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: FP63-SKVK2-2004
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NEW YORK AND NEW JERSEY HARBOR DEEPENING
NEW YORK AND NEW JERSEY CHANNELS
FEDERAL NAVIGATION PROJECT
CONTRACT AREA S-KVK-2

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 HARS suitable material obtained under the first 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 red-brown clay and glacial till material dredged under the first construction contract to be placed at the Historic Area Remediation Site (HARS) - see below for further information.

ACTIVITY: Deepen the existing federal Kill Van Kull Channel, which is authorized as part of the NY & NJ Harbor Deepening project in Section 101(a)(2) of the Water Resources Act of 2000, Public Law 106-541. The proposed action is to place approximately 1,313,000 cubic yards of Pleistocene red-brown clay and glacial till material, that has been determined to be suitable Remediation Material at the HARS, as part of the first construction contract for the federal New York and New Jersey Harbor Deepening Project.

LOCATION: Kill Van Kull federal Navigation Channel is within the Port of New York and New Jersey. The federal channel extends from its confluence with the Anchorage Channel, westerly approximately 3.3 miles to its confluence with Newark Bay.

DESCRIPTION OF PLANNED ACTION:

The overall Project involves deepening the existing federal 45-foot Kill Van Kull Navigation Channel to a navigable depth of 50 feet below mean low water (MLW), plus 2 feet for safety due to

the hard underlying material, with up to an additional 1.5 feet allowable overdepth from the channels confluence with the Anchorage Channel in the Upper New York Bay, to its confluence with Newark Bay. Also included are selected widenings and realignments of the channel. Construction of the overall Project is planned to be accomplished using sixteen contracts (see Figure 1). The Kill Van Kull portion of the project will be accomplished using two contracts. The action described herein is for the first of the two planned contracts areas within the KVK.

Contract Area S-KVK-2

Contract Area S-KVK-2 (see Figure 2) contains Holocene black silt overlying hard Pleistocene red-brown clay and 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). An additional 1.5 feet of dredging depth to ensure that the required depth is achieved. The Pleistocene red-brown clay and glacial till material are proposed to be used beneficially as HARS Remediation Material. The following table summarizes the volumes of material proposed to be dredged from the Kill Van Kull Channel. The contract under discussion in the Public Notice is expected to begin in October 2004 and have a duration of approximately two years. The District has requested a Water Quality Certificate in accordance with Section 401 of the Clean Water Act from the States of New York and New Jersey, which is expects by mid-April 2004.

Table A
Material Volume Estimates for the Kill Van Kull Channel (to a total depth of –53.5')

Location of Material / Volume Estimates	HARS Suitable Pleistocene Sediments		Upland Sediments	Rock (CY)	Total Material Volume (CY)
	Glacial Till* (CY)	Red-Brown Clay** (CY)	Black Silt*** (CY)		
S-KVK-2	1,247,000	66,000	120,000	771,000	2,204,000

* The USEPA, Region 2 and the USACE, NY District determined in a Memorandum For Record dated August 26, 2003, that Pleistocene glacial till from the Kill Van Kull Channel is suitable for HARS placement. As a result, future Pleistocene glacial till dredged from this area would not require further HARS testing.

** The USEPA, Region 2 and the USACE, NY District determined in a Memorandum for Record dated January 26, 2000 that Pleistocene red-brown clay from the greater Newark Bay formation (which encompasses the Kill Van Kull Channel) is suitable for HARS placement. As a result, future Pleistocene red-brown clay dredged from the greater geological formation would not require further HARS testing.

*** The NY District will send this material to a permitted upland site. It is included in this table for completeness.

The U.S. Environmental Protection Agency (USEPA), Region 2 and the U.S. Army Corps of Engineers (USACE), New York District have separately evaluated Pleistocene red-brown clay and Pleistocene glacial till material from this contract area. This evaluation has shown that these materials are suitable for use as HARS Remediation Material. The purpose of this Public Notice is to solicit comments regarding the proposed placement of these materials at the HARS. These comments, along with all available technical data/information, will form the basis of a determination of whether this proposed project is in the public interest. The HARS (Figures 4 & 5), located in the Atlantic Ocean off the coasts of New York and New Jersey, is described later in this notice.

