Table 1-1
USEPA QA/R-5 Elements and Newark Bay Study Area RIWP
Cross-Reference Table

QA/R-5 Element		RIWP Corresponding Location	Page Number
1.0	Title & Approval Page	Inside front cover of Volumes 1, 2, and 3 (Approval page not provided in Volume 1)	--
2.0	Table of Contents	Front portion of Volumes 1, 2, and 3	i
3.0	Distribution List	Inside front cover of Volumes 1, 2, and 3	--
4.0	Project/Task Organization	Section 5 of Volume 2	5-1
5.0	Problem Definition/Background	Sections 1 and 2 of Volume 2	1-1, 2-1
6.0	Project/Task Description	Sections 4 and 6 of Volume 2	4-1, 6-1
7.0	Quality Objectives Criteria	Section 5 of Volume 2	5-4
8.0	Special Training/Certification	Section 5 of Volume 2 Section 8 of Volume 3	5-11 8-1
9.0	Documents & Records	Section 5 of Volume 2	5-12
10.0	Sampling Process Design	Section 6 of Volume 2	6-3
11.0	Sampling Methods	Section 6 of Volume 2	6-22
12.0	Sample Handling & Custody	Section 6 of Volume 2	6-26
13.0	Analytical Methods	Section 6 of Volume 2	6-30
14.0	Quality Control	Section 6 of Volume 2	6-40
15.0	Instrument/Equipment, Inspection, and Maintenance	Section 6 of Volume 2	6-45
16.0	Instrument/Equipment Calibration and Frequency	Section 6 of Volume 2	6-45
17.0	Inspection/Acceptance of Supplies and Consumables	Section 6 of Volume 2	6-48
18.0	Non-Direct Measurements	Section 6 of Volume 2	6-48
19.0	Data Management	Section 6 of Volume 2	6-48

Table 1-1 (cont'd)
USEPA QA/R-5 Elements and Newark Bay Study Area RIWP
Cross-Reference Table

QA/R-5 Element		RIWP Corresponding Location	Page Number
20.0	Assessments and Response Actions	Section 7 of Volume 2	7-1
21.0	Reports to Management	Section 6 of Volume 2	6-48
22.0	Data Review, Verification and Validation	Section 8 of Volume 2	8-1
23.0	Verification and Validation Methods	Section 8 of Volume 2	8-1
24.0	Reconciliation with User Requirements	Section 8 of Volume 2	8-6

Table 1-2
AOC Elements and Newark Bay Study Area RIWP Cross-Reference Table

AOC Element	RIWP Corresponding Location	Page Number
Inventory and Overview Report	Volume 1	--
Investigation Work Plan (IWP)		
1. Distribution of Constituents In Sediments		
a. Coring locations and sampling depths	Section 6 of Volume 2	6-8
b. Chemistry and Radiodating	Section 6 of Volume 2	6-6
2. Human and Ecological Risk Assessment	Section 4 of Volume 2	4-15
3. Direct and Indirect Source Identification		
a. Fate/Transport Model	Section 4 of Volume 2	4-11
b. Storm Water/CSO Characterization	Section 4 of Volume 2	4-17
Sampling and Analysis Plan (SAP)		
1. Sampling Location Maps	Section 6 of Volume 2	6-8
2. Sampling Methods	Section 6 of Volume 2	6-22
3. Sampling Frequency	Section 6 of Volume 2	6-5
4. Analytical Methods	Section 6 of Volume 2	6-30
5. Data Usefulness	Section 8 of Volume 2	8-6
6. Milestones	Section 10 of Volume 2	10-1
Site Management Plan (SMP)		
1. Contractor/Subcontractor Identification	Section 5 of Volume 2	5-2
2. Listing of Key Employees/Responsibilities	Section 5 of Volume 2	5-2
Quality Assurance Project Plan (QAPP)		
1. Project Description	Sections 4 and 6 of Volume 2	4-1, 6-1
2. Project Organization and Responsibility	Section 5 of Volume 2	5-1
3. Quality Assurance Objectives	Section 5 of Volume 2	5-4
4. Sampling Procedures	Section 6 of Volume 2	6-22
5. Sample Custody	Section 6 of Volume 2	6-26
6. Calibration Procedures and Frequency	Section 6 of Volume 2	6-45
7. Analytical Procedures	Section 6 of Volume 2	6-30
8. Data Reduction, Validation, and Reporting	Section 8 of Volume 2	8-1
9. Internal Quality Control Checks	Section 6 of Volume 2	6-40
10. Performance and Systems Audits	Section 7 of Volume 2	7-1
11. Preventive Maintenance	Section 6 of Volume 2	6-45
12. Procedures Used to Assess Data Precision, Accuracy and Completeness	Section 5 of Volume 2	5-6
13. Corrective Action	Section 7 of Volume 2	7-5
14. Quality Assurance Reports to Management	Section 6 of Volume 2	6-48

Table 1-2 (cont'd)
AOC Elements and Newark Bay Study Area RIWP
Cross-Reference Table

AOC Element	RIWP Corresponding Location	Page Number
Health and Safety/Contingency Plan (HASCP)		
1. Known hazards and evaluation of the risks	Section 3 of Volume 3	3-1
2. Key personnel responsible for safety	Section 2 of Volume 3	2-1
3. Operations and governmental notification/coordination	Section 9 of Volume 3	9-1
4. Levels of protection	Section 5 of Volume 3	5-1
5. Decontamination procedures for personnel and equipment	Section 7 of Volume 3	7-3
6. Incident emergency procedures	Section 9 of Volume 3	9-1
7. Medical Surveillance Programs	Section 8 of Volume 3	8-3
8. Monitoring for personnel safety	Section 6 of Volume 3	6-1
9. Routine and special personnel training programs	Section 8 of Volume 3	8-1

Table 2-1
Current Dredging Conditions of Waterways Within or Adjacent to Newark Bay

Channel	Length (miles)	Width (ft)	Depth (ft MLW)	Year last Dredged	Current and Future Work
Arthur Kill	13.2	500-800	35/40/41	2005	Dredging is currently ongoing in the Arthur Kill as part of the Arthur Kill Channel and Howland Hook Marine Terminal Deepening Project. Contract Area 1 is scheduled for completion in October 2005 and work began March 31, 2005 on Contract Area 2/3. These areas will also be dredged to 50 ft as part of contract areas S-AK-1, S-AK-2, and S-AK-3 of the NY and NJ Harbor Deepening Projec with anticipated construction start dates of September 2006, January 2008, and January 2009, respectively.
Kill van Kull	5.3	800-2,000	45/50	2004/2005	Dredging was completed for the Kill van Kull & Newark Bay Channels 45 ft Deepening Project in December 2004. Contract Area 4b is currently being dredged to 50 ft as part of contract area S-KVK-2 of the NY and NJ Harbor Deepening Project. Work began in April 2005 for this project.
Newark Bay South	3.1	800-2,200	40/45	2004	Dredging was completed for the Kill van Kull & Newark Bay Channels 45 ft Deepening Project in December 2004. In addition, as part of consolidation efforts with the NY and NJ Harbor Deepening Project, Contract Area 5 was dredged to 50 feet below MLW. The remaining area will also be dredged to 50 ft as part of contract areas S-NB-1 and S-NB-2 of the NY and NJ Harbor Deepening Project with anticipated construction start dates of October 2005 and June 2009, respectively.
Newark Bay North	1.5	500-1,000	35	1989	No dredging is currently ongoing in the Newark Bay North Channel and no projects have been announced for the foreseeable future.
Elizabeth Channel	1.7	290-800	40/45	2004/2005	Dredging is ongoing in berths of the Elizabeth Channel. This area encompasses 100 berths and 7 linear miles of wharf. The PA NY/NJ conducts maintenance dredging on an as-needed-basis within this channel. This area will also be dredged to 50 ft as part of contract area S-E-1 of the NY and NJ Harbor Deepening Project with an anticipated construction start date of April 2011.
Port Newark Channel	1.3	290-800	40	2002	No dredging is currently ongoing in Port Newark Channel and no projects have been announced for the foreseeable future.
Passaic River - Kearny Point Reach	1.2	300	30	1983	No dredging is currently ongoing in the Passaic River and no projects have been announced for the foreseeable future.
Hackensack River - Droyers Point Reach	4.2	300-800	22/25	1986	No dredging is currently ongoing in the Hackensack River and no projects have been announced for the foreseeable future.

Notes:
Length, width, and depth measurements are approximate.
cy = cubic yards
ft = feet
MLW = mean low water
PA NY/NJ = Port Authority of New York and New Jersey

Sources: Iannuzzi et al. 2002; PA NY/NJ 2004; USACE 2004a; and personal communication with PA NY/NJ and USACE.

Table 2-2
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
Newark Bay					
2004 - 2011	USACE/PA NY/NJ	NY & NJ Harbor 50' Deepening Project	50	Undetermined[a]	HARS
4/02 - 12/04	USACE/PA NY/NJ	Newark Bay 45-foot Deepening Project Area 5: Bergen Point	50	2,124,000[b]	Fishing Reef/HARS
10/02 - 12/04	USACE/PA NY/NJ	Newark Bay 45-foot Deepening Project Area 6: Upper Portion of Main Channel	47	2,124,000[b]	Landfill Closure/HARS
7/03 - 12/04	USACE/PA NY/NJ	Newark Bay 45-foot Deepening Project Area 8: Lower Portion of Main Channel	47	2,124,000[b]	N/A
1999	PA NY/NJ	Auto Marine Terminals	N/A	36,000	Newark Bay CDF
1997	USACE	Newark Bay Main Channel	N/A	N/A	Upland
1997	USACE	Raritan Bay Reach	N/A	N/A	Open Water
3/90	USACE	Federal Navigation Channel	N/A	10,200	N/A
2/90	USACE	Federal Navigation Channel	N/A	57,200	N/A
1/90	USACE	Federal Navigation Channel	N/A	230,900	N/A
1/90	USACE	Federal Navigation Channel	N/A	10,000	N/A
12/89	USACE	Federal Navigation Channel	N/A	138,500	N/A
12/89	USACE	Federal Navigation Channel	N/A	25,900	N/A
11/89	USACE	Federal Navigation Channel	N/A	102,800	N/A
11/89	USACE	Federal Navigation Channel	N/A	110,200	N/A
10/89	USACE	Federal Navigation Channel	N/A	302,600	N/A
10/89	USACE	Federal Navigation Channel	N/A	57,600	N/A
9/89	USACE	Federal Navigation Channel	N/A	155,900	N/A
8/89	USACE	Federal Navigation Channel	N/A	122,000	N/A
8/89	USACE	Federal Navigation Channel	N/A	118,400	N/A
8/89	USACE	Federal Navigation Channel	N/A	24,300	N/A
8/89	USACE	Federal Navigation Channel	N/A	31,500	N/A
7/89	USACE	Federal Navigation Channel	N/A	229,000	N/A
7/89	USACE	Federal Navigation Channel	N/A	63,900	N/A
7/89	USACE	Federal Navigation Channel	N/A	292,300	N/A
7/89	USACE	Federal Navigation Channel	N/A	76,800	N/A
6/89	USACE	Federal Navigation Channel	N/A	259,200	N/A
6/89	USACE	Federal Navigation Channel	N/A	45,200	N/A
6/89	USACE	Federal Navigation Channel	N/A	224,000	N/A
6/89	USACE	Federal Navigation Channel	N/A	337,600	N/A
5/89	USACE	Federal Navigation Channel	N/A	111,400	N/A
5/89	USACE	Federal Navigation Channel	N/A	147,200	N/A
5/89	USACE	Federal Navigation Channel	N/A	149,100	N/A
5/89	USACE	Federal Navigation Channel	N/A	23,900	N/A
5/89	USACE	Federal Navigation Channel	N/A	96,100	N/A
5/89	USACE	Federal Navigation Channel	N/A	116,800	N/A
5/89	USACE	Federal Navigation Channel	N/A	21,800	N/A
5/89	USACE	Federal Navigation Channel	N/A	137,600	N/A
5/89	USACE	Federal Navigation Channel	N/A	184,200	N/A
4/89	USACE	Federal Navigation Channel	N/A	50,600	N/A
4/89	USACE	Federal Navigation Channel	N/A	306,400	N/A
4/89	USACE	Federal Navigation Channel	N/A	323,600	N/A

