	500U	500U	500U	500U
2-Butanol	--	500U	500U	500U	500U	500U	500U	500U
2-Butanone	300	10U	10U	10U	10U	10U	10U	10U
2-Hexanone	100 **	10U	10U	10U	10U	10U	10U	10U
2-Methyl-2-propanol	500 **	500U	500U	500U	500U	500U	500U	500U
2-Propanol	--	500U	500U	500U	500U	500U	500U	500U
4-Methyl-2-pentanone	400	10U	10U	10U	10U	10U	10U	10U
Acetone	700	10U	10U	10U	10U	7J	7J	10U
Benzene	1	10U	10U	10U	10U	10U	10U	10U
Bromodichloromethane	1	10U	10U	10U	10U	10U	10U	10U
Bromoform	4	10U	10U	10U	10U	10U	10U	10U
Bromomethane	10	10U	10U	10U	10U	10U	10U	10U
Carbon disulfide	--	10U	10U	10U	10U	10U	10U	10U
Carbon tetrachloride	2	10U	10U	10U	10U	10U	10U	10U
Chlorobenzene	4	10U	10U	10U	10U	10U	10U	10U
Chloroethane	100 **	10U	10U	10U	10U	10U	10U	10U
Chloroform	6	10U	10U	10U	10U	10U	10U	10U
Chloromethane	30	10U	10U	10U	10U	10U	10U	10U
cis-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U	10U
Dibromochloromethane	10	10U	10U	10U	10U	10U	10U	10U

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: TB-101994 Date: 10/19/94	TB-102094 10/20/94	TB-102194 10/21/94	TB-102594 10/24/94	TB-110294 11/02/94	TB-110894 11/08/94	TB1-012395 01/23/95
Ethylbenzene	700	10U	.10U	10U	10U	10U	10U	10U
Hexane	--	20U	20U	20U	20U	20U	20U	20U
Methyl-t-butyl ether	700 **	20U	20U	20U	20U	20U	20U	20U
Methylene chloride	2	2J	5J	10U	10U	2J	3J	10U
n-Propylbenzene	--	20U	20U	20U	20U	20U	20U	20U
Styrene	100	10U	10U	10U	10U	10U	10U	10U
Tetrachloroethene	1	10U	10U	10U	10U	10U	10U	10U
Toluene	100	10U	10U	10U	10U	10U	10U	10U
trans-1,3-Dichloropropene	0.02	10U	10U	10U	10U	10U	10U	10U
Trichloroethene	1	10U	10U	10U	10U	10U	10U	10U
Vinyl chloride	5	10U	10U	10U	10U	10U	10U	10U
Xylenes (Total)	40	10U	10U	10U	10U	10U	10U	10U
Total VOCs		2	5	0	0	9	10	0

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: TB2-012495 Date: 01/24/95	TB3-012595 01/25/95	TB4-012695 01/26/95	TB5-012795 01/27/95
Total Petroleum Hydrocarbons (mg/L)	1.0 **	NA	NA	NA	NA
Volatile Organic Compounds (ug/L)					
1,1,1-Trichloroethane	30	10U	10U	10U	10U
1,1,2,2-Tetrachloroethane	2	10U	10U	10U	10U
1,1,2-Trichloroethane	3	10U	10U	10U	10U
1,1-Dichloroethane	70	10U	10U	10U	10U
1,1-Dichloroethene	2	10U	10U	10U	10U
1,2-Dibromoethane	--	20U	20U	20U	20U
1,2-Dichloroethane	2	10U	10U	10U	10U
1,2-Dichloroethene(Total)	110	10U	10U	10U	10U
1,2-Dichloropropane	1	10U	10U	10U	10U
1-Butanol	--	500U	500U	500U	500U
2-Butanol	--	500U	500U	500U	500U
2-Butanone	300	10U	10U	10U	10U
2-Hexanone	100 **	10U	10U	10U	10U
2-Methyl-2-propanol	500 **	500U	500U	500U	500U
2-Propanol	--	500U	500U	500U	500U
4-Methyl-2-pentanone	400	10U	10U	10U	10U
Acetone	700	10U	10U	10U	10U
Benzene	1	10U	10U	10U	10U
Bromodichloromethane	1	10U	10U	10U	10U
Bromoform	4	10U	10U	10U	10U
Bromomethane	10	10U	10U	10U	10U
Carbon disulfide	--	10U	10U	10U	10U
Carbon tetrachloride	2	10U	10U	10U	10U
Chlorobenzene	4	10U	6J	10U	1J
Chloroethane	100 **	10U	10U	10U	10U
Chloroform	6	10U	10U	10U	10U
Chloromethane	30	10U	10U	10U	10U
cis-1,3-Dichloropropene	0.02	10U	10U	10U	10U
Dibromochloromethane	10	10U	10U	10U	10U

See last page for footnotes.

Table 5-11. Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: TB2-012495 Date: 01/24/95	TB3-012595 01/25/95	TB4-012695 01/26/95	TB5-012795 01/27/95
Ethylbenzene	700	10U	10U	10U	10U
Hexane	--	20U	20U	20U	20U
Methyl-t-butyl ether	700 **	20U	20U	20U	20U
Methylene chloride	2	10U	2J	2J	1J
n-Propylbenzene	--	20U	20U	20U	20U
Styrene	100	10U	10U	10U	10U
Tetrachloroethene	1	10U	10U	10U	10U
Toluene	100	10U	10U	10U	10U
trans-1,3-Dichloropropene	0.02	10U	10U	10U	10U
Trichloroethene	1	10U	10U	10U	10U
Vinyl chloride	5	10U	10U	10U	10U
Xylenes (Total)	40	10U	10U	10U	10U
Total VOCs		0	8	2	2

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per liter (ug/L) (equivalent to parts per billion [ppb]) except total petroleum hydrocarbon (TPH) results and criteria, which are reported in milligrams per liter (mg/L) (equivalent to parts per million [ppm]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) OLM01.8, and New Jersey modified 418.1 for total petroleum hydrocarbons (TPH).
Exceedances of NJDEP criteria are shown in bold and are underlined.

VOCs Volatile organic compounds.
FBA Indicates a field blank associated with aqueous samples.
PQL Practical quantitation level.
FR Field replicate of previous sample.
TB Trip blank.
U The compound was analyzed for, but not detected at the specific detection limit.
J Estimated result.
-- No applicable criteria.
N Presumptive evidence.
NA Not analyzed.
* NJDEP Groundwater Standards, New Jersey Register, April 5, 1993.
** Interim generic groundwater quality criterion.

Table 5-12. Semivolatile Organic Compounds in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: EB1	EB29	EB51	EB68	EBR13	EBR19	GMMW2	GMMW3	GMMW4	GMMW6	GMMW8
	Date:	01/26/95	01/26/95	01/25/95	01/24/95	01/27/95	01/24/95	01/25/95	01/25/95	01/25/95	01/25/95	01/23/95
1,2,4-Trichlorobenzene	9	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
1,2-Dichlorobenzene	600	10U	10U	10U	10U	10U	10U	19J	9J	10U	10U	10U
1,3-Dichlorobenzene	600	10U	10U	10U	10U	10U	10U	30U	18	10U	10U	10U
1,4-Dichlorobenzene	75	10U	10U	10U	10U	10U	10U	3J	<u>130</u>	10U	10U	10U
2,2'-oxybis(1-chloropropane)	300	10U	10U	10UJ	10UJ	10U	10UJ	30U	10UJ	10UJ	10UJ	10UJ
2,4,5-Trichlorophenol	700	25U	25U	25U	25U	25U	25U	75U	25U	25U	25U	25U
2,4,6-Trichlorophenol	20	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
2,4-Dichlorophenol	20	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
2,4-Dimethylphenol	100	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
2,4-Dinitrophenol	40	25U	25U	25U	25U	25U	25U	75UJ	25U	25U	25U	25UJ
2,4-Dinitrotoluene	10	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
2,6-Dinitrotoluene	10	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
2-Chloronaphthalene	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
2-Chlorophenol	40	10U	10U	10U	10U	10U	10U	30U	17	10U	10U	10U
2-Methylnaphthalene	100 **	10U	10U	10U	10U	3J	10U	<u>150</u>	12	1J	2J	10U
2-Methylphenol	400 **	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
2-Nitroaniline	--	25U	25U	25U	25U	25U	25U	75UJ	25U	25U	25U	25U
2-Nitrophenol	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
3,3'-Dichlorobenzidine	60	10U	10U	10U	10UJ	10U	10UJ	30U	10U	10U	10U	10UJ
3-Nitroaniline	--	25U	25U	25U	25U	25U	25U	75U	25U	25U	25U	25U
4,6-Dinitro-2-methylphenol	--	25U	25U	25U	25U	25U	25U	75U	25U	25U	25U	25U
4-Bromophenyl phenyl ether	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
4-Chloro-3-methylphenol	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
4-Chloroaniline	--	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	30UJ	10UJ	10UJ	10UJ	10UJ
4-Chlorophenyl phenyl ether	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
4-Methylphenol	350 **	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	2J
4-Nitroaniline	--	25U	25U	25U	25U	25U	25U	75U	25U	25U	25U	25U
4-Nitrophenol	--	25U	25U	25U	25U	25U	25U	75UJ	25U	25U	25U	25UJ
Acenaphthene	400	10U	10U	10U	3J	1J	1J	30U	2J	7J	10U	10U
Acenaphthylene	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Anthracene	2000	10U	10U	10U	10U	10U	10U	30U	10U	2J	2J	10U
Benzo(a)anthracene	--	10U	10U	10U	10U	10U	10U	30U	1J	2J	5J	10U
Benzo(a)pyrene	--	2J	10U	10U	10U	10U	10U	30U	10U	1J	5J	10U
Benzo(b)fluoranthene	--	2J	10U	10U	10U	10U	1J	30U	10U	1J	8J	10U
Benzo(g,h,i)perylene	--	2J	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Benzo(k)fluoranthene	--	2J	10U	10U	10U	10U	1J	30U	10U	1J	9J	10U

See last page for footnotes.

Table 5-12. Semivolatile Organic Compounds in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: EB1 Date: 01/26/95	EB29 01/26/95	EB51 01/25/95	EB68 01/24/95	EBR13 01/27/95	EBR19 01/24/95	GMMW2 01/25/95	GMMW3 01/25/95	GMMW4 01/25/95	GMMW6 01/25/95	GMMW8 01/23/95
Butyl benzyl phthalate	100	10U	10U	10UJ	10UJ	10U	10UJ	30UJ	10UJ	10UJ	10UJ	10UJ
Carbazole	--	10U	10U	10U	10U	2J	10U	30U	10U	10U	10U	10U
Chrysene	--	3J	10U	10U	10U	10U	1J	30U	2J	3J	4J	10U
Di-n-butyl phthalate	900	10U	10U	10U	1J	10U	10U	30U	10U	10U	10U	10U
Di-n-octyl phthalate	100	10U	10U	10UJ	10UJ	10U	10UJ	30U	10UJ	10UJ	10UJ	10UJ
Dibenz(a,h)anthracene	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Dibenzofuran	100 **	10U	10U	10U	10U	2J	10U	4J	10U	2J	10U	10U
Diethyl phthalate	5000	10U	10U	10U	10U	10U	10U	30U	10U	1J	10U	10U
Dimethyl phthalate	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Fluoranthene	300	10U	10U	10U	1J	10U	2J	30U	10U	3J	6J	10U
Fluorene	300	10U	10U	2J	10U	1J	10U	11J	2J	3J	10U	10U
Hexachlorobenzene	10	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Hexachlorobutadiene	1	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Hexachlorocyclopentadiene	50	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Hexachloroethene	10	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Indeno(1,2,3-cd)pyrene	--	1J	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Isophorone	100	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
N-Nitroso-di-n-propylamine	20	10U	10UJ	10U	10U	10UJ	10U	30U	10U	10U	10U	10U
N-Nitrosodiphenylamine(1)	20	10UJ	10UJ	10UJ	10U	10UJ	10U	30U	10UJ	10UJ	10UJ	10U
Naphthalene	30 **	10U	10U	10U	2J	9J	10U	<u>40</u>	<u>64</u>	3J	2J	10U
Nitrobenzene	10	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Pentachlorophenol	1	25U	25U	25U	25U	25U	25U	75U	25U	25U	25U	25U
Phenanthrene	100 **	10U	10U	10U	10U	1J	1J	30	2J	6J	3J	10U
Phenol	4000	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
Pyrene	200	2J	10U	10U	2J	10U	2J	4J	3J	5J	8J	1J
bis(2-Chloroethoxy)methane	--	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
bis(2-Chloroethyl)ether	10	10U	10U	10U	10U	10U	10U	30U	10U	10U	10U	10U
bis(2-Ethylhexyl)phthalate	30	3J	3J	4J	4J	1J	2J	6J	4J	2J	6J	10UJ
Total SVOCs		19	3	6	13	20	11	267	266	43	60	3

See last page for footnotes.

