



**US Army Corps
of Engineers®**

PUBLIC NOTICE

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

In replying refer to:
Public Notice Number: FP63-SKVK1-2007
Issue Date: 24 August 2007
Expiration Date: 24 September 2007

**NEW YORK AND NEW JERSEY HARBOR DEEPENING
NEW YORK AND NEW JERSEY CHANNELS
FEDERAL NAVIGATION PROJECT
CONTRACT AREA S-KVK-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) and Section 404 of the Federal Water Pollution Control Act (amended in 1977 and commonly referred to as the Clean Water Act, 33 U.S.C.1344), 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 S-KVK-1 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 Holocene silt and clay, Holocene sand, recently deposited sediments, Pleistocene red-brown clay, and Pleistocene glacial till material to be placed at the Historic Area Remediation Site (HARS) .

ACTIVITY: Deepen the remainder of the federal Kill Van Kull Channel, which is authorized as part of the New York & New Jersey Harbor Deepening Project in Section 101(a)(2) of the Water Resources Act of 2000, Public Law 106-541 to -52 ft below mean low water with placement of approximately 1,500,000 cubic yards of HARS-suitable remediation dredged material at the Historic Area Remediation Site. Also, approximately 900,000 cubic yards of rock will be placed at a permitted reef site.

LOCATION: Kill Van Kull federal Navigation Channel, Bayonne, New Jersey and Staten Island, New York.

DESCRIPTION OF PLANNED ACTION:

The overall New York and New Jersey Harbor Project involves deepening 23.6 miles of navigation channel to depths of 50-53 feet below mean low water. Sixteen individual dredging contracts are planned to accomplish the deepening (see Figure 1). To date, four contracts have been awarded,

including the S-KVK-2 contract which was completed in March 2007. A fifth contract (Port Jersey) is scheduled to be awarded in fall of 2007.

Contract Area S-KVK-1

Contract Area S-KVK-1 (see Figure 2) contains Holocene gray silt and clay, Holocene sand, and recently deposited sediments overlying hard Pleistocene red-brown clay, Pleistocene glacial till 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 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 Holocene gray silt and clay, Holocene sand, recently deposited sediments, and the Pleistocene red-brown clay and Pleistocene glacial till are proposed to be used beneficially as HARS Remediation Material. The table below summarizes the volumes of material proposed to be dredged from the Kill Van Kull Channel, which is expected to take approximately two years to complete.

**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		HARS-Suitable Holocene Sediments			Rock (CY) (to be placed at reef site)	Total Material Volume (CY)
	Glacial Till* (CY)	Red-Brown Clay** (CY)	Gray Silt & Clay (CY)	Sand (CY)	Recently Deposited Sediments (CY)		
S-KVK-1	400,000	160,000	180,000	600,000	160,000	900,000	2,400,000
<p>* 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.</p> <p>** 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, Pleistocene red-brown clay dredged from the greater geological formation would not require further HARS testing.</p>							

The purpose of this Public Notice is to solicit comments regarding the proposed placement of dredged materials at the HARS. These comments, along with all available technical data and information, will form the basis of a determination of whether this proposed project 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.

In addition to the material proposed for placement at the HARS, an additional 900,000 cubic yards of dredged rock will be utilized beneficially at a permitted artificial reef site.

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, consideration has also been given to alternatives other than placement of the dredged material in ocean waters.

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.

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.

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. Harold Hawkins, Project Manager for the New York and New Jersey Harbor Deepening Project, at telephone number (917) 790-8204.

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 3 & 4) 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.

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 4A-4C) 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 5A-7C) 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.

SEDIMENT TEST RESULTS FOR HOLOCENE SANDS, GRAY SILTS AND CLAYS, AND RECENTLY DEPOSITED SEDIMENTS

In accordance with the Ocean Dumping Regulations at 40 CFR Part 227, bioassays were performed to assess the toxicity of the solid phase, liquid phase and suspended particulate phase of the proposed dredged material from the project area. Bioassays were performed using appropriate sensitive marine organisms as discussed below. Bioassay testing conformed to procedures outlined in Evaluation of Dredged Material Proposed for Ocean Disposal (USEPA, USACE; 1991) commonly referred to as the "Green Book". The results of bioassay tests conducted on sediments from the project area are provided in Table 2 (A, B, and C).

The proposed dredging area has been characterized by using three (3) sediment testing reaches with 8 core samples in Reach 1, 21 core samples in Reach 2, and 14 core samples in Reach 3. The core samples were taken to a depth of -53.5 feet (i.e., design depth of -50 feet plus an additional -2 feet required for safety and -1.5 feet allowable paid overdepth). The core samples in each reach were combined to yield three sediment composites, which were submitted to chemical and biological testing. Based upon an analysis of sediment samples from the reach, the grain size characteristics of the proposed dredged material are:

Reach 1: 0.01% GRAVEL, 49.8% SAND, 25.2% SILT, 25.0% CLAY

Reach 2: 1.0% GRAVEL, 82.4% SAND, 8.0% SILT, 8.6% CLAY

Reach 3: 7.5% GRAVEL, 38.2% SAND, 29.1% SILT, 25.2% CLAY

Results of the chemical and biological testing are summarized below.

Evaluation of the Liquid Phase: Chemistry

In accordance with requirements of 40 CFR Sections 227.6(c)(1) and 227.27(a), chemical analysis was conducted on project area site water and elutriate. Results of this evaluation are summarized in Table 1 (A, B, and C). (Please note the detection limits are shown for those constituents that the laboratory report as “not detected” (ND) in the concentration column. This reporting convention is also used in reporting the results of bioaccumulation potential testing discussed below).

Concentrations of chemical constituents in the water column following ocean placement, after allowing for initial mixing, were calculated using the Automated Dredging and Disposal Alternatives Management System (ADDAMS), a mixing model developed by the U.S. Army Corps of Engineers, Waterways Experiment Station (WES) and described in the joint USEPA/USACE manual referred to as the “Green Book”. The material can be considered suitable for ocean disposal only if the concentration of the Suspended Particulate Phase (SPP) of the dredged material, after allowance for initial mixing, will not exceed the Limiting Permissible Concentration (LPC) beyond the boundaries of the disposal site within the first four hours following dumping or at any point in the marine environment after the first four hours. The ADDAMS Model predicted that applicable marine water quality criteria for listed constituents were not exceeded after allowance for initial mixing (40 CFR 227.29(a)). Results of the analyses indicate that the LPC will be met for the proposed dredged material from the project area.

Bioassays

In accordance with 40 CFR Part 227 of the Ocean Dumping Regulations, bioassays were performed to assess possible toxicity of the liquid, suspended particulate, and solid phases of the proposed dredged material from the project area.

Liquid phase bioassay. The results of the liquid phase bioassay indicated that none of the three sensitive marine organisms, mysid shrimp (*Mysidopsis bahia*), inland silversides (*Menidia beryllina*), and blue mussels (*Mytilus edulis*), after initial mixing (as determined under 40 CFR Sections 227.29(a)(2)), exceeded the toxicity threshold of 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms. Accordingly, the liquid phase of the material is in compliance with 40 CFR Sections 227.6(c)(1) and 227.27(a).