Table 2-2 (cont'd)
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
4/89	USACE	Federal Navigation Channel	N/A	204,400	N/A
3/89	USACE	Federal Navigation Channel	N/A	40,300	N/A
3/89	USACE	Federal Navigation Channel	N/A	481,000	N/A
3/89	USACE	Federal Navigation Channel	N/A	246,700	N/A
3/89	USACE	Federal Navigation Channel	N/A	25,300	N/A
3/89	USACE	Upper Newark Bay	N/A	150,500	N/A
2/89	USACE	Upper Newark Bay	N/A	214,100	N/A
2/89	USACE	Upper Newark Bay	N/A	382,200	N/A
2/89	USACE	Federal Navigation Channel	N/A	151,100	N/A
2/89	USACE	Federal Navigation Channel	N/A	26,500	N/A
1/89	USACE	Federal Navigation Channel	N/A	180,200	N/A
1/89	USACE	Federal Navigation Channel	N/A	12,000	N/A
1/89	USACE	Upper Newark Bay	N/A	160,000	N/A
1/89	USACE	Upper Newark Bay	N/A	410,000	N/A
12/88	USACE	Upper Newark Bay	N/A	123,400	N/A
12/88	USACE	Upper Newark Bay	N/A	174,700	N/A
12/88	USACE	Upper Newark Bay	N/A	349,800	N/A
12/88	USACE	Upper Newark Bay	N/A	55,600	N/A
11/88	USACE	Upper Newark Bay	N/A	226,100	N/A
11/88	USACE	Upper Newark Bay	N/A	311,400	N/A
10/88	USACE	Federal Navigation Channel	N/A	599,400	N/A
9/88	USACE	Federal Navigation Channel	N/A	406,400	N/A
8/88	USACE	Federal Navigation Channel	N/A	403,800	N/A
7/88	USACE	Federal Navigation Channel	N/A	410,600	N/A
6/88	USACE	Federal Navigation Channel	N/A	110,800	N/A
10/87	USACE	Federal Navigation Channel	N/A	149,700	N/A
10/87	USACE	Federal Navigation Channel	N/A	3,700	N/A
12/84	USACE	Federal Navigation Channel	N/A	3,600	N/A
11/84	USACE	Federal Navigation Channel	N/A	7,200	N/A
10/84	USACE	Federal Navigation Channel	N/A	180,800	N/A
9/84	USACE	Federal Navigation Channel	N/A	487,800	N/A
8/84 - 11/84	PA NY/NJ	Main Channel and Port Elizabeth Branch Channel	35	N/A	N/A
8/84	USACE	Federal Navigation Channel	N/A	198,000	N/A
8/84	USACE	North Channel Reach	N/A	198,000	N/A
4/84	USACE	South Shooters Island Channel	N/A	32,400	N/A
3/84	USACE	South Shooters Island Channel	N/A	255,000	N/A
2/84	USACE	South Shooters Island Channel	N/A	194,400	N/A
1984	USACE	Entrance Channel	N/A	N/A	Upland
1983	USACE	South of Shooters Island	N/A	N/A	Mud Dump
7/82 - 11/83	PA NY/NJ	Main Channel and Port Elizabeth Branch Channel	35	N/A	N/A
7/82 - 11/82	USACE	Federal Navigation Channel	N/A	552,800	N/A
7/82 - 8/82	PA NY/NJ	Main Channel and Port Elizabeth Channel	35	N/A	N/A
6/82 - 7/82	Atlantic Richfield Co.	Atlantic Richfield Co. (ARCO) Facility	N/A	41,800	N/A
4/79 - 10/79	PA NY/NJ	Main Channel and Port Newark Branch Channel	35	732,300	N/A

Table 2-2 (cont'd)
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
1/79 - 7/79	USACE	South Shooters Island Channel	N/A	18,000	N/A
5/78 - 11/78	USACE	South Shooters Island Channel	N/A	78,600	N/A
1977	USACE	South of Shooters Island	N/A	N/A	Mud Dump/One Man Stone Dumping Ground
10/76 - 12/76	Texaco, Inc.	Texaco, Inc. Facility	N/A	44,000	N/A
8/76 - 12/76	USACE	South Shooters Island Channel	N/A	197,000	N/A
7/76	USACE	North Channel Reach	N/A	72,400	N/A
1/76 - 11/76	USACE	South Shooters Island Channel	N/A	116,500	N/A
8/76 - 10/77	USACE	South of Shooters Island Reach	35	N/A	N/A
6/76 - 7/76	USACE	North of C.R.R. NJ Railroad Bridge	35	66,500	N/A
4/74 - 5/74	USACE	North Reach Channel of Newark Bay	35	455,500	N/A
1974	USACE	North of Shooters Island	N/A	N/A	Open Water
12/72 - 9/73	USACE	Main Channel Newark Bay (Contract #7)	35	1,664,100	N/A
11/71 - 9/72	USACE	North of C.R.R. NJ Railroad Bridge (Contract #4)	35	804,200	N/A
6/72 - 3/73	USACE	Contract #5	35	13,000	N/A
5/72 - 2/73	USACE	Contract #6	35	889,500	N/A
11/71 - 4/72	USACE	South of C.R.R. NJ Railroad Bridge (Contract #2)	38	845,800	N/A
7/70 - 4/71	USACE	North of C.R.R. NJ Railroad Bridge (Contract #3)	35	N/A	N/A
3/70 - 2/71	USACE	South of C.R.R. NJ Railroad Bridge (Contract #1)	35/38	812,800	N/A
1970	USACE	North of Shooters Island	N/A	N/A	Open Water
1965	USACE	Newark Bay	N/A	N/A	Upland
8/64 - 5/65	USACE	North Reach Channel Newark Bay	32	488,200	N/A
4/64 - 6/64	USACE	North Reach Channel Newark Bay	32	N/A	N/A
1963	USACE	North of Shooters Island	N/A	N/A	Open Water
1958	USACE	Rock Area Sec 4	N/A	N/A	Open Water
1953	USACE	Newark Bay	N/A	N/A	Upland Public Dumping Ground
1952	USACE	South of Shooters Island	N/A	N/A	Upland Public Dumping Ground
1952	USACE	Bergen Point Rock	37	33,800 (sediment); 92,900 (rock)	N/A
3/52 - 7/52	USACE	C.R.R. NJ to Railroad Bridge Port Newark	35	256,400	N/A
4/51 - 4/52	USACE	Vicinity of Bergen Point	37	81,300 (rock)	N/A
3/51 - 8/51	USACE	Main Channel Newark Bay	35	1,282,000	N/A
7/50 - 2/51	USACE	Northerly 1,900 ft Main Channel and Branch Inshore Channel	35	2,034,900	N/A
6/50	USACE	Northerly 1,900 ft Main Channel and Branch Inshore Channel	35	131,700	N/A
1945	USACE	Newark Bay	N/A	N/A	Upland Public Dumping Ground
1944	USACE	South of Shooters Island	N/A	N/A	Upland Public Dumping Ground
Port Newark Channel					
12/02	PA NY/NJ	Port Newark Channels	40	55,000	N/A
5/99-6/99	PA NY/NJ	Port Newark Channel (Reach A)	N/A	200,000	Newark Bay CDF
6/98	PA NY/NJ	Port Newark Channel (Reach A)	N/A	N/A	N/A
1996/1997	PA NY/NJ	Reach A in Newark Bay	N/A	N/A	N/A
2/90	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	38,400	N/A
1/90	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	68,000	N/A
10/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	89,600	N/A
9/89	USACE	Port Newark Channel	N/A	21,000	N/A

Table 2-2 (cont'd)
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
9/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	6,400	N/A
6/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	158,600	N/A
4/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	16,000	N/A
3/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	3,200	N/A
12/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	6,400	N/A
12/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	12,000	N/A
10/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	20,400	N/A
7/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	45,400	N/A
6/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	118,400	N/A
4/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	21,000	N/A
3/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	2,200	N/A
2/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	42,000	N/A
1/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	82,800	N/A
1/88	USACE	Port Newark Channel	N/A	21,000	N/A
12/87	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	13,200	N/A
11/87	USACE	Port Newark Channel	N/A	16,500	N/A
9/87	USACE	Port Newark Channel	N/A	85,800	N/A
5/87	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	74,300	N/A
4/87	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	47,600	N/A
9/86	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	20,400	N/A
8/86	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	50,400	N/A
5/86	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	117,200	N/A
9/85	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	43,200	N/A
8/85	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	104,400	N/A
9/84	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	3,000	N/A
6/84	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	18,800	N/A
5/84	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	82,800	N/A
9/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	109,500	N/A
8/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	36,000	N/A
5/83 - 11/84	PA NY/NJ	Port Newark Inshore Channel & Port Newark Pierhead Channel	35	365,500	N/A
5/83 - 7/83	USACE	Port Newark Channel	N/A	468,400	N/A
3/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	7,200	N/A
2/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	3,600	N/A
1/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	7,200	N/A
8/82 - 11/82	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	180,000	N/A
5/81 - 7/81	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	111,600	N/A
4/80 - 5/80	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	97,200	N/A
4/79 - 12/79	USACE	Port Newark Channel	N/A	880,000	N/A
11/78 - 12/78	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	155,000	N/A
2/78	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	80,100	N/A
2/78 - 3/78	USACE	Port Newark Channel	N/A	287,000	N/A
3/78	PA NY/NJ	Port Newark Pierhead Channel	35	247,200	N/A
1/74 - 5/74	PA NY/NJ	Port Newark Branch Channel	35	314,300	N/A
1974	PA NY/NJ	Port Newark Inshore and Branch Channels	35	714,000	N/A

Table 2-2 (cont'd)
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
12/71 - 2/72	PA NY/NJ	Port Newark Branch and Inshore Channels	35	174,600	N/A
12/71 - 2/72	PA NY/NJ	Port Newark Branch Channel	35	N/A	N/A
10/68 - 1/69	PA NY/NJ	Port Newark Branch and Inshore Channels	35	362,800	N/A
11/64	PA NY/NJ	Port Newark Inshore Channel	35	92,200	N/A
1964	PA NY/NJ	Port Newark Inshore Channel	35	12,900	N/A
11/62 - 5/63	PA NY/NJ	Port Newark Inshore Channel	35	101,400	N/A
1/62 - 3/62	PA NY/NJ	Port Newark Branch Channel	35	232,300	N/A
3/56	PA NY/NJ	Port Newark Branch and Inshore Channels	35	198,700	N/A
4/53 - 6/53	PA NY/NJ	Port Newark Inshore Channel	30/35	215,000	N/A
1/51 - 4/51	PA NY/NJ	Port Newark Inshore Channel Rock Area	37	55,800	N/A
Elizabeth Channel/Elizabeth Marine Terminal					
2004 - 2011	USACE/PA NY/NJ	NY & NJ Harbor 50 ft Deepening Project	50	Undetermined[a]	HARS
2003	USACE/PA NY/NJ	Newark Bay 45 ft Deepening Project Area 7: Port Elizabeth Channel	45	2,124,000[b]	N/A
2003	PA NY/NJ	Reaches B, C, D in Newark Bay	50	173,000	N/A
10/02 - 2/03	PA NY/NJ	Reaches B, C, D in Newark Bay	45	49,000	N/A
10/01 - 6/02	USACE	Newark Bay, Port Elizabeth Pierhead Channel	45 to 50	147,000 (clay); 33,000 (maint. material)	Newark Bay CDF/HARS
2002	PA NY/NJ	Reaches B, C, D in Newark Bay	45	50,000 (sediment); 100,000 (red clay)	Landfill Closure/HARS
7/01	PA NY/NJ	Reaches B, C, D in Newark Bay	45	250,000	Upland Disposal/Newark Bay CDF
1999	PA NY/NJ	Reaches B, C, D in Newark Bay	N/A	N/A	CDF
6/1998	PA NY/NJ	Elizabeth Channel	N/A	N/A	N/A
1997	PA NY/NJ	Reaches B, C, D in Newark Bay	N/A	N/A	N/A
2/90	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	38,400	N/A
1/90	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	68,000	N/A
10/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	89,600	N/A
9/89	USACE	Elizabeth Channel	N/A	30,000	N/A
9/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	6,400	N/A
6/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	158,600	N/A
4/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	16,000	N/A
3/89	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	3,200	N/A
12/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	6,400	N/A
12/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	12,000	N/A
10/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	20,400	N/A
7/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	45,400	N/A
6/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	118,400	N/A
4/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	21,000	N/A
3/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	2,200	N/A
2/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	42,000	N/A
1/88	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	82,800	N/A
12/87	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	13,200	N/A
11/87	USACE	Elizabeth Channel	N/A	72,400	N/A
10/87	USACE	Elizabeth Channel	N/A	44,500	N/A
10/87	USACE	Elizabeth Channel	N/A	65,800	N/A
5/87	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	74,300	N/A