Table 5-12. Semivolatile Organic Compound in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW9 Date: 01/23/95	GMMW10 01/23/95	GMMW11 01/25/95	GMMW13 01/27/95	GMMW14 01/23/95	GMMW15 01/24/95	GMMW17 01/25/95	GMMW19 01/27/95	GMMW20 01/23/95	GMMW21I 01/26/95
1,2,4-Trichlorobenzene	9	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,2-Dichlorobenzene	600	10U	10U	10U	10U	10U	10U	1J	10U	10U	3J
1,3-Dichlorobenzene	600	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,4-Dichlorobenzene	75	10U	10U	10U	10U	10U	10U	2J	10U	10U	4J
2,2'-oxybis(1-chloropropane)	300	10UJ	10U	10UJ	10U	10UJ	10UJ	10UJ	10U	10UJ	10UJ
2,4,5-Trichlorophenol	700	25U	25U	25U	25U	25U	25U	25U	25U	25U	25U
2,4,6-Trichlorophenol	20	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
2,4-Dichlorophenol	20	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
2,4-Dimethylphenol	100*	10U	10U	1J	10U	10U	10U	10U	10U	10U	10U
2,4-Dinitrophenol	40	25U	25UJ	25U	25U	25U	25UJ	25U	25U	25U	25U
2,4-Dinitrotoluene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
2,6-Dinitrotoluene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Chloronaphthalene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Chlorophenol	40	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Methylnaphthalene	100 **	10U	10U	10U	10U	10U	10U	5J	2J	10U	10U
2-Methylphenol	400 **	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Nitroaniline	--	25U	25UJ	25U	25U	25U	25U	25U	25U	25U	25U
2-Nitrophenol	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
3,3'-Dichlorobenzidine	60	10UJ	10U	10U	10U	10UJ	10UJ	10UJ	10U	10UJ	10U
3-Nitroaniline	--	25U	25U	25U	25U	25U	25U	25U	25U	25U	25U
4,6-Dinitro-2-methylphenol	--	25U	25U	25U	25U	25U	25U	25U	25U	25U	25U
4-Bromophenyl phenyl ether	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
4-Chloro-3-methylphenol	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
4-Chloroaniline	--	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ
4-Chlorophenyl phenyl ether	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
4-Methylphenol	350 **	2J	10U	10U	10U	10U	10U	10U	10U	2J	2J
4-Nitroaniline	--	25U	25U	25U	25U	25U	25U	25U	25U	25U	25U
4-Nitrophenol	--	25U	25UJ	25U	25U	25U	25UJ	25U	25U	25U	25U
Acenaphthene	400	10U	10U	15	10U	2J	10U	10U	10U	10U	10U
Acenaphthylene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Anthracene	2000	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Benzo(a)anthracene	--	10U	10U	10U	2J	10U	10U	10U	10U	2J	10U
Benzo(a)pyrene	--	10U	10U	10U	2J	10U	10U	10U	10U	1J	10U
Benzo(b)fluoranthene	--	10U	10U	10U	2J	10U	1J	10U	10U	1J	10U
Benzo(g,h,i)perylene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Benzo(k)fluoranthene	--	10U	10U	10U	2J	10U	1J	10U	10U	1J	10U

See last page for footnotes.

Table 5-12. Semivolatile Organic Compound in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW9 Date: 01/23/95	GMMW10 01/23/95	GMMW11 01/25/95	GMMW13 01/27/95	GMMW14 01/23/95	GMMW15 01/24/95	GMMW17 01/25/95	GMMW19 01/27/95	GMMW20 01/23/95	GMMW21I 01/26/95
Butyl benzyl phthalate	100	10UJ	10UJ	10UJ	10U	10UJ	10UJ	10UJ	10U	10UJ	10UJ
Carbazole	--	10U	10U	3J	10U	10U	10U	10U	10U	10U	10U
Chrysene	--	10U	10U	10U	3J	1J	1J	10U	10U	2J	10U
Di-n-butyl phthalate	900	10U	10U	2J	10U	10U	10U	10U	10U	10U	10U
Di-n-octyl phthalate	100*	10UJ	10U	10UJ	10U	10UJ	10UJ	10UJ	10U	10UJ	10UJ
Dibenz(a,h)anthracene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Dibenzofuran	100 **	10U	10U	9J	10U	10U	10U	10U	10U	10U	10U
Diethyl phthalate	5000	10U	10U	1J	10U	10U	10U	10U	10U	10U	1J
Dimethyl phthalate	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Fluoranthene	300	10U	10U	3J	2J	10U	2J	10U	10U	1J	10U
Fluorene	300	10U	10U	6J	10U	2J	10U	10U	2J	10U	10U
Hexachlorobenzene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Hexachlorobutadiene	1	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Hexachlorocyclopentadiene	50	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Hexachloroethane	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Indeno(1,2,3-cd)pyrene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Isophorone	100	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
N-Nitroso-di-n-propylamine	20	10U	10U	10U	10UJ	10U	10U	10U	10UJ	10U	10U
N-Nitrosodiphenylamine(1)	20	10U	10U	10UJ	10UJ	10U	10U	10U	10UJ	10U	10UJ
Naphthalene	30 **	10U	10U	10U	10U	16	10U	5J	10U	1J	10U
Nitrobenzene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
Pentachlorophenol	1	25U	25U	25U	25U	25U	25U	25U	25U	25U	3J
Phenanthrene	100 **	10U	10U	1J	10U	1J	2J	10U	10U	2J	10U
Phenol	4000	10U	10U	10U	10U	2J	10U	2J	10U	10U	12
Pyrene	200	10U	10U	3J	3J	1J	2J	10U	10U	2J	10U
bis(2-Chloroethoxy)methane	--	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
bis(2-Chloroethyl)ether	10	10U	10U	10U	10U	10U	10U	10U	10U	10U	10U
bis(2-Ethylhexyl)phthalate	30	10UJ	10U	9J	3J	10UJ	8J	3J	2J	3J	6J
Total SVOCs		2	0	53	19	25	17	18	6	18	31

See last page for footnotes.

Table 5-12. Semivolatile Organic Compound in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW21D Date: 01/24/95	GMMW22D 01/27/95	GMMW23I 01/26/95	GMMW23D 01/26/95	GMMW23DFR 01/26/95	GMMW24I 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95
1,2,4-Trichlorobenzene	9	10U	10U	100U	10U	10U	10U	10U	10U
1,2-Dichlorobenzene	600	10U	10U	100U	10U	10U	10U	3J	10U
1,3-Dichlorobenzene	600	10U	10U	100U	10U	10U	10U	10U	10U
1,4-Dichlorobenzene	75	10U	10U	100U	10U	10U	10U	10U	10U
2,2'-oxybis(1-chloropropane)	300	10UJ	10U	100U	10UJ	10UJ	10UJ	10UJ	10UJ
2,4,5-Trichlorophenol	700	R	25U	250U	25U	25U	25U	25U	25U
2,4,6-Trichlorophenol	20	R	10U	100U	10U	10U	10U	10U	10U
2,4-Dichlorophenol	20	R	10U	100U	10U	10U	10U	10U	10U
2,4-Dimethylphenol	100*	R	10U	100U	10U	10U	10U	10U	10U
2,4-Dinitrophenol	40	R	25U	250U	25U	25U	25U	25U	25U
2,4-Dinitrotoluene	10	10U	10U	100U	10U	10U	10U	10U	10U
2,6-Dinitrotoluene	10	10U	10U	100U	10U	10U	10U	10U	10U
2-Chloronaphthalene	--	10U	10U	100U	10U	10U	10U	10U	10U
2-Chlorophenol	40	R	10U	100U	10U	10U	10U	10U	10U
2-Methylnaphthalene	100 **	10U	10U	100U	10U	10U	13	9J	10U
2-Methylphenol	400 **	R	10U	100U	5J	8J	2J	2J	10U
2-Nitroaniline	--	25U	25U	250U	25U	25U	25U	25U	25U
2-Nitrophenol	--	R	10U	100U	10U	10U	10U	10U	10U
3,3'-Dichlorobenzidine	60	10U	10U	100U	10U	10U	10UJ	10UJ	10UJ
3-Nitroaniline	--	25U	25U	250U	25U	25U	25U	25U	25U
4,6-Dinitro-2-methylphenol	--	R	25U	250U	25U	25U	25U	25U	25U
4-Bromophenyl phenyl ether	--	10U	10U	100U	10U	10U	10U	10U	10U
4-Chloro-3-methylphenol	--	R	10U	100U	10U	10U	10U	10U	10U
4-Chloroaniline	--	10UJ	10UJ	100UJ	10UJ	10UJ	10UJ	10UJ	10UJ
4-Chlorophenyl phenyl ether	--	10U	10U	100U	10U	10U	10U	10U	10U
4-Methylphenol	350 **	R	15	100U	10U	10U	180	160	10U
4-Nitroaniline	--	25U	25U	250U	25U	25U	25U	25U	25U
4-Nitrophenol	--	R	25U	250U	25U	25U	25U	25U	25U
Acenaphthene	400	10U	10U	100U	10U	10U	10U	10U	10U
Acenaphthylene	--	10U	10U	100U	10U	10U	10U	10U	10U
Anthracene	2000	10U	10U	100U	10U	10U	10U	10U	10U
Benzo(a)anthracene	--	10U	10U	100U	10U	10U	10U	10U	10U
Benzo(a)pyrene	--	10U	10U	100U	10U	10U	10U	10U	10U
Benzo(b)fluoranthene	--	10U	10U	100U	10U	10U	10U	10U	10U
Benzo(g,h,i)perylene	--	10U	10U	100U	10U	10U	10U	10U	10U
Benzo(k)fluoranthene	--	10U	10U	100U	10U	10U	10U	10U	10U

See last page for footnotes.

Table 5-12. Semivolatile Organic Compound in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW21D Date: 01/24/95	GMMW22D 01/27/95	GMMW23I 01/26/95	GMMW23D 01/26/95	GMMW23DFR 01/26/95	GMMW24I 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95
Butyl benzyl phthalate	100	10UJ	10U	100U	10UJ	10UJ	10UJ	10UJ	10UJ
Carbazole	--	10U	10U	100U	10U	10U	10U	10U	10U
Chrysene	--	10U	10U	100U	10U	10U	10U	10U	10U
Di-n-butyl phthalate	900	10U	10U	100U	10UJ	1J	10U	10U	10U
Di-n-octyl phthalate	100*	10UJ	10U	100U	10UJ	10UJ	10UJ	10UJ	10UJ
Dibenz(a,h)anthracene	--	10U	10U	100U	10U	10U	10U	10U	10U
Dibenzofuran	100 **	10U	10U	100U	10U	10U	10U	10U	10U
Diethyl phthalate	5000	10U	1J	100U	10U	10U	10U	10U	10U
Dimethyl phthalate	--	10U	10U	100U	10U	10U	10U	10U	10U
Fluoranthene	300	10U	10U	100U	10U	10U	10U	10U	10U
Fluorene	300	10U	10U	100U	10U	10U	10U	10U	10U
Hexachlorobenzene	10	10U	10U	100U	10U	10U	10U	10U	10U
Hexachlorobutadiene	1	10U	10U	100U	10U	10U	10U	10U	10U
Hexachlorocyclopentadiene	50	10U	10U	100U	10U	10U	10U	10U	10U
Hexachloroethane	10	10U	10U	100U	10U	10U	10U	10U	10U
Indeno(1,2,3-cd)pyrene	--	10U	10U	100U	10U	10U	10U	10U	10U
Isophorone	100	10U	10U	100U	10U	10U	10U	10U	10U
N-Nitroso-di-n-propylamine	20	10U	10UJ	100U	10U	10U	10U	10U	10U
N-Nitrosodiphenylamine(1)	20	10UJ	10UJ	100UJ	10UJ	10UJ	10U	10U	10U
Naphthalene	30 **	2J	10U	100U	1J	1J	23	17	10U
Nitrobenzene	10	10U	10U	100U	10U	10U	10U	10U	10U
Pentachlorophenol	1	R	25U	250U	25U	25U	25U	9J	25U
Phenanthrene	100 **	10U	10U	100U	10U	10U	10U	10U	10U
Phenol	4000	R	7J	10J	49	48J	21	14	10U
Pyrene	200	10U	10U	100U	10U	10U	10U	10U	10U
bis(2-Chloroethoxy)methane	--	10U	10U	100U	10U	10U	10U	10U	10U
bis(2-Chloroethyl)ether	10	10U	10U	100U	10U	10U	10U	10U	10U
bis(2-Ethylhexyl)phthalate	30	2J	11	100U	9J	11J	10UJ	12J	9J
Total SVOCs		4	34	10	64	133	239	226	9

See last page for footnotes.