Suspended particulate phase. The results of the suspended particulate phase conducted on the three sensitive marine organisms (mysid shrimp (*Mysidopsis bahia*), inland silversides (*Menidia beryllina*), and blue mussels (*Mytilus edulis*) indicated that dredged material in the suspended particulate phase would not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic in the laboratory bioassays, and thus would not cause significant mortality. Moreover, after placement, the suspended particulate phase would only exist in the environment for a short time, indicating that the suspended particulate phase of the project material would not cause significant undesirable effects, including the possibility of danger associated with bioaccumulation, since these impacts require long duration exposures (see USEPA, 1994). Accordingly, it is concluded that the suspended phase of the material from Kill Van Kull Channel, Contract Area S-KVK-1, would be in compliance with 40 CFR Sections 227.6(c)(2) and 227.27(b). The results from

the suspended particulate phase evaluation conducted on proposed dredged sediments from the project area are presented in Table 2 (A, B, and C) of this Public Notice..

Solid phase. The solid phase evaluation tests the whole test sediment before it has undergone processing that might alter its chemical or toxicological properties. The reference sediment represents existing background conditions in the vicinity of the dumpsite, removed from the influence of any disposal operation. For the solid phase bioassay, 10-day toxicity was determined by exposing a filter feeding mysid shrimp (*Mysidopsis bahia*) and a deposit feeding, burrowing amphipod (*Ampelisca abdita*) to a composite of sediment from the project area and comparing mortalities in those treatments to mortalities experienced after exposure to a reference sediment. These organisms are good predictors of adverse effects to benthic marine communities (see USEPA, 1996a). Results are evaluated for biologically and statistically significant differences in mortality between treatments. The 1991 Green Book guidance considers that dredged material does not meet the whole sediment toxicity criterion when mortality in the test treatments is (a) statistically significant and greater than in the reference sediment and (b) exceeds mortality in the reference treatment by at least 10% for mysid shrimp and 20% for amphipod species. The following sections address the results of those tests and further analyze compliance with the regulatory criteria of 40 CFR Sections 227.6(c)(3), 227.27(b), and 228.15 and with USEPA, Region 2/New York District guidance.

The toxicity of project sediments was not statistically greater than reference for either mysids or amphipods, and the difference between percent survivals in test and reference sediments was less than 10% for mysid shrimp and less than 20% for amphipods. These results show that the solid phase of the material would not cause significant mortality. The results of the toxicity portion of the solid phase bioassays can be seen in Table 2 (A, B, and C).

Evaluation of the solid phase bioaccumulation

Bioaccumulation tests for sediments from the project area reaches were conducted on the solid phase of the project material for contaminants of concern using two appropriate sensitive benthic marine organisms, a sand worm (*Nereis virens*) and a bent-nosed clam (*Macoma nasuta*). These species are considered to be good representatives of the phylogenetically diverse base of the marine food chain.

Contaminants of concern, identified for the regional testing manual are listed in the NY/NJ Harbor Estuary Program Toxics Characterization report (Squibb, *et al.* 1991). Table 3 (A, B, and C) of this notice addresses the bioaccumulation of contaminants of concern for the project area. Additional information on more rigorous evaluations conducted on individual contaminants may be found in the Testing Evaluation Memos for this project. Table 3 indicates that several contaminants in these reaches bioaccumulated above reference in the clam and/or worm. The Testing Memo further evaluates these contaminants and concludes that any contaminant that exceeded reference did not exceed any existing regional matrix or dioxin value. Several contaminants that do not have matrix values did exceed background levels, but in no case did any contaminant accumulate to toxicologically important concentrations, even when very conservative assumptions were used in the analysis. Any contaminants that exhibited bioaccumulation test results above reference were all below the acceptable human health risk range and acceptable aquatic effects range, again using conservative approaches and analyses.

Based on the requirements of 40 CFR Parts 227.6 and 227.27, bioaccumulation analyses were performed for the chemical constituents listed in Table 3 (A, B, and C) of this Public Notice. All constituents identified in worm and clam tissue were compared to existing Food and Drug Administration (FDA) action levels for poisonous or deleterious substances in fish and shellfish for human food, regional disposal criteria, background concentrations and risk-based criteria provided by USEPA, Region 2.

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. The 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 may be placed at alternative beneficial use sites that are or may be 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 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.

S-KVK-1 contract dredged material currently has no economically viable alternative site for the HARS-suitable material. For example, the dredging and disposal at permitted upland sites of sand unsuitable for placement at the HARS 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 silty material from the Port Jersey Channel contract #3. 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.

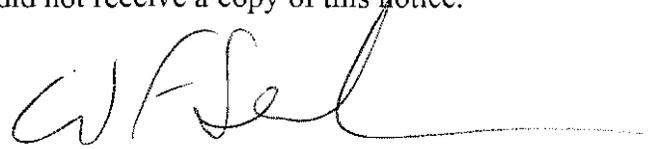
Placement of this material at the HARS would serve to reduce impacts at the HARS to acceptable levels and improve benthic conditions. Sediments in the HARS have been found to be acutely toxic to sensitive benthic marine organisms in laboratory tests. Project dredged material subjected to laboratory acute 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. Harold Hawkins, the NY & NJ Harbor Deepening Project Manager; at (917) 790-8204 or by email: Harold.J.Hawkins@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.

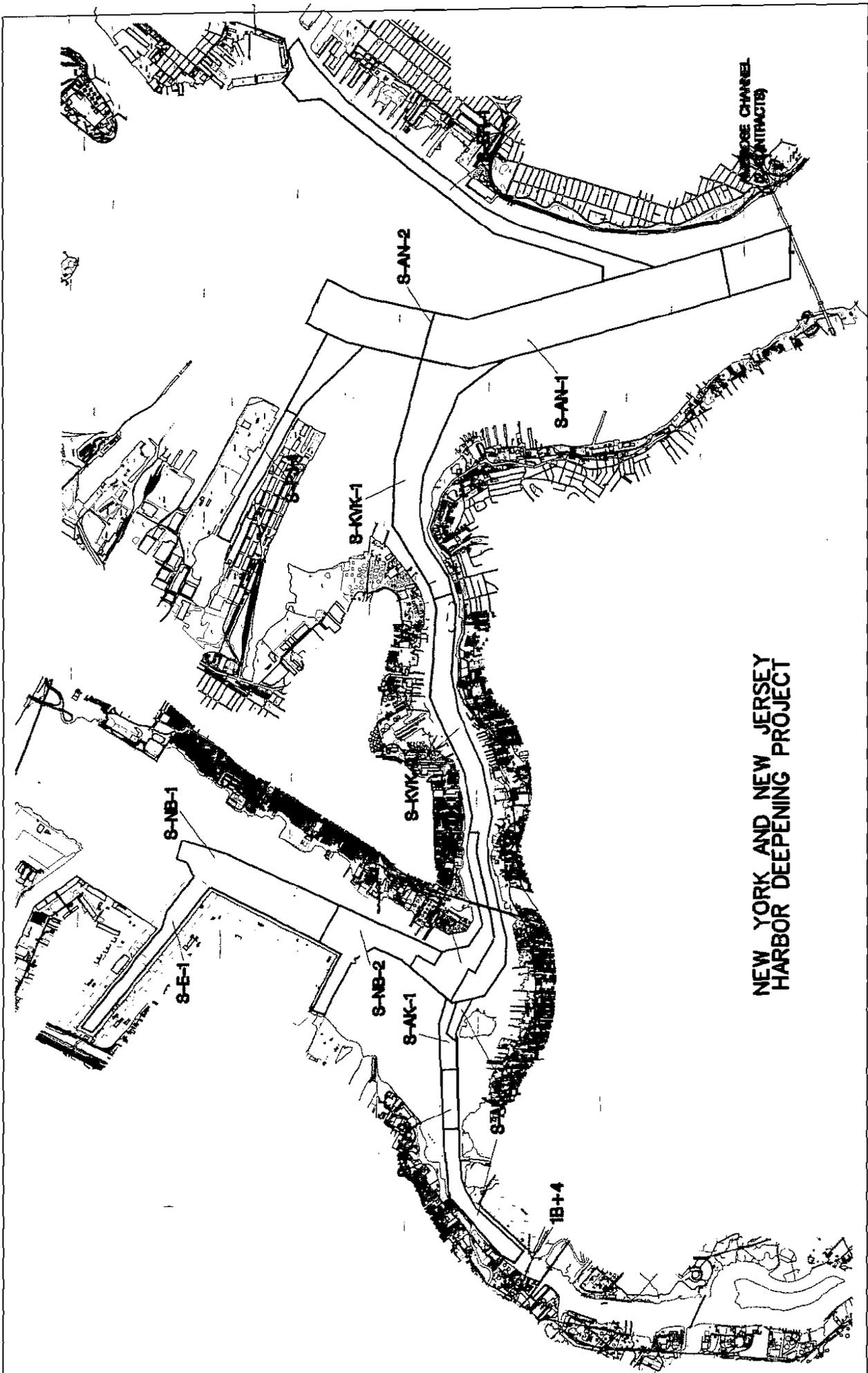
For more information on New York District programs, visit our website at <http://www.nan.usace.army.mil>.

