US Army Corps of Engineers

PUBLIC NOTICE

US Army Corps of Engineers
New York District
ATTN: Harbor Programs Branch (Shea)
26 Federal Plaza, Room 2119
New York, N.Y. 10278-0090

In replying refer to:
Public Notice Number: FP64-SE1-2008
Issue Date: 25 April 2008
Expiration Date: 27 May 2008

NEW YORK AND NEW JERSEY HARBOR DEEPENING
ELIZABETH CHANNEL
FEDERAL NAVIGATION PROJECT
CONTRACT AREA S-E-1

TO WHOM IT MAY CONCERN:

Pursuant to Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 (commonly referred to as the Ocean Dumping Act, 33 U.S.C. 1413), this Public Notice serves as the U.S. Army Corps of Engineers (New York District) notification and request for comments relating to the potential placement of Historic Area Remediation Site (HARS) suitable material obtained under the sixth construction contract of the New York and New Jersey Harbor Deepening Project, as authorized by Section 101(a)(2) of the Water Resources Act of 2000, Public Law 106-541. This proposed placement will allow suitable Pleistocene age red-brown clay and Pleistocene age glacial till material dredged under the fifth construction contract to be placed at the HARS - see below for further information.

ACTIVITY: Place approximately 11,000 cubic yards of Pleistocene age glacial till dredged material and approximately 704,000 cubic yards of Pleistocene age red-brown clay dredged material at the Historic Area Remediation Site (HARS) for a total of 715,000 cubic yards of Remediation Material for the HARS. The remaining material identified in Table 1 will be placed at either an upland location or at an artificial reef, as appropriate.

LOCATION: Elizabeth Channel, Newark Bay, Newark and Elizabeth, New Jersey, within the Port of New York and New Jersey. The federal channel extends from its confluence with Newark Bay westerly approximately 2,050 feet.

DESCRIPTION OF PLANNED ACTION:

The New York and New Jersey Harbor Deepening Project involves deepening existing Federal Navigation Channels to a navigable depth of 50 feet below mean low water (MLW). Construction of the overall Project is planned to be accomplished using seventeen contracts (see Figure 1). The Newark Bay portion of the project will be accomplished using three contracts. The action described herein is the second of the three planned contract areas for the deepening of Newark Bay and the Port Authority facilities.

Contract Area S-E-1

Contract Area S-E-1 (Figure 2a and 2b) contains Holocene age black silt overlying hard Pleistocene age red-brown silt and clay and Pleistocene age glacial till material and rock that are to be dredged to a depth of –52 feet for the 50-foot project depth (i.e., design depth of –50 feet plus an additional –2 feet for safety). To account for the inherent imprecision and variability in a dredging operation, the contractor is also paid for removing up to an additional 1.5 feet of material, below the required depth of –52 feet mean low water. Based on analyses of survey data from previous contracts, it is expected that that the average depth that will be achieved will be –53.5 feet. Approximately 95% of the individual survey points will likely be between –52.5 feet and –54.5 feet below mean low water. The Pleistocene age red-brown clay and Pleistocene age glacial till materials are proposed to be used beneficially as HARS Remediation Material. The construction contract under discussion in this public notice is expected to begin in November 2008 and have a duration of approximately twenty-two months. The District has requested a Water Quality Certificate and Federal Consistency Determination from the State of New Jersey, which it expects to receive by June 2008. The following table summarizes the volumes of dredged material proposed to be removed from the Elizabeth Channel.

Table 1
Material Volume Estimates for the Elizabeth Channel (to a total depth of –53.5')

Location of Material / Volume Estimates	HARS Suitable Pleistocene Age Sediments		Upland Sediments	Rock (CY)	Total Material Volume (CY)
	Glacial Till* (CY)	Red-Brown Clay** (CY)	Black Silt*** (CY)		
Contract Area S-E-1	11,000	704,000	222,000	15,000	952,000

* The USEPA, Region 2 and the USACE, NY District determined in a Memorandum For Record dated August 26, 2003, that Pleistocene age glacial till from Newark Bay is characterized for HARS placement.

** The USEPA, Region 2 and the USACE, NY District determined in a Memorandum for Record dated January 26, 2000 that Pleistocene age red-brown clay from the greater Newark Bay formation is characterized for HARS placement.

*** The New York District will send this Holocene age black silt dredged material to a state-approved upland site for amending and beneficial reuse. The volume is included in this table for completeness.

The purpose of this Public Notice is to solicit comments regarding the proposed placement of these Pleistocene age materials at the HARS. These comments, along with all available technical data/information, will form the basis of a determination of whether this proposed placement is in the public interest. The HARS (Figures 3 & 4), located in the Atlantic Ocean off the coasts of New York and New Jersey, is described later in this notice.

The estimated 222,000 cubic yards of Holocene age black silt material will be removed with a standard environmental dredging clamshell bucket and processed into amended dredged material. The amended dredged material will be used beneficially in the ongoing remediation of suitable, state-approved upland remediation or construction locations. There are no other Holocene age dredged materials in Contract Area S-E-1 beyond the 222,000 cubic yards of black silt.

Approximately 11,000 cubic yards of the proposed dredged material from Elizabeth Channel in

Contract Area S-E-1 have been demonstrated to be Pleistocene age glacial till. The joint U.S. Environmental Protection Agency – Region 2 and U.S. Army Corps of Engineers – New York District August 26, 2003 Memorandum For The Record, titled Joint Federal Position on Testing of Glacial Till Dredged Materials from Selected Areas of New York & New Jersey Harbor, concluded that Pleistocene age glacial till is removed from sources of contamination and has been adequately characterized by previous testing in the vicinity. As such, further project-specific testing of glacial till, including these 11,000 cubic yards, is not required.

In accordance with geological testing and assessment procedures set forth in a joint U.S. Environmental Protection Agency – Region 2 and U.S. Army Corps of Engineers – New York District standardized operating procedures, these 11,000 cubic yards are glacial till because the material (1) lacks detectible fossils or shells, (2) has a low organic carbon content, (3) has a reddish or red-brown color, (4) is comprised of a poorly sorted layer of clay particles, silts, sands, gravels and boulders, and (5) has a stratigraphic setting consistent with other Pleistocene age deposits in the vicinity of this Newark Bay Channel dredging area. A copy of the glacial till determination for this construction contract area may be requested from Mr. Thomas Shea, Project Manager for the New York and New Jersey Harbor Deepening Project, at telephone number (917) 790-8304.

Several areas of Pleistocene age glacial till in the vicinity of the Newark Bay Channel, Contract Area S-NB-1, were previously tested to determine suitability for use as Remediation Material at the HARS. This testing of glacial till was conducted in accordance with test protocols for ocean placement established by the U.S. Environmental Protection Agency – Region 2 and U.S. Army Corps of Engineers – New York District. Public notice of previous Pleistocene age glacial till chemical analysis, toxicity, and 28-day bioaccumulation test results for a determination of suitability for HARS remediation purposes was provided in U.S. Army Corps of Engineers – New York District Supplemental Public Notice FP63-345678CC-2002 issued on December 6, 2002 for the Kill Van Kull/Newark Bay Federal Navigation Project, Contract Areas 8 and 4B construction contract area. Those chemical analyses, toxicity, and 28-day bioaccumulation test results are included in this public notice (attached Tables 2A-4C) for informational purposes only.

This deepening project also includes approximately 704,000 cubic yards of Pleistocene age red-brown clay dredged material (from the Newark Bay complex) for placement as Remediation Material at the HARS. Pleistocene age red-brown clay dredged materials (from the Newark Bay complex) were previously tested to determine their suitability for use as Remediation Material at the HARS. Testing was conducted in accordance with test protocols for ocean placement established by the U.S. Environmental Protection Agency – Region 2 and U.S. Army Corps of Engineers – New York District. Notification of the previous Pleistocene age red-brown clay test results for a determination of suitability for HARS remediation purposes were provided in U.S. Army Corps of Engineers – New York District Public Notice Supplement FP63-345678CC issued on July 14, 2000. Those test results are included in this public notice (attached Tables 5A-5C) for informational purposes only. A Joint Memorandum for Record (MFR) signed by both agencies on January 26, 2000, concluded that the Pleistocene age red-brown clay found throughout the Newark Bay Complex, including the Port Jersey Channel, was suitable for HARS placement and would not require further testing.

The approximately 15,000 cubic yards of dredged rock will be used beneficially by its placement at the Axel Carlson or Shark River artificial reef site in the Atlantic Ocean (Figure 5) or at a similar permitted ocean artificial reef.

The proposed transportation of this dredged material for placement in ocean waters is being evaluated to determine that the proposed placement will not unreasonably degrade or endanger human health, welfare or amenities, or the marine environment, ecological systems or economic potentialities. The criteria established by the Administrator, USEPA, pursuant to Section 102(a) of the Ocean Dumping Act will be applied. In addition, based upon an evaluation of the potential effect which the failure to utilize this ocean placement site will have on navigation, economic and industrial development, and foreign and domestic commerce of the United States, an independent determination will also be made of the need to place the dredged material in ocean waters, considering other possible methods of disposal and other appropriate locations.

ALL COMMENTS REGARDING THIS ACTIVITY MUST BE PREPARED IN WRITING AND MAILED TO REACH THE NEW YORK DISTRICT, USACE AT THE OFFICE ADDRESS SHOWN ON THE FRONT PAGE OF THIS NOTICE, BEFORE THE EXPIRATION DATE OF THIS NOTICE. Otherwise, it will be presumed that there are no objections to the activity.

Any person who has an interest, or may be affected by the placement of this dredged material may request a public hearing. The request must be submitted in writing within the comment period of this notice and must clearly set forth the interest affected and the manner in which the interest may be affected by the proposed activity. It should be noted that information submitted by mail is considered just as carefully in the process and bears the same weight as that furnished at a public hearing.

The proposed placement at the HARS has been reviewed based upon the "Biological Assessment for the Closure of the Mud Dump Site and Designation of the Historic Area Remediation Site (HARS) in the New York Bight and Apex" (USEPA, 1997) prepared pursuant to Section 7 of the Endangered Species Act (16 USC 1531). Based upon that review, and a review of the latest public listing of threatened and endangered species, it has been preliminarily determined that the proposed activity described herein is not likely to adversely affect any federally-listed threatened or endangered species (humpback whales, finback whales, right whales, loggerhead turtles, leatherback turtles, green turtles, and Kemp's Ridley turtles) or their critical habitat.