Table 5-12. Semivolatile Organic Compound in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: MW6	MW9	MW10	PKMW-4	FBA1-012395	FBA2-012495	FBA3-012595	FBA4-012695	FBA5-012795
		Date: 01/24/95	01/24/95	01/23/95	01/27/95	01/23/95	01/24/95	01/25/95	01/26/95	01/27/95
1,2,4-Trichlorobenzene	9	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,2-Dichlorobenzene	600	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,3-Dichlorobenzene	600	10U	10U	10U	10U	10U	10U	10U	10U	10U
1,4-Dichlorobenzene	75	10U	10U	10U	10U	10U	10U	10U	10U	10U
2,2'-oxybis(1-chloropropane)	300	10UJ	10UJ	10UJ	10U	10U	10U	10U	10U	10U
2,4,5-Trichlorophenol	700	25U	25U	25U	25U	25U	25U	25U	25U	25U
2,4,6-Trichlorophenol	20	10U	10U	10U	10U	10U	10U	10U	10U	10U
2,4-Dichlorophenol	20	14	10U	10U	10U	10U	10U	10U	10U	10U
2,4-Dimethylphenol	100*	10U	10U	<u>110</u>	10U	10U	10U	10U	10U	10U
2,4-Dinitrophenol	40	25U	25U	25U	25U	25U	25U	25U	25U	25U
2,4-Dinitrotoluene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U
2,6-Dinitrotoluene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Chloronaphthalene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Chlorophenol	40	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Methylnaphthalene	100 **	22	8J	<u>310</u>	15	10U	10U	10U	10U	10U
2-Methylphenol	400 **	10U	10U	10U	10U	10U	10U	10U	10U	10U
2-Nitroaniline	--	25U	25U	25U	25U	25U	25U	25U	25U	25U
2-Nitrophenol	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
3,3'-Dichlorobenzidine	60	10UJ	10UJ	10UJ	10U	10U	10U	10U	10U	10U
3-Nitroaniline	--	25U	25U	25U	25U	25U	25U	25U	25U	25U
4,6-Dinitro-2-methylphenol	--	25U	25U	25U	25U	25U	25U	25U	25U	25U
4-Bromophenyl phenyl ether	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
4-Chloro-3-methylphenol	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
4-Chloroaniline	--	10UJ	10UJ	10UJ	10UJ	10U	10U	10U	10U	10U
4-Chlorophenyl phenyl ether	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
4-Methylphenol	350 **	56	10U	10U	10U	10U	10U	10U	10U	10U
4-Nitroaniline	--	25U	25U	25U	25U	25U	25U	25U	25U	25U
4-Nitrophenol	--	25U	25U	25U	25U	25U	25U	25U	25U	25U
Acenaphthene	400	10U	8J	14	10U	10U	10U	10U	10U	10U
Acenaphthylene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
Anthracene	2000	10U	10U	10U	10U	10U	10U	10U	10U	10U
Benzo(a)anthracene	--	10U	10U	1J	2J	10U	10U	10U	10U	10U
Benzo(a)pyrene	--	10U	10U	10U	2J	10U	10U	10U	10U	10U
Benzo(b)fluoranthene	--	10U	10U	1J	2J	10U	10U	10U	10U	10U
Benzo(g,h,i)perylene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
Benzo(k)fluoranthene	--	10U	10U	1J	2J	10U	10U	10U	10U	10U

See last page for footnotes.

Table 5-12. Semivolatile Organic Compound in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: MW6 Date: 01/24/95	MW9 01/24/95	MW10 01/23/95	PKMW-4 01/27/95	FBA1-012395 01/23/95	FBA2-012495 01/24/95	FBA3-012595 01/25/95	FBA4-012695 01/26/95	FBA5-012795 01/27/95
Butyl benzyl phthalate	100	10UJ	10UJ	10UJ	10U	10U	10U	10U	10U	10U
Carbazole	--	10U	10U	4J	10U	10U	10U	10U	10U	10U
Chrysene	--	10U	10U	1J	3J	10U	10U	10U	10U	10U
Di-n-butyl phthalate	900	10U	10U	10U	10U	10U	10U	10U	10U	10U
Di-n-octyl phthalate	100*	10UJ	10UJ	10UJ	10U	10U	10U	10U	10U	10U
Dibenz(a,h)anthracene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
Dibenzofuran	100 **	10U	10U	10U	10U	10U	10U	10U	10U	10U
Diethyl phthalate	5000	10U	10U	10U	10U	10U	1J	10U	10U	10U
Dimethyl phthalate	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
Fluoranthene	300	10U	10U	3J	1J	10U	10U	10U	10U	10U
Fluorene	300	10U	13	19	10U	10U	10U	10U	10U	10U
Hexachlorobenzene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U
Hexachlorobutadiene	1	10U	10U	10U	10U	10U	10U	10U	10U	10U
Hexachlorocyclopentadiene	50	10U	10U	10U	10U	10U	10U	10U	10U	10U
Hexachloroethane	10	10U	10U	10U	10U	10U	10U	10U	10U	10U
Indeno(1,2,3-cd)pyrene	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
Isophorone	100	10U	10U	10U	10U	10U	10U	10U	10U	10U
N-Nitroso-di-n-propylamine	20	10U	10U	10U	10UJ	10U	10U	10U	10U	10U
N-Nitrosodiphenylamine(1)	20	10U	10U	10U	10UJ	10U	10U	10U	10U	10U
Naphthalene	30 **	**<u>180</u>**	10U	**<u>73</u>**	10U	10U	10U	10U	10U	10U
Nitrobenzene	10	10U	10U	10U	10U	10U	10U	10U	10U	10U
Pentachlorophenol	1	25U	25U	25U	25U	25U	25U	25U	25U	25U
Phenanthrene	100 **	10U	16	32	1J	10U	10U	10U	10U	10U
Phenol	4000	10	15	10U	10U	10U	10U	10U	10U	10U
Pyrene	200	10U	1J	5J	2J	10U	10U	10U	10U	10U
bis(2-Chloroethoxy)methane	--	10U	10U	10U	10U	10U	10U	10U	10U	10U
bis(2-Chloroethyl)ether	10	10U	10U	10U	10U	10U	10U	10U	10U	10U
bis(2-Ethylhexyl)phthalate	30	10UJ	3J	16J	14	10U	10U	10U	10U	10U
Total SVOCs		282	64	590	44	0	1	0	0	0

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per liter (ug/L) (equivalent to parts per billion [ppb]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) OLM01.8.
Exceedances of NJDEP criteria are shown in bold and are underlined.

FBA	Indicates a field blank associated with aqueous samples.
PQL	Practical quantitation level.
FR	Field replicate of previous sample.
U	The compound was analyzed for, but not detected at the specified detection limit.
J	Estimated result.
R	Rejected result.
--	No applicable criteria.
SVOC	Semivolatile organic compound.
*	NJDEP Groundwater Standards, New Jersey Register, April 5, 1993.
**	Interim generic groundwater quality criterion.

Table 5-13. Pesticide and Polychlorinated Biphenyl Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP* Groundwater Quality Standard (Higher of PQLs)	Sample ID: Date:	EB1 01/26/95	EB29 01/26/95	EB51 01/25/95	EB68 01/24/95	EBR13 01/27/95	EBR19 01/24/95	GMMW2 01/25/95	GMMW3 01/25/95	GMMW4 01/25/95	GMMW6 01/25/95	GMMW8 01/23/95
4,4'-DDD	0.1		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
4,4'-DDE	0.1		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
4,4'-DDT	0.1		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
Aldrin	0.04		0.05UJ	0.06U	.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	.05U	.05UJ
Aroclor-1016	0.5		1UJ	1.2U	1U	1UJ	1UJ	1UJ	1UJ	R	1UJ	1U	1UJ
Aroclor-1221	0.5		2UJ	2.4U	2U	2UJ	2UJ	2UJ	2UJ	R	2UJ	2U	2UJ
Aroclor-1232	0.5		1UJ	1.2U	1U	1UJ	1UJ	1UJ	1UJ	R	1UJ	1U	1UJ
Aroclor-1242	0.5		1UJ	1.2U	1U	1UJ	1UJ	1UJ	1UJ	R	1UJ	1U	1UJ
Aroclor-1248	0.5		1UJ	1.2U	1U	1UJ	1UJ	1UJ	1UJ	R	1UJ	1U	1UJ
Aroclor-1254	0.5		1UJ	1.2U	1U	1UJ	1UJ	1UJ	1UJ	R	1UJ	1U	1UJ
Aroclor-1260	0.5		1UJ	1.2U	1U	1UJ	1UJ	1UJ	1UJ	R	1UJ	1U	1UJ
Dieldrin	0.03		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	.1U	0.1UJ
Endosulfan I	0.4		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ
Endosulfan II	0.4		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
Endosulfan sulfate	0.4		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
Endrin	2		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
Endrin aldehyde	--		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
Endrin ketone	--		0.1UJ	0.12U	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ	R	0.1UJ	0.1U	0.1UJ
Heptachlor	0.4		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ
Heptachlor epoxide	0.2		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ
Methoxychlor	40		00.5UJ	0.6U	0.5U	00.5UJ	00.5UJ	00.5UJ	00.5UJ	R	00.5UJ	0.5U	00.5UJ
Toxaphene	3		5UJ	6U	5U	5UJ	5UJ	5UJ	5UJ	R	5UJ	5U	5UJ
alpha-BHC	0.02		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ
alpha-Chlordane	0.5		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05J	0.05U	0.05UJ
beta-BHC	0.2		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ
delta-BHC	--		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ
gamma-BHC (Lindane)	0.2		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ
gamma-Chlordane	0.5		0.05UJ	0.06U	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ	R	0.05UJ	0.05U	0.05UJ

See last page for footnotes.

Table 5-13. Pesticide and Polychlorinated Biphenyl Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP* Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW9	GMMW10	GMMW11	GMMW13	GMMW14	GMMW15	GMMW17	GMMW19	GMMW20	GMMW21I
		Date: 01/23/95	01/23/95	01/25/95	01/27/95	01/23/95	01/24/95	01/25/95	01/27/95	01/23/95	01/26/95
4,4'-DDD	0.1	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.1U	0.1UJ	0.1UJ	0.1UJ
4,4'-DDE	0.1	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.069J	0.1UJ	0.1UJ	0.1UJ
4,4'-DDT	0.1	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.12	0.1UJ	0.1UJ	0.1UJ
Aldrin	0.04	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ
Aroclor-1016	0.5	1UJ	1UJ	1.2UJ	1UJ	1UJ	1UJ	1U	1UJ	1UJ	1UJ
Aroclor-1221	0.5	2UJ	2UJ	2.4UJ	2UJ	2UJ	2UJ	2U	2UJ	2UJ	2UJ
Aroclor-1232	0.5	1UJ	1UJ	1.2UJ	1UJ	1UJ	1UJ	1U	1UJ	1UJ	1UJ
Aroclor-1242	0.5	1UJ	1UJ	1.2UJ	1UJ	1UJ	1UJ	1U	1UJ	1UJ	1UJ
Aroclor-1248	0.5	1UJ	1UJ	1.2UJ	1UJ	1UJ	1UJ	1U	1UJ	1UJ	1UJ
Aroclor-1254	0.5	1UJ	1UJ	1.2UJ	1UJ	1UJ	1UJ	1U	1UJ	1UJ	1UJ
Aroclor-1260	0.5	1UJ	1UJ	1.2UJ	1UJ	1UJ	1UJ	1U	1UJ	1UJ	1UJ
Dieldrin	0.03	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.1U	0.1UJ	0.1UJ	0.1UJ
Endosulfan I	0.4	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ
Endosulfan II	0.4	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.1U	0.1UJ	0.1UJ	0.1UJ
Endosulfan sulfate	0.4	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.1U	0.1UJ	0.1UJ	0.1UJ
Endrin	2	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.1U	0.1UJ	0.1UJ	0.1UJ
Endrin aldehyde	--	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.1U	0.1UJ	0.1UJ	0.1UJ
Endrin ketone	--	0.1UJ	0.1UJ	0.12UJ	0.1UJ	0.1UJ	0.1UJ	0.1U	0.1UJ	0.1UJ	0.1UJ
Heptachlor	0.4	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ
Heptachlor epoxide	0.2	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ
Methoxychlor	40	0.5UJ	0.5UJ	0.59UJ	0.5UJ	0.5UJ	0.5UJ	0.5U	0.5UJ	0.5UJ	0.5UJ
Toxaphene	3	5UJ	5UJ	5.9UJ	5UJ	5UJ	5UJ	5U	5UJ	5UJ	5UJ
alpha-BHC	0.02	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	5J
alpha-Chlordane	0.5	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ
beta-BHC	0.2	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ
delta-BHC	--	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	3.8J
gamma-BHC (Lindane)	0.2	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ
gamma-Chlordane	0.5	0.05UJ	0.05UJ	0.059UJ	0.05UJ	0.05UJ	0.05UJ	0.05U	0.05UJ	0.05UJ	0.05UJ

See last page for footnotes.