Table 2-2 (cont'd)
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
4/87	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	47,600	N/A
9/86	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	20,400	N/A
8/86	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	50,400	N/A
5/86	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	117,200	N/A
9/85	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	43,200	N/A
8/85	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	104,400	N/A
9/84	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	3,000	N/A
8/84 - 11/84	USACE	Main Channel and Elizabeth Branch Channel	35	N/A	N/A
6/84	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	18,800	N/A
5/84	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	82,800	N/A
9/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	109,500	N/A
8/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	36,000	N/A
3/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	7,200	N/A
2/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	3,600	N/A
1/83	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	7,200	N/A
8/82 - 11/82	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	180,000	N/A
7/82 - 8/82	USACE	Main Channel and Elizabeth Channel	35	N/A	N/A
7/82 - 11/83	USACE	Main Channel and Elizabeth Branch Channel	35	N/A	N/A
5/81 - 7/81	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	111,600	N/A
4/80 - 5/80	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	97,200	N/A
4/79 - 10/79	USACE	Main Channel and Port Newark Branch Channel	35	732,300	N/A
11/78 - 12/78	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	155,000	N/A
2/78	PA NY/NJ	Port Newark and Elizabeth Marine Terminal	N/A	80,100	N/A
12/77 - 1/78	USACE	Elizabeth Channel	N/A	534,400	N/A
12/77 - 1/78	USACE	Elizabeth Channel	35	313,400	N/A
7/73 - 9/73	USACE	Elizabeth Branch Channel and Inshore Channel	35	216,100	N/A
Kill van Kull					
10/04-10/06	USACE/PA NY/NJ	NY & NJ Harbor 50 ft Deepening Project	50	ongoing[a]	HARS/Upland Disposal
2004-2011	USACE/PA NY/NJ	Newark Bay 45 ft Deepening Project Area 4b: Adjacent to Staten Island	50	ongoing	N/A
2003	USACE/PA NY/NJ	Newark Bay 45 ft Deepening Project Area 3: Length of Kill van Kull	45	2,124,000[b]	HARS
2003	USACE/PA NY/NJ	Newark Bay 45 ft Deepening Project Area 4a: Adjacent to Staten Island	45	2,124,000[b]	Artificial Reef Site/HARS
2003	USACE	Kill van Kull Area 8	N/A	N/A	Axel Carlson/HARS/CDF/Upland OENJ
2002	USACE	NY Harbor Kill van Kull Contract 5 Area 6	N/A	N/A	HARS
2002	USACE	NY Harbor Kill van Kull Contract 5 Area 5	N/A	N/A	HARS
2001	USACE	Kill van Kull NY/NJ Channels Area 3	N/A	N/A	HARS
2000	USACE	Kill van Kull & Newark Bay Area 7	N/A	N/A	Open Water
2000	USACE	Kill van Kull & Newark Bay Area 4A	N/A	N/A	Open Water
1999	USACE	Kill van Kull NY/NJ Channels Area 2	N/A	N/A	Open Water
1999	USACE	Kill van Kull NY/NJ Channels Area 1	N/A	N/A	Open Water
1994	USACE	Kill van Kull 4C	N/A	N/A	Open Water
1993	USACE	Kill van Kull 4B	N/A	N/A	Open Water
1991	USACE	Kill van Kull 4A	N/A	N/A	Open Water
6/76	USACE	Junctionc of Kill van Kull (Triangle Turning Basin)	35	244,200 (sediment); 34,500 (rock)	N/A

Table 2-2 (cont'd)
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
Arthur Kill					
2009 - 2011	USACE/PA NY/NJ	NY & NJ Harbor 50 ft Deepening Project	50	Undetermined[a]	HARS
7/03-present	USACE	Arthur Kill & Howland Hook Marine Terminal 41/40 ft Deepening Project	41/40	950,000	Landfill Closure/HARS
7/03 - 1/04	USACE	Howland Hook Terminal (Wharf Expansion Project)	41/37	60,000	N/A
12/02	USACE	Howland Hook Terminal	43	15,000	Fishing Reef/HARS
6/99	Tosco Refining Company	Arthur Kill - maintenance dredging	N/A	3,500 (dredging)	Newark Bay CDF
3/97 - 4/97	USACE	Lower New York Bay, Raritan Bay & Arthur Kill to 1,000 ft North of Smith Creek	35	190,000	N/A
Hackensack River					
1986	USACE	Junction[c] to Turning Basin (Various Sections)	22 to 25	257,130	N/A
1979	USACE	Hackensack River	N/A	N/A	Upland
1974	USACE	Hackensack River	N/A	N/A	N/A
1965	USACE	Hackensack River	N/A	N/A	Upland
1963	USACE	Turning Basin	25	321,883	N/A
1962	USACE	Turning Basin	N/A	N/A	Upland-Vacant Marsh Land
1962	USACE	Junction[c] to Beacon #3	30	209,040	N/A
1959	USACE	Little Ferry to Upstream Limit of Hackensack River	12	37,100 and 39,841	Upland-Property at Little Ferry NJ
1956	USACE	Hackensack River	N/A	N/A	Upland-bordering waterway
1954	USACE	Hackensack River	N/A	N/A	Upland-East Rutherford, Bergen Co.
1953	USACE	Junction to 1,500 ft above Gen. Pulaski Skyway	30	73,000	N/A
1952	USACE	Shoals at Central RR of NJ Bridge	N/A	613	N/A
1945	USACE	Hackensack River	N/A	N/A	Upland Public Dumping Ground
Passaic River					
2/89	Texaco, Inc.	Point-No-Point Reach - maintenance dredging	N/A	30,400	N/A
8/83	Celanese Chemical Co.	Point-No-Point Reach - maintenance dredging	N/A	23,100	N/A
7/83 - 10/83	USACE	Federal Navigation Channel	N/A	702,400	N/A
1983	USACE	Point-No-Point: Junction[c] to Lincoln Highway Bridge	30	540,000	N/A
10/81	Celanese Chemical Co.	Point-No-Point Reach - maintenance dredging	N/A	36,000	N/A
6/77	Celanese Chemical Co.	Point-No-Point Reach - maintenance dredging	N/A	24,000	N/A
5/77 - 8/77	USACE	Federal Navigation Channel	N/A	525,000	N/A
1977	USACE	Point-No-Point: Junction[c] to Vicinity of Central RR of NJ Bridge	30	478,000	N/A
3/76 - 4/76	USACE	Federal Navigation Channel	N/A	230,700	N/A
1972	USACE	Point-No-Point: Junction[c] to U.S. Rt. 1 and 9 Bridge, Newark	30	174,600	N/A
1971	USACE	Point-No-Point: Junction[c] to U.S. Rt. 1 and 9 Bridge, Newark	30	155,600	N/A
1965	USACE	Point-No-Point: Junction[c] to U.S. Rt. 1 and 9 Bridge, Newark	30	505,500	N/A
1962	USACE	Point-No-Point: Junction[c] to Vicinity of Central RR of NJ Bridge	30	245,000	N/A
1957	USACE	Point-No-Point: Junction[c] to Vicinity of Glen. Pulaski Skyway	30	413,900	N/A
1953	USACE	Passaic River	N/A	N/A	Upland Public Dumping Ground
1951	USACE	Point-No-Point: Junction[c] to Vicinity of Central RR of NJ Bridge	30	329,200	N/A
1946	USACE	Point-No-Point and Harrison: Junction[c] to 3,000 ft above Lincoln Hwy. Bridge	30	934,500	N/A
1945	USACE	Passaic River	N/A	N/A	Upland Public Dumping Ground
1941	USACE	Point-No-Point and Harrison: Junction[c] to Rt. 95 Bridge	30	1,202,000	N/A

Table 2-2 (cont'd)
Dredging Activities Within or Adjacent to Newark Bay - 1932 to Present

Date of Dredging	Entity Responsible for Dredging	Description of Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
1933	USACE	Point-No-Point and Harrison: Junction[c] to Rt. 95 Bridge, Newark	30	607,200	N/A
1932	USACE	Point-No-Point and Harrison: Junction[c] to 3,000 ft above Lincoln Hwy. Bridge	30	1,430,700	N/A

Notes:
1. Reach and/or channel terminology may be inconsistent with the IWP text; wording was maintained as per the original source.
2. The completeness of this table is unknown.

a. Estimated total volume of dredged material to be removed as part of the NY&NJ 50 ft Deepening Project is 42,500,000 cy, with 31,288,000 cy to be placed at the HARS and the remaining to be placed at upland locations.
b. A total volume of 2,124,000 cy was removed as part of the Newark Bay 45-Foot Deepening Project.
c. Junction is defined as the red channel Junction marker at the confluence of the Hackensack and Passaic Rivers.

CDF = Combined Disposal Facility
cy = cubic yards
ft = feet
HARS = Historic Area Remediation Site
N/A = Information not available at this time
PA NY/NJ = Port Authority of New York/New Jersey
USACE = U.S. Army Corps of Engineers

Sources: Iannuzzi et al. 2002; PA NY/NJ 2004; USACE 1997d; USACE 2004a; USACE 2005b; and personal communication with the PA NY/NJ.

Table 2-3
Dredging Permits Issued Within or Adjacent to Newark Bay - 1980 to Present

Permit/Public Notice Date[a]	Permit Applicant	Description of Requested Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
Newark Bay					
6/05	USACE	Contract Area S-NB-1 of NY/NJ Harbor 50-ft Deepening Project	50	1,816,000	HARS
1/00	PA NY/NJ	Reaches B, C, D in Newark Bay - adding upland disposal site to existing dredging	N/A	202,000	Upland Disposal
11/99	Darling International, Inc.	Ten-year maintenance and subsequent upland disposal	N/A	22,000	Upland Disposal
9/99	PA NY/NJ	Newark Bay - maintenance dredging	N/A	4,000	Upland Disposal
9/99	Amerada Hess Corp.	Ten-year maintenance and subsequent upland disposal	N/A	20,500	Upland Disposal
4/99	Motiva Enterprises, L.L.C.	Ten-year maintenance and subsequent upland disposal	N/A	37,550	Upland Disposal
3/97	PA NY/NJ	Reaches B, C, D in Newark Bay - maintenance dredging and deepening	45	137,000	Mud Dump Site
11/91	PA NY/NJ	Reaches B, C, D in Newark Bay - maintenance dredging	40	200,000	Mud Dump Site
12/88-12/91	Texaco Refining and Marketing, Inc.	Newark Bay - maintenance dredging	35	15,500	Mud Dump Site
12/87-12/90	Town of Kearny	Newark Bay - pipeline installation to Kearny Point	32 to 54	97,000	Upland Disposal
7/85-7/88	PA NY/NJ	Newark Bay - maintenance dredging	40	250,000	Mud Dump Site
2/84-2/87	Amerada Hess Corp.	Newark Bay - maintenance dredging	11	4,000	Mud Dump Site
2/83-2/86	PA NY/NJ	Newark Bay - maintenance dredging	35	N/A	Mud Dump Site
3/82-3/92	City of Elizabeth	Maintenance dredge from the Great Ditch of Newark Bay	N/A	2,500	Upland Disposal
3/82-3/85	Atlantic Richfield Co.	Newark Bay - maintenance dredging	30	35,000	Mud Dump Site
Elizabeth Channel/Port Newark Channel					
5/05	USACE	Port Elizabeth and Port Newark - maintenance dredging	40 to 45	400,000 to 550,000	Upland Disposal
3/97	USACE	Elizabeth Channel, Elizabeth Pierhead Channel, and South Elizabeth Channel	40	390,000	Mud Dump Site
Kill Van Kull					
3/04	USACE	Contract Area S-KVK-2 of NY/NJ Harbor 50-ft Deepening Project	50	2,204,000	Upland Disposal/HARS
5/01	IMTT-Bayonne, Inc.	Perform new dredging in area surrounding pier	N/A	120,000	Newark Bay CDF/HARS
6/99	Coastal Oil of New York, Inc.	Maintenance dredging of a barge and berthing area	N/A	10,000	Newark Bay CDF
4/97	Exxon Company	Maintenance dredging of two berthing areas	15 to 40	106,000	Mud Dump Site
Arthur Kill					
8/04	USACE	Arthur Kill 41-foot Deepening Project	41	1,985,300	Upland Disposal/HARS
5/04	Conoco Phillips	Maintenance dredging of Steamer Dock No. 1, Steamer Dock No. 2, and Barge Piers	24 to 38	20,600	Upland Disposal
6/99	Tosco Refining Company	Dredging and installation of floats, including wave attenuator	N/A	4,000	Upland Disposal
6/99	Interstate Materials Corporation	Arthur Kill - maintenance dredging	N/A	217,000	Upland Disposal
6/88 - 6/98	Petro Port Terminal Corp.	Arthur Kill - maintenance dredging	37	17,800	Upland Disposal
1997	Perth Amboy Refinery	Arthur Kill - maintenance dredging	39	17,500	Upland Placement
8/97	Tosco Refining Company	Maintenance dredging of Barge Piers A and B (5-year maintenance schedule)	25	14,000 - 1st yr; 25,000 - 5 yrs	Mud Dump Site
4/97	Mobil Oil Corp.	Port Mobil Terminal - maintenance dredging	38	80,000	Mud Dump Site
3/97	Citgo Petroleum Corp.	Citgo Petroleum Berthing Facilities - maintenance dredging	36	34,500	Mud Dump Site
4/93	Bayway Refining Company	Bayway Refining Company - maintenance dredging	25	11,300	Mud Dump Site
10/92	PA NY/NJ	Howland Hook Marine Terminal - maintenance dredging	35 to 40	50,000	Mud Dump Site
8/92	Consolidated Edison of New York	Maintenance dredging in front of Generating Station	22	87,000	Mud Dump Site
6/92	Northville Linden Terminal Corp.	Northville Linden Terminal Corporation - maintenance dredging	20, 26 & 37	18,000	Mud Dump Site
4/88 - 4/91	Citgo Petroleum Corp.	Arthur Kill - maintenance dredging	33	5,900	Mud Dump Site
5/87 - 5/90	B.P. Oil, Inc.	Arthur Kill - maintenance dredging	32	3,000	Mud Dump Site
7/85 - 7/88	GATX Terminals Corp.	Arthur Kill - maintenance dredging	35	75,000	Mud Dump Site