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.

A handwritten signature in black ink, appearing to read 'WFSlezak', with a long horizontal flourish extending to the right.

William F. Slezak
Chief, Harbor Programs Branch

Enclosures



**NEW YORK AND NEW JERSEY
HARBOR DEEPENING PROJECT**

Figure 1

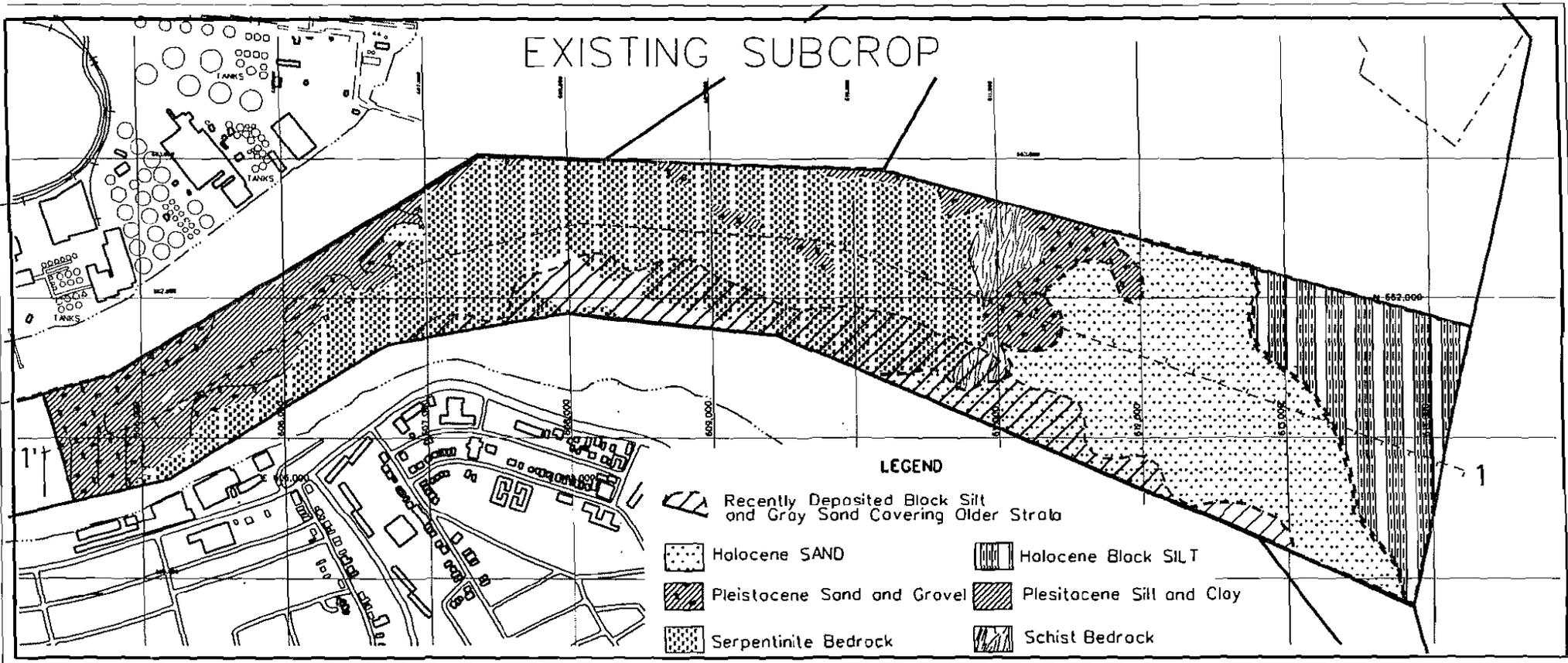
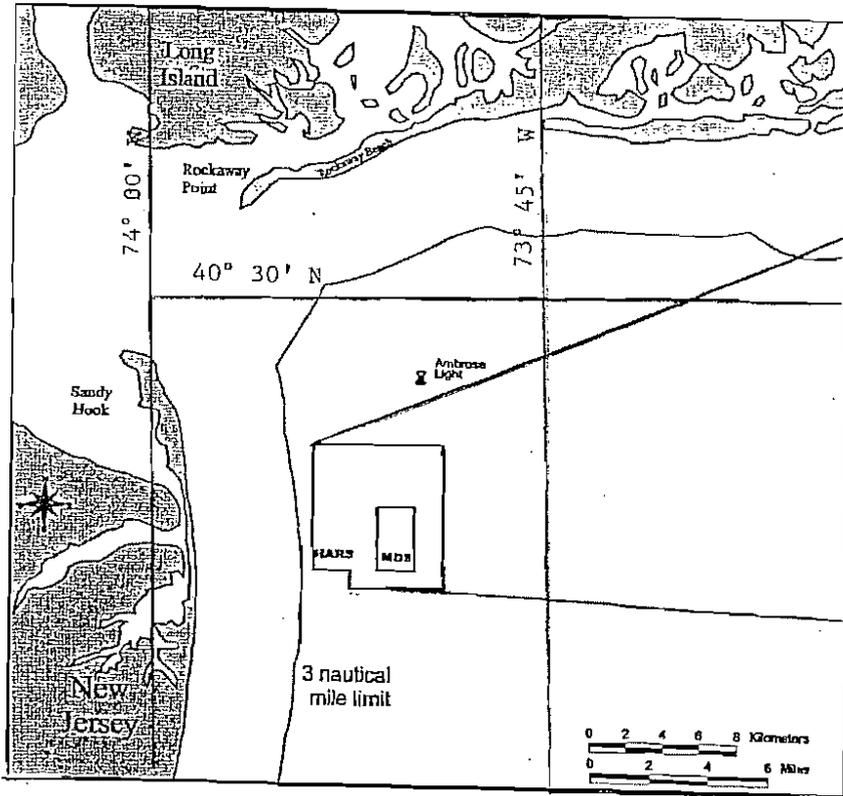