The Holocene black silt material will be placed at the permitted Staten Island Landfill (Figure 3) or a similar suitable permitted upland location. Beneficial use of dredged rock will be accomplished

through placement at the Axel Carlson artificial reef site (Figure 6) or a similar permitted 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 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, 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 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 Final Limited Reevaluation Report and Final Environmental Assessment/Finding of No Significant Impact dated January 2004; (3) the Federal Record-of-Decision executed in June 2002. 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 (212) 264-5570.

PLACEMENT SITES FOR HARS SUITABLE DREDGED MATERIAL

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".

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).

Additional information concerning the HARS can be obtained from Mr. Douglas Pabst of USEPA, Region 2, Team Leader of the Dredged Material Management Team, at telephone number (212) 637-3797.

HARS SUITABILITY TESTING FOR PLEISTOCENE RED-BROWN CLAY AND GLACIAL TILL:

Pleistocene red-brown clay (from the Newark Bay complex) and Pleistocene glacial till (from the New York Harbor area) 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 USEPA and USACE.

Notification of the Pleistocene red-brown clay test results and a determination of suitability for HARS remediation purposes were provided in USACE Public Notice Supplement FP63-345678CC issued on July 14, 2000. Those test results are included in this Public Notice (Tables 1-3) for informational purposes only. A Joint Memorandum for Record (MFR) signed by both agencies on

January 26, 2000, concluded that the Pleistocene red-brown clay found throughout the Newark Bay Complex, including the Kill Van Kull, was suitable for HARS placement and would not require further testing.

Notification of the Pleistocene glacial till test results and a determination of suitability for HARS remediation purposes were provided in USACE Public Notice Supplement FP63-345678CC-2002 issued on December 6, 2002. Those test results are included in this Public Notice (Tables 2A-4C) for informational purposes only. A Joint MFR signed by both agencies on August 26, 2003, concluded that the Pleistocene glacial till from Selected Areas of New York Harbor (including the Kill Van Kull) was suitable for HARS placement and would not require further testing.

ALTERNATIVES TO HARS PLACEMENT:

As regards ocean placement of dredged material, the Ocean Dumping Regulations (Title 40 CFR Sections 227.16(b)) state that "...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need not be competitive with the costs of ocean dumping, taking into account the environmental impacts associated with the use of alternatives to ocean dumping....". 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 responsive and responsible bid received for Contract Area 1 for the Arthur Kill 41-foot Project, the incremental cost for using an upland placement site as an alternative site to the HARS for the Pleistocene red-brown clay and glacial till materials is found to be $9,190,000, which represents over a 23% increase in the cost of these contract line items to the United States and the Port Authority of New York and New Jersey over the cost of being able to place the material at the HARS. Consequently, the incremental cost for using this alternative, when compared to the HARS, is not considered reasonable or practicable.

For material to be dredged from the Kill Van Kull Channel, Contract Area S-KVK-2, that has been found suitable for use as HARS Remediation Material, the New York District will prepare a MFR

for the placement of this material at the HARS, which will fully consider all the comments received in response to this Public Notice.

Conclusion

The USACE and the USEPA have determined that the material to be dredged meet 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 telephone number (212) 264-5570 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
Acting Chief, Harbor Programs Branch

Enclosures

NEWARK BAY/STATEN ILAND KILLS COMPLEX - NATURAL CLAYS

TABLE 1. TOXICITY 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 2. 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		11		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.

TABLE 3. 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.

Table 2A. Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R1

RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	SITE WATER		ELUTRIATE	
	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 8
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 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 2C. Project: Kill Van Kull Phase II, Contract Area 48, 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 3A. 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%
Mysidopsis 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? ($\alpha = 0.05$)
Ampelisca abdita	99%	93%	6%	No
Mysidopsis bahia	100%	96%	4%	Yes

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%
Mysidpsis 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	99%	88%	11%	Yes
Mysidpsis bahia	94%	96%	-2%	No

Table 3C. 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%
Mysidopsis 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? ($\alpha = 0.05$)
Ampelisca abdita	93%	93%	0%	No
Mysidopsis bahia	94%	96%	-2%	No

Table 4A.