Table 2-3 (cont'd)
Dredging Permits Issued Within or Adjacent to Newark Bay - 1980 to Present

Permit/Public Notice Date[a]	Permit Applicant	Description of Requested Dredging Event	Depth of Dredging (ft)	Estimated Volume of Dredged Material (cy)	Dredged Material Disposal Site
1/85 - 1/88	Exxon Corp.	Arthur Kill - maintenance dredging	40	3,000	Mud Dump Site
4/84 - 4/87	United States Lines, Inc.	Arthur Kill - maintenance dredging	35/40	50,000 (rock); 22,000 (silt)	Mud Dump Site
Arthur Kill (cont'd)					
12/83 - 12/86	Citgo Petroleum Corp.	Arthur Kill - maintenance dredging	33	15,000	Mud Dump Site
10/83 - 10/86	Amoco Oil Co.	Arthur Kill - maintenance dredging	27	17,000	Mud Dump Site
5/83 - 5/86	Exxon Corp.	Arthur Kill - maintenance dredging	23	2,500	Mud Dump Site
10/82 - 10/85	B.P. Oil, Inc.	Arthur Kill - maintenance dredging	30	22,000	Mud Dump Site
9/82 - 9/85	Gulf Refining and Marketing Co.	Arthur Kill - maintenance dredging	33	40,000	Mud Dump Site
2/82 - 2/85	Proctor & Gamble Mfg. Co.	Arthur Kill - maintenance dredging	15.5	7,500	Mud Dump Site
12/81 - 12/84	B.P. Oil, Inc.	Arthur Kill - maintenance dredging	32	30,000	Mud Dump Site
7/81 - 7/84	Linden Roselle Sewerage Authority	Arthur Kill - maintenance dredging	24.3	11,000	Mud Dump Site
Passaic River					
12/91	Celanese Chemical Company, Inc.	Point-No-Point Reach - maintenance dredging	28	25,000	Mud Dump Site
2/88	USACE	Federal Navigation Project No. 64 - Point-No-Point Reach	30	N/A	Mud Dump Site
1986	Celanese Chemical Company, Inc.	Point-No-Point Reach - maintenance dredging	N/A	N/A	Ocean Waters
10/80-10/83	Amerada Hess Corp.	Passaic River - maintenance dredging	N/A	2,000	Mud Dump Site

Notes:
1. Reach and/or channel terminology may be inconsistent with the IWP text; wording was maintained as per the original source.
2. The completeness of this table is unknown.
a. Due to incomplete information, the date assigned is the public notice or permit date as opposed to the date of project completion.
CDF = Combined Disposal Facility
cy = cubic yards
ft = feet
HARS = Historic Area Remediation Site
N/A = Information not available at this time
NJDOC = New Jersey Department of Commerce
PA NY/NJ = Port Authority of New York/New Jersey
USACE = U.S. Army Corps of Engineers

Sources: USACE 1991a; USACE 1991b; USACE 1992a; USACE 1992b; USACE 1993; USACE 1997b; USACE 1997c; USACE 1997d; USACE 1997e; USACE 1997f; USACE 1997g; USACE 1997h; USACE 1999a; USACE 1999b; USACE 1999c; USACE 1999d; USACE 1999e; USACE 1999f; USACE 1999g; USACE 1999h; USACE 2000; USACE 2004c; USACE 2004d; USACE 2004e; USACE 2005c; USACE 2005d.

Table 4-1
Data Needs/Data Uses

Tasks	Sampling Area	Parameter	Number of Locations/Samples	Data Use
Sediment Sampling – Analytical Testing	Southern Navigation Channels (South of Port Newark)	All samples will be analyzed for PCB Congeners and Homologues, Aroclor PCBs, pesticides, TEPHs, SVOCs, organotins, chlorinated herbicides, inorganics, cyanide, VOCs, mercury, titanium, PCDD/PCDF, TOC, and moisture content. Grain size and bulk density will also be assessed on a more limited basis. See Tables 5-1 through 5-10 for the analytical methods.	12 Locations, 46 Samples: 36 Field Samples, 2 Field Duplicates, 6 QA/QC Samples, 2 Trip Blank Samples.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants.
	Northern Navigation Channels (North of Port Newark)		6 Locations, 46 Samples: 36 Field Samples, 2 Field Duplicates, 6 QA/QC Samples, 2 Trip Blank Samples.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants.
	Port Channels		6 Locations, 23 Samples: 18 Field Samples, 1 Field Duplicate, 3 QA/QC Samples, 1 Trip Blank Sample.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants.
	Transitional Slopes		5 Locations, 40 Samples: 30 Field Samples, 2 Field Duplicates, 6 QA/QC Samples, 2 Trip Blank Samples.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants and understand potential focusing mechanisms between Navigation Channels and Sub-tidal Flats.
	Sub-tidal Flats (deep)		9 Locations, 69 Samples: 54 Field Samples, 3 Field Duplicates, 9 QA/QC Samples, 3 Trip Blank Samples.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants.
	Sub-tidal Flats (shallow)		19 Locations, 96 Samples: 76 Field Samples, 4 Field Duplicates, 12 QA/QC Samples, 4 Trip Blank Samples.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants.
	Industrial Waterfront (Source Identification)		9 Locations, 70 Samples: 55 Field Samples, 3 Field Duplicates, 9 QA/QC Samples, 3 Trip Blank Samples.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants; RI Goal 2 (Risk Assessment) - Understand nature and extent of contamination in ecologically sensitive areas; and RI Goal 3 (Source Identification) - Confirm evidence of current/ historical discharges to the Bay.
	Inter-tidal Areas		3 Locations, 17 Samples: 12 Field Samples, 1 Field Duplicate, 3 QA/QC Samples, 1 Trip Blank Sample.	RI Goal 1 (Nature and Extent) - Assess broad spatial and vertical patterns of contaminants; RI Goal 2 (Risk Assessment) - Understand nature and extent of contamination in ecologically sensitive areas; and RI Goal 3 (Source Identification) - Determine impact of local sources in select areas.
Sediment Sampling – Radiochemistry Testing	Northern Navigation Channels (North of Port Newark)	Lead-210, Beryllium-7 (surface samples only). See Tables 5-1 through 5-9 for analytical methods.	6 Locations, 63 Samples: 54 Field Samples, 3 Field Duplicates, 6 QA/QC Samples.	RI Goal 1 (Nature and Extent) - Verify sedimentation rates.
	Transitional Slopes	Lead-210, Cesium-137, Beryllium-7 (surface samples only). See Tables 5-1 through 5-10 for analytical methods.	5 Locations, 54 Samples: 45 Field Samples, 3 Field Duplicates, 6 QA/QC Samples.	RI Goal 1 (Nature and Extent) - Confirm depth of the 1940 horizon and verify sedimentation rates. Also, understand potential focusing mechanisms between Navigation Channels and Sub-tidal Flats.

Table 4-1 (cont'd)
Data Needs/Data Uses

Tasks	Sampling Area	Parameter	Number of Locations/Samples	Data Use
Sediment Sampling – Radiochemistry Testing (cont'd)	Sub-tidal Flats (deep)	Lead-210, Cesium-137, Beryllium-7 (surface samples only). See Tables 5-1 through 5-10 for analytical methods.	9 Locations, 96 Samples: 81 Field Samples, 5 Field Duplicates, 10 QA/QC Samples.	RI Goal 1 (Nature and Extent) - Confirm depth of the 1940 horizon and verify sedimentation rates.
	Sub-tidal Flats (shallow)		19 Locations, 198 Samples: 171 Field Samples, 9 Field Duplicates, 18 QA/QC Samples.	RI Goal 1 (Nature and Extent) - Confirm depth of the 1940 horizon and verify sedimentation rates.
	Industrial Waterfront (Source Identification)		9 Locations, 97 Samples: 82 Field Samples, 5 Field Duplicates, 10 QA/QC Samples.	RI Goal 1 (Nature and Extent) - Confirm depth of the 1940 horizon and verify sedimentation rates; RI Goal 3 (Source Identification) - Understand relationship between contaminant discharge and specific time periods.
	Inter-tidal Areas		3 Locations, 33 Samples: 27 Field Samples, 2 Field Duplicates, 4 QA/QC Samples.	RI Goal 1 (Nature and Extent) - Confirm depth of the 1940 horizon and verify sedimentation rates; RI Goal 2 (Risk Assessment) - Understand sedimentation rates in ecologically sensitive areas.
Biologically Active Zone (BAZ) Investigation	Various geomorphic areas	Sediment profile imaging and grab sampling of BAZ.	14 locations: 6 in Sub-tidal Flats, 5 in Inter-tidal Areas, and 3 in Navigation Channels.	RI Goal 2 (Risk Assessment) - Understand depth of the BAZ in the Phase I Study Area.
Geophysical Surveys	Phase I Study Area	Bathymetry	Planned survey tracklines extending across the Bay will be spaced at approximate 0.25-mile intervals oriented perpendicular to the Bay.	RI Goal 1 (Nature and Extent) - Verify identified geomorphic features, and assist the field crew in locating various cores.

Notes:
a. QA/QC Samples include MS/MSD samples and Rinse Blanks.
b. Assumes MS/MSD are collected at a rate of 1 (MS) and 1 (MSD) per 20 samples for organic constituents or 1 (MS) and 1 (DUP) per 20 samples for inorganic constituents.
c. Total number of samples includes QA/QC samples.
d. Table represents maximum number of samples to be collected. The actual number of samples collected may be lower.