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Table 5-13. Pesticide and Polychlorinated Biphenyl Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP* Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW21D Date: 01/24/95	GMMW22D 01/27/95	GMMW23I 01/26/95	GMMW23D 01/26/95	GMMW23DFR 01/26/95
4,4'-DDD	0.1	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
4,4'-DDE	0.1	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
4,4'-DDT	0.1	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Aldrin	0.04	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ
Aroclor-1016	0.5	1U	1UJ	1UJ	1UJ	1UJ
Aroclor-1221	0.5	2U	2UJ	2UJ	2UJ	2UJ
Aroclor-1232	0.5	1U	1UJ	1UJ	1UJ	1UJ
Aroclor-1242	0.5	1U	1UJ	1UJ	1UJ	1UJ
Aroclor-1248	0.5	1U	1UJ	1UJ	1UJ	1UJ
Aroclor-1254	0.5	1U	1UJ	1UJ	1UJ	1UJ
Aroclor-1260	0.5	1U	1UJ	1UJ	1UJ	1UJ
Dieldrin	0.03	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endosulfan I	0.4	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ
Endosulfan II	0.4	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endosulfan sulfate	0.4	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endrin	2	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endrin aldehyde	--	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endrin ketone	--	0.1U	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Heptachlor	0.4	0.05U	.05UJ	0.05UJ	0.05UJ	0.05UJ
Heptachlor epoxide	0.2	0.05U	.05UJ	0.05UJ	0.05UJ	0.05UJ
Methoxychlor	40	0.5U	0.5UJ	0.5UJ	0.5UJ	0.5UJ
Toxaphene	3	5U	5UJ	5UJ	5UJ	5UJ
alpha-BHC	0.02	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ
alpha-Chlordane	0.5	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ
beta-BHC	0.2	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ
delta-BHC	--	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ
gamma-BHC (Lindane)	0.2	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ
gamma-Chlordane	0.5	0.05U	0.05UJ	0.05UJ	0.05UJ	0.05UJ

Analyte (ug/L)	GMMW24I 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95	MW8 01/24/95	MW9 01/24/95
4,4'-DDD	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
4,4'-DDE	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
4,4'-DDT	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Aldrin	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
Aroclor-1016	1UJ	1UJ	1UJ	1UJ	1UJ
Aroclor-1221	2UJ	2UJ	2UJ	2UJ	2UJ
Aroclor-1232	1UJ	1UJ	1UJ	1UJ	1UJ
Aroclor-1242	1UJ	1UJ	1UJ	1UJ	1UJ
Aroclor-1248	1UJ	1UJ	1UJ	1UJ	1UJ
Aroclor-1254	1UJ	1UJ	1UJ	1UJ	1UJ
Aroclor-1260	1UJ	1UJ	1UJ	1UJ	1UJ
Dieldrin	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endosulfan I	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
Endosulfan II	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endosulfan sulfate	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endrin	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endrin aldehyde	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Endrin ketone	0.1UJ	0.1UJ	0.1UJ	0.1UJ	0.1UJ
Heptachlor	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
Heptachlor epoxide	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
Methoxychlor	0.5UJ	0.5UJ	0.1UJ	0.5UJ	0.5UJ
Toxaphene	5UJ	5UJ	5UJ	5UJ	5UJ
alpha-BHC	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
alpha-Chlordane	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
beta-BHC	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
delta-BHC	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
gamma-BHC (Lindane)	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ
gamma-Chlordane	0.05UJ	0.05UJ	0.05UJ	0.05UJ	0.05UJ

See last page for footnotes.

Table 5-13. Pesticide and Polychlorinated Biphenyl Compounds in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP* Groundwater Quality Standard (Higher of PQLs)	Sample ID: MW10 Date: 01/23/95	PKMW-4 01/27/95	FBA1-012395 01/23/95	FBA2-012495 01/24/95	FBA3-012595 01/25/95	FBA4-012695 01/26/95	FBA5-012795 01/27/95
4,4'-DDD	0.1	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.0066J	0.1U
4,4'-DDE	0.1	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.1U	0.1U
4,4'-DDT	0.1	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.0033J	0.1U
Aldrin	0.04	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
Aroclor-1016	0.5	1UJ	1UJ	1U	1U	1U	1U	1U
Aroclor-1221	0.5	2UJ	2UJ	2U	2U	2U	2U	2U
Aroclor-1232	0.5	1UJ	1UJ	1U	1U	1U	1U	1U
Aroclor-1242	0.5	1UJ	1UJ	1U	1U	1U	1U	1U
Aroclor-1248	0.5	1UJ	1UJ	1U	1U	1U	1U	1U
Aroclor-1254	0.5	1UJ	1UJ	1U	1U	1U	1U	1U
Aroclor-1260	0.5	1UJ	1UJ	1U	1U	1U	1U	1U
Dieldrin	0.03	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.1U	0.1U
Endosulfan I	0.4	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
Endosulfan II	0.4	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.1U	0.1U
Endosulfan sulfate	0.4	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.1U	0.1U
Endrin	2	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.002J	0.1U
Endrin aldehyde	--	0.1UJ	0.1UJ	0.1U	0.1U	0.034J	0.1U	0.1U
Endrin ketone	--	0.1UJ	0.1UJ	0.1U	0.1U	0.1U	0.1U	0.1U
Heptachlor	0.4	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
Heptachlor epoxide	0.2	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
Methoxychlor	40	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
Toxaphene	3	5UJ	5UJ	5U	5U	5U	5U	5U
alpha-BHC	0.02	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
alpha-Chlordane	0.5	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
beta-BHC	0.2	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
delta-BHC	--	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
gamma-BHC (Lindane)	0.2	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U
gamma-Chlordane	0.5	0.05UJ	0.05UJ	0.05U	0.05U	0.05U	0.05U	0.05U

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per liter (ug/L) (equivalent to parts per billion (ppb)).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) OLM01.8.
Exceedances of NJDEP criteria are shown in bold and are underlined.

FBA Indicates a field blank associated with aqueous samples.
PQL Practical quantitation level.
FR Field replicate of previous sample.
U The compound was analyzed for, but not detected at the specific detection limit.
J Estimated result.
R Rejected result.
-- No applicable criteria.
* NJDEP Groundwater Standards, New Jersey Register, April 5, 1993.

Table 5-14. Dissolved Metals in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: EB1	EB29	EB51	EB68	EBR13	EBR19	GMMW2	GMMW3	GMMW4	GMMW6	GMMW8	GMMW9
		Date: 01/26/95	01/26/95	01/25/95	01/24/95	01/27/95	01/24/95	01/25/95	01/25/95	01/25/95	01/25/95	01/23/95	01/23/95
Aluminum	200	110U	171U	104U	33.8UJ	1450U	119UJ	361J	116J	68.5U	142U	75.6UJ	51.8J
Antimony	20	41.1U	41.1U	41.1U	41.1U	411U	162	41.1U	41.1U	41.1U	41.1U	41.1U	41.1U
Arsenic	8	11.3U	2.2U	8.8U	22UJ	2.8U	22UJ	35.8	22.3	2.5U	43.9	2.2UJ	2.2UJ
Barium	2000	79J	62.8J	83J	9.9U	36.7J	144J	16.3J	46.8J	60J	35.8J	508	1230
Beryllium	20	0.2U	0.2U	0.2U	1.7U	2U	158	1.1U	0.2U	0.2U	0.2U	0.2U	0.2U
Cadmium	4	4.4UJ	4.4UJ	4.4UJ	4.4U	44UJ	175	4.4U	4.4UJ	4.4UJ	4.4UJ	4.4U	4.4U
Calcium	--	179000	22000	77200	4570U	82600	2150U	8110	56700	55300	46300	128000	127000
Chromium	100	5.7U	5.7U	5.7U	5.7U	57U	173	67.7	5.7U	5.7U	57.6	5.7U	5.7U
Cobalt	100 **	12.6U	12.6U	12.6U	12.6U	126U	174	12.6U	14.4J	12.6U	12.6U	12.6U	12.6U
Copper	1000	2.5U	12.5J	2.5U	2.5U	25U	146	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
Iron	300	899	63.1J	8160	566U	315J	199U	415	5770	2480	473	17700	2780U
Lead	10	1.6UJ	17.8J	1.6UJ	1.6UJ	1.6UJ	16UJ	1.6U	1.6UJ	1.6UJ	1.6UJ	1.6UJ	1.6UJ
Magnesium	--	8490	2590J	66500	2230U	153000	1780U	3080J	24500	33900	53200	26800	99500
Manganese	50	48.3	55.3	498	16UJ	83.4J	171J	6.3UJ	236J	206	65.5	616J	360J
Mercury	2	0.2U	0.2U	0.2U	0;2	0.21J	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U
Molybdenum	--	13U	13U	13U	13U	13UJ	18.9J	13U	13U	13U	13U	13U	13U
Nickel	100	17.8U	20J	17.8U	17.8U	178U	168	17.8U	17.8U	17.8U	67.2	17.8U	17.8U
Palladium	--	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ
Potassium	--	5480	844U	20500	943U	52900	810U	19700	8440	8840	3650J	10200	27800
Selenium	50	2.7UJ	2.7UJ	27U	27UJ	27U	27UJ	27UJ	27UJ	2.7UJ	2.7UJ	27UJ	27UJ
Silver	--	4.5UJ	4.5UJ	4.5UJ	4.5UJ	45UJ	9.8UJ	4.5UJ	4.5UJ	4.5UJ	4.5UJ	4.5UJ	4.5UJ
Sodium	50000	16000	3190J	93.8U	69300U	1260000	2270U	376000	122000	126000	61000	140000	368000U
Thallium	10	R	R	R	R	R	R	R	R	R	R	R	R
Vanadium	100 **	6.4J	2.9U	2.9U	3.3U	29U	166	389	5.1U	6.3J	2.9U	2.9U	2.9U
Zinc	5000	8.3J	360	3.1U	3.1UJ	31U	164	13.5J	17.5J	3.1U	34.5	63U	44.2
Hexavalent chromium	--	R	R	R	50UJ	R	50UJ	50UJ	50UJ	R	R	50UJ	50UJ

See last page for footnotes.

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Table 5-14. Dissolved Metals in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID:	GMMW10	GMMW11	GMMW13	GMMW14	GMMW15	GMMW17	GMMW19	GMMW20	GMMW211	GMMW21D	GMMW22D
		Date:	01/23/95	01/25/95	01/27/95	01/23/95	01/24/95	01/25/95	01/27/95	01/23/95	01/26/95	01/24/95	01/27/95
Aluminum	200		33.8UJ	164U	122U	94.9UJ	<u>94300J</u>	129J	112U	<u>1060J</u>	1240U	<u>908</u>	160U
Antimony	20		41.1U	41.1U	41.1U	79.4U	41.1U	41.1U	41.1U	411U	411U	41.1U	41.1U
Arsenic	8		5.1J	18.2U	3.6U	<u>2970J</u>	2.2UJ	2.2UJ	<u>916</u>	5.9J	10.2U	3.1U	2.2U
Barium	2000		463	45.5J	75.1J	67.9J	1.8U	83J	106J	1780J	28J	32.6J	20.9J
Beryllium	20		0.2U	0.2U	0.2U	74.6U	2.4U	0.2U	0.2U	2U	2U	0.72U	0.2U
Cadmium	4		4.4U	4.4UJ	4.4UJ	83.2U	4.4U	4.4U	4.4UJ	44UJ	44UJ	4.4UJ	4.4UJ
Calcium	--		109000	7280	84900	1260U	114000	50900	176000	531000	55700	117000	78500
Chromium	100		5.7U	5.7U	5.7U	83.2U	5.9J	<u>410</u>	5.7U	57U	57U	5.9J	5.7U
Cobalt	100 **		12.6U	12.6U	12.6U	83U	12.6U	12.6U	12.6U	126U	126U	19.8J	12.6U
Copper	1000		2.5U	3.4J	2.5U	69.7U	2.7U	4.9U	2.5U	25U	25U	4.1J	2.5U
Iron	300		<u>19400</u>	52.6J	<u>1590</u>	120U	<u>38900</u>	36.1J	<u>946</u>	<u>89600</u>	208U	<u>7100</u>	<u>1620</u>
Lead	10		1.6UJ	1.6UJ	1.6UJ	<u>37.4</u>	1.6U	1.6UJ	1.6UJ	1.6UJ	1.6UJ	1.6UJ	1.6UJ
Magnesium	--		36800	6360	6440	933U	107000	39500	24300	116000	43300J	10600	7600
Manganese	50		<u>525J</u>	<u>791</u>	<u>160</u>	81.5UJ	1U	30.5J	<u>524</u>	<u>1130J</u>	<u>400</u>	<u>1040</u>	<u>234</u>
Mercury	2		0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U
Molybdenum	--		13U	13U	13U	13U	13U	25.7J	13U	13UJ	24.4J	13U	13U
Nickel	100		17.8U	17.8U	17.8U	81.4U	17.8U	64.2	17.8U	178U	178U	31.8J	17.8U
Palladium	--		16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	20.1J	16.9UJ	16.9UJ	16.9UJ
Potassium	--		17100	10500	3550J	341U	341U	6230	13500J	46700J	38300J	49600	7530
Selenium	50		27UJ	2.7UJ	2.7U	27UJ	27UJ	5.3J	2.7UJ	27UJ	27U	2.7UJ	2.7U
Silver	--		4.5UJ	4.5UJ	4.5UJ	7.4UJ	4.5UJ	4.5UJ	4.5UJ	45UJ	45UJ	4.5UJ	4.5UJ
Sodium	50000		<u>257000</u>	<u>197000</u>	24500	1100U	279U	35800	<u>144000</u>	<u>1230000</u>	<u>632000</u>	<u>159000</u>	33600
Thallium	10		R	R	R	R	R	R	R	R	R	R	R
Vanadium	100 **		2.9U	28.8J	56.9	79.7U	7.7U	2.9U	2.9U	29U	29U	8.7J	2.9U
Zinc	5000		3.1UJ	3.1U	3.1U	77.2U	3.1UJ	64.7	3.1U	31UJ	31U	186	56.1
Hexavalent chromium	50		50UJ	R	R	50UJ	50UJ	330J	R	50UJ	R	R	R

See last page for footnotes.