The material proposed for HARS placement will not be placed within 0.27 nautical miles of any identified wrecks, which are indicated in the National Register of Historic Places. Other than wrecks, there are no known sites eligible for, or included in, the Register within the dredged material placement area. No known archaeological, scientific, pre-historical or historical data is expected to be lost by the anticipated placement of dredged material.

The District continues to work closely with the following Federal and State agencies:

- U.S. Environmental Protection Agency
- U.S. Department of the Interior, Fish and Wildlife Service
- U.S. Department of Commerce, National Marine Fisheries Service
- U.S. Coast Guard, Activities New York
- New Jersey Department of Environmental Protection
- New York State Department of Environmental Conservation
- New York State Department of State

ENVIRONMENTAL DOCUMENTATION:

The environmental impacts of the New York and New Jersey Harbor Deepening Project (HDP) have been evaluated in National Environmental Policy Act (NEPA) and other regulatory documents including: (1) the Final Feasibility Report and Final Environmental Impact Statement dated December 1999; (2) the Federal Record-of-Decision executed in June 2002; and (3) the Final Limited Reevaluation Report and Final Environmental Assessment/Finding of No Significant Impact dated January 2004.

The District prepared a Draft Environmental Assessment (EA) on the Newark Bay Area of the New York and New Jersey Harbor Deepening Project (June 2005). This EA has been prepared to 1) review EPA's designation of those parts of the Newark Bay Study Area (NBSA) to include Newark Bay and portions of Arthur Kill and the Kill Van Kull as an operable unit of the Diamond Alkali Superfund Site, (2) evaluate whether the dredging activities of the HDP will significantly affect the NBSA Remedial Investigation/Feasibility Study and determine if impacts will significantly differ from those previously identified in the documents referenced above and 3) to review the information in the Contaminant Assessment and Reduction Program (CARP; NYSDEC, 2003) and Inventory Report (Tierra Solutions, 2004). (For purposes of the District's assessment, the EPA's designation of portions of the Hackensack River as part of the NBSA will not be evaluated, as the Hackensack River is not located within the HDP's project area.)

A copy of the June 2005 Draft EA can be found at www.nan.usace.army.mil. Copies of these documents can be viewed and/or obtained by contacting Mr. Thomas Shea, Project Manager for the New York and New Jersey Harbor Deepening Project, at telephone number (917) 790-8304.

HISTORIC AREA REMEDIATION SITE (HARS):

In 1972, Congress enacted the Marine Protection Research and Sanctuaries Act (MPRSA) to address and control the dumping of materials into ocean waters. Title I of the Act authorized the US Environmental Protection Agency and the US Army Corps of Engineers to regulate dumping in ocean waters. USEPA and USACE share responsibility for MPRSA permitting and ocean disposal site management. USEPA regulations implementing MPRSA are found at 40 CFR Sections 220 through 229. With few exceptions, MPRSA prohibits the transportation of material from the United States for the purpose of ocean dumping except as may be authorized by a permit issued under the MPRSA. The MPRSA divides permitting responsibility between the USEPA and USACE. Under Section 102 of the MPRSA, USEPA has responsibility for issuing permits for all materials other than dredged material. Under Section 103 of MPRSA, the Secretary of the Army has the responsibility for issuing permits for dredged material, subject to

USEPA concurrence.

In the fall of 1997, the USEPA de-designated and terminated the use of the New York Bight Dredged Material Disposal Site (commonly known as the Mud Dump Site or MDS). The MDS had been designated in 1984 for the disposal of up to 100 million cubic yards of dredged material from navigation channels and other port facilities within the Port of New York and New Jersey. Simultaneous with the closure of the MDS, the site and surrounding areas that had been used historically as disposal sites for dredged materials were redesignated as the HARS (Figures 4 & 5) at 40 CFR Sections 228.15(d)(6) (See 62 Fed. Reg. 46142 (August 29, 1997); 62 Fed. Reg. 26267 (May 13, 1997)). The HARS is to be managed to reduce impacts of historical disposal activities at the site to acceptable levels in accordance with 40 CFR Sections 228.11(c). The need to remediate the HARS is supported by the presence of toxic effects, dioxin bioaccumulation exceeding Category 1 levels (a definition of which appears in an evaluation memorandum reviewing the results of the testing) in worm tissue, as well as TCDD/PCB contamination in area lobster stocks. Individual elements of those data do not establish that sediments within the Study Area are imminent hazards to the New York Bight Apex ecosystem, living resources, or human health. However, the collective evidence presents cause for concern, and justifies the need for remediation. Further information on the surveys performed and the conditions in the HARS Study Area may be found in the Supplemental Environmental Impact Statement (USEPA, 1997).

The HARS designation identifies an area in and around the former MDS that has exhibited the potential for adverse ecological impacts. The HARS will be remediated with dredged material that shall be selected so as to ensure it will not cause significant undesirable effects including through bioaccumulation or unacceptable toxicity, in accordance with 40 CFR 227.6. This dredged material is referred to as "Material for HARS Remediation" or "HARS Remediation Material".

As of the end of March 2008, dredged materials from fifty-seven different completed and ongoing private and federal dredging projects in the Port of New York and New Jersey have been dredged and placed as Remediation Material in the ocean at the HARS since the closure of the Mud Dump Site and designation of the HARS in 1997. This represents approximately 33,466,483 cubic yards of Remediation Material.

The HARS, which includes the 2.2 square nautical mile area of the former MDS, is an approximately 15.7 square nautical mile area located approximately 3.5 nautical miles east of Highlands, New Jersey and 7.7 nautical miles south of Rockaway, New York. The former MDS is located approximately 5.3 nautical miles east of Highlands, New Jersey and 9.6 nautical miles south of Rockaway, New York. When determined by bathymetry that capping is complete, the USEPA will undertake any necessary rulemaking to de-designate the HARS. The HARS includes the following three areas:

Priority Remediation Area (PRA): A 9.0 square nautical mile area to be remediated with at least 1 meter of Remediation Material. The PRA encompasses an area of degraded sediments as described in greater detail in the SEIS.

Buffer Zone: An approximately 5.7 square nautical mile area (0.27 nautical mile wide band around the PRA) in which no placement of the Material for Remediation will be allowed, but which may receive Material for Remediation that incidentally spreads out of the PRA.

No Discharge Zone: An approximately 1.0 square nautical mile area in which no placement or incidental spread of Material for Remediation is allowed.

To improve management and monitoring of placement activities at the HARS, electronic monitoring equipment is used on-board vessels carrying Remediation Material to the HARS. This equipment records vessel positions and scow draft throughout the duration of each trip to the HARS and during remediation operations. To improve communication reliability between tugs and scows, a prescribed formal communication procedure has been put in place (copies of this procedure are available upon request).

Over the past years, U.S. Environmental Protection Agency – Region 2 and the U.S. Army Corps of Engineers – New York District have been refining the approach to the technical review and scientific and regulatory analysis of dredging projects' dredged materials proposed for placement at the HARS. Sediment testing evaluation processes are evolving, which establish a responsible framework for assessing results of physical, chemical and bioaccumulation test results, to include tissue analysis from bioaccumulation testing of dredged materials proposed for ocean placement. The bioaccumulation framework defines a standard approach for assessing each analyte (an item to be analyzed for as part of the testing), in relation to regulatory standards and human health and environmental risk factors. The framework's purpose is to facilitate decision, and final decision making, in accordance with the Marine Protection, Research and Sanctuaries Act of 1972. The U.S. Environmental Protection Agency – Region 2 and the U.S. Army Corps of Engineers – New York District utilize these testing evaluation processes for identifying HARS-suitable dredged materials for remediation of the HARS.

Additional information concerning the HARS itself can be obtained from Mr. Douglas Pabst of U.S. Environmental Protection Agency – Region 2, Team Leader of the Dredged Material Management Team, at telephone number (212) 637-3797.

ALTERNATIVES TO HARS PLACEMENT:

The New York District has evaluated the regional practicability of potential alternatives for dredged material disposal in a September 1999 Draft Implementation Report for the "Dredged Material Management Plan for the Port of New York and New Jersey". The Recommended Plan within the report addresses both the long and short term dredged material placement options in two specific timeframes, heretofore referred to as the "2010 Plan" and the "2040 Plan" respectively. The 2010 Plan relies heavily on the creation, remediation, and restoration of a variety of existing degraded or impacted sites in the region with material that would or would not be considered suitable for HARS remediation. The Plan anticipates that a considerable volume of HARS-suitable material will be placed at alternative beneficial use sites currently under development. Use of these sites performs habitat creation (for shellfish, oyster, and bird), habitat restoration at existing degraded pit sites, landfill and quarry remediation, provision of construction material, and beach nourishment. Many dredged material management options

presented in the 2010 Plan are not presently permitted and/or are presently under construction, and are unavailable for the purposes of this notice. However, as alternative sites are developed and permitted, they may be evaluated and designated for use for the remaining dredged material from the NY & NJ Harbor Deepening Project. As specific alternative sites and their applicable testing/regulatory criteria are subject to change, future Public Notices on the remaining NY & NJ Harbor Deepening Project contracts may be issued as evaluations and testing of the material to be dredged are performed and as other alternative placement sites are developed.

Based upon the lowest responsible bid received on 17 July 2007 for the Port Jersey PJ-3 contract, the incremental cost for using an upland placement site as an alternative site to the HARS for silt materials was $65.00 a cubic yard as compared to $5.50 for placement of silt at the HARS. This is an increase of $59.50 per cubic yard over the cost of placing the material at the HARS. The additional costs are to the United States and the Port Authority of New York and New Jersey.

The bid received on 24 August 2006 requires Non-HARS-suitable silt to go upland at costs varying from $62 per cubic yard to $68 per cubic yard. Sand placement at an upland site was bid at $31 per cubic yard, and the sand/silt mixture was negotiated at a cost of $54 per cubic yard. Dredged material that is suitable for placement at the HARS as remediation material is estimated to be approximate to the PJ-3 cost of $5.50 per cubic yard, as indicated above.

S-E-1 contract dredged material currently has no economically viable alternative site for the HARS-suitable material. For example, disposal of sand from the Anchorage Channel S-AN-1a contract is $31 per cubic yard, as compared to a bid price of $5.50 per cubic yard for HARS-suitable material from the PJ-3 contract. The Corps will continue to evaluate all reasonable and beneficial alternatives, as practicable, that may become available during the advertisement and post advertisement periods of the contract.