Table 5-1
Method 8270C (GC/MS) Sample Quantitation Limits For Semivolatile Organics[a]

Compounds	Water (µg/L)	Sediment (µg/kg)
Phenol	5	170
bis (2-Chloroethyl) ether	5	170
2-Chlorophenol	5	170
1,3-Dichlorobenzene	5	170
1,4-Dichlorobenzene	5	170
1,2-Dichlorobenzene	5	170
2-Methylphenol	5	170
2,2'-oxybis(1-chloropropane)	5	170
4-Methylphenol	5	170
N-Nitroso-di-n-dipropylamine	5	170
Hexachloroethane	5	170
Nitrobenzene	5	170
Isophorone	5	170
2-Nitrophenol	5	170
2,4-Dimethylphenol	5	170
bis (2-Chloroethoxy) methane	5	170
2,4-Dichlorophenol	5	170
1,2,4-Trichlorobenzene	5	170
Naphthalene	5	170
4-Chloroaniline	5	170
Hexachlorobutadiene	5	170
4-Chloro-3-methylphenol	5	170
Hexachlorocyclopentadiene	15	500
2-Methylnaphthalene	5	170
2,4,6-Trichlorphenol	5	170
2,4,5-Trichlorophenol	5	170
2-Chloronaphthalene	5	170
2-Nitroaniline	5	170
Dimethylphthalate	5	170
Acenaphthylene	5	170
2,6-Dinitrotoluene	5	170
3-Nitroaniline	10	330
acenaphthene	5	170

Table 5-1 (cont'd)
Method 8270C (GC/MS) Sample Quantitation Limits For Semivolatile Organics[a]

Compounds	Water (µg/L)	Sediment (µg/kg)
2,4-Dinitrophenol	25	830
4-Nitrophenol	15	500
Dibenzofuran	5	170
2,4-Dinitrotoluene	5	170
Diethylphthalate	5	170
4-Chlorophenyl phenyl ether	5	170
Fluorene	5	170
4-Nitroaniline	10	330
4,6-Dinitro-2-methylphenol	15	500
N-nitrosodiphenylamine	5	170
4-Bromophenyl-phenyl ether	5	170
Hexachlorobenzene	5	170
Pentachlorophenol	15	500
Phenanthrene	5	170
Anthracene	5	170
Carbazole	5	170
Di-n-butylphthalate	5	170
Fluoranthene	5	170
Pyrene	5	170
Butylbenzylphthalate	5	170
3,3'-Dichlorobenzidine	10	330
Benz(a)anthracene	5	170
Chrysene	5	170
bis (2-Ethylhexyl) phthalate	10	330
Di-n-octylphthalate	5	170
Benzo(b)fluoranthene	5	170
Benzo(k)fluoranthene	5	170
Benzo(a)pyrene	5	170
Indeno (1,2,3-cd) pyrene	5	170
Dibenz(a,h)anthracene	5	170
Benzo(g,h,i)perylene	5	170

Notes:

a. Specific quantitation limits are highly matrix-dependent. The laboratory-demonstrated MDL must be equal to or lower than the quantitation limits listed in this table. Quantitation limits listed for sediment are based on wet weight.

GC/MS = Gas Chromatography/Mass Spectrometry
ug/kg = micrograms per kilogram
ug/L = micrograms per liter

Table 5-2
Method 8081 Sample Quantitation Limits for Pesticides[a]

Compounds	Water (µg/L)	Sediment (µg/kg)
Aldrin	0.05	1.7
BHC-alpha	0.05	1.7
BHC-beta	0.05	1.7
BHC-delta	0.05	1.7
BHC-gamma (Lindane)	0.05	1.7
Chlordane-gamma	0.05	1.7
Chlordane-alpha	0.05	1.7
Dieldrin	0.10	3.3
4,4'-DDD	0.10	3.3
4,4'-DDE	0.10	3.3
4,4'-DDT	0.10	3.3
Endosulfan-1	0.05	1.7
Endosulfan-2	0.10	3.3
Endosulfan sulfate	0.10	3.3
Endrin	0.10	3.3
Endrin aldehyde	0.10	3.3
Endrin ketone	0.10	3.3
Heptachlor	0.05	1.7
Heptachlor epoxide	0.05	1.7
Methoxychlor	0.50	17
Toxaphene	5.0	170

Notes:

a. Specific quantitation limits are highly matrix-dependent. The laboratory-derived MDL must be at least a factor of three less than the SQLs provided in this table with the exception of chlordane-gamma, in the water matrix. The laboratory derived MDL for chlordane-gamma in water must be at least a factor of two less than the SQL provided in this table. Quantitation limits listed for sediment are based on wet weight. Quantitation limits reported by the laboratory for sediment are calculated on a dry weight basis and will be higher.

ug/kg = micrograms per kilogram
ug/L = micrograms per liter

Table 5-3
Method 8082 Sample Quantitation Limits for Aroclor PCBs[a]

Compounds	Water (µg/L)	Sediment (µg/kg)
Aroclor-1016	1	33
Aroclor-1221	1	33
Aroclor-1232	1	33
Aroclor-1242	1	33
Aroclor-1248	1	33
Aroclor-1254	1	33
Aroclor-1260	1	33

Notes:

a. Specific quantitation limits are highly matrix-dependent. The laboratory-derived MDL must be at least a factor of three less than the SQLs provided in this table. Quantitation limits listed for sediment are based on wet weight. Quantitation limits reported by the laboratory for sediment are calculated on a dry weight basis and will be higher.

ug/kg = micrograms per kilogram
ug/L = micrograms per liter

Table 5-4
Method 1668 Rev. A Sample Quantitation Limits for PCB Congeners[a]

Parameter	Water (pg/L)	Sediment (ng/kg)
PCB1	25	2.5
PCB2	25	2.5
PCB3	25	2.5
PCB4/10	25	2.5
PCB6	25	2.5
PCB5/8	25	2.5
PCB7/9	25	2.5
PCB11	25	2.5
PCB12/13	25	2.5
PCB14	25	2.5
PCB15	25	2.5
PCB16/32	25	2.5
PCB17	25	2.5
PCB18	25	2.5
PCB19	25	2.5
PCB20/21/33	25	2.5
PCB22	25	2.5
PCB23	25	2.5
PCB24/27	25	2.5
PCB25	25	2.5
PCB26	25	2.5
PCB28	25	2.5
PCB29	25	2.5
PCB30	25	2.5
PCB31	25	2.5
PCB34	25	2.5
PCB35	25	2.5
PCB36	25	2.5
PCB37	25	2.5
PCB38	25	2.5
PCB39	25	2.5
PCB40	50	5.0
PCB41/64/71/72	50	5.0
PCB42/59	50	5.0
PCB43/49	50	5.0

Table 5-4 (cont'd)
Method 1668 Rev. A Sample Quantitation Limits for PCB Congeners[a]

Parameter	Water (pg/L)	Sediment (ng/kg)
PCB44	50	5.0
PCB45	50	5.0
PCB46	50	5.0
PCB47	50	5.0
PCB48/75	50	5.0
PCB50	50	5.0
PCB51	50	5.0
PCB52/69	50	5.0
PCB53	50	5.0
PCB54	50	5.0
PCB55	50	5.0
PCB56/60	50	5.0
PCB57	50	5.0
PCB58	50	5.0
PCB61	50	5.0
PCB62	50	5.0
PCB63	50	5.0
PCB65	50	5.0
PCB66	50	5.0
PCB67	50	5.0
PCB68	50	5.0
PCB70	50	5.0
PCB73	50	5.0
PCB74	50	5.0
PCB76	50	5.0
PCB77	50	5.0
PCB78	50	5.0
PCB79	50	5.0
PCB80	50	5.0
PCB81	50	5.0
PCB82	50	5.0
PCB83	50	5.0
PCB84/92	50	5.0
PCB85/116	50	5.0
PCB86	50	5.0

Table 5-4 (cont'd)
Method 1668 Rev. A Sample Quantitation Limits for PCB Congeners[a]

Parameter	Water (pg/L)	Sediment (ng/kg)
PCB87/117/125	50	5.0
PCB88/91	50	5.0
PCB89	50	5.0
PCB90/101	50	5.0
PCB93	50	5.0
PCB94	50	5.0
PCB95/98/102	50	5.0
PCB96	50	5.0
PCB97	50	5.0
PCB99	50	5.0
PCB100	50	5.0
PCB103	50	5.0
PCB104	50	5.0
PCB105	50	5.0
PCB106/118	50	5.0
PCB107/109	50	5.0
PCB108/112	50	5.0
PCB110	50	5.0
PCB111/115	50	5.0
PCB113	50	5.0
PCB114	50	5.0
PCB119	50	5.0
PCB120	50	5.0
PCB121	50	5.0
PCB122	50	5.0
PCB123	50	5.0
PCB124	50	5.0
PCB126	50	5.0
PCB127	50	5.0
PCB128/162	50	5.0
PCB129	50	5.0
PCB130	50	5.0
PCB131	50	5.0
PCB132/161	50	5.0
PCB133/143	50	5.0
PCB134/142	50	5.0

Table 5-4 (cont'd)
Method 1668 Rev. A Sample Quantitation Limits for PCB Congeners[a]

Parameter	Water (pg/L)	Sediment (ng/kg)
PCB135	50	5.0
PCB136	50	5.0
PCB137	50	5.0
PCB138/163/164	50	5.0
PCB139/149	50	5.0
PCB140	50	5.0
PCB141	50	5.0
PCB144	50	5.0
PCB145	50	5.0
PCB146/165	50	5.0
PCB147	50	5.0
PCB148	50	5.0
PCB150	50	5.0
PCB151	50	5.0
PCB152	50	5.0
PCB153	50	5.0
PCB154	50	5.0
PCB155	50	5.0
PCB156	50	5.0
PCB157	50	5.0
PCB158/160	50	5.0
PCB159	50	5.0
PCB166	50	5.0
PCB167	50	5.0
PCB168	50	5.0
PCB169	50	5.0
PCB170	50	5.0
PCB171	50	5.0
PCB172	50	5.0
PCB173	50	5.0
PCB174	50	5.0
PCB175	50	5.0
PCB176	50	5.0
PCB177	50	5.0
PCB178	50	5.0
PCB179	50	5.0

Table 5-4 (cont'd)
Method 1668 Rev. A Sample Quantitation Limits for PCB Congeners[a]

Parameter	Water (pg/L)	Sediment (ng/kg)
PCB180	50	5.0
PCB181	50	5.0
PCB182/187	50	5.0
PCB183	50	5.0
PCB184	50	5.0
PCB185	50	5.0
PCB186	50	5.0
PCB188	50	5.0
PCB189	50	5.0
PCB190	50	5.0
PCB191	50	5.0
PCB192	50	5.0
PCB193	50	5.0
PCB194	75	7.5
PCB195	75	7.5
PCB196/203	75	7.5
PCB197	75	7.5
PCB198	75	7.5
PCB199	75	7.5
PCB200	75	7.5
PCB201	75	7.5
PCB202	75	7.5
PCB204	75	7.5
PCB205	75	7.5
PCB206	75	7.5
PCB207	75	7.5
PCB208	75	7.5
PCB209	75	7.5

Notes:

a. Specific quantitation limits are highly matrix-dependent. The laboratory's SQL must be equal to or lower than the quantitation limits provided in this table. Quantitation limits listed for sediment are based on wet weight.

ng/kg = nanograms per kilogram
pg/L = picograms per liter

Table 5-5
Method 1668 Rev. A Sample Quantitation Limits for PCB Homologues

PCB Homologues	Water (pg/L)	Sediment (ng/kg)
Monochlorobiphenyls	25	2.5
Dichlorobiphenyls	25	2.5
Trichlorobiphenyls	25	2.5
Tetrachlorobiphenyls	50	5.0
Pentachlorobiphenyl	50	5.0
Hexachlorobiphenyl	50	5.0
Heptachlorobiphenyl	75	7.5
Octachlorobiphenyl	75	7.5
Nonachlorobiphenyl	75	7.5
Decachlorobiphenyl	75	7.5

Notes:

ng/kg = nanograms per kilogram
pg/L = picograms per liter

Table 5-6
Method 8151A Sample Quantitation Limits for Chlorinated Herbicides[a]

Compounds	Water (µg/L)	Sediment (µg/kg)
2,4-D	12	240
2,4-DB	9.1	182
2,4,5-TP (Silvex)	5.0	100
2,4,5-T	5.0	100

Notes:

a. Specific quantitation limits are highly matrix-dependent. The laboratory-derived MDL must be at least a factor of three less than the SQLs provided in this table. Quantitation limits listed for sediment are based on wet weight.

ug/kg = micrograms per kilogram
ug/L = micrograms per liter

Table 5-7
Method 1613B Sample Quantitation Limits for PCDD/PCDFs

PCDD/PCDF Parameters	Quantitation Limits[a]	
	Water (pg/L)	Sediment (ng/kg)
2,3,7,8-TCDD	10	1
1,2,3,7,8-PeCDD	50	5
1,2,3,4,7,8-HxCDD	50	5
1,2,3,6,7,8-HxCDD	50	5
1,2,3,7,8,9-HxCDD	50	5
1,2,3,4,6,7,8-HpCDD	50	5
OCDD	100	10
2,3,7,8-TCDF	10	1
1,2,3,7,8-PeCDF	50	5
2,3,4,7,8-PeCDF	50	5
1,2,3,4,7,8-HxCDF	50	5
1,2,3,6,7,8-HxCDF	50	5
2,3,4,6,7,8-HxCDF	50	5
1,2,3,7,8,9-HxCDF	50	5
1,2,3,4,6,7,8-HpCDF	50	5
1,2,3,4,7,8,9-HpCDF	50	5
OCDF	100	10
Total TCDD	10	1
Total PeCDD	50	5
Total HxCDD	50	5
Total HpCDD	50	5
Total TCDF	10	1
Total PeCDF	50	5
Total HxCDF	50	5
Total HpCDF	50	5