Table 5-14. Dissolved Metals in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW23I Date: 01/26/95	GMMW23D 01/26/95	GMMW23DFR 01/26/95	GMMW24I 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95	MW6 01/24/95	MW9 01/24/95	MW10 01/23/95
Aluminum	200	172U	387U	484U	50.3J	93.98J	33.8UJ	90.7J	512000J	33.8UJ
Antimony	20	41.1U	41.1U	41.1U	121	167	41.1U	151	41.1U	41.1U
Arsenic	8	32.5	2.2U	2.2U	2.8J	2.7J	2.2UJ	51.5J	2.2UJ	2.2UJ
Barium	2000	341	34.8J	33.5J	101J	132J	11.4U	118J	1.1U	3.3U
Beryllium	20	0.2U	0.2U	0.2U	110	146	2.3U	129	0.2U	0.2U
Cadmium	4	4.4UJ	4.4UJ	4.4UJ	124	164	4.4U	146	4.4U	4.4U
Calcium	--	28500	63900	74800	1370U	1880U	4800U	1850U	513000	10100
Chromium	100	5.7U	5.7U	5.7U	119	161	5.7U	142	20.1	5.7U
Cobalt	100 **	12.6U	12.6U	12.6U	122	157	12.6U	140	12.6U	12.6U
Copper	1000	5.9J	7.1J	3.4J	102	134	3.8U	119	R	6U
Iron	300	3820	189	205	102U	138U	614U	144U	162000	765
Lead	10	1.6UJ	1.6UJ	1.6UJ	1.6UJ	1.6UJ	4.2J	2J	1.6UJ	2.2J
Magnesium	--	21900	8490	11300	1230U	1650U	2300U	1490U	547000	9180
Manganese	50	803	41.8J	120J	119J	158J	17.5UJ	139J	1UJ	30.2UJ
Mercury	2	0.2U	0.2U	0.2U	0.25	0.2U	0.2U	0.2U	0.2U	0.24
Molybdenum	--	29.8J	31.1J	33.8J	13U	13U	13U	17.6J	13U	13U
Nickel	100	17.8U	17.8U	17.8U	118	155	17.8U	135U	17.8U	91U
Palladium	--	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ	16.9UJ
Potassium	--	16600	34600	30300	571UJ	1100UJ	1070U	767U	341U	8590
Selenium	50	2.7UJ	2.7UJ	2.7UJ	2.7UJ	2.7UJ	2.7UJ	2.7UJ	27UJ	27UJ
Silver	--	4.5UJ	4.5UJ	4.5UJ	8.2UJ	10.9UJ	4.5UJ	9.6UJ	4.5UJ	4.5UJ
Sodium	50000	313000	188000	183000	1280U	1810U	69800U	2140U	123U	473000
Thallium	10	R	R	R	R	R	R	R	R	R
Vanadium	100 **	2.9U	4J	2.9U	117	154	4U	136	R	3.6U
Zinc	5000	22.8	15.4J	5J	114	149	3.1UJ	136	3.1UJ	3.9U
Hexavalent chromium	--	R	R	R	50UJ	50UJ	50UJ	50UJ	50UJ	50UJ

See last page for footnotes.

Table 5-14. Dissolved Metals in Groundwater Samples Collected During the Phase 1A Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: PKMW-4 Date: 01/27/95	FBA1-012395 01/23/95	FBA2-012495 01/24/95	FBA3-012595 01/25/95	FBA4-012695 01/26/95	FBA5-012795 01/27/95
Aluminum	200	1160U	70.2J	33.8U	33.8U	115J	87.9J
Antimony	20	411U	**<u>106</u>**	41.1U	41.1U	41.1U	41.1U
Arsenic	8	7U	2.2UJ	2.2U	2.2UJ	2.2U	2.2U
Barium	2000	148J	72.1J	11.2J	0.6U	0.62J	0.69J
Beryllium	20	0.2U	80.7U	1.8J	0.2U	0.2U	0.2U
Cadmium	4	44UJ	**<u>93.4</u>**	4.4U	4.4U	4.4U	4.4U
Calcium	--	336000	1220J	5290	53.7U	61.2J	53.7U
Chromium	100	57U	87.3	5.7U	5.7U	5.7U	5.7U
Cobalt	100 **	126U	91.3	12.6U	12.6U	12.6U	12.6U
Copper	1000	25U	73.5	2.5U	2.5U	2.5U	2.5U
Iron	300	**<u>315J</u>**	108	**<u>638</u>**	20.8U	20.8U	20.8U
Lead	10	1.6UJ	1.6U	1.6U	1.6U	1.6U	1.6U
Magnesium	--	205000	962J	2620J	27.3U	27.3U	27.3U
Manganese	50	**<u>1170</u>**	**<u>87</u>**	18.2	1U	1U	1U
Mercury	2	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U
Molybdenum	--	13UJ	13U	13U	13U	13U	13U
Nickel	100	178U	86.4	17.8U	17.8U	17.8U	17.8U
Palladium	--	16.9UJ	16.9U	16.9U	16.9U	16.9U	16.9U
Potassium	--	53500	341U	1080J	341U	341U	450J
Selenium	50	27U	2.7U	2.7U	2.7U	2.7U	2.7U
Silver	--	45UJ	8.8J	4.5U	4.5U	4.5U	4.5U
Sodium	50000	**<u>1410000</u>**	1070J	**<u>82700</u>**	364J	568J	334J
Thallium	10	R	2.7UJ	2.7UJ	2.7UJ	2.7U	2.7U
Vanadium	100 **	29U	85.5	3.3J	2.9U	2.9U	2.9U
Zinc	5000	31U	81	3.1U	3.1U	3.1U	3.1U
Hexavalent chromium	50	R	50U	50U	50U	50U	50U

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per liter (ug/L) (equivalent to parts per billion [ppb]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols co Statement of Work (SOW) ILM03.0.
Exceedances of NJDEP criteria are shown in bold and are underlined.

FBA	Indicates a field blank associated with aqueous samples.
FR	Field replicate of previous sample.
U	The compound was analyzed for but not detected at the specified detection limit.
J	Estimated result.
--	No applicable criteria.
R	Rejected result.
*	NJDEP Groundwater Standards, New Jersey Register, April 5, 1993.
**	Interim generic groundwater quality criterion.

Table 5-15. Total Metals and Cyanide in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: EB01	EB29	EB51	EB68	EBR13	EBR19	GMMW2	GMMW3	GMMW4	GMMW6	GMMW8	GMMW9	GMMW10
		Date: 01/26/95	01/26/95	01/25/95	01/24/95	01/27/95	01/24/95	01/25/95	01/25/95	01/25/95	01/25/95	01/23/95	01/23/95	01/23/95
Aluminum	200	528J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	20	8.9J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	8	16.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2000	84.1J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	20	0.1U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	4	0.5U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	147000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	--	2.9U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	100**	1J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1000	26.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	200	10U	10U	10UJ	10UJ	10U	10UJ	10UJ	10UJ	10U	10U	10UJ	10UJ	17.2J
Iron	300	2700	13700	9590J	45400J	5610	46000	51700	62900	NA	NA	74800	146000	86300
Lead	10	66.9J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	7190	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	50	52.4	305	509J	480J	80.6	243	884	491	NA	NA	849	1140	874
Mercury	2	1.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	100	15.4J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	7080	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	4.4U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	--	0.6U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	50000	14200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	10	5.5U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	100**	10.8J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	5000	161J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

See last page for footnotes.

Table 5-15. Total Metals and Cyanide in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: / Date:	GMMW11 01/25/95	GMMW13 01/27/95	GMMW14 01/23/95	GMMW15 01/24/95	GMMW17 01/25/95	GMMW19 01/27/95	GMMW20 01/23/95	GMMW21I 01/26/95	GMMW21D 01/24/95	GMMW22D 01/27/95	GMMW23I 01/26/95
Aluminum	200		NA	NA	NA	NA	NA	NA	NA	280J	1200J	NA	1300J
Antimony	20		NA	NA	NA	NA	NA	NA	NA	1.9U	1.9U	NA	1.9J
Arsenic	8		NA	NA	NA	NA	NA	NA	NA	26.3	5.8J	NA	29.6
Barium	2000		NA	NA	NA	NA	NA	NA	NA	27.8J	30.4J	NA	332
Beryllium	20		NA	NA	NA	NA	NA	NA	NA	0.1U	0.74U	NA	0.1U
Cadmium	4		NA	NA	NA	NA	NA	NA	NA	0.5U	0.5U	NA	0.5U
Calcium	--		NA	NA	NA	NA	NA	NA	NA	51100	99500	NA	24400
Chromium	--		NA	NA	NA	NA	NA	NA	NA	6.4U	11U	NA	5.5U
Cobalt	100**		NA	NA	NA	NA	NA	NA	NA	3.7J	15.8J	NA	4.9J
Copper	1000		NA	NA	NA	NA	NA	NA	NA	103	49.1	NA	20.3J
Cyanide	200		10U	10U	10UJ	10UJ	13.7J	10U	10U	10U	10U	10U	10U
Iron	300		54500	38400	26200	85400J	12800	NA	NA	798	6730	3210	5140
Lead	10		NA	NA	NA	NA	NA	NA	NA	7.2J	7.6J	NA	11.8J
Magnesium	--		NA	NA	NA	NA	NA	NA	NA	39500	9180	NA	18500
Manganese	50		2490	340	97.2	725J	84.4	NA	NA	402	907	230	662
Mercury	2		NA	NA	NA	NA	NA	NA	NA	0.2U	0.2U	NA	0.2U
Nickel	100		NA	NA	NA	NA	NA	NA	NA	11.6J	33.8J	NA	7.5U
Potassium	--		NA	NA	NA	NA	NA	NA	NA	6560C	51200	NA	24500
Selenium	50		NA	NA	NA	NA	NA	NA	NA	4.4U	5.7	NA	4.4U
Silver	--		NA	NA	NA	NA	NA	NA	NA	0.6U	0.6U	NA	0.6U
Sodium	50000		NA	NA	NA	NA	NA	NA	NA	545000	131000	NA	250000
Thallium	10		NA	NA	NA	NA	NA	NA	NA	5.5U	5.5U	NA	5.5U
Vanadium	100**		NA	NA	NA	NA	NA	NA	NA	6.2J	10J	NA	5.1J
Zinc	5000		NA	NA	NA	NA	NA	NA	NA	63.7J	151J	NA	30.8J

See last page for footnotes.

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Table 5-15. Total Metals and Cyanide in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: GMMW23D Date: 01/26/95	GMMW23DFR 01/26/95	GMMW24I 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95	MW6 01/24/95	MW9 01/24/95	MW10 01/23/95	PKMW-4 01/27/95	FBA001-012395 01/23/95
Aluminum	200	17400J	13300J	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	20	1.9U	1.9U	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	8	9.1J	10.4	NA	NA	NA	NA	NA	NA	NA	NA
Barium	2000	296	275	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	20	1.2U	1.1U	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	4	0.5U	0.5U	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	--	112000	100000	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	--	37.4	34.2	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	100**	14.7J	13.4J	NA	NA	NA	NA	NA	NA	NA	NA
Copper	1000	68.9	63.4	NA	NA	NA	NA	NA	NA	NA	NA
Cyanide	200	10U	10U	10UJ	10UJ	10UJ	10UJ	10UJ	10UJ	10U	10U
Iron	300	22200	19200	3920	3190J	1710	69700	10900	7620	2800	71J
Lead	10	27.5J	23.6J	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	--	17600	14800	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	50	509	398	790	817J	90.4	760	251	79	414	1U
Mercury	2	0.2U	0.2U	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	100	26.9J	24.7J	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	--	62500	56900	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	50	6.6	7.9	NA	NA	NA	NA	NA	NA	NA	NA
Silver	--	0.6U	0.6U	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	50000	212000	191000	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	10	5.5U	5.5U	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	100**	38.3J	33.4J	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	5000	105J	109J	NA	NA	NA	NA	NA	NA	NA	NA

See last page for footnotes.