Conclusion

The USACE and the USEPA have determined that the material to be dredged meets the criteria for ocean placement as described in 40 CFR parts 227.6 and 227.27, and in USEPA, Region 2/USACE, New York District guidance. The material is also suitable for placement at the HARS as Remediation Material as described at 40 CFR Part 228.15.

Placement of this material at the HARS would serve to reduce impacts at the HARS to acceptable levels and improve benthic conditions. Sediments in the HARS have been found to be acutely toxic to sensitive benthic marine organisms in laboratory tests. Project dredged material subjected to laboratory acute toxicity tests with the same species was determined not to be toxic. Placement of project material over existing toxic sediments would serve to remediate those areas for toxicity. In addition, by covering the existing sediments at the HARS with this project material, surface dwelling organisms will be exposed to sediments exhibiting Category 1 qualities, which will ameliorate the existing sediment conditions.

Please contact Mr. Thomas Shea, the NY & NJ Harbor Deepening Project Manager; at (917) 790-8304 or by email: Thomas.Shea@usace.army.mil should you have any questions regarding this Public Notice or the NY & NJ Harbor Deepening Project in general. Comments or questions

may be FAXED to (212) 264-2924.

For more information on New York District programs, visit our website at http://www.nan.usace.army.mil.

We request that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who did not receive a copy of this notice.

William F. Slezak
Chief, Harbor Programs Branch

Enclosures

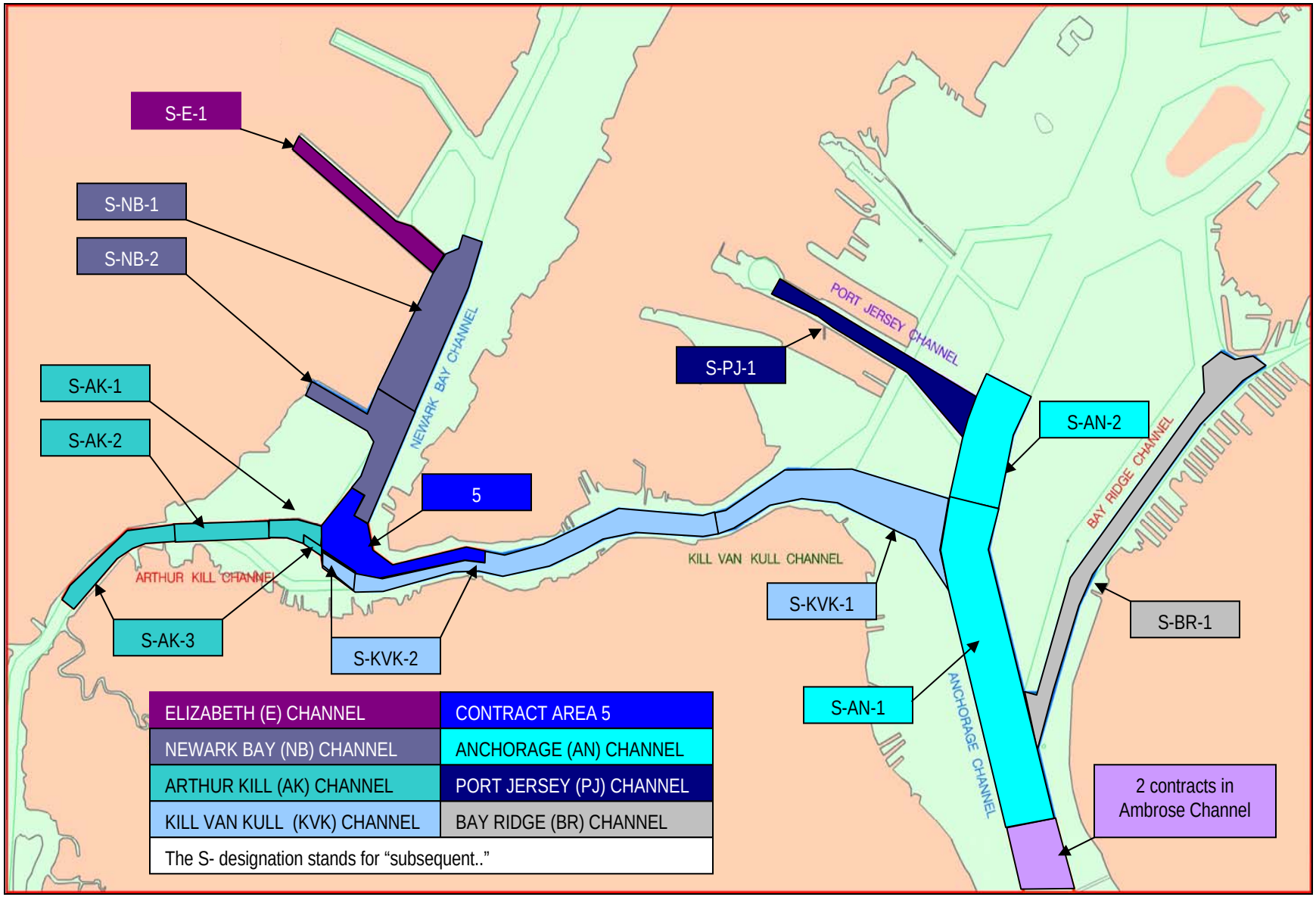


Figure 1, General Map of NY & NJ Harbor Deepening Contract Areas

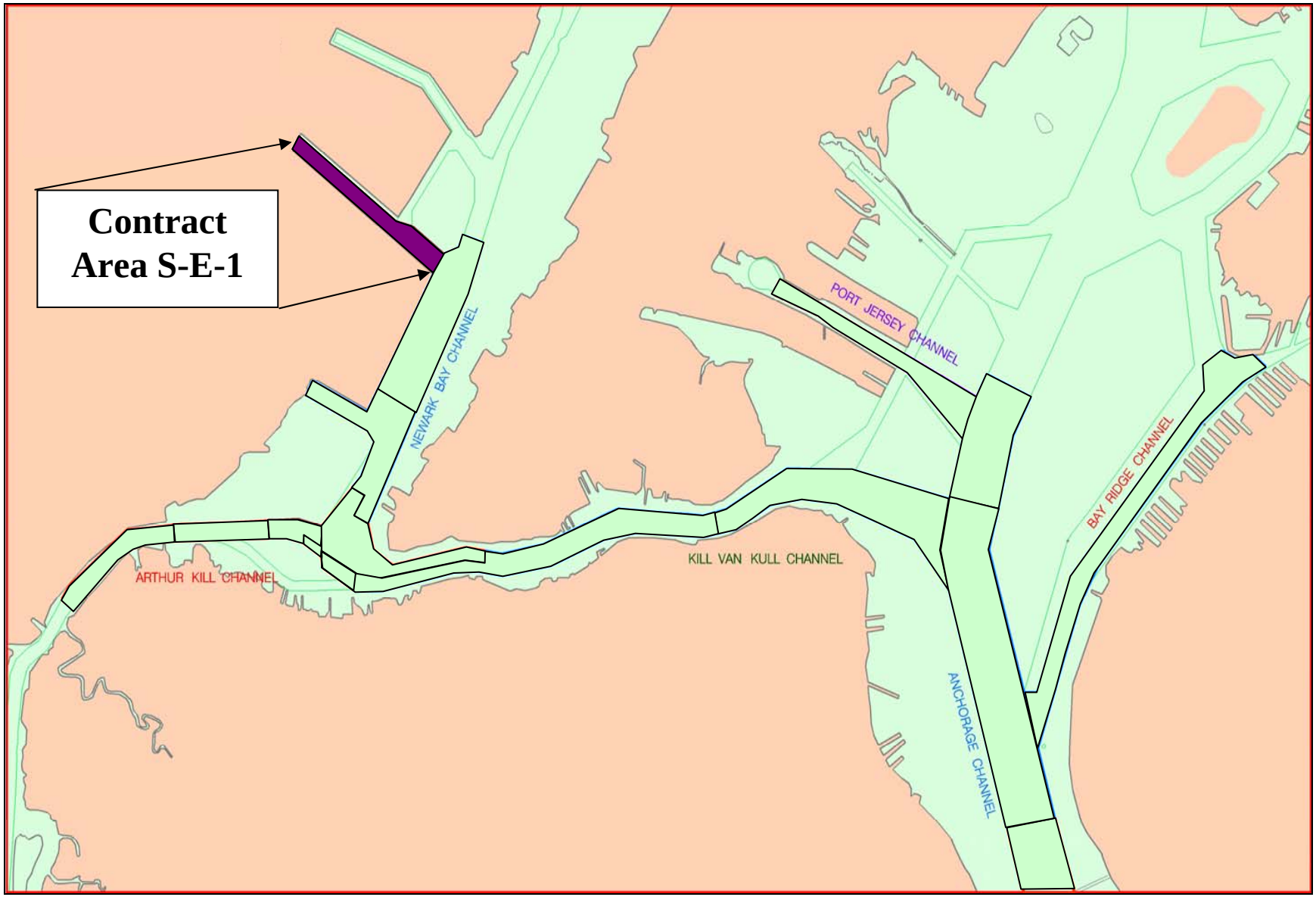
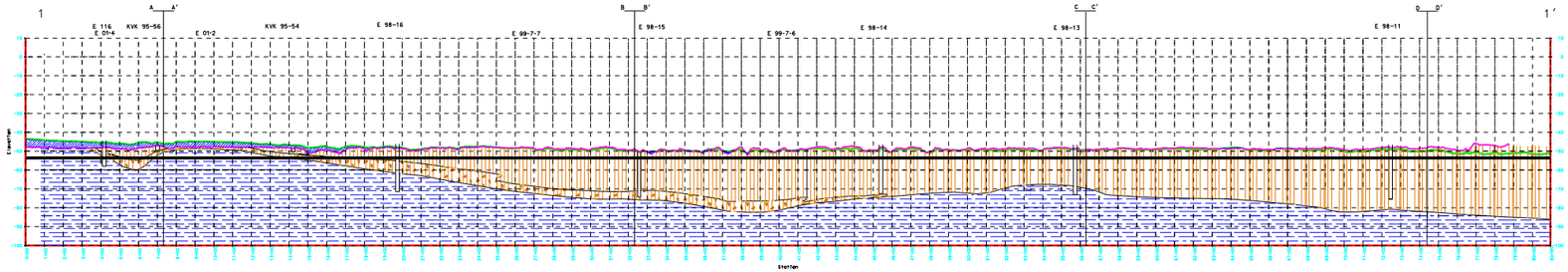
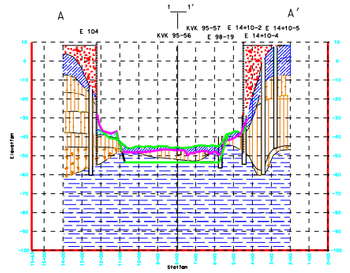
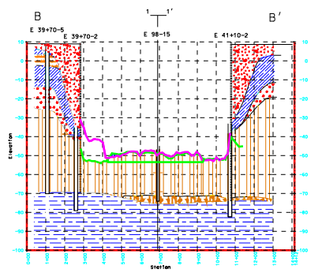
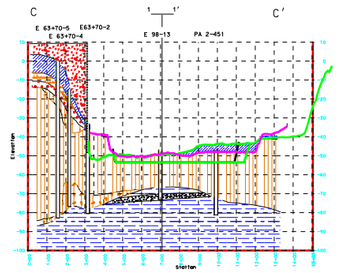