Notes:

a. Detection limits listed are based on the minimum level at which the analytical system will give acceptable selected ion current profiles (SICPs) and calibration as specified in the method. Detection limits are sample and matrix specific and are calculated based on peak height or area of the signal for the internal standard and the noise level associated with the target analyte measurement. Actual detection limits obtained for analysis of field samples may be higher.

ng/kg = nanograms per kilogram
pg/L = picograms per liter

Table 5-8
Sample Quantitation Limits for Metals and Cyanide[a]

Analyte	Method	Water (µg/L)	Sediment (mg/kg)
Aluminum, Al	6010B	200	20
Antimony, Sb	6010B	60	6
Arsenic, As	6010B	10	1
Barium, Ba	6010B	200	20
Beryllium, Be	6010B	5	0.5
Cadmium, Cd	6010B	5	0.5
Calcium, Ca	6010B	5,000	500
Chromium, Cr	6010B	10	1
Cobalt, Co	6010B	50	5
Copper, Cu	6010B	25	2.5
Total Cyanide	9012	10	1
Iron, Fe	6010B	100	10
Lead, Pb	6010B	3	0.3
Magnesium, Mg	6010B	5,000	500
Manganese, Mn	6010B	15	1.5
Mercury, Hg	7470/7471A	0.2	0.1
Nickel, Ni	6010B	40	4
Potassium, K	6010B	5,000	500
Selenium, Se	6010B	5	0.5
Silver, Ag	6010B	10	1
Sodium, Na	6010B	5,000	500
Thallium, Tl	6010B	10	1
Vanadium, V	6010B	50	5
Zinc, Zn	6010B	20	2
Titanium	6010B	10	1

Notes:

a. Specific quantitation limits are highly matrix dependent. The laboratory IDL must be less than or equal to the quantitation limit. Quantitation limits listed for soil/sediment are based on wet weight.

mg/kg = milligrams per kilogram
ug/L = micrograms per liter

Table 5-9
Sample Quantitation Limits For Other Analytes[a]

Analyte	Method	Water	Sediment
Total Organic Carbon (TOC)	Lloyd Kahn (Sediment) 415.1 (Water)	2 mg/L	200 mg/kg
TEPH (DRO)	NJ-TPH-QAM 025-10/91[b]	1 mg/L	20 mg/kg
% Moisture	ASTM, D2974	NA	0.01%
Cesium-137	Gamma Spec	NA	0.1 pCi/g
Beryllium-7	Gamma Spec	NA	0.5 pCi/g
Lead-210	Beta Detection	NA	0.2 pCi/g
Grain Size	Laser Defractor	NA	0.02 um
Monobutyltin	STL SOP LM-GC-ALKYLTINS REV. 7[c]	0.05 ug/l	1.7 ug/kg
Dibutyltin	STL SOP LM-GC-ALKYLTINS REV. 7[c]	0.05 ug/l	1.7 ug/kg
Tributyltin	STL SOP LM-GC-ALKYLTINS REV. 7[c]	0.05 ug/l	1.7 ug/kg
Tetrabutyltin	STL SOP LM-GC-ALKYLTINS REV. 7[c]	0.05 ug/l	1.7 ug/kg

Notes:

a. Specific quantitation limits are highly matrix-dependent. The laboratory-derived MDL must be at least a factor of three less than the SQLs provided in this table. Quantitation limits listed for sediment are based on wet weight.
b. New Jersey Department of Environmental Protection Office of Quality Assurance Analytical Method OQA-QAM-025-10/97, Rev. 5.
c. STL, SOP No. LM-GC-ALKYLTINS REV.7, Standard Operating Procedure for Organotin Compounds.

% = Percent
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
ug/kg = micrograms per kilogram
ug/l = micrograms per liter
um = micrometers
pCi/g = picoCuries per gram
NA = Not Applicable
ASTM = American Society for Testing and Materials

Table 5-10
Method 8260B (GC/MS) Sample Quantitation Limits for Volatile Organics[a]

Compounds	Water (µg/L)	Sediment (µg/Kg)
Chloromethane	5	5
Bromomethane	5	5
Vinyl Chloride	5	5
Chloroethane	5	5
Methylene Chloride	5	5
Acetone	10	10
Carbon Disulfide	5	5
1,1-Dichloroethene	5	5
1,1 –Dichloroethane	5	5
1,2 –Dichloroethene (total)	5	5
Chloroform	5	5
1,2-Dichloroethane	5	5
2-Butanone	10	10
1,1,1-Trichloroethane	5	5
Carbon Tetrachloride	5	5
Bromodichloromethane	5	5
1,2-Dichloropropane	5	5
Cis-1,3-Dichloropropene	5	5
Trichloroethene	5	5
Dibromochloromethane	5	5
1,1,2-Trichlorethane	5	5
Benzene	5	5
Trans-1,3-Dichloropropene	5	5
Bromoform	5	5
4-methyl-2-pentanone	10	10
2-hexanone	10	10
Tetrachloroethene	5	5
Toluene	5	5
1,1,2,2-Tetrachloroethane	5	5
Chlorobenzene	5	5
Ethyl Benzene	5	5
Styrene	5	5
Xylenes (total)	5	5

Notes:

a. Specific quantitation limits are highly matrix-dependent. The laboratory-derived MDL must be at least a factor of three less than the SQLs provided in this table. Quantitation limits listed for sediment are based on wet weight.

GC/MS = Gas Chromatography/Mass Spectrometry
ug/kg = micrograms per kilogram
ug/L = micrograms per liter

Table 5-11
Field Chemistry QC Samples

Sample Matrix/Type	Parameter	Field Duplicate	Rinsate Blank	Trip Blank
Sediments	Volatile Organics	X	X	X
	Semivolatile Organics	X	X	
	Pesticide/PCBs	X	X	
	PCB Congeners and Homologues	X	X	
	Chlorinated Herbicides	X	X	
	PCDDs/PCDFs	X	X	
	TEPH	X	X	
	TOC	X	X	
	Metals and Cyanide	X	X	
	Mercury	X	X	
	Organotins	X	X	
	Moisture Content	X		
	Radiochemistry	X		
	Grain Size	X		

Note:

X = Indicates that QC sample is to be collected.

Table 5-12
Frequency of Collection of Field Chemistry QC Samples

Type of QC Sample	Frequency
Rinsate Blank	1 per 20 field samples (not to exceed 1 per day)
Field Duplicate	1 per 20 field samples per matrix and per method
Trip Blank	1 trip blank will be included with each shipment of samples collected for VOC analyses.

Table 5-13
Standard Laboratory Data Qualifiers

Qualifier	Description
B	Inorganics – The reported value was obtained from an instrument reading that was less than the sample quantitation limit (SQL). Organics – The associated analyte was also detected in the method blank.
D	The organic analyte was quantitated from a diluted analysis.
E	Inorganics – The reported value is estimated because of the presence of an interference. Organics – The associated compound concentration exceeded the calibration range of the instrument.
G	Organic data indicated the presence of a compound that meets the identification criteria; the result is below the SQL but above the Method Detection Limit (MDL).
N	The inorganic analysis is associated with a spike sample not within control limits.
P	The percent difference between the primary and confirmation column for pesticide/Aroclor analyses is greater than 25 percent.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
*	The inorganic duplicate analysis was not within the established QC control limit.
S	Inorganics – The reported value was determined by Method of Standard Additions (MSA).
+	Inorganics – Correlation coefficient for MSA is less than 0.995.
W	Inorganics – The post digestion spike for furnace AA analysis is out of control.
I	The laboratory indicated the presence of an interference during the sample analysis.

Table 5-14
Example Format for Electronic Loading of Laboratory Files

ANALYTE	UNITS	SED-1[a]	LQ	VQ	SED-2[a]	LQ	VQ	SED-3[a]	LQ	VQ
Phenol	ug/kg	500	U		500	U		500	U	
bis(2-Chloroethyl)ether	ug/kg	110	U		110	U		110	U	
2-Chlorophenol	ug/kg	110	U		110	U		110	U	
1,3-Dichlorobenzene	ug/kg	110	U		110	U		110	U	
1,4-Dichlorobenzene	ug/kg	250	U		250	U		250	U	
1,2-Dichlorobenzene	ug/kg	110	U		110	U		110	U	
2-Methylphenol	ug/kg	250	U		250	U		250	U	
2,2'-oxybis(1-Chloropropane)	ug/kg	2,500	U		2,500	U		2,500	U	
4-Methylphenol	ug/kg	750	U		750	U		750	U	
N-Nitroso-di-n-propylamine	ug/kg	250	U		250	U		250	U	
Hexachloroethane	ug/kg	250	U		250	U		250	U	
Nitrobenzene	ug/kg	250	U		250	U		250	U	
Isophorone	ug/kg	250	U		250	U		250	U	
2-Nitrophenol	ug/kg	110	U		110	U		110	U	
2,4-Dimethylphenol	ug/kg	110	U		110	U		110	U	
bis(2-Chloroethoxy)methane	ug/kg	110	U		110	U		110	U	
2,4-Dichlorophenol	ug/kg	110	U		110	U		110	U	
1,2,4-Trichlorobenzene	ug/kg	110	U		110	U		110	U	
Naphthalene	ug/kg	110	U		110	U		110	U	
4-Chloroaniline	ug/kg	110	U		110	U		110	U	
Hexachlorobutadiene	ug/kg	110	U		110	U		110	U	
4-Chloro-3-methylphenol	ug/kg	110	U		110	U		110	U	
2-Methylnaphthalene	ug/kg	110	U		110	U		110	U	
etc.										

Notes:

a. Example sample IDs
LQ = Laboratory Qualifiers
VQ = Validation Qualifiers
ug/kg = micrograms per kilogram

Table 6-1
Sediment Sampling Summary
For Chemical Analyses

Geomorphic Area	Number of Locations	Number of Samples from Each Core	Analytes	Number of Field Samples					
				Sediment Samples[a]	Field Duplicate	Rinsate Blank	MS/MSD[b]	Trip Blanks	Total Samples
Southern Navigation Channels (South of Port Newark)	12	3	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotins, titanium, mercury, PCDDs/PCDFs	36	2	2	4	------	44
	12	3	VOCs	36	2	2	4	2	46
Northern Navigation Channels (North of Port Newark)	6	6	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotins, titanium, mercury, PCDDs/PCDFs	36	2	2	4	------	44
	6	6	VOCs	36	2	2	4	2	46
Port Channels	6	3	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotins, titanium, mercury, PCDDs/PCDFs	18	1	1	2	------	22
	6	3	VOCs	18	1	1	2	1	23

Table 6-1 (cont'd)
Sediment Sampling Summary
For Chemical Analyses

Sampling Stratum	Number of Locations	Number of Samples from Each Core	Analytes	Number of Field Samples					
				Sediment Samples[a]	Field Duplicate	Rinsate Blank	MS/MSD[b]	Trip Blanks	Total Samples
Transitional Slopes	5	6	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotins, titanium, mercury, PCDDs/PCDFs	30	2	2	4	------	38
	5	6	VOCs	30	2	2	4	2	40
Sub-tidal Flats (deep)	9	6	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotins, titanium, mercury, PCDDs/PCDFs	54	3	3	6	------	66
	9	6	VOCs	54	3	3	6	3	69
Sub-tidal Flats (shallow)	19	4	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotin, titanium, mercury, PCDDs/PCDFs	76	4	4	8	------	92
	19	4	VOCs	76	4	4	8	4	96

Table 6-1 (cont'd)
Sediment Sampling Summary
For Chemical Analyses

Sampling Stratum	Number of Locations	Number of Samples from Each Core	Analytes	Number of Field Samples					
				Sediment Samples[a]	Field Duplicate	Rinsate Blank	MS/MSD[b]	Trip Blanks	Total Samples
Industrial Waterfront	9	6	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotin, titanium, mercury, PCDDs/PCDFs	55[c]	3	3	6		67
	9	6	VOC	55[c]	3	3	6	3	70
Inter-tidal Areas	3	4	Congener PCBs, Aroclor PCBs, pesticides, TEPHs, SVOCs, chlorinated herbicides, inorganics, cyanide, TOC, organotin, titanium, mercury, PCDDs/PCDFs	12	1	1	2		16
	3	4	VOC	12	1	1	2	1	17
Total Number of Samples[d]				**317**	**18**	**18**	**36**	**18**	**407**

Notes:
a. Table represents maximum number of samples to be collected. The actual number of samples collected may be lower.
b. Assumes MS/MSD are collected at a rate of 1 (MS) and 1 (MSD) per 20 samples for organic constituents or 1 (MS) and 1 (DUP) per 20 samples for inorganic constituents.
c. Core 012 will be segmented into 7 samples instead of the 6 samples proposed for cores 002, 025, 036, 049, 065, 067, 068, and 069.
d. Total number of samples includes QA/QC samples.