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		0.08
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	1.69	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		0.18		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 4A. (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 4B. 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		* 2.26		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 4B. (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 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		4.83		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		0.08		* 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	6.61	* 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.

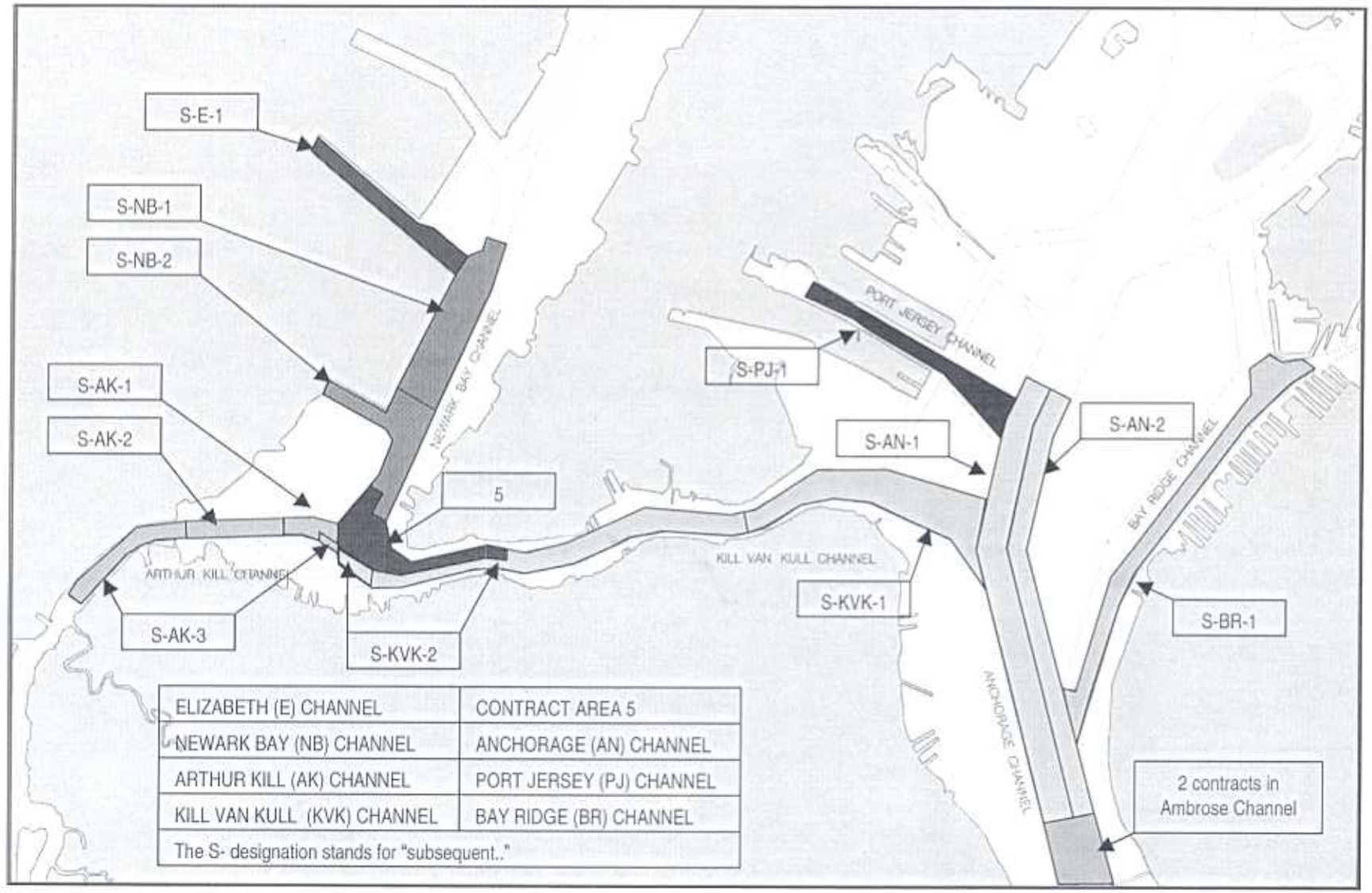
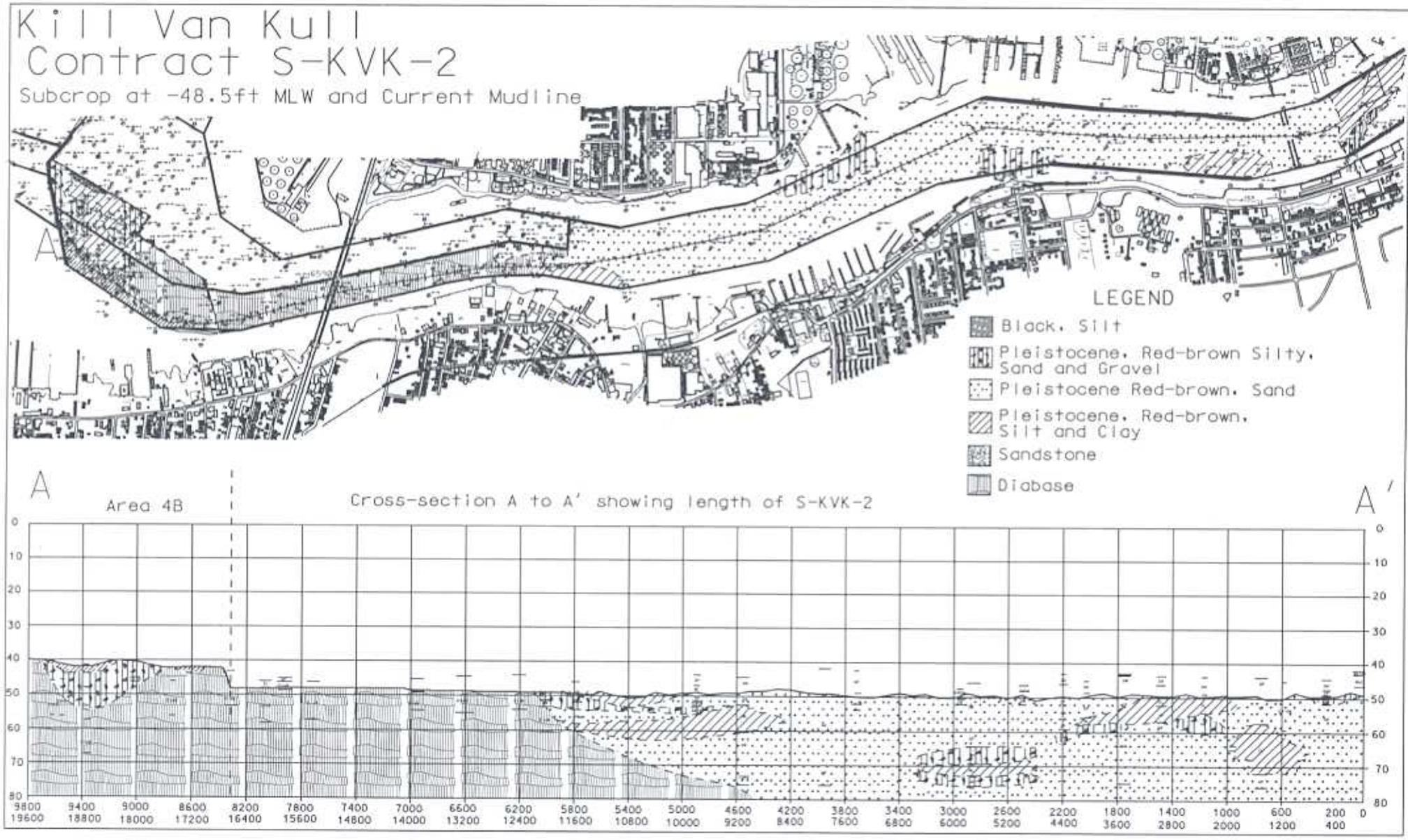