Table 5-15. Total Metals and Cyanide in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (ug/L)	NJDEP * Groundwater Quality Standard (Higher of PQLs)	Sample ID: FBA002-012495 Date: 01/24/95	FBA003-012595 01/25/95	FBA004-012695 01/26/95	FBA005-012795 01/27/95
Aluminum	200	NA	NA	65.3J	NA
Antimony	20	NA	NA	1.9U	NA
Arsenic	8	NA	NA	3.5U	NA
Barium	2000	NA	NA	0.38J	NA
Beryllium	20	NA	NA	0.1U	NA
Cadmium	4	NA	NA	0.5U	NA
Calcium	--	NA	NA	35J	NA
Chromium	--	NA	NA	2.2U	NA
Cobalt	100**	NA	NA	0.5U	NA
Copper	1000	NA	NA	0.8U	NA
Cyanide	200	10U	10U	10U	10U
Iron	300	43.7J	137	38.9J	27.2U
Lead	10	NA	NA	1.6U	NA
Magnesium	--	NA	NA	18.4J	NA
Manganese	50	1U	1U	0.4U	0.53J
Mercury	2	NA	NA	0.2U	NA
Nickel	100	NA	NA	1.5U	NA
Potassium	--	NA	NA	108J	NA
Selenium	50	NA	NA	4.4U	NA
Silver	--	NA	NA	0.6U	NA
Sodium	50000	NA	NA	544J	NA
Thallium	10	NA	NA	5.5U	NA
Vanadium	100**	NA	NA	0.5U	NA
Zinc	5000	NA	NA	1.3J	NA

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in micrograms per liter (ug/L) (equivalent to parts per billion [ppb]).
Analyses were performed by CompuChem Environmental Corporation, Research Triangle Park, North Carolina, using Contract Laboratory Program (CLP) protocols contained in the Statement of Work (SOW) ILM03.0.
Exceedances of NJDEP criteria are shown in bold and are underlined.

FBA	Indicates a field blank associated with aqueous samples.
PQL	Practical quantitation level.
FR	Field replicate of previous sample.
U	The compound was analyzed for, but not detected at the specified detection limit.
J	Estimated result.
--	No applicable criteria.
NA	Not analyzed.
*	NJDEP Groundwater Standards, New Jersey Register, April 5, 1993.
**	Interim generic groundwater quality criterion.

Table 5-16. Wet Chemistry, Intrinsic Biological Parameters, and Dissolved Gases in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (mg/L)	NJDEP * Groundwater Quality Standards (Higher of PQLs)	Sample ID:	EB1	EB29	EB51	EB68	EBR13	EBR19	GMMW2	GMMW3	GMMW8	GMMW9	GMMW10	GMMW11
		Date:	01/26/95	01/26/95	01/25/95	01/24/95	01/27/95	01/24/95	01/25/95	01/25/95	01/23/95	01/23/95	01/23/95	01/25/95
Ammonia	0.5		0.1U	0.1U	1.46	2.88	1.08	0.205	4.28	0.9	2.16	1.77	4.8	1.33
BOD, 5-day total	--		7.6	7.8	12	70	65	15	34	39	10	28	34	4.8
Carbon dioxide	--		56.1	13.1	62.9	37.8	33.4	1.6U	1.6U	153.4	44.4	112.4	103	2.5
Carbon monoxide	--		0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U
Chemical oxygen demand	--		86	370	91	400	190	790	470	430	340	800	710	140
Chloride	250		12.4	5.47	1760J**	5580J**	2430	11300J**	220J**	204J**	203J**	782J**	431J**	65.7
Methane	--		0.3	0.2U	5.3	2.5	0.2U	0.2U	6.3	9.3	2.7	10.4	13.2	0.2U
Nitrate-N	10		0.33	3.2	0.04U	0.04U	0.04U	0.04U	0.042	0.04U	0.048	0.4	0.04U	0.04U
Nitrogen dioxide	--		12.2	12.6	9.9	11.3	12.8	12.4	12.6	5.7	11.9	5.2	4.0	11.2
Total organic carbon	--		28.7	9.4	15.4	21.1	22.4	12.1	76.7	27.2	32.2	21.3	100	28.8
Dissolved oxygen	--		2.4	7.0	1.1	1.6	0.9	2.6	2.0	2.5	1.6	1.1	1.0	2.6
Sulfate	250		300	24.6	62.9	240	70.6	1840	194J**	28.7	38	28.8	27.7	29.9
Sulfide, low	--		0.2	0.1U	0.2	62	83	16	0.8	0.52	5.1	7.8	6	0.59
Total dissolved solids	500		2010	150	204J**	378J**	3320	3670J**	162J**	152J**	4100UJ*	4320UJ*	224J**	202
Total alkalinity	--		411	10.7	490	720	393	54.5	486	211	436	430	432	427
Total phosphorus	--		0.1U	0.734	0.971	1.99	0.321	0.371	4.44	0.68	1.94	1.55	1.95	8.71

See last page for footnotes.

Table 5-16. Wet Chemistry, Intrinsic Biological Parameters, and Dissolved Gases in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (mg/L)	NJDEP * Groundwater Quality Standards (Higher of PQLs)	Sample ID: / Date:	GMMW13 01/27/95	GMMW14 01/23/95	GMMW15 01/24/95	GMMW17 01/25/95	GMMW21I 01/26/95	GMMW21D 01/24/95	GMMW22D 01/27/95	GMMW23I 01/26/95	GMMW23D 01/26/95	GMMW23DFR 01/26/95
Ammonia	0.5		1.08	1.90	5.01	0.1U	0.1U	0.1U	0.1U	0.1U	0.136	0.1U
BOD, 5-day total	--		33	43	74	6.4	240	1600	420	700	430	430
Carbon dioxide	--		82	114.5	80.2	2.2	35	151.8	38.8	228.4	1.6U	1.6U
Carbon monoxide	--		0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U
Chemical oxygen demand	--		200	240	720	91	250	2200	660	850	1700	1600
Chloride	250		27.8	242	1750	17.1	159	211J**	49.6	185	302	298J**
Methane	--		2.4	10.9	5.4	1.5	3	0.2U	0.2U	0.6	0.2U	0.2U
Nitrate-N	10		0.04U	0.04U	0.04U	0.45	0.04U	0.04U	0.04U	0.04U	0.063	0.087
Nitrogen dioxide	--		12.9	7.2	8.4	12.7	8.1	9.9	14.1	4.6	13.5	12.7
Total organic carbon	--		98.6	27.6	42.2	15.2	98.8	719	235	345	515	563
Dissolved oxygen	--		0.9	1.1	0.6	2.9	1.3	1.7	1.0	1.0	0.9	1.0
Sulfate	250		12.5	87.7	78.4	117	364	427J**	701	33.3	396	473J**
Sulfide, low	--		4.1	13	20	0.43	11	0.17	0.1U	0.1U	0.1U	0.1U
Total dissolved solids	500		182	492	4240	146	4060	322J**	900	2020	1920	260J**
Total alkalinity	--		233	425	991	206	1210	221	73	440	33.6	44.7
Total phosphorus	--		1.86	2.25	3.99	0.154	0.647	0.527	0.275	0.495	0.982	0.894

See last page for footnotes.

Table 5-16. Wet Chemistry, Intrinsic Biological Parameters, and Dissolved Gases in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (mg/L)	NJDEP * Groundwater Quality Standards (Higher of PQLs)	Sample ID: GMMW24I Date: 01/24/95	GMMW24IFR 01/24/95	GMMW24D 01/24/95	MW6 01/24/95	MW9 01/24/95	MW10 01/23/95	PKMW-4 01/27/95	FBA1-012395 01/23/95	FBA2-012495 01/24/95
Ammonia	0.5	0.1U	0.1U	0.1U	4.15	3.44	0.1U	2.92	0.1U	0.1U
BOD, 5-day total	--	710	1900	16	66	14	37	76	9.1	4U
Carbon dioxide	--	153	175.6	1.6U	103.3	131.7	23.7	54.6	NA	NA
Carbon monoxide	--	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	0.3U	NA	NA
Chemical oxygen demand	--	3600	3700	87	390	140	270	430	20U	20U
Chloride	250	2280	1270	154J**	346	99.7	23.5	3310J**	3U	3U
Methane	--	0.3	0.4	0.2U	4.9	10.1	13.4	2.6	NA	NA
Nitrate-N	10	0.04U	0.04U	0.04U	0.08	0.04U	0.04U	0.04U	0.04U	0.04U
Nitrogen dioxide	--	9.2	10.7	15.1	13.1	7.2	6.8	10.6	NA	NA
Total organic carbon	--	1220	1290	15.2	83.7	20.2	43.8	77.1	4.13	1U
Dissolved oxygen	--	1.5	1.3	4.0	2.5	2.8	2.7	0.7	NA	NA
Sulfate	250	81.5	29.3	34.9	87.7	20	14	582J**	2U	2U
Sulfide, low	--	2.9	1.3	0.1U	1.7	0.16	0.1U	97	0.1U	0.1U
Total dissolved solids	500	4340	6430	106J**	2680	4630	210	178J**	3570U	592J**
Total alkalinity	--	451	369	58.5	322	185	1060	736	10U	10U
Total phosphorus	--	0.713	0.839	0.227	3.78	0.321	0.328	0.789	0.122	0.168

See last page for footnotes.

Table 5-16. Wet Chemistry, Intrinsic Biological Parameters, and Dissolved Gases in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Analyte (mg/L)	NJDEP * Groundwater Quality Standards (Higher of PQLs)	Sample ID: FBA3-012595 Date: 01/25/95	FBA4-012695 01/26/95	FBA5-012795 01/27/95
Ammonia	0.5	0.1U	0.1U	0.1U
BOD, 5-day total	--	4U	4.0U	4U
Carbon dioxide	--	NA	NA	NA
Carbon monoxide	--	NA	NA	NA
Chemical oxygen demand	--	20U	20U	20U
Chloride	250	3U	3U	3U
Methane	--	NA	NA	NA
Nitrate-N	10	0.04U	0.04U	0.04U
Nitrogen dioxide	--	NA	NA	NA
Total organic carbon	--	1U	1U	1U
Dissolved oxygen	--	NA	NA	NA
Sulfate	250	2U	2U	2U
Sulfide, low	--	0.1U	0.1U	0.1U
Total dissolved solids	500	138J**	4U	**2110J****
Total alkalinity	--	10U	10U	10U
Total phosphorus	--	0.1U	0.1U	0.1U

Analyte concentrations and New Jersey Department of Environmental Protection (NJDEP) criteria in milligrams per liter (mg/L) (equivalent to parts per million (ppm)).
Analyses were performed by Compuchem Environmental Corporation of Research Park Triangle, North Carolina, using standard United States Environmental Protection Agency (USEPA) methodology.
Exceedances of the NJDEP criteria are shown in bold and are underlined.

FBA	Indicates a field blank associated with aqueous samples.
PQL	Practical quantitation level.
FR	Field replicate of previous sample.
U	The compound was analyzed for, but not detected at the specified detection limit.
J	Estimated result.
NA	Not analyzed.
--	No applicable criteria.
*	NJDEP Groundwater Standards, New Jersey Register, April 5, 1993.
**	Indicates a value reported by the laboratory where concentrations of chlorides and/or sulfates exceed the reported TDS concentration. These values are considered suspect.