Table 6-2
Sediment Sampling Summary
For Radiochemistry Analyses

Geomorphic Area	Total Number of Locations	Number of Radio-chemistry Samples From Each Core	Number of Field Samples – Lead-210				Number of Field Samples – Cesium-137				Number of Field Samples – Beryllium-7			
			Sediment Samples[a]	Field Duplicate	MS/ MSD[b]	Total Samples	Sediment Samples[a]	Field Duplicate	Laboratory Duplicate[b]	Total Samples	Sediment Samples[c]	Field Duplicate	Laboratory Duplicate[b]	Total Samples
Northern Navigational Channels (North of Port Newark)	6	9	54	3	6	63	--	--	--	--	6	1	1	8
Transitional Slopes	5	9	45	3	6	54	45	3	3	51	5	1	1	7
Sub-tidal Flats (deep)	9	9	81	5	10	96	81	5	5	91	9	1	1	11
Sub-tidal Flats (shallow)	19	9	171	9	18	198	171	9	9	189	19	1	1	21
Industrial Waterfront	9	9	82[d]	5	10	97	82[d]	5	5	92	9	1	1	11
Inter-tidal Areas	3	9	27	2	4	33	27	2	2	31	3	1	1	5
Total Number of Samples[e]			**460**	**27**	**54**	**541**	**406**	**24**	**24**	**454**	**51**	**6**	**6**	**63**

Notes:

a. Table represents maximum number of radiochemistry samples to be collected. The actual number of samples collected may be lower.
b. Assumes MS/MSD (or duplicates) are collected at a rate of 1 (MS) and 1 (MSD) per 20 samples.
c. Only a surface sample will be collected for Beryllium-7.
d. Core 012 will be segmented into ten samples instead of the nine samples proposed for cores 002, 025, 036, 049, 065, 067, 068, and 069.
e. Total number of samples includes QA/QC samples.

Table 6-3

Chemical Sampling Detail

Geomorphic Unit	Core Location	New Jersey State Plane Coordinates (NAD 83)[a]		Number of Samples per Core[b]	Target Penetration (ft-bss)	Chemical Sample Intervals					
		Easting (feet)	Northing (feet)			Segment 1 (ft-bss)	Segment 2 (ft-bss)	Segment 3 (ft-bss)	Segment 4 (ft-bss)	Segment 5 (ft-bss)	Segment 6 (ft-bss)
Southern Navigation Channels (South of Port Newark)	NB01SED001	578106	659148	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED004	586397	658516	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED006	590472	659036	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED008	586683	660505	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED010	583053	660587	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED017	589319	661742	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED021	590622	664133	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED027	590505	666102	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED030	592093	667338	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED031	592159	669487	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED033	593564	670656	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED043	594665	673862	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
Northern Navigation Channels (North of Port Newark)	NB01SED046	595466	675678	6	11.0	0 to 0.5	0.5 to 1.5	1.5 to 3.5	3.5 to 6.0	6.0 to 8.5	8.5 to 11
	NB01SED052	596407	677403	6	11.0	0 to 0.5	0.5 to 1.5	1.5 to 3.5	3.5 to 6.0	6.0 to 8.5	8.5 to 11
	NB01SED055	597327	679180	6	11.0	0 to 0.5	0.5 to 1.5	1.5 to 3.5	3.5 to 6.0	6.0 to 8.5	8.5 to 11
	NB01SED061	598148	681571	6	11.0	0 to 0.5	0.5 to 1.5	1.5 to 3.5	3.5 to 6.0	6.0 to 8.5	8.5 to 11
	NB01SED063	598801	684037	6	11.0	0 to 0.5	0.5 to 1.5	1.5 to 3.5	3.5 to 6.0	6.0 to 8.5	8.5 to 11
	NB01SED066	601476	686276	6	11.0	0 to 0.5	0.5 to 1.5	1.5 to 3.5	3.5 to 6.0	6.0 to 8.5	8.5 to 11
Port Channels	NB01SED024	589434	665131	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED026	587166	666321	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED034	590518	672481	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED035	588832	673830	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED047	593286	676286	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
	NB01SED048	591600	678267	3	3.0	0 to 0.5	0.5 to 1.5	1.5 to 3.0	NA	NA	NA
Transitional Slopes	NB01SED011	583058	661012	6	5.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	4.5 to 5.5
	NB01SED016	589949	661426	6	5.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	4.5 to 5.5
	NB01SED018	588726	662114	6	5.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	4.5 to 5.5
	NB01SED029	592538	667134	6	5.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	4.5 to 5.5
	NB01SED042	595083	673659	6	5.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 4.5	4.5 to 5.5

Table 6-3 (cont'd)

Chemical Sampling Detail

Geomorphic Unit	Core Location	New Jersey State Plane Coordinates (NAD 83)[a]		Number of Samples per Core[b]	Target Penetration (ft-bss)	Chemical Sample Intervals					
		Easting (feet)	Northing (feet)			Segment 1 (ft-bss)	Segment 2 (ft-bss)	Segment 3 (ft-bss)	Segment 4 (ft-bss)	Segment 5 (ft-bss)	Segment 6 (ft-bss)
Sub-tidal Flats	NB01SED005	587774	658932	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED007	590096	660554	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED009	585270	660151	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED013	583521	661969	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED014	585952	661925	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED015	587422	661575	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED019	585710	663375	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED020	588775	663778	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED022	591840	664163	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED023	586857	665048	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED028	593175	666796	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED032	594423	669450	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED037	595480	671794	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED039	597372	672477	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED040	593404	672585	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED041	592308	673533	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED044	593288	674492	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED045	596606	674884	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED050	597682	676377	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED051	595242	676957	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED053	599479	677317	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED054	598275	678818	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED056	596720	679499	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED057	600451	679403	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED059	600858	681076	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED060	599087	681181	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED062	600092	683472	4	3.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	NA	NA
	NB01SED064	600822	684875	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
Inter-tidal Area	NB01SED003	582972	659133	4	4.0	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 4.0	NA	NA
	NB01SED038	597906	671975	4	4.0	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 4.0	NA	NA
	NB01SED058	601722	681206	4	4.0	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 4.0	NA	NA

Table 6-3 (cont'd)

Chemical Sampling Detail

Geomorphic Unit	Core Location	New Jersey State Plane Coordinates (NAD 83)[a]		Number of Samples per Core[b]	Target Penetration (ft-bss)	Chemical Sample Intervals					
		Easting (feet)	Northing (feet)			Segment 1 (ft-bss)	Segment 2 (ft-bss)	Segment 3 (ft-bss)	Segment 4 (ft-bss)	Segment 5 (ft-bss)	Segment 6 (ft-bss)
Industrial Waterfront	NB01SED002	579924	659149	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED012[c]	582703	661835	7	8.0	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED025	586895	666089	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED036	586557	675627	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED049	588248	679816	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED065	600447	686971	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED067	606171	693971	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED068	609300	695498	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
	NB01SED069	609483	696217	6	6.5	0 to 0.5	0.5 to 1.5	1.5 to 2.5	2.5 to 3.5	3.5 to 5.0	5.0 to 6.5
TOTAL SAMPLES				**317**	---	---	---	---	---	---	---

Notes:
a. Actual locations may vary depending upon field conditions.
b. Does not include QA/QC samples.
c. Additional sample will be collected from 6.5 to 8.0 ft-bss.
ft-bss = Feet below sediment surface
NA = Not applicable
NAD 83 = North American Datum of 1983

Table 6-4

Radiochemical Sampling Detail

Geomorphic Unit	Core Location	New Jersey State Plane Coordinates (NAD 83)[a]		Radiochemical Test Method(s) Conducted[b]	Number of Samples per Core[c]	Target Penetration (ft-bss)	Radiochemical Sample Intervals								
		Easting (feet)	Northing (feet)				Sample Segment 1 (in-bss)	Sample Segment 2 (in-bss)	Sample Segment 3 (in-bss)	Sample Segment 4 (in-bss)	Sample Segment 5 (in-bss)	Sample Segment 6 (in-bss)	Sample Segment 7 (in-bss)	Sample Segment 8 (in-bss)	Sample Segment 9 (in-bss)
Sub-tidal Flats	NB01SED005	587774	658932	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED007	590096	660554	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED009	585270	660151	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED013	583521	661969	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED014	585952	661925	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED015	587422	661575	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED019	585710	663375	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED020	588775	663778	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED022	591840	664163	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED023	586857	665048	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED028	593175	666796	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED032	594423	669450	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED037	595480	671794	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED039	597372	672477	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED040	593404	672585	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED041	592308	673533	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED044	593288	674492	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED045	596606	674884	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED050	597682	676377	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED051	595242	676957	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED053	599479	677317	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED054	598275	678818	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED056	596720	679499	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
	NB01SED057	600451	679403	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED059	600858	681076	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED060	599087	681181	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED062	600092	683472	^{210}Pb, ^{137}Cs, ^{7}Be	9	3.5	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	40 to 42
	NB01SED064	600822	684875	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	76 to 78
Inter-tidal Areas	NB01SED003	582972	659133	^{210}Pb, ^{137}Cs, ^{7}Be	9	4.0	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	46 to 48
	NB01SED038	597906	671975	^{210}Pb, ^{137}Cs, ^{7}Be	9	4.0	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	46 to 48
	NB01SED058	601722	681206	^{210}Pb, ^{137}Cs, ^{7}Be	9	4.0	0 to 2	2 to 4	4 to 6	8 to 10	14 to 16	20 to 22	26 to 28	32 to 34	46 to 48

Table 6-4 (cont'd)

Radiochemical Sampling Detail

Geomorphic Unit	Core Location	New Jersey State Plane Coordinates (NAD 83)[a]		Radiochemical Test Method(s) Conducted[b]	Number of Samples per Core[b]	Target Penetration (ft-bss)	Radiochemical Sample Intervals								
		Easting (feet)	Northing (feet)				Sample Segment 1 (in-bss)	Sample Segment 2 (in-bss)	Sample Segment 3 (in-bss)	Sample Segment 4 (in-bss)	Sample Segment 5 (in-bss)	Sample Segment 6 (in-bss)	Sample Segment 7 (in-bss)	Sample Segment 8 (in-bss)	Sample Segment 9 (in-bss)
Northern Navigation Channels (North of Port Newark)	NB01SED046	595466	675678	^{210}Pb, ^{7}Be	9	11.0	0 to 2	2 to 4	4 to 6	21 to 23	43 to 45	65 to 67	87 to 89	109 to 111	130 to 132
	NB01SED052	596407	677403	^{210}Pb, ^{7}Be	9	11.0	0 to 2	2 to 4	4 to 6	21 to 23	43 to 45	65 to 67	87 to 89	109 to 111	130 to 132
	NB01SED055	597327	679180	^{210}Pb, ^{7}Be	9	11.0	0 to 2	2 to 4	4 to 6	21 to 23	43 to 45	65 to 67	87 to 89	109 to 111	130 to 132
	NB01SED061	598148	681571	^{210}Pb, ^{7}Be	9	11.0	0 to 2	2 to 4	4 to 6	21 to 23	43 to 45	65 to 67	87 to 89	109 to 111	130 to 132
	NB01SED063	598801	684037	^{210}Pb, ^{7}Be	9	11.0	0 to 2	2 to 4	4 to 6	21 to 23	43 to 45	65 to 67	87 to 89	109 to 111	130 to 132
	NB01SED066	601476	686276	^{210}Pb, ^{7}Be	9	11.0	0 to 2	2 to 4	4 to 6	21 to 23	43 to 45	65 to 67	87 to 89	109 to 111	130 to 132
Transitional Slopes	NB01SED011	583058	661012	^{210}Pb, ^{137}Cs, ^{7}Be	9	5.5	0 to 2	2 to 4	4 to 6	10 to 12	18 to 20	28 to 30	40 to 42	52 to 54	64 to 66
	NB01SED016	589949	661426	^{210}Pb, ^{137}Cs, ^{7}Be	9	5.5	0 to 2	2 to 4	4 to 6	10 to 12	18 to 20	28 to 30	40 to 42	52 to 54	64 to 66
	NB01SED018	588726	662114	^{210}Pb, ^{137}Cs, ^{7}Be	9	5.5	0 to 2	2 to 4	4 to 6	10 to 12	18 to 20	28 to 30	40 to 42	52 to 54	64 to 66
	NB01SED029	592538	667134	^{210}Pb, ^{137}Cs, ^{7}Be	9	5.5	0 to 2	2 to 4	4 to 6	10 to 12	18 to 20	28 to 30	40 to 42	52 to 54	64 to 66
	NB01SED042	595083	673659	^{210}Pb, ^{137}Cs, ^{7}Be	9	5.5	0 to 2	2 to 4	4 to 6	10 to 12	18 to 20	28 to 30	40 to 42	52 to 54	64 to 66
Industrial Waterfront	NB01SED002	579924	659149	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED012[d]	582703	661835	^{210}Pb, ^{137}Cs, ^{7}Be	10	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED025	586895	666089	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED036	586557	675627	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED049	588248	679816	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED065	600447	686971	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED067	606171	693971	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED068	609300	695498	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
	NB01SED069	609483	696217	^{210}Pb, ^{137}Cs, ^{7}Be	9	6.5	0 to 2	2 to 4	4 to 6	10 to 12	22 to 24	34 to 36	48 to 50	62 to 64	73 to 78
TOTAL SAMPLES					**460**	--	--	--	--	--	--	--	--	--	--