S-E-1
S-NB-1
S-NB-2
S-AK-1
S-AK-2
S-AK-3
S-KVK-2
S-PJ-1
S-AN-1
S-AN-2
S-KVK-1
S-BR-1
5
NEWARK BAY CHANNEL
PORT JERSEY CHANNEL
ARTHUR KILL CHANNEL
KILL VAN KULL CHANNEL
BAY RIDGE CHANNEL
ANCHORAGE CHANNEL
2 contracts in Ambrose Channel
ELIZABETH (E) CHANNEL
CONTRACT AREA 5
NEWARK BAY (NB) CHANNEL
ANCHORAGE (AN) CHANNEL
ARTHUR KILL (AK) CHANNEL
PORT JERSEY (PJ) CHANNEL
KILL VAN KULL (KVK) CHANNEL
BAY RIDGE (BR) CHANNEL
The S- designation stands for "subsequent.."

Figure 1


Kill Van Kull
Contract S-KVK-2
Subcrop at -48.5ft MLW and Current Mudline
A
A'
LEGEND
Black, Silt
Pleistocene, Red-brown Silty, Sand and Gravel
Pleistocene Red-brown, Sand
Pleistocene, Red-brown, Silt and Clay
Sandstone
Diabase
A
Area 4B
Cross-section A to A' showing length of S-KVK-2
A'
0
10
20
30
40
50
60
70
80
9800 19600
9400 18800
9000 18000
8600 17200
8200 16400
7800 15600
7400 14800
7000 14000
6600 13200
6200 12400
5800 11600
5400 10800
5000 10000
4600 9200
4200 8400
3800 7600
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3000 6000
2600 5200
2200 4400
1800 3600
1400 2800
1000 2000
600 1200
200 400
0