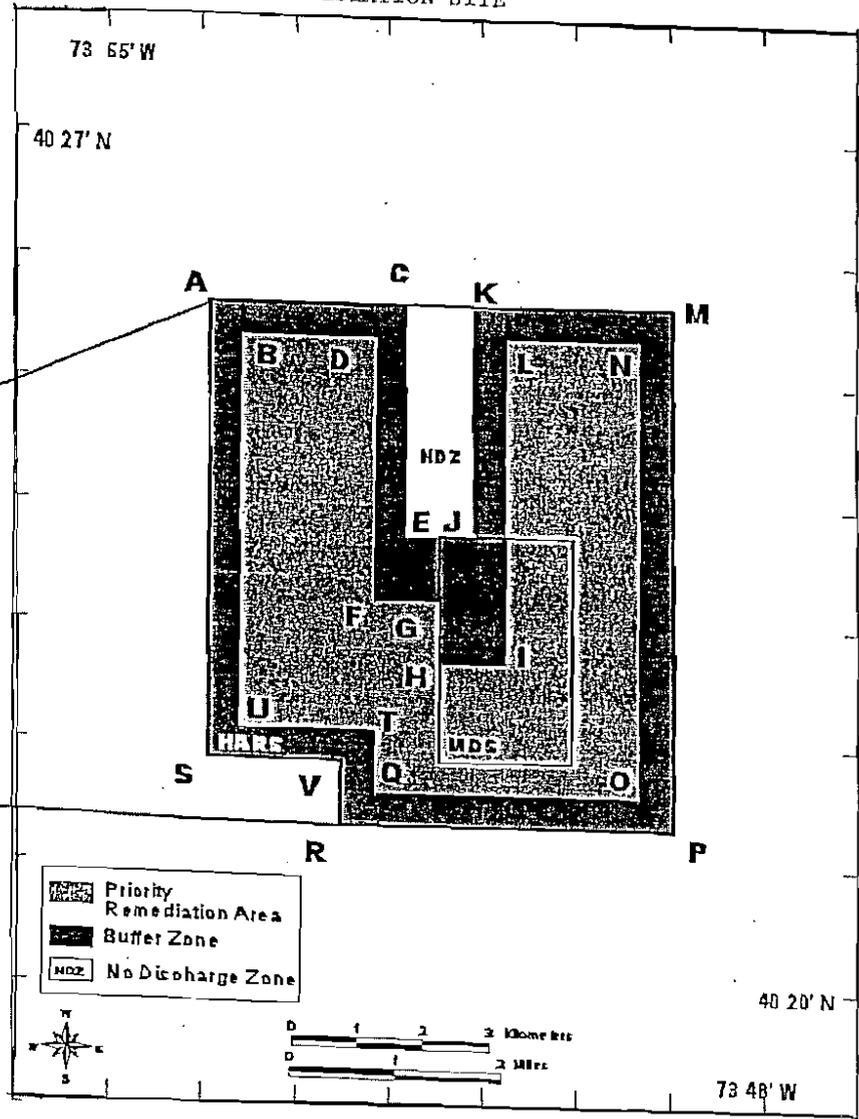
Figure 2

HISTORIC AREA REMEDIATION SITE LOCATION MAP



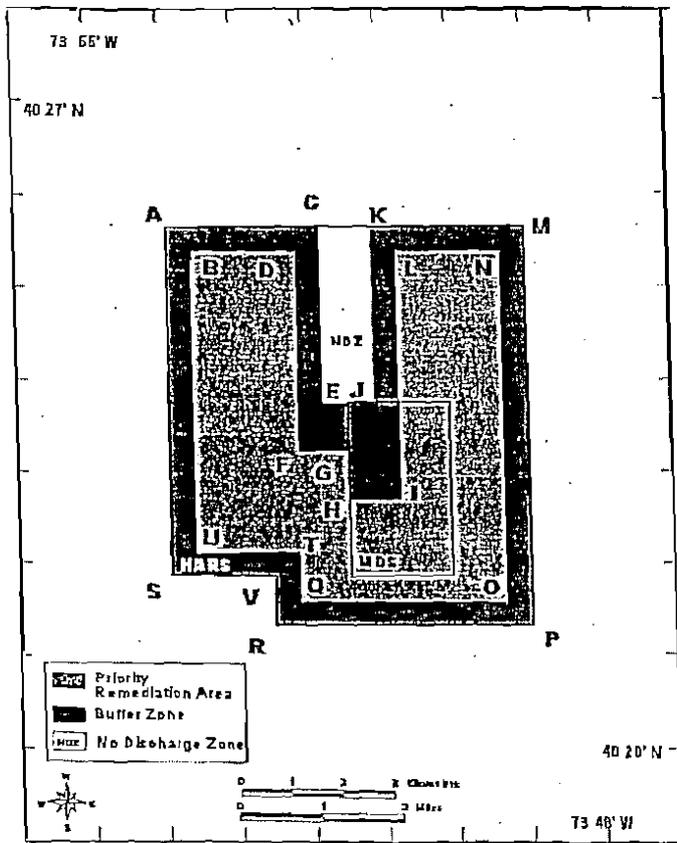
A

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

** -- DDM := Degrees, Decimal Minutes

Figure 4

KILL VAN KULL CHANNEL S-KVK-1
TABLE 1A. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
REACH 1

CONSTITUENTS	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb	ppb	ppb	ppb
Ag		0.021	0.01400	ND
Cd		0.052		0.008
Cr		0.516		0.552
Cu		11.27		0.772
Hg		0.005		0.003
Ni		1.04		0.89
Pb		1.28		0.60
Zn		23.77		1.47
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	0.38	ND	0.38	ND
a-Chlordane	0.40	ND	0.40	ND
trans Nonachlor	0.40	ND	0.40	ND
Dieldrin	0.49	ND	0.49	ND
4,4'-DDT	0.44	ND	0.44	ND
2,4'-DDT	0.88	ND	0.88	ND
4,4'-DDD	0.48	ND	0.48	ND
2,4'-DDD	0.59	ND	0.59	ND
4,4'-DDE	0.40	ND	0.40	ND
2,4'-DDE	0.94	ND	0.94	ND
Total DDT		1.9		1.9
Endosulfan I	0.45	ND	0.45	ND
Endosulfan II	0.41	ND	0.41	ND
Endosulfan sulfate	0.41	ND	0.41	ND
Heptachlor	0.36	ND	0.36	ND
Heptachlor epoxide	0.89	ND	0.89	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8	0.51	ND	0.51	ND
PCB 18	0.46	ND	0.46	ND
PCB 28	0.38	ND	0.38	ND
PCB 44	0.47	ND	0.47	ND
PCB 49	0.34	ND	0.34	ND
PCB 52	0.41	ND	0.41	ND
PCB 66	0.47	ND	0.47	ND
PCB 87	0.49	ND	0.49	ND
PCB 101	0.83	ND	0.83	ND
PCB 105	0.41	ND	0.41	ND
PCB 118	0.50	ND	0.50	ND
PCB 128	0.56	ND	0.56	ND
PCB 138	0.48	ND	0.48	ND
PCB 153	0.35	ND	0.35	ND
PCB 170	0.64	ND	0.64	ND
PCB 180	0.67	ND	0.67	ND
PCB 183	0.44	ND	0.44	ND
PCB 184	0.66	ND	0.66	ND
PCB 187	0.40	ND	0.40	ND
PCB 195	0.59	ND	0.59	ND
PCB 206	0.44	ND	0.44	ND
PCB 209	0.59	ND	0.59	ND
Total PCB		16.14		16.1

ND = Not detected

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

Total PCB = sum of congeners reported x 2

Concentrations shown are the mean of three replicate analyses

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

TABLE 2A.