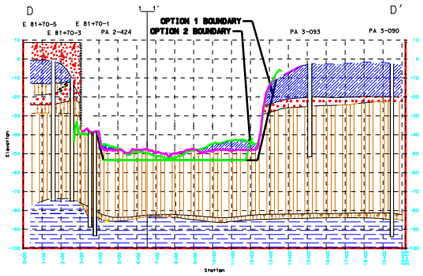
Figure 2a, Contact Area S-E-1Location Map











PLEISTOCENE SUBCROP MAP NOTE:
BLACK SILT NOT SHOWN, SEE CROSS SECTIONS AND ISOPACH MAP FOR LOCATION AND THICKNESS OF BLACK SILT.

LEGEND

HOLOCENE
- FILL MATERIAL
- BLACK ORGANIC SILT AND CLAY
- GRAY TO DARK SILTY SAND
- POORLY GRADED CLEAN SAND
- WELL GRADED CLEAN SAND

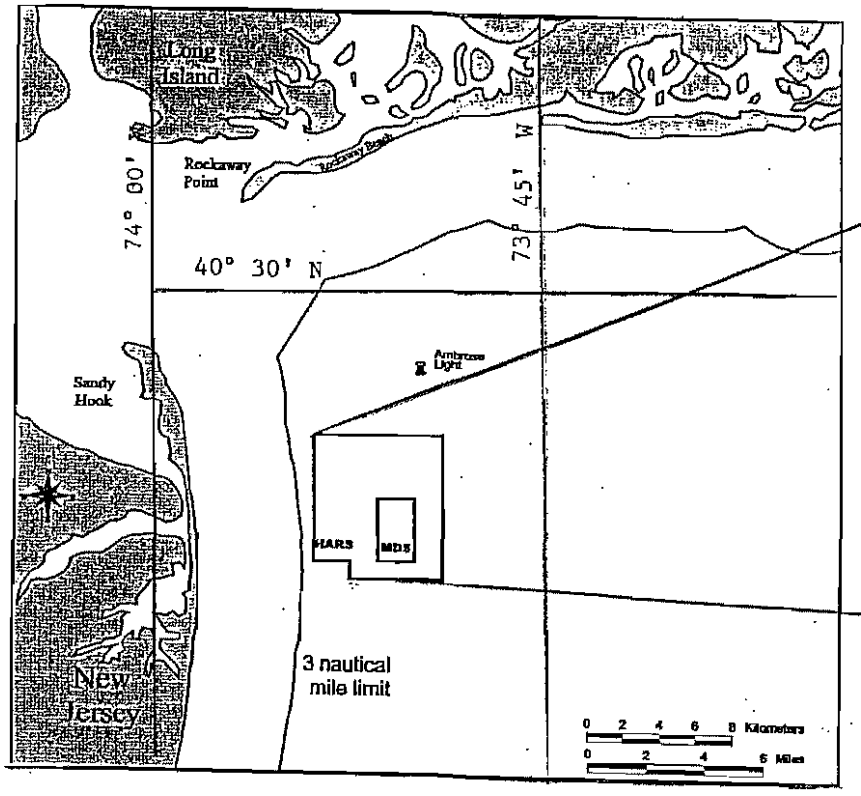
PLEISTOCENE
- RED-BROWN SILT AND CLAY
- RED-BROWN SILTY SAND
- RED-BROWN SILTY GRAVEL
- TAN BROWN CLEAN SAND

JURASSIC
- GRAY TO RED-BROWN SHALE
- GRAY TO RED-BROWN SANDSTONE

Material Volumes (CY)	
Black Silt	222,000
Pleistocene Glacial Till	11,000
Pleistocene Silt and Clay	704,000
Rock	15,000
Total	952,000

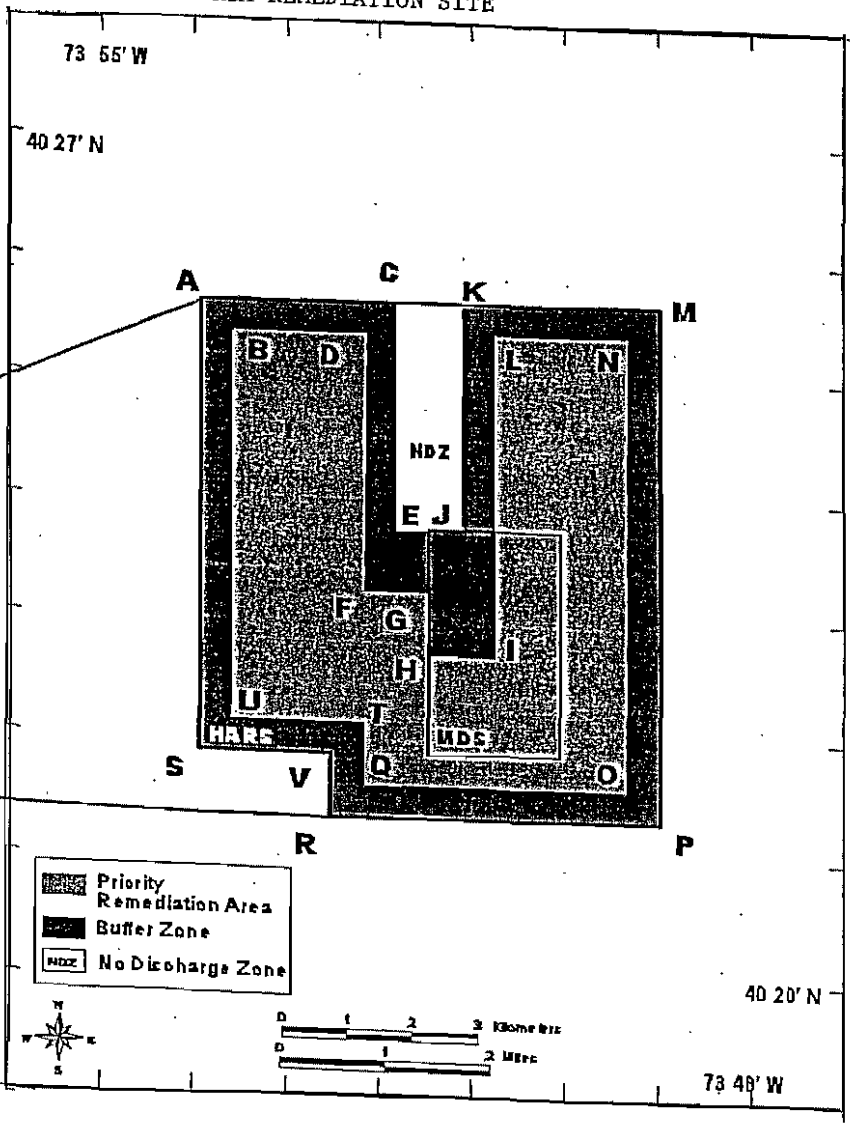
ELIZABETH CHANNEL

HISTORIC AREA REMEDIATION SITE LOCATION MAP



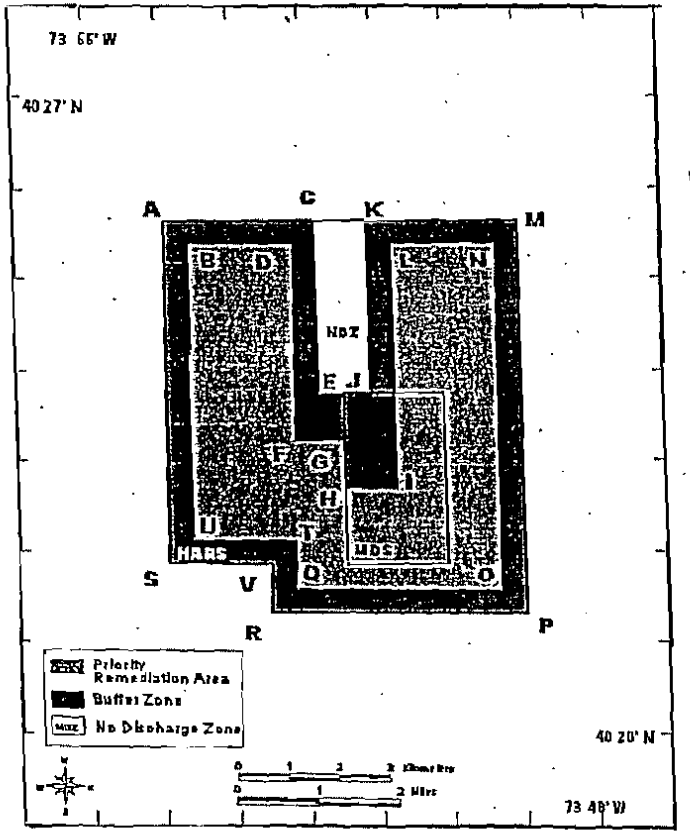
A

LOCATION OF PRIMARY REMEDIATION AREA WITHIN THE HISTORIC AREA REMEDIATION SITE



B

Figure 3



Priority Remediation Area (PRA): 9.0 square nautical mile area to be remediated with at least one meter of Remediation Material, bounded by the following coordinates:

Point	Latitude DMS *	Longitude DMS	Latitude DDM **	Longitude DDM
B	40° 25' 23" N	73° 53' 34" W	40° 25.38' N	73° 53.57' W
D	40° 25' 22" N	73° 52' 08" W	40° 25.37' N	73° 52.13' W
F	40° 23' 13" N	73° 52' 09" W	40° 23.22' N	73° 52.15' W
G	40° 23' 13" N	73° 51' 28" W	40° 23.22' N	73° 51.47' W
H	40° 22' 41" N	73° 51' 28" W	40° 22.68' N	73° 51.47' W
I	40° 22' 41" N	73° 50' 43" W	40° 22.68' N	73° 50.72' W
L	40° 25' 22" N	73° 50' 44" W	40° 25.37' N	73° 50.73' W
N	40° 25' 22" N	73° 49' 19" W	40° 25.37' N	73° 49.32' W

* -- DMS = Degrees, Minutes, Seconds

** -- DDS = Degrees, Decimal Minutes

Figure 4

Table 2A. Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R1
RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

	SITE WATER		ELUTRIATE	
CONSTITUENTS	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	**ppb**	**ppb**	**ppb**	**ppb**
Ag		0.046		0.03
Cd		0.0809		0.284
Cr		1.340		1.2
Cu		3.52		6.6
Hg		0.0197		0.003
Ni		2.14		5.7
Pb		1.843		0.6
Zn		9.26		14.7
Pesticides	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**
Aldrin	1.28	ND	1.06	ND
alpha-Chlordane	1.10	ND	0.91	ND
trans-Nonachlor	0.89	ND	1.98	ND
Dieldrin	1.59	ND	2.31	ND
4,4'-DDT	6.32	ND	3.97	ND
2,4'-DDT	2.71	ND	1.59	ND
4,4'-DDD	3.26	ND	5.58	ND
2,4'-DDD	3.32	ND	2.81	ND
4,4'-DDE	2.80	ND	1.89	ND
2,4'-DDE	1.50	ND	2.60	ND
Total DDT		**10.0**		**9.2**
Endosulfan I	1.66	ND	1.58	ND
Endosulfan II	2.15	ND	5.93	ND
Endosulfan sulfate	1.12	ND	1.00	ND
Heptachlor	1.35	ND	1.55	ND
Heptachlor epoxide	0.97	ND	0.95	ND
Industrial Chemicals	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**
PCB 8	0.53	ND		1.000
PCB 18	3.43	ND	1.78	ND
PCB 28	1.22	ND		0.6
PCB 44	1.13	ND	1.65	ND
PCB 49	0.73	ND	1.32	ND
PCB 52	1.59	ND		0.61
PCB 66	0.33	ND	1.61	ND
PCB 87	3.89	ND	4.13	ND
PCB 101	1.30	ND	0.31	ND
PCB 105	1.09	ND	2.39	ND
PCB 118	2.49	ND		0.98
PCB 128	1.16	ND	2.12	ND
PCB 138	3.54	ND	2.44	ND
PCB 153	1.54	ND	2.28	ND
PCB 170	2.15	ND	4.12	ND
PCB 180	2.34	ND	1.84	ND
PCB 183	1.72	ND	1.63	ND
PCB 184	2.19	ND	1.40	ND
PCB 187	1.94	ND	3.35	ND
PCB 195	1.22	ND	0.95	ND
PCB 206	1.76	ND	1.45	ND
PCB 209	1.83	ND	2.01	ND
Total PCB		**77.9**		**79.6**

ND = Not detected
Total DDT = sum of 2,4' and 4,4' DDD, DDE, and DDT
Total PCB = sum of congeners reported x 2
Means were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit.

Table 2B. **Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R1**
TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	> 100% (b)	1.00%
Mysidposis bahia	96 hours	> 100% (b)	1.00%
Mytilus edulis (larval survival)	48 hours	> 100% (b)	1.00%
Mytilus edulis (larval normal development)	48 hours	> 100% (c)	1.00%

(a) Limiting Permissible Concentration (LPC) is the LC50 or EC50 time 0.01.
(b) Median Lethal Concentration (LC50) resulting in 50% mortality at test termination
(c) Median Effective Concentration (EC50) based on normal development tot the D-cell, prodissoconch 1 stage.

Whole Sediment (10 days)

Test Species	% Survival in Reference	% Survival in Test	% Difference: Reference - Test	Is difference statistically significant? (a = 0.05)
Ampelisca abdita	99%	93%	6%	No
Mysidposis bahia	100%	96%	4%	Yes

Table 2C. **Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R1**
28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
(in wet weight concentrations)

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION
Metals	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Ag		0.06		0.04		0.03		0.02
As		3.22		3.33		3.34		2.90
Cd		0.04		0.06		0.06		0.06
Cr		0.18		* 0.78		10.25		0.40
Cu		1 85		* 2 33		1 72		1.49
Hg		0.02		0.02		0.01		0.01
Ni		0 42		* 0 78		4.63		0 27
Pb		0.22		* 0.33		0.34		0.15
Zn		12 96		14 82		21.30		27.54
Pesticides	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Aldrin	0.27	ND	0.37	* ND	1 84	ND	0.49	* ND
a-Chlordane		0.04		0.17		0.08		0.12
trans Nonachlor		0.03	0.37	* ND		0.31		* 0.40
Dieldrin		0.12		* 0.16		0.42		0.38
4,4'-DDT	0.22	ND	0.31	* ND	2 57	ND	0.38	* ND
2,4'-DDT	0 20	ND	0 31	* ND	1 05	ND	0.26	* ND
4,4'-DDD		0.13		0 20		0 34		0.38
2,4'-DDD		0.09	0.32	* ND		0.02		* 0 27
4,4'-DDE		0.20		0.20		0.02		* 0.27
2,4'-DDE	0.26	ND	0.31	* ND	1.49	ND	0 66	* ND
Total DDT		**0.71**		* **1.03**		**0.38**		* **2.02**
Endosulfan I	0.30	ND	0.45	* ND	1.75	ND	0 25	* ND
Endosulfan II	0 31	ND	0.40	* ND	1 83	ND	0 41	* ND
Endosulfan sulfate	0.25	ND	0.33	* ND	2.10	ND	0.30	* ND
Heptachlor	0.24	ND	0.33	* ND	2 01	ND	0 27	* ND
Heptachlor epoxide	0 21	ND	0 31	* ND	1 89	ND	0 20	* ND
Industrial Chemicals	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
PCB 8		0.05		0 09	3.21	ND	1.00	* ND
PCB 18		0 14		0 15		0.09		0.17
PCB 28		0.10		0.06		0.09		0.13
PCB 44		0.07		0 10		0.06		* 0.15
PCB 49		0 18		0.15		0.22		0.11
PCB 52		0.51		0.62		0.20		0.23
PCB 66		0 24		0.18		0.08		0.07
PCB 87		0 15		0.15		0.20		0.11
PCB 101		0.38		0.26		0.25		0.28
PCB 105		0.07		0 11		0 11		* 0.17
PCB 118		0.20		0.12		0.20		0.20
PCB 128		0.12	0.41	* ND		0.07		0.09
PCB 138		0 29		0.15		1.01		1.21
PCB 153		0.36		0.17		0 96		1.08
PCB 170		0.03	0.40	* ND		0.12		* 0.17
PCB 180		0.14		0.12		0.38		0.47
PCB 183		0 06	0.40	* ND		0.15		0.19
PCB 184	0.25	ND	0.35	ND	1 86	ND	0.47	* ND
PCB 187		0.12		0.16		0.30		0.35
PCB 195		0.10	0.37	* ND		0.05		0.06
PCB 206		0 11	0.38	* ND		0.09		0.10
PCB 209		0.10	0.37	* ND		0.08		0.08
Total PCB		**7.30**		**8.51**		**9.43**		* **13.53**
1,4-Dichlorobenzene		0 43		0 44		0 92		0.80

Table 2C. (Continued)

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION
PAH's	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Naphthalene		1.51		0.98		3.37		* 6.56
Acenaphthylene		0.11		1.79	7.60	ND		* 5.33
Acenaphthene		0.04		* 1.95		0.24		0.21
Fluorene		0 12		* 0 18	7.33	ND		* 0 14
Phenanthrene		0.79		0.68		0 47		* 2.10
Anthracene		0 13		* 0.22		0 01		* 10.88
Fluoranthene		1.63		2.03	8.43	ND		* 0.46
Pyrene		1 37		3.68		0.06		* 0.47
Benzo(a)anthracene		0.35		0.21		0.03		* 0.08
Chrysene		1 05		0.94		0 35		0 38
Benzo(b)fluoranthene		0.62		0.34	15 27	ND	14.48	* ND
Benzo(k)fluoranthene		0.54		0.50	7.31	ND	13 56	* ND
Benzo(a)pyrene		0.63		0.31		1.30	13.33	* ND
Indeno(1,2,3-cd)pyrene		0.71	5.38	* ND	6.61	ND	3 30	* ND
Dibenzo(a,h)antracene		0.70	5.80	* ND	7 52	ND	10.43	* ND
Benzo(g,h,i)perylene		0.50	6.44	* ND	5.18	ND	8.39	* ND
Total PAH's		**10.78**		* **31.43**		**6.15**		* **89.06**
Dioxins	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)
2378 TCDD		0 13		* 0.41		0.20		0.17
12378 PeCDD	0 22	ND	0 24	ND		0 13		0.19
123478 HxCDD	0.17	ND		0 09		0 08		0 14
123678 HxCDD		0.10		* 0.18		0.16		0.26
123789 HxCDD		0.08		* 0.15		0 07		* 0.20
1234678 HpCDD		0 41		* 1 42		0 77		0 76
12346789 OCDD		2.44		* 12.51		2 71		3.03
2378 TCDF		0.21		0.15		0 80		0.87
12378 PeCDF	0.18	ND	0.22	ND		0 11		0 17
23478 PeCDF		0.08		* 0.12		0.21		0.20
123478 HxCDF		0.11		* 0.26		0 11		0.20
123678 HxCDF	0 14	ND		* 0 15		0 06		0 09
234678 HxCDF	0.17	ND		0.11	0 16	ND		0.08
123789 HxCDF	0 14	ND		* 0.15		0.06		0.09
1234678 HpCDF		0 18		* 0 54		0.28		0.33
1234789 HpCDF	0.52	ND		0.19	0 37	ND		0.09
12346789 OCDF		0.29		* 0.93		0 20		* 0.30