Figure 2

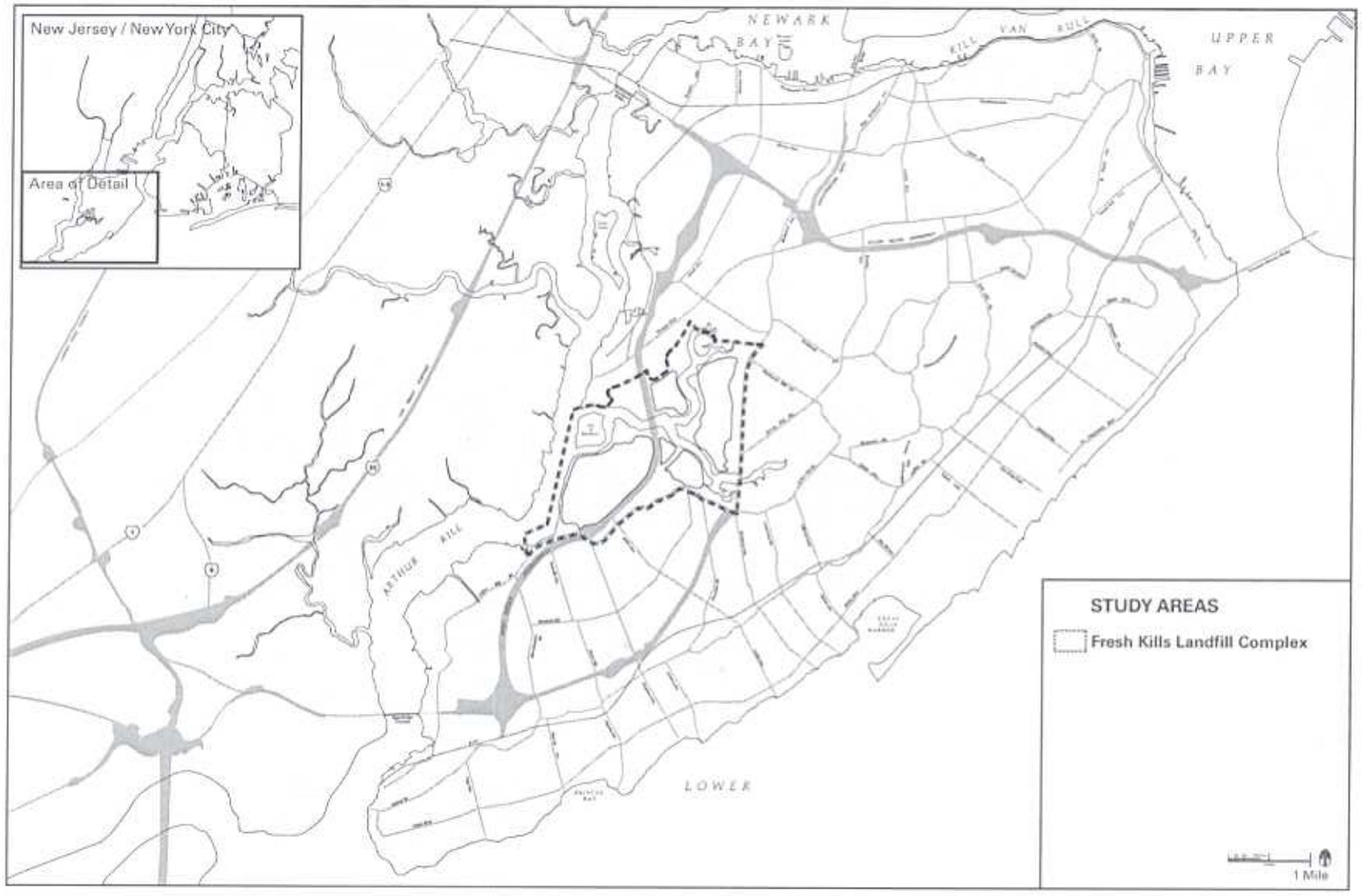
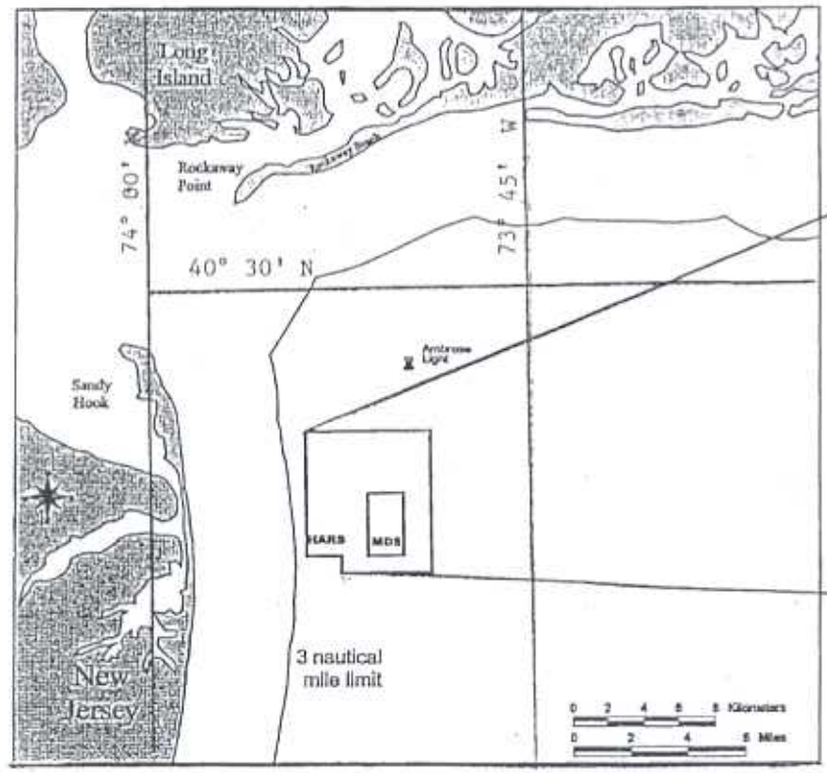

New Jersey / New York City
Area of Detail
NEWARK
BAY
KILL VAN KULL
UPPER
BAY
ARTHUR KILL
LOWER
STUDY AREAS
Fresh Kills Landfill Complex
1 Mile