KILL VAN KULL CHANNEL S-KVK-1 - REACH 1

TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC ₅₀ /EC ₅₀	LPC (a)
<i>Menidia beryllina</i>	96 hours	(b) 95.2%	0.95
<i>Mysidopsis bahia</i>	96 hours	(b) >100%	1.00
<i>Mytilus edulis</i> (larval survival)	48 hours	(b) >100%	1.00
<i>Mytilus edulis</i> (larval normal develop.)	48 hours	(c) 22.4%	0.22

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

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

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

Whole Sediment (10 days)

Test Species	% Survival in Reference	% Survival in Test	% Difference Reference - Test	Is difference statistically significant? (α=0.05)
<i>Ampelisca abdita</i>	96%	95%	1%	No
<i>Mysidopsis bahia</i>	94%	96%	-2%	No

TABLE 3A.

KILL VAN KULL CHANNEL S-KVK-1
28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations
REACH 1

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	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		0.04		0.04		0.03		0.01
As		3.20		3.52		1.00		0.64
Cd		0.04		0.04		0.01	*	0.01
Cr		0.29		0.34		0.07		0.07
Cu		1.17		* 1.66		2.15		2.18
Hg		0.006		* 0.012		0.005		0.005
Ni		0.32		* 0.47		0.15		* 0.18
Pb		0.16		* 0.55		0.04		* 0.07
Zn		11.72		11.47		11.38		11.60
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	0.03	ND	0.03	ND	0.03	ND	0.03	ND
a-Chlordane		0.03		* 0.09		0.81		0.85
trans Nonachlor	0.04	ND	0.04	ND		1.22		1.20
Dieldrin	0.06	ND		* 0.11		1.13		* 1.39
4,4'-DDT	0.05	ND		0.05		0.21		0.21
2,4'-DDT	0.05	ND	0.05	ND	0.05	ND	0.05	ND
4,4'-DDD		0.04		* 0.17		0.72		* 1.03
2,4'-DDD	0.06	ND		* 0.35		0.37		* 0.56
4,4'-DDE		0.07		* 0.34		0.43		* 0.78
2,4'-DDE	0.06	ND		0.03	0.06	ND	0.06	ND
Total DDT		0.22		* 0.97		1.78		* 2.64
Endosulfan I	0.02	ND		0.01		0.09		* 0.11
Endosulfan II	0.06	ND	0.06	ND	0.06	ND	0.06	ND
Endosulfan sulfate	0.14	ND		0.07		0.46		0.48
Heptachlor	0.04	ND	0.04	ND	0.04	ND	0.04	ND
Heptachlor epoxide	0.02	ND	0.02	ND		0.24		0.26
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	0.19	ND	0.19	ND	0.19	ND	0.19	ND
PCB 18	0.04	ND		* 0.21	0.04	ND		* 1.13
PCB 28		0.03		* 0.39		0.10		* 1.06
PCB 44	0.03	ND		* 0.13		0.32		* 0.98
PCB 49		0.02		* 0.29		0.13		* 0.93
PCB 52		0.03		* 0.46		0.31		* 1.70
PCB 66		0.02		* 0.33		0.15		* 0.80
PCB 87	0.05	ND		* 0.15		0.05		* 0.29
PCB 101		0.03		* 0.35		0.77		* 1.51
PCB 105	0.05	ND		* 0.11		0.23		0.34
PCB 118		0.03		* 0.30		0.50		* 0.94
PCB 128	0.03	ND		* 0.03		0.25		* 0.32
PCB 138		0.03		* 0.27		1.78		* 2.28
PCB 153		0.03		* 0.36		2.61		2.39
PCB 170	0.03	ND		* 0.06		0.35		* 0.48
PCB 180		0.02		* 0.11		1.08		* 1.31
PCB 183	0.04	ND		* 0.05		0.43		* 0.52
PCB 184	0.05	ND	0.05	ND	0.05	ND	0.05	ND
PCB 187		0.02		* 0.09		1.05		* 1.23
PCB 195	0.03	ND		* 0.03		0.20		* 0.28
PCB 206	0.02	ND		* 0.04		0.37		* 0.49
PCB 209	0.03	ND		* 0.05		0.20		* 0.33
Total PCB		1.13		* 7.83		22.03		* 38.87
1,4-Dichlorobenzene		0.21		0.25		0.31		* 0.39

TABLE 3A. (Continued)

KILL VAN KULL S-KVK-1
REACH 1

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN
	LIMITS	TRATION	LIMITS	TRATION	LIMITS	TRATION	LIMITS	TRATION
	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
PAH's								
Naphthalene		0.32	*	0.81		0.59		0.65
Acenaphthylene		0.04	*	1.10		0.14	*	0.97
Acenaphthene		0.06	*	0.46		0.49	*	1.53
Fluorene		0.12	*	0.68		0.47	*	0.77
Phenanthrene		0.60	*	5.32		0.92	*	2.37
Anthracene		0.13	*	5.37		0.09	*	1.43
Fluoranthene		1.57	*	50.09		0.72	*	52.98
Pyrene		1.62	*	89.24		0.88	*	81.56
Benzo(a)anthracene		0.13	*	20.57		0.03	*	4.85
Chrysene		0.21	*	15.30		0.05	*	5.83
Benzo(b)fluoranthene		0.33	*	18.22		0.07	*	4.42
Benzo(k)fluoranthene		0.11	*	6.29		0.04	*	2.82
Benzo(a)pyrene		0.11	*	14.54		0.03	*	3.72
Indeno(1,2,3-cd)pyrene		0.05	*	3.75		0.01	*	0.47
Dibenzo(a,h)anthracene		0.01	*	0.69		0.01	*	0.16
Benzo(g,h,i)perylene		0.08	*	4.80		0.03	*	1.18
Total PAH's		5.47	*	237.23		4.58	*	165.73
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	0.60	ND		0.37		0.26	*	0.48
12378 PeCDD	1.12	ND		1.39	0.99	ND	0.95	ND
123478 HxCDD	0.57	ND	0.91	ND	0.18	ND	0.28	ND
123678 HxCDD	0.79	ND	0.88	ND	0.17	ND	*	0.16
123789 HxCDD	0.60	ND	0.81	ND		0.13	0.25	ND
1234678 HpCDD	0.42	ND		0.84		0.29		0.25
1234789 OCDD		1.08		7.72		1.61		2.17
2378 TCDF	0.55	ND		1.80		0.16	*	1.15
12378 PeCDF	0.41	ND	1.06	ND		0.19	0.44	ND
23478 PeCDF	0.40	ND	1.11	ND		0.24		0.26
123478 HxCDF	0.12	ND	0.77	ND		0.09		0.11
123678 HxCDF	0.13	ND	0.77	ND		0.07		0.06
234678 HxCDF	0.13	ND	0.82	ND		0.10	0.14	ND
123789 HxCDF	0.15	ND	0.89	ND	0.14	ND	0.16	ND
1234678 HpCDF	0.17	ND		0.67		0.14		0.18
1234789 HpCDF		0.15		0.43		0.14	0.19	ND
12346789 OCDF		0.49	*	1.66		0.36		0.47

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.