ND = Not detected
Total PAH = Sum of all PAH's.
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Total PCB = 2(x), where x = sum of PCB congeners
Concentrations shown are the mean of 5 replicate analyses in wet weight.
Means were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit
* = Statistically significant at the 95% confidence level

Table 3A. Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R2
RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

	SITE WATER		ELUTRIATE	
CONSTITUENTS	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	**ppb**	**ppb**	**ppb**	**ppb**
Ag		0.035		0.02
Cd		0.0583		0.369
Cr		0.436		0.2
Cu		1.91		2.9
Hg		0.0045		0.006
Ni		1.35		5.0
Pb		0.729		0.1
Zn		5.02		2.8
Pesticides	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**
Aldrin	1.06	ND	1.06	ND
alpha-Chlordane	0.91	ND	0.91	ND
trans-Nonachlor	1.98	ND	1.98	ND
Dieldrin	2.31	ND	2.31	ND
4,4'-DDT	3.97	ND	3.97	ND
2,4'-DDT	1.59	ND	1.59	ND
4,4'-DDD	5.58	ND	5.58	ND
2,4'-DDD	2.81	ND	2.81	ND
4,4'-DDE	1.89	ND	1.89	ND
2,4'-DDE	2.60	ND	2.60	ND
Total DDT		**9.2**		**9.2**
Endosulfan I	1.58	ND	1.58	ND
Endosulfan II	5.93	ND	5.93	ND
Endosulfan sulfate	1.00	ND	1.00	ND
Heptachlor	1.55	ND	1.55	ND
Heptachlor epoxide	0.95	ND	0.95	ND
Industrial Chemicals	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**
PCB 8	1.23	ND	1.23	ND
PCB 18	1.78	ND	1.78	ND
PCB 28	1.85	ND	1.85	ND
PCB 44	1.65	ND	1.65	ND
PCB 49	1.32	ND	1.32	ND
PCB 52	2.03	ND	2.03	ND
PCB 66	1.61	ND	1.61	ND
PCB 87	4.13	ND	4.13	ND
PCB 101	0.31	ND	0.31	ND
PCB 105	2.39	ND	2.39	ND
PCB 118	2.22	ND	2.22	ND
PCB 128	2.12	ND	2.12	ND
PCB 138	2.44	ND	2.44	ND
PCB 153	2.28	ND	2.28	ND
PCB 170	4.12	ND	4.12	ND
PCB 180	1.84	ND	1.84	ND
PCB 183	1.63	ND	1.63	ND
PCB 184	1.40	ND	1.40	ND
PCB 187	3.35	ND	3.35	ND
PCB 195	0.95	ND	0.95	ND
PCB 206	1.45	ND	1.45	ND
PCB 209	2.01	ND	2.01	ND
Total PCB		**88.0**		**88.0**

ND = Not detected

Total DDT = sum of 2,4' and 4,4' DDD, DDE, and DDT

Total PCB = sum of congeners reported x 2

Means were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit.

Table 3B. **Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R2**
TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	> 100% (b)	1.00%
Mysidposis bahia	96 hours	> 100% (b)	1.00%
Mytilus edulis (larval survival)	48 hours	> 100% (b)	1.00%
Mytilus edulis (larval normal development)	48 hours	> 100% (c)	1.00%

(a) Limiting Permissible Concentration (LPC) is the LC_{50} or EC_{50} time 0.01.
(b) Median Lethal Concentration (LC_{50}) resulting in 50% mortality at test termination
(c) Median Effective Concentration (EC_{50}) based on normal development tol the D-cell. prodissoconch 1 stage

Whole Sediment (10 days)

Test Species	% Survival in Reference	% Survival in Test	% Difference: Reference - Test	Is difference statistically significant? (a = 0.05)
Ampelisca abdita	99%	88%	11%	Yes
Mysidposis bahia	94%	96%	-2%	No

Table 3C. Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R2
28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
(in wet weight concentrations)

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION
Metals	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Ag		0.06		0.05		0 03		0.01
As		3 22		3.41		3 34		2.99
Cd		0.04		0.06		0.06		0.06
Cr		0.18		* 0.70		10.25		0.31
Cu		1.85		* 2.25		1 72		1.55
Hg		0 02		0.02		0.01		0.01
Ni		0.41		* 0.78		4 63		0.23
Pb		0.22		* 0.36		0.34		0.15
Zn		12.96		* 15 84		21.30		29.30
Pesticides	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Aldrin	0.27	ND	0.20	ND	0.41	ND	0 49	* ND
a-Chlordane		0.04		* 0.08		0.08		* 0.14
trans Nonachlor		0.03	0.27	* ND		0.31		* 0 41
Dieldrin		0.12		* 0.17		0.42		0.48
4,4'-DDT	0 22	ND	0.25	ND	1.61	ND	1.92	* ND
2,4'-DDT	0 20	ND	0.32	* ND	0.65	ND	0 78	* ND
4,4'-DDD		0.13		0.14		0 34		0.42
2,4'-DDD		0.09	0.25	ND		0.02		* 0 30
4,4'-DDE		0 20		* 0.25		0.11		0.11
2,4'-DDE	0 26	ND	0 42	* ND	0.07	ND	0.09	ND
Total DDT		**0.71**		* **1.19**		**0.54**		* **3.54**
Endosulfan I	0 05	ND	0 05	ND	0.15	ND	0 17	ND
Endosulfan II	0.07	ND	0.08	ND	0.22	ND	0.26	ND
Endosulfan sulfate	0.07	ND	0.08	ND	0 23	ND	0 28	ND
Heptachlor	0 24	ND	0 22	ND	1.18	ND	1.41	* ND
Heptachlor epoxide	0.21	ND	0.22	ND	0.72	ND	0 86	* ND
Industrial Chemicals	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
PCB 8		0 05		* 0.11	0 62	ND	0.73	* ND
PCB 18		0 14		0 18		0 15		0.22
PCB 28		0.10		0 07		0.09		0.14
PCB 44		0 07		0.08		0.08		0.12
PCB 49		0.18		0.17		0 22		0.29
PCB 52		0.51		0 59		0.20		* 0 37
PCB 66		0.24		0.09		0 10		0.11
PCB 87		0.15		0.14		0.20		0.20
PCB 101		0 38		0.26		0.25		* 0.33
PCB 105		0.07		0.04		0 11		0.14
PCB 118		0.20		0.11		0.20		0.24
PCB 128		0.12		0.13		0.10		0.10
PCB 138		0.29		0 15		1 01		1.47
PCB 153		0.36		0.18		0 96		* 1.19
PCB 170		0.03	0.22	* ND		0.12		* 0.20
PCB 180		0 14		0.11		0.38		* 0 55
PCB 183		0.06		* 0.09		0.15		* 0.20
PCB 184	0.25	ND	0.26	ND	0.53	ND	0 62	* ND
PCB 187		0.12		0.06		0 30		* 0.39
PCB 195		0.10	0.20	ND		0.05		0.08
PCB 206		0.11	0.21	ND		0 09		* 0.14
PCB 209		0 10	0.20	ND		0.08		0.12
Total PCB		**7.30**		**6.20**		**9.81**		* **15.80**
1,4-Dichlorobenzene		0 43		0.57		0.92		1 32

TABLE 3C. (Continued)

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION
PAH's	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Naphthalene		1 51		1 54		3 37		4.22
Acenaphthylene		0.11		0.07	7.60	ND		* 3.32
Acenaphthene		0.04		* 0 10		0.24	8 61	* ND
Fluorene		0.12		* 0.18	7.33	ND	8.41	* ND
Phenanthrene		0.79		0.80		0.47		3.21
Anthracene		0.13		0.16		0.01	9.64	* ND
Fluoranthene		1.63		* 2.41	8 43	ND	9.67	* ND
Pyrene		1 37		* 2.25		0.06		* 6.81
Benzo(a)anthracene		0 35		0 18		0.03		* 7.41
Chrysene		1.05		0.82		0.35		0.40
Benzo(b)fluoranthene		0 62		0.28	15.27	ND	17.52	* ND
Benzo(k)fluoranthene		0 54		0.32	7.31	ND	8.39	* ND
Benzo(a)pyrene		0 63		0.28		1.30		* 3.79
Indeno(1,2,3-cd)pyrene		0.71		* 5.15	6.61	ND	7 59	* ND
Dibenzo(a,h)antracene		0 70	6.22	* ND	7 52	ND	8.62	* ND
Benzo(g,h,i)perylene		0.50		0.14	5 18	ND	5 94	* ND
Total PAH's		**10.78**		* **20.91**		**6.15**		* **113.18**
Dioxins	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)
2378 TCDD		0 13		0 12		0 20		0 18
12378 PeCDD	0 22	ND		0 11		0 13	0.39	* ND
123478 HxCDD	0 17	ND		0 10		0.08		* 0 15
123678 HxCDD		0 10		0 13		0 16	0.34	ND
123789 HxCDD		0.08		0.10		0 07	0 31	* ND
1234678 HpCDD		0.41		* 0 60		0.77		0.42
1234789 OCDD		2 44		2 57		3 69		1.83
2378 TCDF		0.21		0.08		0.80		0 57
12378 PeCDF	0.18	ND		* 0.12		0.11		0 16
23478 PeCDF		0 08		0 11		0 21	0.54	ND
123478 HxCDF		0 11		* 0.20		0 11	0 20	ND
123678 HxCDF	0 14	ND		0 11		0.06	0.20	* ND
234678 HxCDF	0.17	ND		0 10	0.16	ND	0.22	* ND
123789 HxCDF	0 14	ND		0.11		0.06	0 22	* ND
1234678 HpCDF		0.18		* 0.41		0.28		0.13
1234789 HpCDF	0.52	ND		0 15	0.37	ND	0.27	ND
12346789 OCDF		0.29		0.39		0.20		0 17

ND = Not detected
Total PAH = Sum of all PAH's.
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Total PCB = 2(x), where x = sum of PCB congeners
Concentrations shown are the mean of 5 replicate analyses in wet weight
Means were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit.
* = Statistically significant at the 95% confidence level.