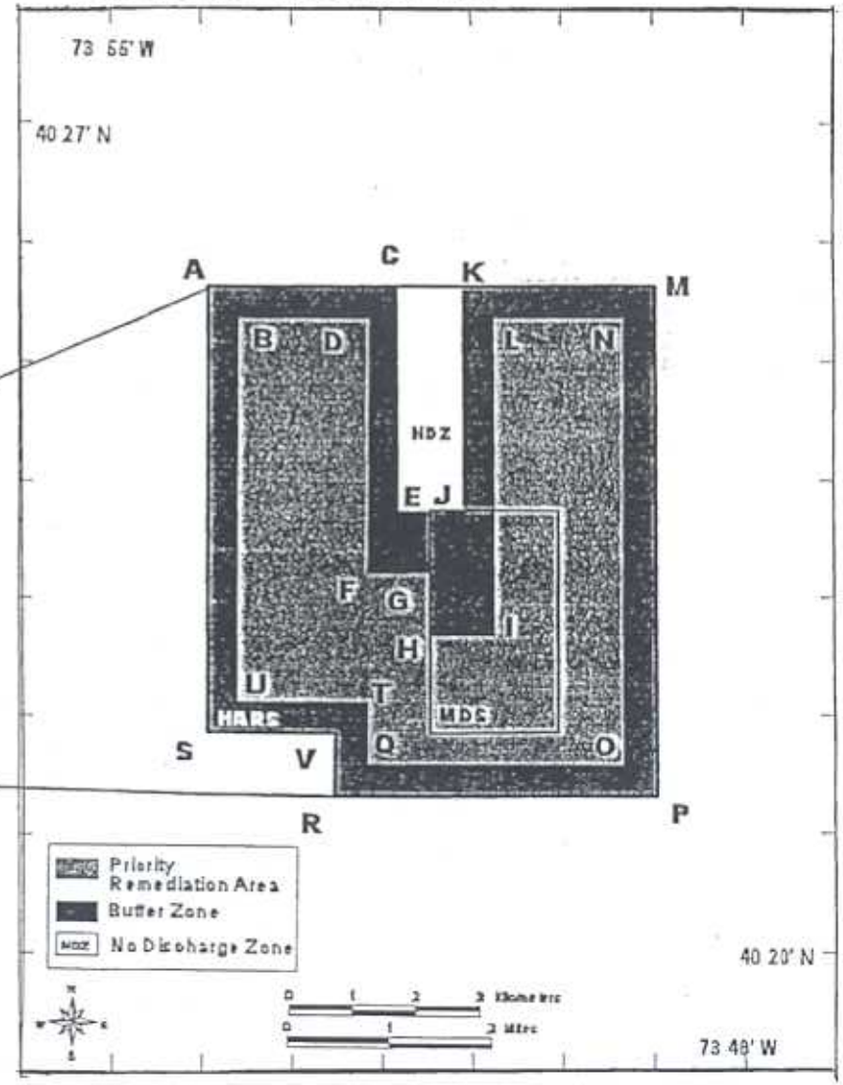
Figure 3

HISTORIC AREA REMEDIATION SITE LOCATION MAP



A

LOCATION OF PRIMARY REMEDIATION AREA WITHIN THE HISTORIC AREA REMEDIATION SITE

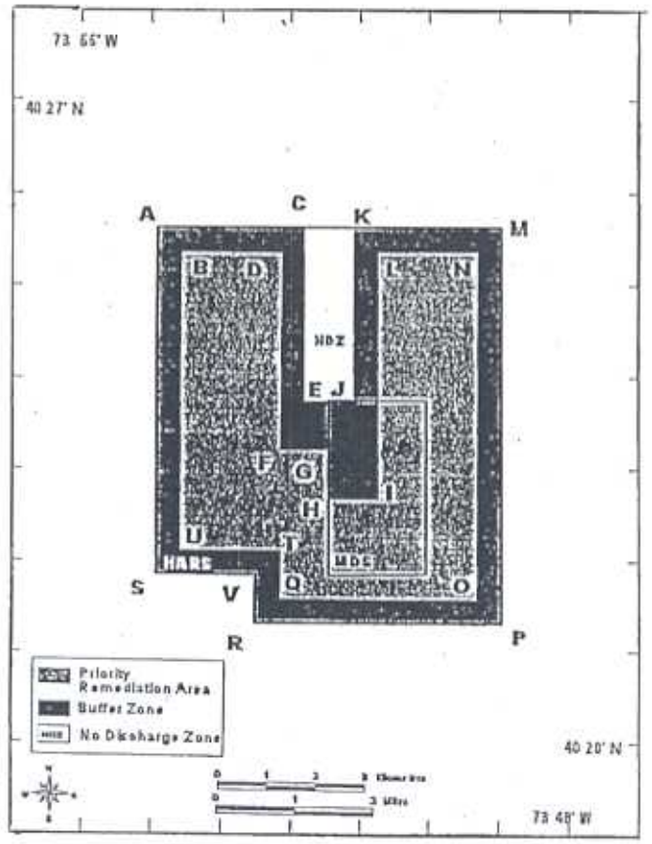


B

SHEET OF

FIGURE 9

00900 ATT. A-2



Priority Remediation Area (FRA): 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