KILL VAN KULL CHANNEL S-KVK-1
TABLE 1B. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
REACH 2

CONSTITUENTS	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb	ppb	ppb	ppb
Ag		0.022	0.01400	ND
Cd		0.055		0.006
Cr		0.676		0.394
Cu		12.50		0.954
Hg		0.007		0.003
Ni		1.10		1.02
Pb		1.58		0.48
Zn		29.40		1.94
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	0.38	ND	0.38	ND
a-Chlordane	0.40	ND	0.40	ND
trans Nonachlor	0.40	ND	0.40	ND
Dieldrin	0.49	ND	0.49	ND
4,4'-DDT	0.44	ND	0.44	ND
2,4'-DDT	0.88	ND	0.88	ND
4,4'-DDD	0.48	ND	0.48	ND
2,4'-DDD	0.59	ND	0.59	ND
4,4'-DDE	0.40	ND	0.40	ND
2,4'-DDE	0.94	ND	0.94	ND
Total DDT		1.9		1.9
Endosulfan I	0.45	ND	0.45	ND
Endosulfan II	0.41	ND	0.41	ND
Endosulfan sulfate	0.41	ND	0.41	ND
Heptachlor	0.36	ND	0.36	ND
Heptachlor epoxide	0.89	ND	0.89	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8	0.51	ND	0.51	ND
PCB 18	0.46	ND	0.46	ND
PCB 28	0.38	ND	0.38	ND
PCB 44	0.47	ND	0.47	ND
PCB 49	0.34	ND	0.34	ND
PCB 52	0.41	ND	0.41	ND
PCB 66	0.47	ND	0.47	ND
PCB 87	0.49	ND	0.49	ND
PCB 101	0.83	ND	0.83	ND
PCB 105	0.41	ND	0.41	ND
PCB 118	0.50	ND	0.50	ND
PCB 128	0.56	ND	0.56	ND
PCB 138	0.48	ND	0.48	ND
PCB 153	0.35	ND	0.35	ND
PCB 170	0.64	ND	0.64	ND
PCB 180	0.67	ND	0.67	ND
PCB 183	0.44	ND	0.44	ND
PCB 184	0.66	ND	0.66	ND
PCB 187	0.40	ND	0.40	ND
PCB 195	0.59	ND	0.59	ND
PCB 206	0.44	ND	0.44	ND
PCB 209	0.59	ND	0.59	ND
Total PCB		16.14		16.1

ND = Not detected

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

Total PCB = sum of congeners reported x 2

Concentrations shown are the mean of three replicate analyses

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

TABLE 2B.

KILL VAN KULL CHANNEL S-KVK-1 - REACH 2

TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC ₅₀ /EC ₅₀	LPC (a)
<i>Menidia beryllina</i>	96 hours	(b) >100%	1.00
<i>Mysidopsis bahia</i>	96 hours	(b) >100%	1.00
<i>Mytilus edulis</i> (larval survival)	48 hours	(b) >100%	1.00
<i>Mytilus edulis</i> (larval normal develop.)	48 hours	(c) 67.7%	0.68

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

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

(c) Median Effective Concentration (EC₅₀) based on normal development to 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? (α=0.05)
<i>Ampelisca abdita</i>	96%	99%	-3%	No
<i>Mysidopsis bahia</i>	94%	90%	4%	No

TABLE 3B.

KILL VAN KULL CHANNEL S-KVK-1
28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations
REACH 2

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN
	LIMITS	TRATION	LIMITS	TRATION	LIMITS	TRATION	LIMITS	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		0.04		0.04		0.03		0.02
As		3.20		3.22		1.00		0.99
Cd		0.04		0.04		0.01		0.01
Cr		0.29	*	0.46		0.07		0.09
Cu		1.17	*	1.51		2.15		2.12
Hg		0.006		0.007		0.005		0.005
Ni		0.32	*	0.76		0.15		0.24
Pb		0.16	*	0.38		0.04		0.05
Zn		11.72		10.62		11.38		12.46
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	0.03	ND	0.03	ND	0.03	ND	*	0.03
<i>α</i> -Chlordane		0.03	*	0.07		0.81		0.64
trans Nonachlor	0.04	ND	0.04	ND		1.22		1.00
Dieldrin	0.06	ND	0.06	ND		1.13		0.98
4,4'-DDT	0.05	ND		0.05		0.21		0.20
2,4'-DDT	0.05	ND	0.05	ND	0.05	ND		0.06
4,4'-DDD		0.04	*	0.30		0.72	*	1.10
2,4'-DDD	0.06	ND	*	0.17		0.37	*	0.55
4,4'-DDE		0.07	*	0.45		0.43	*	0.68
2,4'-DDE	0.06	ND		0.05	0.06	ND	*	0.11
Total DDT		0.22	*	1.03		1.78	*	2.69
Endosulfan I	0.02	ND	0.02	ND		0.09		0.08
Endosulfan II	0.06	ND	0.06	ND	0.06	ND	0.06	ND
Endosulfan sulfate	0.14	ND	0.14	ND		0.46		0.22
Heptachlor	0.04	ND	0.04	ND	0.04	ND	0.04	ND
Heptachlor epoxide	0.02	ND	0.02	ND		0.24		0.17
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	0.19	ND	*	0.14	0.19	ND	0.19	ND
PCB 18	0.04	ND	*	0.15	0.04	ND	*	0.15
PCB 28		0.03	*	0.22		0.10	*	0.28
PCB 44	0.03	ND	*	0.08		0.32		0.29
PCB 49		0.02	*	0.18		0.13	*	0.31
PCB 52		0.03	*	0.25		0.31	*	0.61
PCB 66		0.02	*	0.21		0.15	*	0.29
PCB 87	0.05	ND	*	0.08		0.05	*	0.11
PCB 101		0.03	*	0.24		0.77	*	0.88
PCB 105	0.05	ND	*	0.09		0.23	*	0.27
PCB 118		0.03	*	0.19		0.50	*	0.57
PCB 128	0.03	ND	*	0.03		0.25		0.24
PCB 138		0.03	*	0.22		1.78		1.71
PCB 153		0.03	*	0.29		2.61		2.69
PCB 170	0.03	ND	*	0.03		0.35		0.36
PCB 180		0.02	*	0.09		1.08		1.12
PCB 183	0.04	ND	*	0.05		0.43		0.42
PCB 184	0.05	ND	0.05	ND	0.05	ND	0.05	ND
PCB 187		0.02	*	0.07		1.05		1.08
PCB 195	0.03	ND	*	0.02		0.20	*	0.23
PCB 206	0.02	ND	*	0.03		0.37	*	0.44
PCB 209	0.03	ND		0.02		0.20	*	0.24
Total PCB		1.13	*	5.43		22.03	*	24.84
1,4-Dichlorobenzene		0.21	*	0.32		0.31	*	0.43

TABLE 3B. (Continued)

KILL VAN KULL S-KVK-1
REACH 2

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN
	LIMITS	TRATION	LIMITS	TRATION	LIMITS	TRATION	LIMITS	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		0.32	*	0.48		0.59	*	0.73
Acenaphthylene		0.04	*	0.36		0.14	*	0.30
Acenaphthene		0.06	*	0.15		0.49	*	0.65
Fluorene		0.12	*	0.23		0.47	*	0.51
Phenanthrene		0.60	*	1.22		0.92	*	0.97
Anthracene		0.13	*	1.27		0.09	*	0.30
Fluoranthene		1.57	*	6.85		0.72	*	5.06
Pyrene		1.62	*	13.58		0.88	*	8.54
Benzo(a)anthracene		0.13	*	3.45		0.03	*	0.50
Chrysene		0.21	*	2.88		0.05	*	0.65
Benzo(b)fluoranthene		0.33	*	4.26		0.07	*	0.55
Benzo(k)fluoranthene		0.11	*	1.43		0.04	*	0.38
Benzo(a)pyrene		0.11	*	3.32		0.03	*	0.41
Indeno(1,2,3-cd)pyrene		0.05	*	1.07		0.01	*	0.06
Dibenzo(a,h)anthracene		0.01	*	0.23		0.01	*	0.03
Benzo(g,h,i)perylene		0.08	*	1.29		0.03	*	0.14
Total PAH's		5.47	*	42.06		4.58	*	19.77
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	0.60	ND	0.68	ND		0.26		0.23
12378 PeCDD	1.12	ND	1.29	ND	0.99	ND	0.83	ND
123478 HxCDD	0.57	ND		0.24	0.18	ND	0.33	* ND
123678 HxCDD	0.79	ND	0.43	ND	0.17	ND	0.32	* ND
123789 HxCDD	0.60	ND	0.40	ND		0.13	0.29	ND
1234678 HpCDD	0.42	ND		* 0.73		0.29		0.33
1234789 OCDD		1.08		* 6.27		1.61		1.29
2378 TCDF	0.55	ND		* 0.58		0.16		* 0.94
12378 PeCDF	0.41	ND	0.97	* ND		0.19	0.51	* ND
23478 PeCDF	0.40	ND	1.03	* ND		0.24		0.30
123478 HxCDF	0.12	ND		* 0.22		0.09		* 0.22
123678 HxCDF	0.13	ND		* 0.21		0.07		* 0.21
234678 HxCDF	0.13	ND		* 0.23		0.10		0.20
123789 HxCDF	0.15	ND		* 0.24	0.14	ND	0.44	* ND
1234678 HpCDF	0.17	ND		* 0.37		0.14		* 0.22
1234789 HpCDF		0.15		0.28		0.14	0.40	ND
12346789 OCDF		0.49		1.13		0.36		0.31

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.

KILL VAN KULL CHANNEL S-KVK-1
TABLE 1C. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
REACH 3

CONSTITUENTS	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb	ppb	ppb	ppb
Ag		0.022		0.014
Cd		0.060		0.006
Cr		0.688		1.153
Cu		14.90		1.520
Hg		0.010		0.009
Ni		1.23		2.60
Pb		1.74		1.53
Zn		28.40		2.78
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	0.38	ND	0.38	ND
a-Chlordane	0.40	ND	0.40	ND
trans Nonachlor	0.40	ND	0.40	ND
Dieldrin	0.49	ND	0.49	ND
4,4'-DDT	0.44	ND	0.44	ND
2,4'-DDT	0.88	ND	0.88	ND
4,4'-DDD	0.48	ND		0.75
2,4'-DDD	0.59	ND	0.59	ND
4,4'-DDE	0.40	ND		1.34
2,4'-DDE	0.94	ND	0.94	ND
Total DDT		1.9		2.3
Endosulfan I	0.45	ND	0.45	ND
Endosulfan II	0.41	ND	0.41	ND
Endosulfan sulfate	0.41	ND	0.41	ND
Heptachlor	0.36	ND	0.36	ND
Heptachlor epoxide	0.89	ND	0.89	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8	0.51	ND	0.51	ND
PCB 18	0.46	ND	0.46	ND
PCB 28	0.38	ND		0.7
PCB 44	0.47	ND		0.62
PCB 49	0.34	ND		0.98
PCB 52	0.41	ND		1.79
PCB 66	0.47	ND		1.15
PCB 87	0.49	ND	0.49	ND
PCB 101	0.83	ND		1.03
PCB 105	0.41	ND		0.17
PCB 118	0.50	ND		0.65
PCB 128	0.56	ND	0.56	ND
PCB 138	0.48	ND		1.10
PCB 153	0.35	ND		1.35
PCB 170	0.64	ND		0.82
PCB 180	0.67	ND		0.93
PCB 183	0.44	ND		0.19
PCB 184	0.66	ND	0.66	ND
PCB 187	0.40	ND		0.56
PCB 195	0.59	ND		0.22
PCB 206	0.44	ND		0.36
PCB 209	0.59	ND		0.37
Total PCB		16.14		30.3

ND = Not detected

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

Total PCB = sum of congeners reported x 2

Concentrations shown are the mean of three replicate analyses

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

TABLE 2C.

KILL VAN KULL CHANNEL S-KVK-1 - REACH 3

TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC ₅₀ /EC ₅₀	LPC (a)
<i>Menidia beryllina</i>	96 hours	(b) 57.8%	0.58
<i>Mysidopsis bahia</i>	96 hours	(b) >100%	1.00
<i>Mytilus edulis</i> (larval survival)	48 hours	(b) >100%	1.00
<i>Mytilus edulis</i> (larval normal develop.)	48 hours	(c) 22.4%	0.22

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

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

(c) Median Effective Concentration (EC₅₀) based on normal development to 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? (α=0.05)
<i>Ampelisca abdita</i>	97%	99%	-2%	No
<i>Mysidopsis bahia</i>	86%	96%	-10%	No

TABLE 3C.

KILL VAN KULL CHANNEL S-KVK-1
28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations
REACH 3

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION
	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Metals								
Ag		0.04		* 0.06		0.03		0.03
As		3.20		3.31		1.00		0.54
Cd		0.04		0.04		0.01		* 0.05
Cr		0.29		* 0.41		0.07		0.07
Cu		1.17		* 1.90		2.15		2.29
Hg		0.006		* 0.010		0.005		0.005
Ni		0.32		* 0.82		0.15		* 0.27
Pb		0.16		* 0.53		0.04		* 0.06
Zn		11.72		11.31		11.38		11.46
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	0.03	ND	0.03	ND	0.03	ND		0.02
a-Chlordane		0.03		* 0.14		0.81		0.69
trans Nonachlor	0.04	ND	0.04	ND		1.22		0.82
Dieldrin	0.06	ND		* 0.15		1.13		1.03
4,4'-DDT	0.05	ND	0.05	ND		0.21		0.14
2,4'-DDT	0.05	ND	0.05	ND	0.05	ND		0.08
4,4'-DDD		0.04		* 0.65		0.72		* 1.60
2,4'-DDD	0.06	ND		* 0.36		0.37		* 0.80
4,4'-DDE		0.07		* 1.13		0.43		* 1.28
2,4'-DDE	0.06	ND		0.08	0.06	ND		* 0.15
Total DDT		0.22		* 2.26		1.78		* 4.05
Endosulfan I	0.02	ND	0.02	ND		0.09	0.02	ND
Endosulfan II	0.06	ND	0.06	ND	0.06	ND	0.06	ND
Endosulfan sulfate	0.14	ND	0.14	ND		0.46		0.16
Heptachlor	0.04	ND	0.04	ND	0.04	ND	0.04	ND
Heptachlor epoxide	0.02	ND	0.02	ND		0.24		0.11
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	0.19	ND	0.19	ND	0.19	ND	0.19	ND
PCB 18	0.04	ND		* 0.41	0.04	ND		* 0.94
PCB 28		0.03		* 0.74		0.10		* 0.94
PCB 44	0.03	ND		* 0.28		0.32		* 0.81
PCB 49		0.02		* 0.71		0.13		* 1.07
PCB 52		0.03		* 0.85		0.31		* 1.63
PCB 66		0.02		* 0.64		0.15		* 0.80
PCB 87	0.05	ND		* 0.24		0.05		* 0.29
PCB 101		0.03		* 0.79		0.77		* 1.62
PCB 105	0.05	ND		* 0.20		0.23		* 0.44
PCB 118		0.03		* 0.60		0.50		* 1.10
PCB 128	0.03	ND		* 0.10		0.25		* 0.34
PCB 138		0.03		* 0.69		1.78		* 2.23
PCB 153		0.03		* 0.98		2.61		* 3.40
PCB 170	0.03	ND		* 0.09		0.35		* 0.47
PCB 180		0.02		* 0.29		1.08		* 1.32
PCB 183	0.04	ND		* 0.11		0.43		0.45
PCB 184	0.05	ND	0.05	ND	0.05	ND	0.05	ND
PCB 187		0.02		* 0.23		1.05		* 1.18
PCB 195	0.03	ND		* 0.04		0.20		* 0.23
PCB 206	0.02	ND		* 0.06		0.37		* 0.45
PCB 209	0.03	ND		* 0.05		0.20		* 0.24
Total PCB		1.13		* 16.48		22.03		* 40.11
1,4-Dichlorobenzene		0.21		* 0.50		0.31		* 0.50

TABLE 3C. (Continued)

KILL VAN KULL CHANNEL S-KVK-1
REACH 3

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN	DETECTION	CONCEN
	LIMITS	TRATION	LIMITS	TRATION	LIMITS	TRATION	LIMITS	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		0.32		* 0.78		0.59		* 0.71
Acenaphthylene		0.04		* 0.59		0.14		* 0.50
Acenaphthene		0.06		* 0.39		0.49		* 1.04
Fluorene		0.12		* 0.60		0.47		* 0.67
Phenanthrene		0.60		* 3.61		0.92		* 1.51
Anthracene		0.13		* 3.73		0.09		* 0.83
Fluoranthene		1.57		* 19.01		0.72		* 21.16
Pyrene		1.62		* 28.22		0.88		* 25.37
Benzo(a)anthracene		0.13		* 7.47		0.03		* 1.64
Chrysene		0.21		* 6.68		0.05		* 2.20
Benzo(b)fluoranthene		0.33		* 10.22		0.07		* 2.20
Benzo(k)fluoranthene		0.11		* 3.28		0.04		* 1.44
Benzo(a)pyrene		0.11		* 6.72		0.03		* 1.66
Indeno(1,2,3-cd)pyrene		0.05		* 2.26		0.01		* 0.22
Dibenzo(a,h)anthracene		0.01		* 0.49		0.01		* 0.09
Benzo(g,h,i)perylene		0.08		* 3.01		0.03		* 0.65
Total PAH's		5.47		* 97.06		4.58		* 61.89
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	0.60	ND		0.25		0.26		0.38
12378 PeCDD	1.12	ND	2.50	ND	0.99	ND	1.80	ND
123478 HxCDD	0.57	ND	1.46	ND	0.18	ND	1.13	* ND
123678 HxCDD	0.79	ND		1.50	0.17	ND	1.12	* ND
123789 HxCDD	0.60	ND		1.22		0.13	1.01	ND
1234678 HpCDD	0.42	ND		* 2.67		0.29		1.22
1234789 OCDD		1.08		* 12.36		1.61		11.82
2378 TCDF	0.55	ND	3.18	* ND		0.16		* 1.74
12378 PeCDF	0.41	ND	2.30	* ND		0.19	1.34	* ND
23478 PeCDF	0.40	ND	2.49	* ND		0.24	1.53	* ND
123478 HxCDF	0.12	ND		* 1.61		0.09		* 0.68
123678 HxCDF	0.13	ND	1.98	* ND		0.07		0.64
234678 HxCDF	0.13	ND	2.25	* ND		0.10	1.40	ND
123789 HxCDF	0.15	ND	2.24	* ND	0.14	ND	1.64	ND
1234678 HpCDF	0.17	ND		* 2.00		0.14		* 0.70
1234789 HpCDF		0.15		* 1.19		0.14		0.78
12346789 OCDF		0.49		* 2.72		0.36		0.85

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. 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 ISLAND KILLS COMPLEX - NATURAL CLAYS

TABLE 4B. TOXICIT TEST RESULTS

Suspended Particulate Phase - Raw Clay

Test Species	Test Duration	LC50/EC50	LPC (a)
<i>Menidia beryllina</i>	96 hours	>100% (b)	> 1
<i>Mysidopsis bahia</i>	96 hours	>100% (b)	> 1
<i>Mytilus sp.</i> (larval survival)	48 hours	>100% (b)	> 1
<i>Mytilus sp.</i> (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% mortality 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? (α=0.05)
<i>Ampelisca abdita</i>	89%	86%	3%	No
<i>Mysidopsis bahia</i>	93%	95%	0% ^(a)	No

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

TABLE 4C. NEWARK BAY / STATEN ISLAND KILLS COMPLEX - NATURAL CLAYS
28-DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE (in wet weight concentration)

Constituents	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	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		1.589
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
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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 5A.

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		6.6
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' ODD, 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 5B.

**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)
<i>Menidia beryllina</i>	96 hours	> 100% (b)	1.00%
<i>Mysidopsis bahia</i>	96 hours	> 100% (b)	1.00%
<i>Mytilus edulis</i> (larval survival)	48 hours	> 100% (b)	1.00%
<i>Mytilus edulis</i> (larval normal development)	48 hours	> 100% (c)	1.00%

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

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

(c) Median Effective Concentration (EC50) based on normal development to 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? (α = 0.05)
<i>Ampelisca abdita</i>	99%	93%	6%	No
<i>Mysidopsis bahia</i>	100%	96%	4%	Yes

Table 5C.

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	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	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 5C. (Continued)

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>					
	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)anthracene		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 6A. Project: Kill Van Kull Phase II, Contract Area 8, Reach C8R2
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		0.035		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 6B.

**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)
<i>Menidia beryllina</i>	96 hours	> 100% (b)	1.00%
<i>Mysidopsis bahia</i>	96 hours	> 100% (b)	1.00%
<i>Mytilus edulis</i> (larval survival)	48 hours	> 100% (b)	1.00%
<i>Mytilus edulis</i> (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 to 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)
<i>Ampelisca abdita</i>	99%	88%	11%	Yes
<i>Mysidopsis bahia</i>	94%	96%	-2%	No

Table 6C.

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	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
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
α-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	0.52	* 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 6C. (Continued)

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	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)anthracene		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 7A. Project: Kill Van Kull Phase II, Contract Area 4B, Reach C4R3
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		0.032		0.02
Cd		0.0686		0.042
Cr		0.853		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 7B.

**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)
<i>Menidia beryllina</i>	96 hours	> 100% (b)	1.00%
<i>Mysidopsis bahia</i>	96 hours	> 100% (b)	1.00%
<i>Mytilus edulis</i> (larval survival)	48 hours	> 100% (b)	1.00%
<i>Mytilus edulis</i> (larval normal development)	48 hours	> 100% (c)	1.00%

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

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

(c) Median Effective Concentration (EC50) based on normal development to 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? ($\alpha = 0.05$)
<i>Ampelisca abdita</i>	93%	93%	0%	No
<i>Mysidopsis bahia</i>	94%	96%	-2%	No

Table 7C.

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	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	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		0.03		0.03		0.01
As		3.22		3.01		3.34		3.02
Cd		0.04		0.05		0.05		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 7C. (Continued)

CONSTITUENTS	<i>Macoma nasuta</i>				<i>Nereis virens</i>			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION	CONCEN -	DETECTION	CONCEN -	DETECTION	CONCEN -	DETECTION	CONCEN -
	LIMITS	TRATION	LIMITS	TRATION	LIMITS	TRATION	LIMITS	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)anthracene		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		0.65
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.