Notes:

a. Actual locations may vary depending upon field conditions.

b. ^{7}Be will be colledted from the top inch of a grab sample.

c. Does not include QA/QC samples.

d. Additional sample will be collected from 94 to 96 in-bss.

ft-bss = Feet below sediment surface

in-bss = Inches below sediment surface

NA = Not applicable

NAD 83 = North American Datum of 1983

Table 6-5
Chemical Analysis Hierarchical Prioritization[a] and Weight Requirements For Sediment Samples and Associated Laboratory QC Samples

Number	Analyses	Desired Minimum Sample Weight Wet (g)	Cumulative Weight Wet (g)	Sample Weight for QC Samples[c]		
				MS Weight Wet (g)	MSD Weight Wet (g)	Duplicate Weight Wet (g)
---	Volatile Organics/Percent Moisture[b]	15/5	20	15	15	NA
1	PCDDs/PCDFs	100	120	100	100	NA
2	PCB Congeners and Homologues	100	220	100	100	NA
3	Pesticides and Aroclor PCBs	80	300	80	80	NA
4	Semivolatile Organics	80	380	80	80	NA
5	Mercury	5	385	5	NA	5
6	Inorganics	45	430	45	NA	45
7	Herbicides	80	510	80	120	NA
8	Cyanide	40	550	40	NA	40
9	TEPH	80	630	80	80	NA
10	Total Organic Carbon (TOC)	40	670	40	40	NA
11	Organotins	35	705	30	30	NA
12	Grain Size	10	715	NA	NA	NA
13	Percent Moisture	10	725	NA	NA	NA
	Total	725	- -	695	605	90

Notes:

a. For a given sample, if insufficient mass is obtained to complete all of the listed analyses, then collect Volatile Organics/Percent Moisture and proceed to collect samples in sequence in this table, beginning with Item Number 1.

b. Samples for volatile organic analysis and percent moisture (for the volatile organics) must be collected prior to homogenization.

c. QC sample weights are in addition to desired minimums listed. QC samples do not need to be obtained from the same field sample for all analytical groups.

g = grams

MS = Matrix Spike

MSD = Matrix Spike Duplicate

NA = Not Applicable

QC = Quality Control

Table 6-6
Sample Bottle and Preservative Specifications for Chemical and Radiochemical Analysis of Sediment Samples[a]

Parameters Analyzed	Holding Time[b]	Recommended Size Sample Container[c,d]	Container Material	Preservative
VOCs	48 hours to extraction, 8 days until analysis	(3X) 5g EnCore™ Sampler	EnCore™ Sampler	4°C
Percent Moisture	28 days	(2 oz)	G[e]	4°C
Inorganics	6 months	16 oz	G[e]	4°C
Mercury	28 days			
Cyanide	14 days			
SVOCs	7 days to extraction, 40 days until analysis			
Aroclors, PCBs/Pesticides	7 days to extraction, 40 days until analysis			
Chlorinated Herbicides	7 days to extraction, 40 days until analysis			
TOC	14 days			
TEPH	14 days to extraction, 40 days until analysis			
Radiochemicals	3 months	16 oz	G[e]	4°C
Organotins	14 days to extraction, 40 days until analysis	4 oz[f]	G[e]	4°C
Grain Size	28 days	2 oz	G[e]	4°C
PCB Congeners and Homologues	7 days to extraction, 40 days until analysis	16 oz	G[e]	4°C
PCDDs/PCDFs	30 days to extraction, 40 days until analysis			

Notes:

a. Analytical methods are specified in Table 6-8.
b Holding time is calculated from the date of sample collection to the date of sample analysis (or extraction as noted).
c. Samples for analyses having identical container and preservation requirements may be combined in the same container. The noted 16-oz. container will hold sufficient mass to meet the minimum requirements specified in Table 6-5 for all specified analyses.
d. Wide-mouth jars with Teflon-lined lids preferred.
e. G = Amber glass.
f. Two 4-oz. jars will be needed for samples identified for matrix spike and matrix spike duplicates.

Table 6-7
Sample Bottle, Volume, and Preservative Specifications for Chemical Analysis of Water Samples[a]

Parameters Analyzed	Approximate Volume	Container Material	Preservative	Holding Time[b]
Inorganics	1 liter	P	HNO_3 to pH<2, 4°C	6 months
Mercury	1 liter	P	HNO_3 to pH<2, 4°C	28 days
Cyanide	1 liter	P	NaOH to pH>12, 4°C	14 days
PCDDs/PCDFs	1 liter[c]	G, Amber	4°C	30 days to extraction, 40 days until analysis
Semivolatile Organics	1 liter[c]	G, Amber	4°C	7 days to extraction, 40 days until analysis
Volatile Organics	40 mL VOA vial (in triplicate)	G, Teflon-lined septa	4°C; HCl to pH<2	14 days
Arcoclor PCBs	1 liter[c]	G, Amber	4°C	7 days to extraction, 40 days until analysis
PCB Congeners and Homologues	1 liter[c]	G, Amber	4°C	7 days to extraction, 40 days until analysis
Chlorinated Herbicides	1 liter[c]	G, Amber	4°C	7 days to extraction, 40 days until analysis
TOC	250 milliliters	G	4°C; H_2SO_4 to pH<2	14 days
TEPH	1 liter[c]	G, Amber	4°C; HCl to pH<2	14 days to extraction 40 days until till analysis
Pesticides	1 liter[c]	G, Amber	4°C	7 days to extraction 40 days until analysis
Organotins	1 liter[c]	G, Amber	4°C	7 days to extraction 40 days until analysis

Notes:

a. Analytical methods are specified in Table 6-8. Water samples are rinsate blanks.
b. Holding time is calculated from the date and time of sample collection to the date and time of sample extraction or analysis.
c. For each sample sent to a laboratory for extractable analysis (i.e., TEPH, semivolatile organics, PCB congeners and homologues, pesticides, Aroclor PCBs, organotins, and herbicides), an extra 1-liter bottle should be provided, if practical, in case of breakage or spillage from one of the sample bottles.
d. G = Glass
P = Plastic (polyethylene)

Table 6-8
Analytical Procedures

Parameter	Technique	Extraction and Analysis Method[a]		
		Water		Sediment
Volatile Organics	GC/MS	5030/8260B		5035/8260B
Semivolatile Organics	GC/MS	3510C/8270C		3550B/8270C
Pesticides	GC	3510C/8081		3550B/8081
Aroclor PCBs	GC	3510C/8082		3550B/8082
PCB Congeners and Homologues	HRGC/HRMS	INC/1668A[b]		INC/1668A[b]
Chlorinated Herbicides	GC	INC/8151A		INC/8151A
PCDDs/PCDFs	HRGC/HRMS	INC/1613B[c]		INC/1613B[c]
TEPH	GC	NJ-TPH-QAM-025-10/91		NJ-TPH-QAM-025-10/91
Inorganics	ICP	3010/6010		3050/6010
Mercury	CVAA	INC/7470		INC/7471A
Cyanide	Titration/ Colorimetric	9010B/9013/9014[d]		9010B/9013/9014[d]
Total Organic Carbon (TOC)	Carbonaceous Analyzer	EPA 415.1		INC/Lloyd Kahn[e]
Cesium-137	Gamma Spectroscopy	NA		Paragon Analytics[f] SOP
Beryllium-7	Gamma Spectroscopy	NA		Paragon Analytics[f] SOP
Lead-210	Beta Detection	NA		Paragon Analytics[f] SOP
Percent Moisture	Gravimetric	NA		ASTM D2974
Organotins	GC	STL SOP LM-GC-ALKYLTINS, Rev. 7[g]		STL SOP LM-GC-ALKYLTINS, Rev. 7[g]
Grain Size	Laser Defraction	NA		PTL SOP[h]

Notes:

a. All methods are from USEPA SW-846 "Test Methods for Evaluating Solid Waste," Third Edition, December 1996 including promulgated final update III, unless otherwise noted. 'INC' indicates that the sample preparation method is included in the analytical method. 'NA' indicates that the analysis of a given parameter is not applicable. Copies of the extraction methods, analytical methods, and method summaries are included as Appendices to this IWP.
b. USEPA Method 1668A: Measurement of toxic PCB congeners by isotope dilution HRGC/HRMS (December, 1999).
c. The method for PCDDs/PCDFs is USEPA Method 1613: Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS, Revision B (October 1994).
d. Method 9012A (automated UV, colorimetric) shall also be acceptable for cyanide analyses.
e. Lloyd Kahn TOC method, as modified by USEPA.
f. Paragon Analytics, Inc.
g. STL, SOP No. LM-GC-ALKYLTINS Rev. 7, Standard Operating Procedure for Organotin Compounds.
h. PTL – Particle Technology Laboratory, Ltd.

NA = Not Applicable.
GC/MS = gas chromatography/mass spectroscopy.
HRGC/LRMS = high resolution gas chromatography/low resolution mass spectroscope.
GC = gas chromatography.
HRGC/HRMS = high resolution gas chromatography/high resolution mass spectroscopy.
CVAA = cold vapor atomic absorption.
ICP = inductively coupled plasma emission spectroscopy.

Table 6-9
Equipment Calibration and Maintenance Log

Date	Time	Equipment Information		Calibration[a]			Inspection[b]		Maintenance[c]	
(mm/dd/yy)	(hh:mm)	Make/Model	ID/Serial Number	Initial	Check	Recalibrate	Working	Replace	Charge	Repair[d]

Notes:

a. Enter the time of each activity.
b. Enter initials in appropriate box during each calibration activity, if REPLACE, record the reason on the following line and calibrate new equipment.
c. Enter initials in appropriate box upon performing any of the listed activities.
d. Enter description of repair activity in logbook.

Table 6-10
Equipment Calibration Schedule

Equipment Type	Frequency of Calibration
Photoionization Detector	Daily prior to use.
Hydrogen Sulfide Meter	Prior to beginning project and every six months thereafter.
Fathometer	Twice daily at the beginning and end of the day.
Survey Equipment	Prior to beginning project and twice daily at the beginning and end of the day.
Tide Gage	Annually by user.
SPI Camera	Daily prior to use.

Note:

1. This table provides an approximate schedule for equipment calibration. In addition to this schedule, the equipment manufacturer's specifications should be followed, as appropriate.

Table 10-1
Schedule for AOC-Required RI Reports/Plans[a]

Report or Plan	Prerequisite Event	Submittal Date (Time Required Following Prerequisite Event in Calendar Days)
Submittal of Newark Bay Study Area Remedial Investigation Work Plan (RIWP) (SOW Section B)	Signing of AOC (AOC Paragraph 39)	120
Submittal of Feasibility Study Work Plan (FSWP) (SOW Section F)	Receipt of written notification of approval of RIWP (AOC Paragraph 45)	90
Submittal of RI Report (SOW Section E)	Latest completion of data collection associated with: • Phase II SI Program • Source Sampling Program • USEPA's Modeling Plan • USEPA's Risk Assessment Plan (whichever is later)	Up to 365[b]

Notes:

a. The table does not reflect resubmission of the plans/reports listed, which is to occur 30 days following receipt of USEPA comments.
b. This duration is not required per the AOC.