Table 5-17. Summary of Detected Concentrations of All Constituents in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Groundwater Quality Criteria	Percent of Samples Exceeding NJDEP Groundwater Quality Criteria
Volatile Organic Compounds (ug/L)								
1,1-Dichloroethane	62.00	63.00	64.00	2	44	5	0	0
1,2-Dichloroethene(Total)	7.00	2961.00	11000.00	4	44	9	2	5
1-Butanol	24000.00	24000.00	24000.00	1	44	2	0	0
2-Butanol	26000.00	26000.00	26000.00	1	44	2	0	0
2-Butanone	2800.00	2800.00	2800.00	1	44	2	1	2
Acetone	19.00	1127.00	4300.00	4	44	9	1	2
Benzene	2.00	77944.00	710.00	18	44	41	18	41
Bromodichloromethane	2.00	6.00	10.00	2	44	5	2	5
Chlorobenzene	2.00	2836.50	14000.00	8	44	18	6	14
Chloroethane	65.00	65.00	65.00	1	44	2	0	0
Chloroform	2.00	17.50	40.00	4	44	9	3	7
Ethylbenzene	2.00	1556.25	12000.00	8	44	18	1	2
Hexane	9.00	1323.78	4700.00	9	44	20	0	0
Methyl-t-butyl ether	260.00	390.00	520.00	2	44	5	0	0
Methylene chloride	69.00	69.00	69.00	1	44	2	1	2
Tetrachloroethene	820.00	820.00	820.00	1	44	2	1	2
Toluene	1.00	54.40	510.00	10	44	23	0	0
Trichloroethene	1.00	550.50	1100.00	2	44	5	1	2
Vinyl chloride	3.00	1357.67	3700.00	3	44	7	2	5
Xylenes (Total)	2.00	2909.36	38000.00	14	44	32	4	9
n-Propylbenzene	2.00	387.13	2800.00	15	44	34	0	0
Semivolatile Organic Compounds (ug/L)								
1,2-Dichlorobenzene	1.00	8.00	19.00	4	31	13	0	0
1,3-Dichlorobenzene	18.00	18.00	18.00	1	31	3	0	0
1,4-Dichlorobenzene	2.00	34.75	130.00	4	31	13	1	3
2,4-Dichlorophenol	14.00	14.00	14.00	1	31	3	0	0
2,4-Dimethylphenol	1.00	55.50	110.00	2	31	6	1	3
2-Chlorophenol	17.00	17.00	17.00	1	31	3	0	0
2-Methylnaphthalene	1.00	45.25	310.00	12	31	39	2	6
2-Methylphenol	2.00	3.50	5.00	2	31	7	0	0
4-Methylphenol	2.00	37.00	180.00	7	31	23	0	0
Acenaphthene	1.00	5.89	15.00	9	31	29	0	0
Anthracene	2.00	2.00	2.00	2	31	6	0	0
Benzo(a)anthracene	1.00	2.13	5.00	8	31	26	0	0

See last page for footnotes.

Table 5-17. Summary of Detected Concentrations of All Constituents in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Groundwater Quality Criteria	Percent of Samples Exceeding NJDEP Groundwater Quality Criteria
Semivolatile Organic Compounds (continued) (ug/L)								
Benzo(a)pyrene	1.00	2.17	5.00	6	31	19	0	0
Benzo(b)fluoranthene	1.00	2.11	8.00	9	31	29	0	0
Benzo(g,h,i)perylene	2.00	2.00	2.00	1	31	3	0	0
Benzo(k)fluoranthene	1.00	2.22	9.00	9	31	29	0	0
Carbazole	2.00	3.00	4.00	3	31	10	0	0
Chrysene	1.00	2.18	4.00	11	31	35	0	0
Di-n-butyl phthalate	1.00	1.50	2.00	2	31	6	0	0
Dibenzofuran	2.00	4.25	9.00	4	31	13	0	0
Diethyl phthalate	1.00	1.00	1.00	4	31	13	0	0
Fluoranthene	1.00	2.40	6.00	10	31	32	0	0
Fluorene	1.00	6.10	19.00	10	31	32	0	0
Indeno(1,2,3-cd)pyrene	1.00	1.00	1.00	1	31	3	0	0
Naphthalene	1.00	30.07	180.00	14	31	45	4	13
Pentachlorophenol	3.00	3.00	3.00	1	31	3	1	3
Phenanthrene	1.00	7.54	32.00	13	31	42	0	0
Phenol	2.00	14.22	49.00	9	31	29	0	0
Pyrene	1.00	2.88	8.00	16	31	52	0	0
bis(2-Ethylhexyl)phthalate	1.00	5.54	16.00	24	31	77	0	0
Pesticides/PCBs (ug/L)								
4,4'-DDE	0.07	0.07	0.07	1	31	3	0	0
4,4'-DDT	0.12	0.12	0.12	1	31	3	1	3
alpha-BHC	5.00	5.00	5.00	1	31	3	1	3
alpha-chlordane	0.05	0.05	0.05	1	31	3	0	0
delta-BHC	3.80	3.80	3.80	1	31	3	0	0
Inorganics - Total (ug/L)								
Aluminum	280.00	4141.60	17400.00	5	5	100	5	100
Antimony	1.90	5.40	8.90	2	5	40	0	0
Arsenic	5.80	17.44	29.60	5	5	100	4	80
Barium	27.80	154.06	332.00	5	5	100	0	0
Calcium	24400.00	86800.00	147000.00	5	5	100	0	0
Chromium	37.40	37.40	37.40	1	5	20	0	0
Cobalt	1.00	8.02	15.80	5	5	100	0	0

See last page for footnotes.

Table 5-17. Summary of Detected Concentrations of All Constituents in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Groundwater Quality Criteria	Percent of Samples Exceeding NJDEP Groundwater Quality Criteria
Inorganics - Total (ug/L) (continued)								
Copper	20.30	53.56	103.00	5	5	100	0	0
Cyanide	13.70	15.45	17.20	2	31	6	0	0
Iron	798.00	33212.15	146000.00	27	27	100	27	96
Lead	7.20	24.20	66.90	5	5	100	3	60
Magnesium	7190.00	18394.00	39500.00	5	5	100	0	0
Manganese	52.40	545.89	2490.00	27	27	100	27	96
Mercury	1.10	1.10	1.10	1	5	20	0	0
Nickel	11.60	21.93	33.80	4	5	80	0	0
Potassium	7080.00	42176.00	65600.00	5	5	100	0	0
Selenium	5.70	6.15	6.60	2	5	40	0	0
Sodium	14200.00	230440.00	545000.00	5	5	100	4	80
Vanadium	5.10	14.08	39.30	5	5	100	0	0
Zinc	30.80	102.30	161.00	5	5	100	0	0
Inorganics - Dissolved (ug/L)								
Aluminum	50.30	60906.68	512000.00	10	31	32	5	16
Antimony	121.00	144.67	162.00	3	31	10	3	10
Arsenic	2.80	408.58	2970.00	10	31	32	7	23
Barium	16.30	221.05	1780.00	26	31	84	0	0
Beryllium	110.00	132.33	158.00	3	31	10	4	13
Cadmium	124.00	148.33	175.00	3	31	10	3	10
Calcium	7280.00	122319.60	531000.00	25	31	81	0	0
Chromium	5.90	111.24	410.00	9	31	29	4	13
Cobalt	14.40	94.04	174.00	5	31	16	3	10
Copper	3.40	50.00	146.00	8	31	26	0	0
Hexavalent chromium	330.00	330.00	330.00	1	31	3	1	3
Iron	36.10	16635.17	182000.00	23	31	74	19	61
Lead	2.00	12.72	37.40	5	31	16	2	6
Magnesium	2590.00	66441.20	547000.00	25	31	81	0	0
Manganese	30.50	393.62	1170.00	24	31	77	21	68
Mercury	0.20	0.23	0.25	4	31	13	0	0
Molybdenum	17.60	24.58	31.10	6	31	19	0	0
Nickel	20.00	78.20	168.00	6	31	19	2	6
Palladium	20.10	20.10	20.10	1	31	3	0	0
Potassium	3550.00	21082.27	53500.00	22	31	71	0	0

See last page for footnotes.

Table 5-17. Summary of Detected Concentrations of All Constituents in Groundwater Samples Collected During the Phase IA Remedial Investigation, Bayonne Plant, Bayonne, New Jersey.

Constituent	Minimum Quantifiable Concentration	Geometric Mean Quantifiable Concentration	Maximum Quantifiable Concentration	Number of Quantifiable Concentrations	Number of Samples Analyzed	Percent of Samples with Quantifiable Concentrations	Number of Samples Exceeding NJDEP Groundwater Quality Criteria	Percent of Samples Exceeding NJDEP Groundwater Quality Criteria
Inorganics - Dissolved (ug/L) (continued)								
Selenium	5.30	5.30	5.30	1	31	3	0	0
Sodium	3190.00	342432.86	1410000.00	21	31	68	16	52
Vanadium	4.00	91.91	389.00	10	31	32	0	0
Zinc	8.30	88.36	360.00	14	31	45	0	0
Miscellaneous Inorganic Parameters (mg/L)								
Ammonia	0.14	2.32	5.01	17	27	63	0	0
BOD, 5 Day Total	4.80	177.50	1600.00	27	27	100	0	0
Carbon Dioxide	2.20	79.05	228.40	23	27	85	0	0
Chemical Oxygen Demand	86.00	616.48	3600.00	27	27	100	0	0
Chloride	5.47	1190.75	11300.00	27	27	100	11	41
Methane	0.30	5.53	13.40	19	27	70	0	0
Nitrate-N	0.04	0.58	3.20	8	27	30	0	0
Nitrogen Dioxide	4.00	10.19	15.10	27	27	100	0	0
Organic Carbon	9.40	146.40	1220.00	27	27	100	0	0
Dissolved Oxygen	0.60	1.93	7.00	27	27	100	0	0
Sulfate	12.50	219.34	1840.00	27	27	100	7	26
Sulfide, Low	0.16	15.84	97.00	21	27	78	0	0
Total Dissolved Solids	106.00	1678.44	4630.00	27	27	100	11	41
Total Alkalinity	10.70	412.83	1210.00	27	27	100	0	0
Total Phosphorus	0.15	1.58	8.71	26	27	96	0	0

Ranges of concentrations and exceedances do not inlcude quality assurance/quality control samples such as replicates, field blanks, and matrix spike/matrix spike duplicates.

NJDEP New Jersey Department of Environmental Protection.
PCBs Polychlorinated biphenyls.
mg/L Milligrams per liter (equivalent to parts per million (ppm)).
ug/L Micrograms per liter (equivalent to parts per billion (ppb)).

Table 5-18. Summary of Field Parameter Measurements of Groundwater Samples Collected During the Phase IA Remedial Investigation at the Bayonne Plant, Bayonne, New Jersey.

Well Designation	Date	Temperature (°F)	Specific Conductance (umhos/cm)	pH (s.u.)	Dissolved Oxygen (mg/L)	Oxidation-Reduction Potential (mV)
Phase IA Monitoring Wells						
Shallow						
GMMW2	1/25/95	56.12	1620	9.63	2.52	-252
GMMW3	1/25/95	62.81	998	6.23	4.11	-150
GMMW4	1/25/95	55.74	1409	6.66	1.52	25
GMMW6	1/25/95	55.34	744	7.08	4.66	-107
GMMW8	1/23/95	58.33	1100	7.64	9.08	195
GMMW9	1/23/95	54.50	1300	7.63	8.83	207
GMMW10	1/23/95	60.90	2254	6.55	2.04	-74
GMMW11 *	1/25/95	56.55	1028	8.61	1.12	1.0
GMMW13	1/27/95	51.33	254	6.39	2.8	-20
GMMW14	1/23/95	59.91	2122	6.94	1.08	-158
GMMW15	1/24/95	60.49	5240	6.82	1.17	-244
GMMW17	1/25/95	50.09	624	7.92	4.3	-72
GMMW19	1/27/95	54.33	234	6.67	3.09	101
GMMW20	1/23/95	55.79	9185	6.39	2.03	-54
Intermediate						
GMMW21I	1/26/95	58.10	3130	7.08	0.83	-50
GMMW23I	1/26/95	60.69	272	6.94	0.97	-64
GMMW24I *	1/26/95	60.13	**	6.23	0.64	-184
Deep						
GMMW21D	1/26/95	58.29	**	4.4	1.09	139
GMMW22D	1/27/95	60.40	3000	4.91	1.19	163
GMMW23D	1/26/95	61.26	4320	7.29	1.06	-81
GMMW24D	1/26/95	57.07	**	6.69	0.44	-174
Existing Monitoring Wells						
Shallow						
EB1	1/26/95	51.15	676	6.66	3.5	-30
EB29	1/26/95	44.49	165	6.15	11.73	421
EB51	1/25/95	55.07	7360	6.95	0.93	46
EB68	1/24/95	58.89	**	6.91	4.09	-259
EB90 *	1/27/95	51.45	926	6.97	0.8	300
EBR13 *	1/27/95	55.40	100	6.77	0.45	-133
EBR19	1/24/95	49.49	**	8.1	3.73	-171
MW 6	1/24/95	56.15	1107	6.42	1.82	-10
MW 9	1/24/95	55.77	659	6.23	5.72	-44
MW 10	1/23/95	52.62	1731	7.66	1.8	-109
PKMW4 *	1/27/95	55.65	9280	7.11	0.39	-164

NOTE: Unless otherwise noted, field parameter measurements were recorded downhole at the base of the water column after well purging and prior to groundwater sampling.

umhos/cm Micromhos per centimeter.
s.u. Standard unit.
mg/L Milligram per liter.
mV Millivolt.
* Value obtained prior to well purging.
** Value out of instrument range.
°F Degrees Fahrenheit.

Table 6-1. Physical and Chemical Properties of Organic Constituents of Concern, Bayonne, New Jersey.