SHEET OF

Figure 5

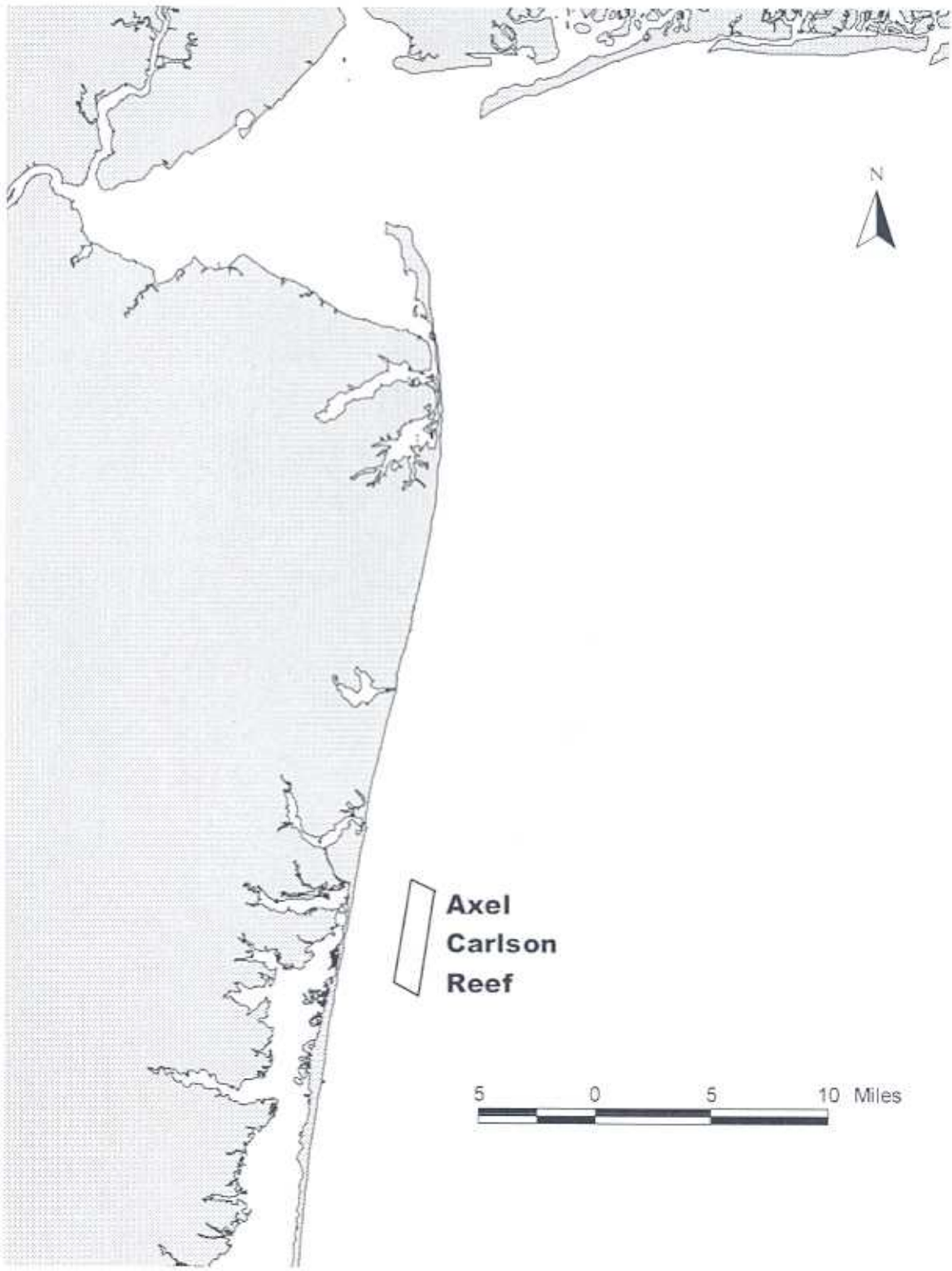


Figure 6. Location of Axel Carlson Reef offshore of the New Jersey coastline.