Table 4A. Project: Kill Van Kull Phase II, Contract Area 4B, Reach C4R3
RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

	SITE WATER		ELUTRIATE	
CONSTITUENTS	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	**ppb**	**ppb**	**ppb**	**ppb**
Ag		0.032		0.02
Cd		0.0686		0.042
Cr		0.653		0.5
Cu		2.19		1.9
Hg		0.0075		0.007
Ni		1.66		5.4
Pb		1.050		0.2
Zn		9.16		4.7
Pesticides	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**
Aldrin	6.39	ND	6.39	ND
alpha-Chlordane	6.51	ND	6.51	ND
trans-Nonachlor	6.61	ND	6.61	ND
Dieldrin	8.00	ND	8.00	ND
4,4'-DDT	7.11	ND	7.11	ND
2,4'-DDT	4.76	ND	4.76	ND
4,4'-DDD	6.00	ND	6.00	ND
2,4'-DDD	6.54	ND	6.54	ND
4,4'-DDE	7.41	ND	7.41	ND
2,4'-DDE	6.33	ND	6.33	ND
Total DDT		**22.8**		**22.8**
Endosulfan I	5.42	ND	5.42	ND
Endosulfan II	5.51	ND	5.51	ND
Endosulfan sulfate	7.36	ND	7.36	ND
Heptachlor	6.97	ND	6.97	ND
Heptachlor epoxide	6.56	ND	6.56	ND
Industrial Chemicals	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**	**ppt (ng/L)**
PCB 8	5.59	ND	5.59	ND
PCB 18	7.36	ND	7.36	ND
PCB 28	5.50	ND	5.50	ND
PCB 44	6.56	ND	6.56	ND
PCB 49	5.63	ND	5.63	ND
PCB 52	5.39	ND	5.39	ND
PCB 66	6.57	ND	6.57	ND
PCB 87	7.58	ND	7.58	ND
PCB 101	4.89	ND	4.89	ND
PCB 105	7.15	ND	7.15	ND
PCB 118	7.20	ND	7.20	ND
PCB 128	6.61	ND	6.61	ND
PCB 138	10.82	ND	10.82	ND
PCB 153	7.48	ND	7.48	ND
PCB 170	11.80	ND	11.80	ND
PCB 180	10.14	ND	10.14	ND
PCB 183	6.23	ND	6.23	ND
PCB 184	6.04	ND	6.04	ND
PCB 187	6.68	ND	6.68	ND
PCB 195	7.63	ND	7.63	ND
PCB 206	8.17	ND	8.17	ND
PCB 209	8.34	5.80	8.34	ND
Total PCB		**315.6**		**318.7**

ND = Not detected

Total DDT = sum of 2,4' and 4,4' DDD, DDE, and DDT

Total PCB = sum of congeners reported x 2

Means were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit.

Table 4B. **Project: Kill Van Kull Phase II, Contract Area 4B, Reach C4R3**
TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	> 100% (b)	1.00%
Mysidposis bahia	96 hours	> 100% (b)	1.00%
Mytilus edulis (larval survival)	48 hours	> 100% (b)	1.00%
Mytilus edulis (larval normal development)	48 hours	> 100% (c)	1.00%

(a) Limiting Permissible Concentration (LPC) is the LC_{50} or EC_{50} time 0.01.
(b) Median Lethal Concentration (LC_{50}) resulting in 50% mortality at test termination.
(c) Median Effective Concentration (EC_{50}) based on normal development tot the D-cell, prodissoconch 1 stage

Whole Sediment (10 days)

Test Species	% Survival in Reference	% Survival in Test	% Difference: Reference - Test	Is difference statistically significant? (a = 0.05)
Ampelisca abdita	93%	93%	0%	No
Mysidposis bahia	94%	96%	-2%	No

Table 4C. Project: Kill Van Kull Phase II, Contract Area 4B, Reach C4R3

28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
(in wet weight concentrations)

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATIO
Metals	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Ag		0.06		0.03		0 03		0.01
As		3.22		3.01		3.34		3.02
Cd		0.04		0.05		0.06		0.06
Cr		0.18		* 0.43		10.25		1.01
Cu		1.85		2.27		1.72		1.68
Hg		0.02		0.02		0.01		0.01
Ni		0.42		* 0.62		4.63		0.57
Pb		0.22		* 0.30		0.34		0.18
Zn		12.96		13.38		21.30		25 78
Pesticides	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Aldrin	0.266	ND	0.15	ND	1.84	ND	0 32	* ND
a-Chlordane		0.04		* 0.07		0.08		* 0.15
trans Nonachlor		0.03		* 0 04		0.31		0 38
Dieldrin		0 12		* 0 16		0.42		0.33
4,4'-DDT	0.22	ND		0 08	2.57	ND	0.25	* ND
2,4'-DDT	0.20	ND	0.24	* ND	1 05	ND	0.17	* ND
4,4'-DDD		0.13		* 0 40		0.34		* 0.60
2,4'-DDD		0.09		* 0 13		0.02		* 0 25
4,4'-DDE		0 20		* 0.65		0.02		* 0.16
2,4'-DDE	0.26	ND	0 31	* ND	1.49	ND	0.43	* ND
Total DDT		**0.71**		* **1.54**		**0.38**		* **1.54**
Endosulfan I	0 30	ND	0 12	ND	1.75	ND	0.25	* ND
Endosulfan II	0 31	ND	0.25	ND	1.83	ND	0.41	* ND
Endosulfan sulfate	0.25	ND	0 19	ND	2.10	ND	0.30	* ND
Heptachlor	0 24	ND	0.16	ND	2.01	ND	0 27	* ND
Heptachlor epoxide	0 21	ND	0.16	ND	1.89	ND	0 20	* ND
Industrial Chemicals	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
PCB 8		0 05		0.06	3.21	ND	0.65	* ND
PCB 18		0.14		0 18		0.09		* 0 20
PCB 28		0 10		0.15		0.09		* 0.19
PCB 44		0 07		0.06		0.06		* 0.21
PCB 49		0.18		* 0.29		0.22		0 24
PCB 52		0.51		* 0.69		0.20		* 0.45
PCB 66		0.24		0.18		0 08		* 0.15
PCB 87		0.15		* 0 18		0.20		0 11
PCB 101		0 38		0.40		0.25		* 0.43
PCB 105		0.07		0.08		0 11		* 0.19
PCB 118		0.20		0.23		0.20		* 0.31
PCB 128		0.12		0.04		0 07		0 10
PCB 138		0.29		0 27		1.01		1 06
PCB 153		0.36		0.35		0.96		1.14
PCB 170		0.03		0 03		0.12		* 0 19
PCB 180		0.14		0.13		0.38		0.48
PCB 183		0.06		0.05		0.15		* 0 19
PCB 184	0.25	ND	0.20	ND	1 86	ND	0.31	* ND
PCB 187		0.12		0.08		0.30		0.39
PCB 195		0.10		0 05		0.05		0.06
PCB 206		0.11		0.01		0.09		* 0.11
PCB 209		0 10		0.01		0.08		0.09
Total PCB		**7.30**		**7.26**		**9.43**		* **14.23**
1,4-Dichlorobenzene		0.43		0.44		0 92		0 51

TABLE 4C. (Continued)

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION	DETECTION LIMITS	CONCEN - TRATION
PAH's	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Naphthalene		1.51		1 38		3.37		4 20
Acenaphthylene		0.11		0.12	7.60	ND		* 0.17
Acenaphthene		0.04		* 0.10		0.24		0 18
Fluorene		0.12		* 0.16	7.33	ND		* 0.11
Phenanthrene		0 79		0.84		0.47		* 1 35
Anthracene		0.13		* 0 26		0.01		* 0.14
Fluoranthene		1 63		* 3.65	8.43	ND		* 0.67
Pyrene		1.37		* 7.59		0.06		* 1.56
Benzo(a)anthracene		0 35		* 0.81		0.03		* 0.16
Chrysene		1 05		* 2 29		0.35		* 0.63
Benzo(b)fluoranthene		0 62		* 1.36	15.27	ND		* 4 93
Benzo(k)fluoranthene		0.54		* 1.42	7.31	ND		* 4.63
Benzo(a)pyrene		0 63		* 1 16		1.30		3.12
Indeno(1,2,3-cd)pyrene		0.71		0 29	6.61	ND	2.16	* ND
Dibenzo(a,h)antracene		0.70		* 3 95	7.52	ND	6.81	* ND
Benzo(g,h,i)perylene		0.50		0.40	5 18	ND		* 2.86
Total PAH's		**10.78**		* **25.78**		**6.15**		* **32.59**
Dioxins	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)	pptr(ng/kg)
2378 TCDD		0 13		* 0 45		0 20		0 16
12378 PeCDD	0.22	ND		* 0.23		0.13	0 37	ND
123478 HxCDD	0.17	ND		0 26		0 08	0.35	* ND
123678 HxCDD		0.10		* 0 39		0 16		0.18
123789 HxCDD		0 08		* 0.28		0.07	0 33	* ND
1234678 HpCDD		0.41		* 0.86		0.77		0.49
1234789 OCDD		2.44		2 68		3 69		2 08
2378 TCDF		0.21		0.23		0.80		0.66
12378 PeCDF	0 18	ND		* 0 19	*	0 11	0 39	* ND
23478 PeCDF		0.08		0 21		0.21	0 36	ND
123478 HxCDF		0 11		* 0.35		0.11		0.13
123678 HxCDF	0.14	ND		* 0 23		0.06		0.09
234678 HxCDF	0.17	ND		* 0 26	0.16	ND	0 21	ND
123789 HxCDF	0.14	ND		* 0.32		0.06	0 22	* ND
1234678 HpCDF		0.18		* 0 62		0 28		0.26
1234789 HpCDF	0.52	ND		0 34	0.37	ND	0.24	ND
12346789 OCDF		0.29		* 0.62		0.20		0.24

ND = Not detected
Total PAH = Sum of all PAH's
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Total PCB = 2(x), where x = sum of PCB congeners
Concentrations shown are the mean of 5 replicate analyses in wet weight
Means were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit
* = Statistically significant at the 95% confidence level.