Constituent	Molecular Weight (g/mol)	Water Solubility (mg/L 25 °C)	Specific Gravity	Vapor Pressure (mm Hg 25 °C)	Henry's Law Constant (atm-m³/mol) (25 °C)	Diffusivity (cm²/sec)	Koc (mL/g)	Log Kow	Groundwater T ½ Low (days)	Groundwater T ½ High (days)	Soil T ½ Low (days)	Soil T ½ High (days)
VOCs												
Acetone	58	miscible	0.79	2.7E+02	3.97E-05	0.11498	0.37	-0.24	2 -	14	1 -	7
Benzene	78	1,780	0.88	9.5E+01	5.48E-03	0.09320	49 - 100	1.56 - 2.15	10 -	720	5 -	16
2-Butanone	72	239,000	0.80	1.0E+02	4.66E-05	0.08944	1.2	0.26 - 0.29	2 -	14	1 -	7
Chlorobenzene	113	295 - 500	1.1	1.2E+01	4.45E-03	0.07193	48 - 331	2.71 - 2.98	136 -	300	68 -	150
Chloroform	119	7,222 - 9,600	1.48	2.0E+02	3.20E-03	0.08868	44	1.90 - 1.97	56 -	1,825	28 -	180
Dichlorobromomethane	164	4,700	1.99	5.0E+01 (20 °C)	2.12E-04	0.08966	62	1.88	ND		ND	
cis-1,2-Dichloroethene	97	3,500	1.28	2.0E+02	3.37E-03	0.09980	49	1.86	56 -	2,850	28 -	180
trans-1,2-Dichloroethene	97	6,300	1.25	2.7E+02 (20 °C)	6.74E-03	0.09980	59	2.09	56 -	2,850	28 -	180
Ethylbenzene	106	152 - 208	0.87	9.5E+00	8.68E-03	0.06667	95 - 260	3.05 - 3.15	6 -	228	3 -	10
Methylene chloride	85	13,000 - 16,700	1.32	4.4E+02 - 4.6E+02	2.69E-03	0.08500	8.7	1.25 - 1.30	14 -	56	7 -	28
Tetrachloroethene	166	150 - 485	1.6	1.9E+01	2.87E-03	0.07404	210 - 363	2.1 - 2.88	360 -	730	180 -	365
Trichloroethene	131	1,100 - 1,500	1.46	7.3E+01	9.90E-03	0.08116	65 -126	2.29 - 3.30	321 -	1,643	180 -	365
Vinyl chloride	63	1,100 - 2,700	0.91	2.7E+03	5.60E-02	0.10726	2.5	0.60	56 -	2,850	28 -	180
Xylenes (total)	106	162 - 200	0.87	6.6E+00 - 8.8E+00	6.30E-03	0.07164	128 - 1,580	2.77 - 3.20	14 -	360	7 -	28
Semi-VOCs												
Benzo(a)anthracene	228	0.0094 - 0.014	1.27	1.1E-07	8.00E-06	0.04564	1,400,000	5.61 - 5.91	204 -	1,361	102 -	679
Benzo(b)fluoranthene	252	0.0012	ND	5.0E-07	1.20E-05	0.04392	550,000	6.57	719.1 -	1,219	360 -	610
Benzo(k)fluoranthene	252	0.00055	ND	9.6E-11	1.04E-03	0.04392	4,400,000	6.85	1,821 -	4,271	909 -	2,139
Benzo(a)pyrene	252	0.0038 - 0.004	1.35	5.5E-09	2.40E-06	0.04653	398,000 - 1,900,000	5.81 - 6.50	114 -	1,059	57 -	529
Chrysene	228	0.0018 - 0.006	1.27	6.3E-09	3.15E-07	0.04531	240,000	5.60 - 5.91	744.6 -	2,000	372 -	993
Dibenzo(a,h)anthracene	278	0.00249 - 0.005	1.28	10E-10 (20 °C)	7.33E-09	0.05707	1,700,000	5.97 - 6.50	722.7 -	1,880	361 -	942
1,2-Dichlorobenzene	147	92.7 - 156	1.3	1.5E+00	2.40E-03	0.07113	180 - 1,700	3.38 - 3.55	56 -	360	28 -	180
1,4-Dichlorobenzene	147	65.3 - 90.6	1.25	4.0E-01	4.45E-03	0.07134	158	3.37 - 3.62	56 -	360	28 -	180
2,4-Dimethylphenol	122	7,868	0.96	9.8E-02	6.55E-06	0.06938	117	2.4	2 -	14	1 -	7
Indeno(1,2,3-c,d)pyrene	276	0.062	ND	1.0E-09	2.96E-20	0.05728	31,000,000	5.91 - 7.70	1,201 -	1,460	599 -	730
2-Methylnaphthalene	142	25	1.00	4.5E-02	3.36E-04	0.06196	7,400 - 8,500	3.86 - 4.11	ND		ND	
Naphthalene	128	30 - 34	1.16	2.3E-01 - 8.7E-01	4.60E-04	0.08205	550 - 3,160	3.2 - 4.7	1 -	258	16.6 -	48
N-Nitrosodiphenylamine	198	35.1	ND	1.0E-01	2.33E-08	0.06710	575	3.13	20 -	68	10 -	34
Pentachlorophenol	266	20 - 25	1.98	1.7E-05	3.40E-06	0.05528	891	5.01 - 5.86	46 -	1533	23 -	178
Pyrene	202	0.013 - 0.171	1.27	6.85E-07 - 2.5E-06	1.10E-05	0.05039	46,000 - 135,000	4.88 - 5.32	420 -	3,796	210 -	1,898
Pesticides												
alpha-BHC	291	2.0	1.87	2.5E-05 (20 °C)	5.30E-06	0.05198	1,901	3.46 - 3.89	13.8 -	270	13.8 -	135
4,4'-DDD	320	0.02 - 0.16	1.48	1.02E-6 (30 °C)	2.16E-05	0.04742	44,000 - 80,500	5.99	70 -	11,425	730 -	5,694
4,4'-DDT	354	0.0012 - 0.26	1.56	1.9E-07	5.20E-05	0.04467	140,000 - 1,800,000	4.89 - 6.44	16 -	11,425	2 -	5,694
Dieldrin	381	0.195	1.75	1.8E-07	5.80E-05	0.04875	12,000 - 35,000	3.69 - 5.48	1 -	2,190	175 -	1,095

References: Hazardous Substances Databank, 1993; Howard et al., 1991; Howard, 1990 and 1989; Lugg, 1968; Lyman et al., 1990; Montgomery and Welkom, 1990; Shen, 1982; and Verschueren, 1983.

atm-m³/mol	Atmospheres-cubic meters per mole.	mg/L	Milligrams per liter.
°C	Degrees Celsius.	mL/g	Milliliters per gram.
cm²/sec	Square centimeters per second.	mm Hg	Millimeters of mercury.
g/mol	Grams per mole.	ND	No data.
Koc	Organic carbon partition coefficient.	T ½	Half-life.
Kow	Octanol-water partition coefficient.		

Table 7-1. Summary of RI Analytical Findings and NAPL Observations by Area, Bayonne Plant, Bayonne, New Jersey.

Area	Soil Surface (0- to 2-feet below grade) Exceedances [1]	Subsurface (greater than 2-feet below grade) Exceedances [1]	NAPL * Plume No. (see Table 5-10)	Groundwater [2] ** Exceedances [b]
Piers and East Side Treatment Plant Area, and MDC Building Area	NA	TPH	1, 2, 3	VOC: 2-Butanone, Benzene, Bromodichloromethane, Chlorobenzene, Chloroform, Xylenes (total); Al, Be, Cd, Co, Cr Fe, Mn, Na, Ni, Sb, V, Cl, SO4
Low Sulfur and Solvent Tank Fields	TPH, As, Cu	TPH, SVOC: Benzo(a)pyrene, Naphthalene	4	TPH, VOC: Benzene, Ethylbenzene, Xylenes (total), 1,2-Dichloroethene (total), Vinyl chloride; SVOC: 2,4-Dimethylphenol, 2-Methylnaphthalene, naphthalene; Al, As, Be, Cd, Co, Cr, Fe, Mn, Na, Pb, V, Cl
General Tank Field	TPH, SVOC: Benzo(a)pyrene; As, Be, Cu, Pb, Zn,	TPH, VOC: Xylenes (Total), SVOC: Benzo(a)pyrene; As, Cu, Pb, Zn	5, 6	TPH, VOC: Benzene; Al, Fe, Mn, Na, Cl
AV-Gas Tank Field and Domestic Trade Area(Includes Southern Part of Interceptor Trench)	TPH, SVOC: Dibenz(a,h)anthracene Benzo(a)pyrene; As, Be, Pb	TPH, SVOC: Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene; As, Pb, Tl	7	TPH, Mn, Na
Asphalt Plant and Chemicals Plant (includes Utility Area)	TPH, SVOC: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene; As, Cu	TPH, VOC: Chlorobenzene, Xylenes (Total); SVOC: Benzo(a)pyrene, Dibenz(a,h)anthracene, 1,2-Dichlorobenzene, 1,4-Dichlorobenzene, Naphthalene; As, Pb, Tl	8, 9	TPH, VOC: Benzene, Chlorobenzene, Chloroform; SVOC: 1,4-Dichlorobenzene, Naphthalene; As, Fe, Mn, Na, Cl, SO4
No. 3 Tank Field	TPH, VOC: Benzene, Chlorobenzene, Xylenes (total); SVOC: Benzo(a)pyrene, Dibenz(a,h)anthracene, n-Nitrosodiphenylamine, As, Be, Pb, Cr^{+6}	TPH, VOC: Chlorobenzene, Benzo(a)anthracene; SVOC: Benzo(a)pyrene; As, Cu, Ni	10	TPH, VOC: Benzene, Chlorobenzene; Pest/PCB: 4,4'-DDT As, Cr, Fe, Mn, Na

See last page for footnotes.

Table 7-1. Summary of RI Analytical Findings and NAPL Observations by Area, Bayonne Plant, Bayonne, New Jersey.

Area	Soil Surface (0- to 2-feet below grade) Exceedances [1]	Subsurface (greater than 2-feet below grade) Exceedances [1]	NAPL * Plume No. (see Table 5-10)	Groundwater [2] ** Exceedances [b]
No. 2 Tank Field and Main Building Area (Includes Northern Part of Interceptor Trench)	TPH, As	TPH, VOC: Xylenes (Total); SVOC: Benzo(a)anthracene, Benzo(a)pyrene, Dibenzo(a,h)anthracene; As, Cu, Pb, Tl, Cr^{+6}	11, 12	TPH, VOC: Benzene, Xylenes (total), Methylene chloride; SVOC: 2-Methylnaphthalene, Naphthalene; Al, As, Fe, Na, V
"A"-Hill Tank Field	TPH, As	TPH, As	13	TPH, Pb, Mn
Lube Oil Area and Stockpile Area (Includes Platty Kill)	TPH, SVOC: Dibenz(a,h)anthracene, Benzo(a)pyrene; Pest/PCB, As, Pb	TPH, SVOC: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(l)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene, Pyrene; As, Pb, Tl	14, 15, 16	TPH, VOC: Benzene, Bromodichloromethane, Chloroform; As, Fe, Mn, Na, Cl, SO4
Pier No. 1 Area (Includes Helipad)	NA	TPH, SVOC: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(a)fluoranthene, Benzo(k)fluoranthene, Dibenz(a,h)anthracene; As	17	TPH, VOC: 1,2-Dichloroethene (total), Acetone, Benzene, Tetrachloroethene, Trichloroethene, Vinyl chloride; SVOC: Pentachlorophenol; Pest/PCB: alpha-BHC; Al, Fe, Mn, Na, SO^4

See last page for footnotes.

Table 7-1. Summary of RI Analytical Findings and NAPL Observations by Area, Bayonne Plant, Bayonne, New Jersey.

ft	Feet.
*	NAPL plumes as enumerated on Figure 5-5.
**	Metal exceedances are for dissolved metals only.
NAPL	Non-aqueous phase liquid.
1	Soil constituents listed are detected in concentrations either above the NJDEP non-residential direct contact soil cleanup criteria or impact to groundwater criteria.
2	Groundwater constituents listed are detected in concentrations either above the New Jersey Department of Environmental Protection (NJDEP) groundwater quality standards or above the interim generic groundwater quality criteria (IGGWQC) established for the Bayway Refinery.
TPH	Total petroleum hydrocarbons - detected in soil by Method 418.10 (NJ modified) above 10,000 mg/kg) or in groundwater above 1 mg/L.
NA	Area not analyzed during the RI; these areas have undergone extensive IRM investigations.
Al	Aluminium
As	Arsenic
Be	Berylium
Cd	Cadmium
Co	Cobalt
Cr	Chromium
Cu	Coper
Fe	Iron
Mn	Manganese
Na	Sodium
Ni	Nickel
Pb	Lead
Tl	Thallium
V	Vanadium
Cl	Chlorides
SO_4	Sulfate
Cr_{+6}	Hexavalent Chromium
VOC	Volatile Organic Compound
SVOC	Semivolatile Organic Compound
Pest/PCB	Pesticide and Polychlorinated Biphenyl