TABLE 5A. NEWARK BAY/STATEN ISLAND KILLS COMPLEX - NATURAL CLAYS
RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)
Cadmium		0.093		0 267
Chromium		1 42		1 11
Copper		2.45		6 42
Lead		1 46		0 259
Mercury		0 011		0 002
Nickel		1 58		1 70
Silver		0.054		0 016
Zinc		11.7		3 56
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	0 8	ND	0 8	ND
alpha-Chlordane		1 9		1 1
trans-Nonachlor		3 7		1.8
Dieldrin	0 3	ND		3 1
4,4'-DDT		4.6		3 1
2,4'-DDT	0.7	ND	0.7	ND
4,4'-DDD		2 5		5 0
2,4'-DDD		1 7		1 0
4,4'-DDE		4 6		6.0
2,4'-DDE	1 4	ND	1 4	ND
Total DDT		14.45		16 15
Endosulfan I		2 0		1 2
Endosulfan II	0 5	ND		1 8
Endosulfan sulfate	2 4	ND		2 7
Heptachlor		3 3		4 0
Heptachlor epoxide		1 1		5 3
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB BZ-8		0 9	0 2	ND
PCB BZ-18		7 6	0 1	ND
PCB BZ-28	0 1	ND	0 1	ND
PCB BZ-44	0 1	ND	0.1	ND
PCB BZ-49	0 1	ND	0 1	ND
PCB BZ-52	0 1	ND	0 1	ND
PCB BZ-66		0.6	0.1	ND
PCB BZ-87	0 1	ND	0.1	ND
PCB BZ-101		0 7	0 1	ND
PCB BZ-105	0 1	ND	0.1	ND
PCB BZ-118	0 1	ND	0.1	ND
PCB BZ-128	0 1	ND	0 1	ND
PCB BZ-138	0 1	ND	0.1	ND
PCB BZ-153	0 1	ND	0 1	ND
PCB BZ-170	0 1	ND	0 1	ND
PCB BZ-180	0 1	ND	0 1	ND
PCB BZ-183	0 1	ND	0 1	ND
PCB BZ-184	0 1	ND	0 1	ND
PCB BZ-187	0 1	ND	0.1	ND
PCB BZ-195	0.2	ND	0.2	ND
PCB BZ-206	0.2	ND		0 5
PCB BZ-209	0.1	ND	0 1	ND
Total PCB		21.6		3 3

ND = Not detected

Total PCB = sum of all congeners * 2.

Total DDT = sum of 2,4' and 4,4' DDD, DDE, and DDT.

NEWARK BAY/STATEN ILAND KILLS COMPLEX - NATURAL CLAYS

TABLE 5B. TOXICIT TEST RESULTS

Suspended Particulate Phase - Raw Clay

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	>100% (b)	> 1
Mysidposis bahia	96 hours	>100% (b)	> 1
Mytilus sp. (larval survival)	48 hours	>100% (b)	> 1
Mytilus sp. (larval normal development)	48 hours	>100% (c)	> 1

(a) Limiting Permissible Concentration (LPC) is the LC50 or EC50 times 0.01.

(b) Median Lethal Concentration (LC50) resulting in 50% mortatlity at test termination.

(c) Median Effective Concentration (EC50) based on normal development to the D-cell, prodissoconch 1 stage.

Whole Sediment (10 days) - Raw Clay

Test Species	% Survival in Reference	% Survival in Test	% Difference Reference -Test	Is Difference statistically significant? (a=0.05)
Ampelisca abdita	89%	86%	3%	No
Mysidopsis bahia	93%	95%	0%[a]	No

(a) Survival in the test material was greater than in the Reference.

TABLE 5C. NEWARK BAY / STATEN ISLAND KILLS COMPLEX - NATURAL CLAYS
28-DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE (in wet weight concentration)

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
Constituents	Detection Limits	Mean Concentration	Detection Limits	Mean Concentration	Detection Limits	Mean Concentration	Detection Limits	Mean Concentration
Metals	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
Arsenic		3.5		3.36		3.26		3.2
Cadmium		0.05		0 048		0 068		0.064
Chromium		0.948		0 768		0.338		0 328
Copper		8 84		10.18		2.32		2 14
Lead		0 536		0.47		0.704		0 558
Mercury		0 16		0.088		0 13		0 138
Nickel		1 18		1.176		0.648		0 666
Silver		0.08		0.072		0.036	0 04	ND
Zinc		23.68		22 52		24		14.56
Pesticides	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Aldrin		1 793	0 164	ND		4 36		5
alpha-Chlordane		0.601		0 16		0 2		0.625
trans-Nonachlor		0 469		0 445	0.18	ND	0.182	ND
Dieldrin		1 234		1 314		1 814		1 278
4,4'-DDT		0 185		0 27		1.108		0.521
2,4'-DDT		1.224		0.634	0 532	ND		* 0.908
4,4'-DDD		2.82		2.52		3.88		5.92
2,4'-DDD		0 738		0.493		0.67		0.616
4,4'-DDE		3.98		4.66		1.505		0 589
2,4'-DDE	0 14	ND	0.138	ND		0.762		0 77
Total DDT		9 152		8 646		7.925		9 324
Endosulfan I		1 96		1 6		1 88		2 08
Endosulfan II		0 175		0 127	0 216	ND		0 196
Endosulfan sulfate		0 36	1.106	* ND	1 16	ND	1 16	* ND
Heptachlor	0 252	ND		0 157	0 258	ND		* 0 582
Heptachlor epoxide		1 62		1 92		1 128		1 04
Industrial Chemicals	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
PCB BZ-08		1.542		0.976		1 235		1.563
PCB BZ-18		1 404		0 902		0 62		0.798
PCB BZ-28	0 54	ND	0 508	* ND		0 22		* 0.738
PCB BZ-44		0.738		0 498		0.486		0.397
PCB BZ-49		0.959	0.36	ND		0.974	0 36	ND
PCB BZ-52		0 134	0 47	* ND	0 486	ND		* 0 628
PCB BZ-66		1 04	1.008	ND	1.06	ND	1 012	* ND
PCB BZ-101		1		0 798		0.906		0 614
PCB BZ-105	0.394	ND	0.37	ND		0.363		0 324
PCB BZ-118	0 578	ND	0 544	* ND		0 812		0 604
PCB BZ-87		0 138	0 46	* ND	0.476	ND	0 46	* ND
PCB BZ-128	0 658	ND	0.618	* ND	0.642	ND	0 616	* ND
PCB BZ-138	0 412	ND	0 386	* ND		1.144		0 848
PCB BZ-153	0 384	ND	0.36	ND		1.94		1.634
PCB BZ-170	0 354	ND	0 334	ND	0 346	ND	0 332	ND
PCB BZ-180	0.344	ND	0.324	ND		0.382		0 244
PCB BZ-183	0.422	ND	0.376	* ND	0 412	ND	0 396	ND
PCB BZ-184	0.568	ND	0 534	* ND		1 2		0.928
PCB BZ-187	0 304	ND	0.286	ND	0 296	ND		0.239
PCB BZ-195	0.254	ND	0 238	ND		0.306		0 298
PCB BZ-206	0.254	ND	0.238	ND	0 248	ND	0 238	ND
PCB BZ-209	0 206	ND	0.194	ND	0 2	ND	0 194	ND
Total PCB		16.562		20.536		22.424		25.58
1,4-Dichlorobenzene	0 2	ND	0.2	ND	0 2	ND	0.2	ND

Dioxins and Furans	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
2378-TCDD	0 115	ND	0.105	ND		0 237		0 177
12378-PeCDD	0 172	ND	0 134	ND		0 431		0 252
123478-HxCDD		0 197	0.177	ND		0 296		0 172
123678-HxCDD		3.250		1.632		3.230		1 580
123789-HxCDD		1.410		0 665		1.423		0 661
1234678-HpCDD		16 250		7.424		10.308		5 255
OCDD		12.441		7 929		11.220		6 714
2378-TCDF	0.239	ND	0.145	ND		1 001		0.691
12378-PeCDF		0 650		0 317		1 130		0 442
23478-PeCDF	0 874	ND		0.336		0.713		0 259
123478-HxCDF		0.410		0 282		0.631	0 347	ND
123678-HxCDF		0 689		0 348		0.919		0.384
123789-HxCDF	0.668	ND	0.310	ND	0 155	ND	0.407	* ND
234678-HxCDF		0 900		0 476		1 145		0 279
1234678-HpCDF		4 140		2 194		2.473		1 515
1234789-HpCDF		0 276	0 273	ND	0 347	ND	0 446	ND
OCDF		2.022		2.355		0.809		0 731
PAHs	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Acenaphthene		4.29		3.84	3.75	ND	3 78	ND
Acenaphthylene	56 4	ND	56 2	* ND	56 5	ND	56 4	* ND
Anthracene	1 98	ND	2 0	ND	2.0	ND	2 0	ND
Fluorene	3 56	ND	3 6	ND	3.55	ND	3 58	ND
Naphthalene	1 7	ND	1 7	ND	1 7	ND	1 7	ND
Phenanthrene		0.78	1 3	ND	1 3	ND	1 3	ND
Benzo[a]anthracene	1 6	ND	1 6	ND	1 6	ND	1 6	ND
Benzo[a]pyrene		0 8	1 3	ND	1 3	ND	1 3	ND
Benzo[g,h,i]perylene	1 4	ND	1 4	ND	1 4	ND	1 4	ND
Benzo[b]fluoranthene	1 4	ND	1 4	ND	1.4	ND	1 4	ND
Benzo[k]fluoranthene	1 2	ND	1 2	ND	1 2	ND	1 2	ND
Chrysene		2 44	2	ND	2	ND	2	ND
Dibenz[a,h]anthracene	1 6	ND	1.6	ND	1.6	ND	1 6	ND
Fluoranthene	3 16	ND	3 2	ND	3 15	ND	3.18	ND
Indeno[1,2,3-cd]pyrene	0 822	ND	0 822	ND	0.812	ND	0.822	ND
Pyrene		2.12		1 68		1.263		1 1
Total PAHs		19.64		* 73 281		11.72		* 70.931

Concentrations shown are the mean of 5 replicate analyses in wet weight with the following exceptions:

PAH concentrations for *Nereis virens* Reference tissue are the mean of 4 replicate analyses.

1,4 dichlorobenzene concentration for *Nereis virens* Test tissue is the mean of 4 replicate analyses due to limited tissue volume.

1,4 dichlorobenzene concentration for *Nereis virens* Reference tissue is the result of one set of analyses due to limited tissue volume

*** Significantly higher than reference at 95% confidence.**

ND = Not Detected

Total PAHs = sum of all PAHs

Total PCB = sum of congeners reported * 2

Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT

Means and statistical comparisons were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit.