PUBLIC NOTICE

US Army Corps
of Engineers
New York District
Jacob K. Javits Federal Building
New York, N.Y. 10278-0090
ATTN: Regulatory Branch

In replying refer to:
Public Notice Number: FP63-1234CC
Issue Date: 25 JAN 1999
Expiration Date: 22 FEB 1999

CONSTRUCTION CONTRACTS 1 & 2
KILL VAN KULL FEDERAL CHANNEL
REACHES #1, #2, #3 and #4

TO WHOM IT MAY CONCERN:

FEDERAL PROJECT AUTHORIZATION:
Pursuant to Section 404 (33 U.S.C. 1344) of the Federal Water Pollution Control Act (amended in 1977 and commonly referred to as the Clean Water Act), and Section 103 (33 U.S.C. 1413, 86 Stat. 1052) of the Marine Protection, Research and Sanctuaries Act of 1972 (commonly referred to as the Ocean Dumping Act), notice is hereby given that the U.S. Army Engineer District, New York proposes to perform new work dredging in a federal navigation project (see Figure No. 1 of this public notice) with subsequent placement of the dredged material at the Historic Area Remediation Site (HARS) for the purpose of remediation.

The N. Y. and N. J. Channels, Kill van Kull Federal Navigation Channel was authorized by the Rivers and Harbors Act of 1933 and subsequently modified by the Rivers and Harbors Acts of 1935, 1950 and 1965; and WRDA 1985.

FEDERAL PROJECT DESCRIPTION:
The Kill van Kull navigation project is located along a very heavily-used waterway of the Port of New York and New Jersey. The Kill van Kull/Newark Bay Channel was authorized for construction to 45 feet below mean low water (47 feet in rock) in 1985.

The New York District, U.S. Army Corps of Engineers (USACE) is proposing to initiate Phase II of the project identified in the Supplemental Appropriations Act of 1985, authorizing navigational improvements along the existing Federal navigation channels of the Kill Van Kull (KVK) and Newark Bay, New York and New Jersey. Phase I construction was initiated in July 1987 and substantially completed in September 1995. A total of 7 construction contracts were awarded and completed. Phase II would complete the deepening of the channels, over the course of several years, to the authorized depth of -45 mean low water (MLW). The proposed plans were analyzed in a Feasibility Report (1980), a Final Environmental Impact Statement (FEIS) (1980), a Supplemental Environmental Impact Statement (SEIS) (1986), a General Design Memorandum (GDM) (1986), and a Final Supplement to the Final Environmental Impact Statement (FSFEIS) (1987). These documents and the Record of Decision (ROD) (1987) are available in the District office for review.

DESCRIPTION OF PLANNED FEDERAL ACTION:
The comprehensive plan for the authorized project involves deepening of existing navigational channels from the

confluence of the Kill Van Kull and Anchorage channels to the northern edge of the Port Newark Reach in Newark Bay: deepening would take place to -45 feet MLW plus an additional 2-foot allowance for safety clearance and maintenance to ensure project depth is achieved. This will approach or equal the depth of the Ambrose-Anchorage channel feeder arteries that connect the harbor with the Atlantic Ocean (USACE 1980). The existing Federal navigation channels in the Kill Van Kull and Newark Bay are presently at depths which do not provide for economically efficient and safe utilization of these channels by vessels with drafts greater than 40 feet. Dredged material from the first two contracts (reaches 1-4) of the KVK, from its confluence in the east with the Upper Bay, to approximately the central KVK, south of Constable Hook in Bayonne, N. J. is currently proposed for placement at the HARS.

Vessels that transit these waterways generally dock along the southshore of the City of Bayonne and at Port Newark and the Elizabeth-Port Authority Marine Terminal. Consequently, container ships and oil tankers either transit these waterways in a lightered or underloaded condition or anchor in New York Harbor to await a favorable tide. By underloading, vessels vary their drafts in order to safely transit channels of various depths. Lighterage requirements cause markedly increased tanker occupancy at the deeper New York anchorages. The chronic condition of tanker overcrowding at the anchorages increases the probability of accidents. The extra handling of oil cargo associated with lightering (transferring of cargo to smaller vessels or barges), coupled with congested marine traffic elevates the probability of water pollution from spillage during these additional shipping/transfer operations.

The estimated total volume of material to be removed to achieve the construction depth of 45 feet MLW plus an additional 2-foot allowance for safety clearance for the entire project is 10.7 million cubic yards (mcy). It is anticipated that the majority of this material will be uncontaminated sediment and rock, because the dredged material removed from these depths are well below natural depth or past channel depths.

DESCRIPTION OF PROPOSED WORK:
The purpose of the proposed dredging is to create channels deep enough in the harbor□s berths and access routes to maintain safe navigational access to terminal facilities and piers for arriving and departing vessels. The resulting dredged material would be used for remediation at the HARS by placing it over degraded sediments within the site. The proposed dredged material would be transported by bottom-opening barges to the placement sites.

This public notice serves to announce the government's intent and identifies the proposed location for placement of approximately 1,268,000 cu. yds. of dredged material. This estimated volume of material is to be dredged during the first two contracts (of a total of eight contracts) of this multi-year, multi-contract project. Subsequent public notices will be issued as testing of areas to be dredged under later contracts is completed. Final characterization and placement of dredged materials is dependent on results of appropriate ocean disposal testing and evaluation. The dredging and disposal of this project is estimated to take approximately two years to complete.

About 410,000 cu.yds of this material is classified as rock and will be used to develop artificial fishing reefs at approved locations in the open ocean, managed by the states of New York and New Jersey. The remaining material has been tested, meets the criteria for remediation material at the Historic Area Remediation Site (HARS) and will be placed there.

ENVIRONMENTAL IMPACT STATEMENT:

An Environmental Assessment (FEA, December, 1997) provides an update of the analyses of potential environmental impacts contained in the above-referenced documents. The FEA determined there were no substantial changes in the proposed action or significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts that warranted the preparation of a new supplement to the FEIS. A tiered approach to evaluation of impacts of disposal has been adopted in accordance with the Council on Environmental Quality, NEPA regulations found at 40 CFR 1502.20 and 1508.28. All appropriate NEPA and other regulatory compliance documents for disposal site selection and utilization will be prepared prior to the placement of dredged materials from this project. An Environmental Assessment (December 1998) identified potential disposal sites for placement of dredged materials from Contracts 1 & 2 of the Kill Van Kull/Newark Bay project as required for NEPA compliance.

DISPOSAL SITE:

The dredged material from this project is proposed to be placed at the HARS (see next section: Introduction to the HARS) using the bottom dumping process. Various locations within Remediation Cell Number 2 will be used for the placement of the project dredged material. Remediation Cell Number 1 may also be utilized for placement. Based upon a review of the latest published version of the National Register of Historic Places, two wrecks, believed to be the HLW Ley and the ORMOND, were found at the HARS at Remediation Area Number 1. As noted in the designation of the HARS, Remediation Material would not be allowed to be placed within 0.27 nautical miles of the identified wrecks or other wrecks that might be found; any permit issued for activities at the HARS will contain this condition; hence, no Remediation Material will be placed within 0.27 nautical miles of the identified wrecks. Otherwise, there are no known sites eligible for, or included in, the Register within the permit area.

INTRODUCTION TO THE HARS:

In 1972, the Congress of the United States enacted the MPRSA to address and control the dumping of materials into ocean waters. Title I of the Act authorized the US Environmental Protection Agency (USEPA) and the US Army Corps of Engineers (USACE) to regulate dumping in ocean waters. USEPA and USACE share responsibility for MPRSA permitting and ocean disposal site management. USEPA regulations implementing MPRSA can be 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. Determinations to issue MPRSA permits for dredged material are 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 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 will 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 testing results for this project) 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 conditions in the Study Area and the surveys performed may be found in the Supplemental Environmental Impact Statement (USEPA, 1997).

The HARS designation identifies an area: (see Figure 2) in and around the MDS which has exhibited the potential for adverse ecological impacts. The HARS will be remediated with dredged material that meets current Category 1 standards and will not cause significant undesirable effects including through bioaccumulation, referred to as "Material for Remediation" or "Remediation Material."

The HARS which includes the 2.2 square nautical mile area of the 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 MDS is located approximately 5.3 nautical miles east of Highlands, New Jersey and 9.6 nautical miles south of Rockaway, New Jersey. When determined by bathymetry that capping is complete, the USEPA will take 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 the 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 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 will be on-board any barges carrying Remediation Material to the HARS. This equipment records vessel positions 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 the USEPA, Team Leader of the Dredged Material Management Team, at (212) 637-3797.

TESTING:

SUMMARY OF SEDIMENT TESTING RESULTS:

In accordance with 40 CFR Part 227 of the Ocean Dumping Regulations, 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 the 1991 Green Book. The results of bioassay tests conducted on sediments from the project area are provided in Table 1.

Over the past year, the USEPA and USACE have been refining the approach to the technical review and scientific and regulatory analysis of dredging projects proposed for the HARS. A testing evaluation process was developed, which established a basic framework for assessing results of tissue analysis from bioaccumulation testing of dredged material proposed for ocean placement. The framework defines a standard approach for assessing each analyte (an item to be analyzed for as part of the testing), in relation to regulatory standards and human health, and environmental risk factors, to facilitate decisions in accordance with the Marine Protection Research and Sanctuaries Act of 1972. EPA and the Corps utilize this testing evaluation process for identifying Category 1 dredged material in determining suitability of dredged materials as material for remediation at the HARS.

As depicted in the attached drawings (Figure 3), the proposed new construction dredging area has been characterized by using four (4) sediment testing reaches (segments within the larger project area) with the following number of samples per Reach: Reach 1 = 11 core samples, Reach 2 =13 core samples, Reach 3 =

14 core samples, and Reach 4 = 15 cores. These core samples were taken to a depth of 47 feet, project depth plus two feet allowable overdepth. The samples in each Reach were composited, respectively, to yield four separate composites which were submitted to chemical and biological testing. Based upon an analysis of sediment samples from the Reaches #1, #2, #3 and #4, the grain size characteristics of the proposed dredged material are:

Reach#1: 23.27% GRAVEL, 63.11% SAND, 07.16% SILT, 06.46% CLAY
Reach#2: 18.86% GRAVEL, 53.79% SAND, 16.43% SILT, 10.92% CLAY
Reach#3: 14.37% GRAVEL, 67.80% SAND, 09.97% SILT, 07.86% CLAY
Reach#4: 44.32% GRAVEL, 36.75% SAND, 10.04% SILT, 8.89% CLAY

Results of the chemical and biological testing are summarized below.

Evaluation of the Liquid Phase: Chemistry

Under the requirements of 40 CFR Sections 225.2, chemical analysis was conducted on project sitewater and elutriate. Results of this evaluation for each reach are summarized in Table 2. Please note in reading Table 2 that detection limits have been listed for only those constituents which the laboratory reported as not-detected (ND) in the concentration column (this reporting convention was similarly applied in reporting the results of bioaccumulation potential testing discussed below). If the constituents were detected (above the detection limit), the measured value would appear.

Expected 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 (USACE) Waterways Experiment Station (WES) and described in the joint EPA/USACE implementation manual entitled "Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Water" (commonly referred to as the National "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 the toxicities of the solid phase, liquid phase, and suspended particulate phase of the proposed

dredged material from the project area. Liquid phase bioassays for each Reach, run as part of the suspended particulate phase on three appropriate sensitive marine organisms; a crustacean (the shrimp *M. bahia*), a finfish (*Menidia beryllina*), and the planktonic larvae of a bivalve (the clam *Mulinia lateralis*), show that after initial mixing (as determined under 40 CFR Sections 227.29(a)(2)), the liquid phase of the material from each Reach would not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms. Accordingly, it is concluded that the liquid phase of the material would be in compliance with 40 CFR Sections 227.6(c)(1) and 227.27(a). The specific test results and technical analysis of the data underlying this conclusion are described and evaluated in a joint USACE New York District/US Environmental Protection Agency Region 2 memorandum (copies available upon request).

Evaluation of the suspended particulate phase

The suspended particulate phase of the material for each reach was evaluated for compliance with 40 CFR Sections 227.6(c)(2) and 227.27(b). Bioassay testing of the suspended particulate phase of the material has been conducted using three appropriate sensitive marine organisms (a crustacean (*M. bahia*), a finfish (*Menidia beryllina*), and the planktonic larvae of a bivalve (*Mulinia lateralis)*. Median lethal concentrations (LC50), those concentrations of suspended particulate phase resulting in 50% mortality, were determined for all three test species for each Reach. In addition, the median effective concentration (EC50) based on normal larval development to the D-cell stage, was determined for the bivalve larvae of *M. lateralis*. The Limiting Permissible Concentration (LPC) was then calculated as 0.01 of the LC50 or EC50 of the most sensitive organism. For Reach #1, the LPC was calculated at 0.575 based on the EC50 of *Mulinea lateralis*. For Reach #2, the LPC was calculated at >1.0 based on every EC50/ LC50 for the Reach exceeding 1.0. For Reach #3, the LPC was calculated at 0.570 based on the EC50 of *Mulinea lateralis*.
And for Reach #4, the LPC was calculated at 0.220 based on the EC50 of *Mulinea lateralis*.

The information shows that when placed in the HARS, and after initial mixing (as determined under 40 CFR Sections 227.29(a)(2)), the suspended particulate phase of this material 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 result in 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 each reach would not cause significant undesirable effects, including the possibility of danger associated with bioaccumulation, since these impacts require long exposure durations (see USEPA, 1994). Accordingly, it is concluded that the suspended phase of the material from Reaches #1, #2, and #3 and #4 would be in compliance with 40 CFR Sections 227.6(c)(2) and 227.27(b). The results of bioassay tests conducted on proposed dredged sediments from each reach are presented in Table 1 of this public notice. The specific test results and technical analysis of the data underlying this conclusion are described in a joint USACE New York District/USEPA Region 2 memorandum mentioned previously.

Evaluation of the solid phase toxicity

The solid phase describes 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/USACE New York District guidance.

For Reach #1, the mysids toxicity was not statistically greater than reference sediment toxicity. Amphipod toxicity of project sediments was statistically greater than reference sediment toxicity, but did not exceed 10%. For Reaches #2 and #3, 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. For Reach #4, the toxicity of the project sediment to amphipods was not statistically greater than reference and did not exceed mortality in the reference sediment by 20%. For mysids, toxicity of project sediments was statistically greater than the reference and exceeded the mortality in reference sediment by exactly 10 % (i.e., survival was 90% in the test and survival in the reference was 100%). These results show that the solid phase of the material from each reach would not cause significant mortality. The results of the toxicity portion of the solid phase bioassays can be seen in Table 1.

Evaluation of the solid phase bioaccumulation

Bioaccumulation tests for sediments from each reach were conducted on the solid phase of the project material for contaminants of concern using two appropriate sensitive benthic marine organisms, a burrowing, deposit-feeding polychaete *Nereis virens* and a filter-feeding bivalve *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). For each reach, Table 3 of this notice addresses the bioaccumulation of contaminants of concern. Additional information on more rigorous evaluations conducted on individual contaminant values may be found in the Testing Evaluation Memoranda for this project. Table 3 for each reach indicates that several contaminants 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 which did 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 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 EPA Region II.

Conclusion: Based on the results of the testing performed, the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency have determined that the proposed dredged material from NY/NJ Channels-Kill van Kull Reaches #1 – #4 are considered Category I dredged material and are suitable as remediation material at the HARS.

The Testing Evaluation Memoranda, dated 15 January 1998, for this project may be obtained by contacting Mr. Douglas Pabst, Team Leader of the Dredged Material Management Team at (212 637-3797) or Mr. Joe Olha, Project Manager USACE at (212) 264-5621. The bioaccumulation test results were used in evaluating the potential impacts of the material. The combined results of the toxicity and bioaccumulation tests established that the material met the criteria of 40 CFR Sections 227.6(c)(3) and 227.27(b) and 228.15(d)(6)(v)(A) of the Regulations, and that the material is suitable for placement at the HARS.

PROPOSED PLACEMENT AREA WITHIN THE HARS:

Placement of this material at the HARS will 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 used in 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 in the site with this project material, surface dwelling organisms will be exposed to sediments exhibiting Category 1 qualities whereas the existing sediments exceed these levels.

Based upon the results of testing of the sediments proposed for dredging from each reach, the USACE and the USEPA have determined that the material meets the criteria for ocean placement as described in 40 CFR parts 227.6, 227.27, and 228.15, and is a Remediation Material as defined in under the USEPA Region 2/

USACE, New York District guidance.

ALTERNATIVES TO HARS PLACEMENT:

As to 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 of the U.S. Army Corps of Engineers has evaluated the regional practicability of potential disposal alternatives in a 1989 report entitled "Managing Dredged Material: An Evaluation of Disposal Alternatives in the New York - New Jersey Metropolitan Region." In the report alternatives considered included land placement, use as sanitary landfill cover, placement in sub-aqueous borrow pits (and possible capping with clean material), creation of islands and/or wetlands, placement on beaches or wetlands, transport and placement in deep mines, and incineration. Of these, only land placement is considered a potentially viable alternative at the present time for the dredged material. The New York District has recently distributed a revised draft version of the Dredged Material Management Plan for the Port of New York and New Jersey. It presents a range of options, some of which require years to construct, and are therefore unavailable at this time. Other options are not available at reasonable incremental costs, thus leaving HARS placement as the preferred alternative.

Upland placement of the dredged material as an alternative to its use as remediation material at the HARS has been evaluated. There is no available vacant land in the vicinity of the proposed activity upon which the dredged material could be temporarily stored while chemically/physically treating for beneficial reuse, de-watered, or permanently placed. Therefore, it would become necessary to transport the proposed dredged material by truck in a semi-fluid state to any upland destination.

MISCELLANEOUS INFORMATION:

Any person may request, in writing, that a public hearing be held to consider the proposed disposal of this dredged material. Requests for a public hearing must state the specific reasons for holding a hearing and state why comments cannot be submitted by mail. Comments received by mail are given the same weight as those presented at a public hearing.

Based upon a review of the latest public listing of threatened and endangered species, a preliminary determination indicated that the proposed activity under consideration will not affect those species listed or their critical habitat. See Section 7 of the Endangered Species Act (16 U.S.C. (531)).

There are no known sites within the project area that are eligible for or included in the National Register of Historic Places. Presently, no known archaeological, scientific, prehistorical or historical data are expected to be lost by work accomplished under the required dredging.

Water Quality Certification has been obtained from the New York State Department of Environmental Conservation and the New Jersey Department of Environmental Protection, Office of Dredging and Sediment Technology, in accordance with Section 401 of the Clean Water Act.

The proposed work is being coordinated with the following Federal, State and local 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, Third District
- New York State Department of Environmental Conservation
- State of New Jersey Department of Environmental Protection
- City of New York, New York (NYC Dept. of City Planning; NYC Dept. of Environmental Protection)

Since this activity is located within the coastal zone of two states, each of which has a federally approved coastal zone management programs, the USACE has applied to the State of New York Coastal Management Program for certification, and the New Jersey Department of Environmental Protection - Division of Coastal Resources so that the proposed action will be conducted in a manner that is consistent with state approved coastal zone management programs. Reference is made to Section 307(c) of the Coastal Zone Management Act of 1972 as amended (16 U.S.C. 1456(c)). By this public notice, USACE requests the State's concurrence with, objection to, or waiver of this certification.

The U.S. Army Corps of Engineers is particularly interested in obtaining information on utility line crossings, other known structures, or debris within the prism proposed for the deepening project. While much of this information is presently available, we look to all affected or interested parties in this action to provide any information that would be useful towards engineering, design and construction of the project. This should include any as-built drawings of utilities, including the latest survey drawings depicting the location and depths of such facilities.

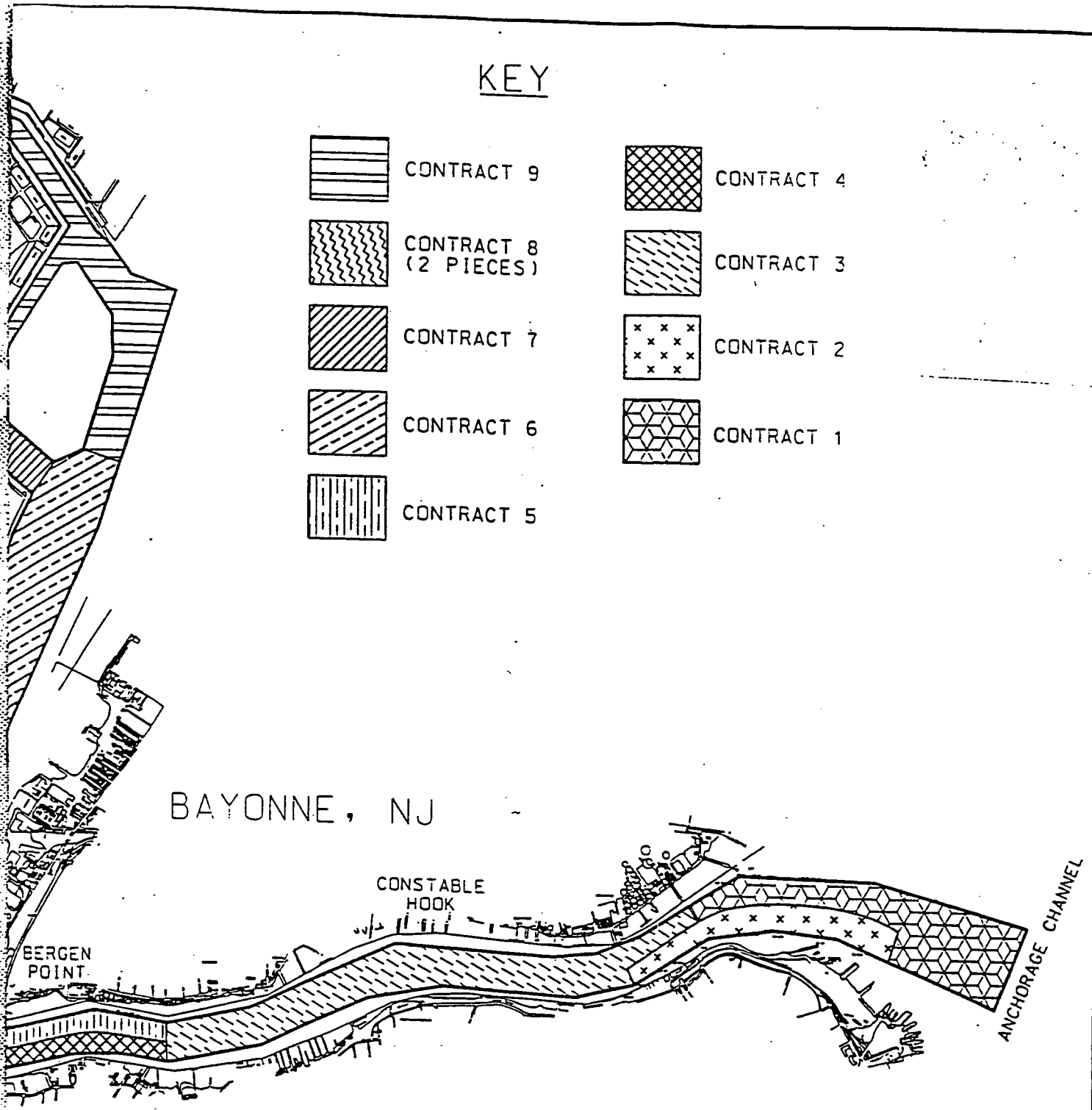
Comments regarding the proposed work should be **PREPARED IN WRITING AND MAILED TO REACH THIS OFFICE** prior to the expiration date of this notice; otherwise, it will be presumed that there are no objections.

It is requested 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.

If you have any questions, please contact Mr. Hal Hawkins at (212) 264-9092. Comments or questions may be faxed to (212) 264-5779.

Stuart Piken
Deputy District Engineer
For Project Management

Enclosures
as stated



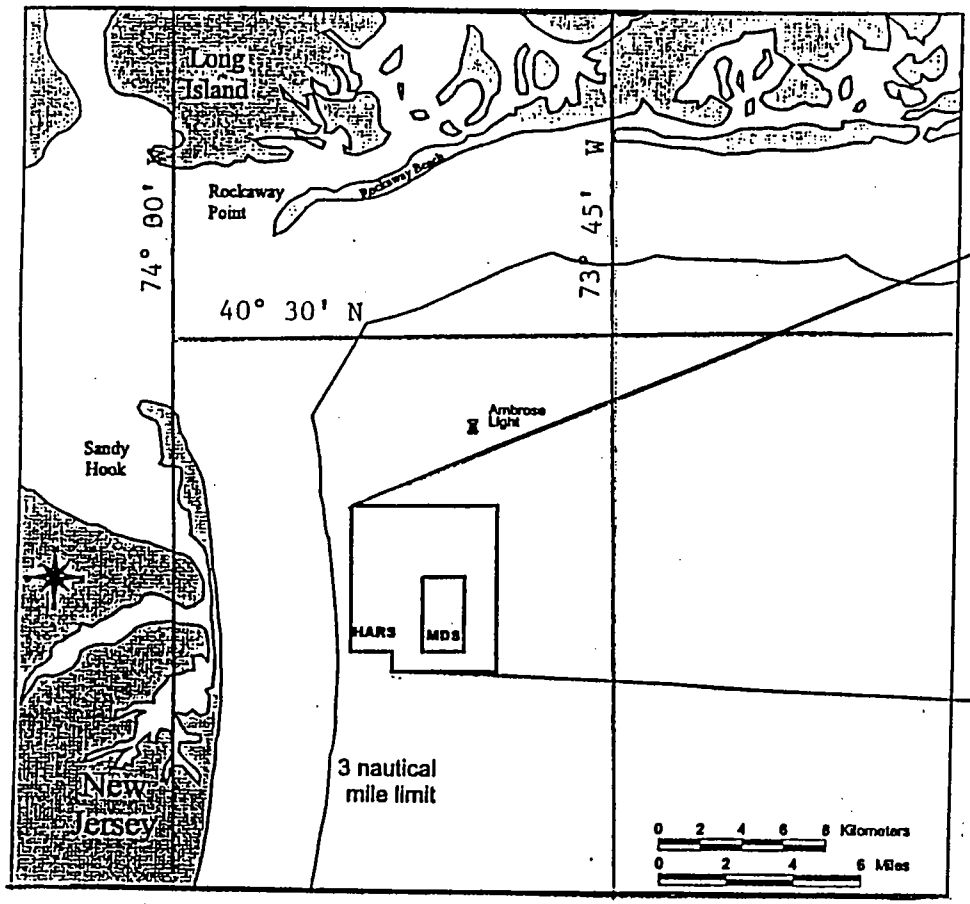
DEPARTMENT OF THE ARMY
NEW YORK DISTRICT CORPS OF ENGINEERS
NEW YORK, N.Y. 10278-0090

KILL VAN KULL - NEWARK BAY CHANNEL STUDY

DREDGING CONTRACT LOCATIONS

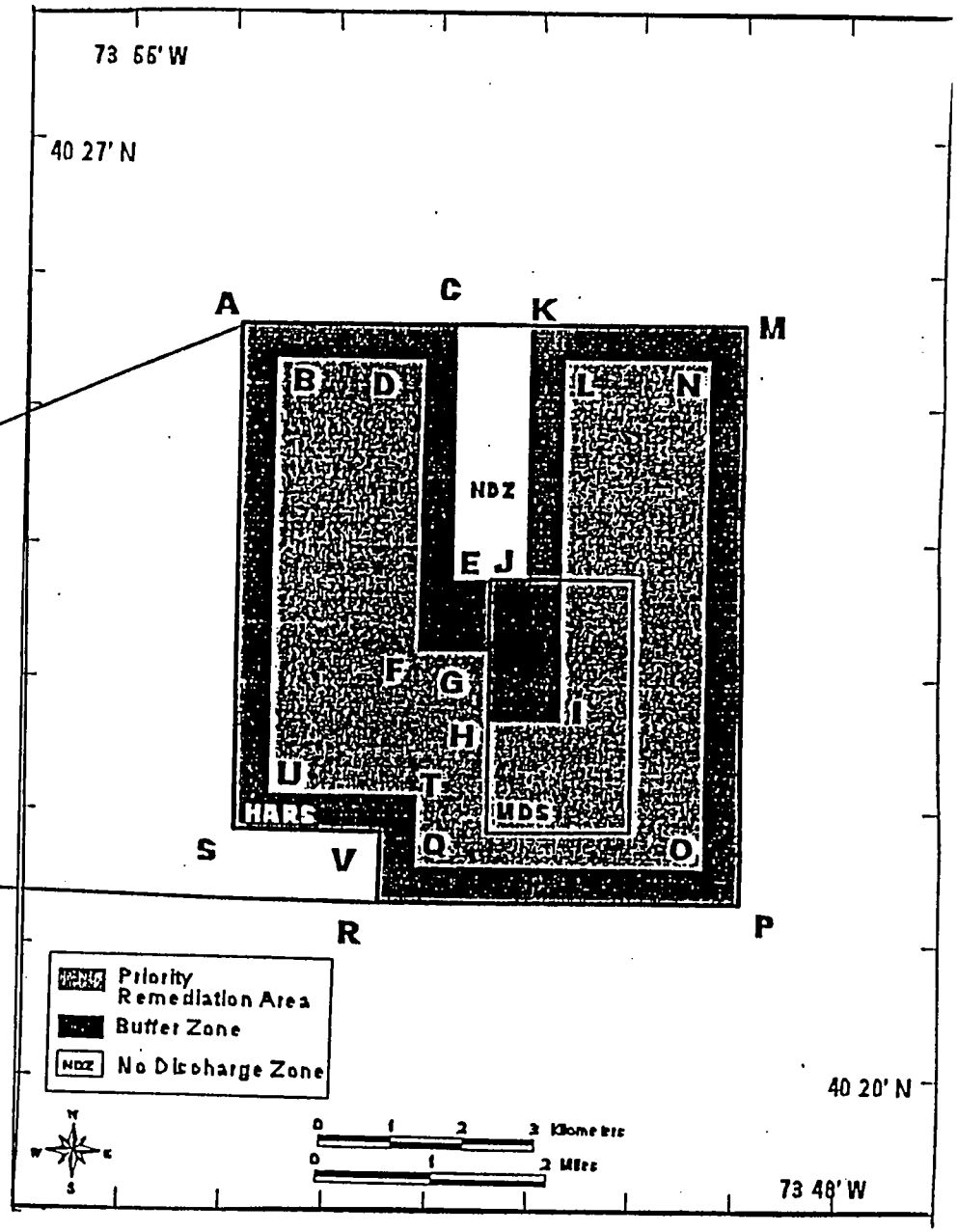
FIGURE 1

HISTORIC AREA REMEDIATION SITE LOCATION MAP



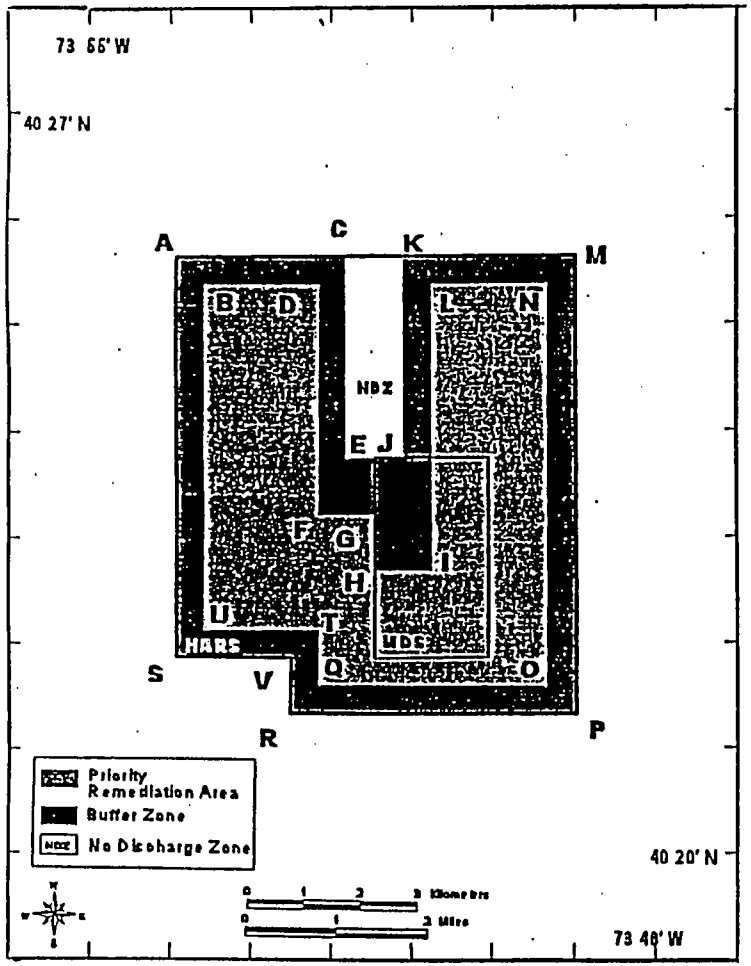
A

LOCATION OF PRIMARY REMEDIATION AREA WITHIN THE HISTORIC AREA REMEDIATION SITE



B

FIGURE 2a



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

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

* -- DMS = Degrees, Minutes, Seconds

** -- DDS = Degrees, Decimal Minutes

FIGURE 2b

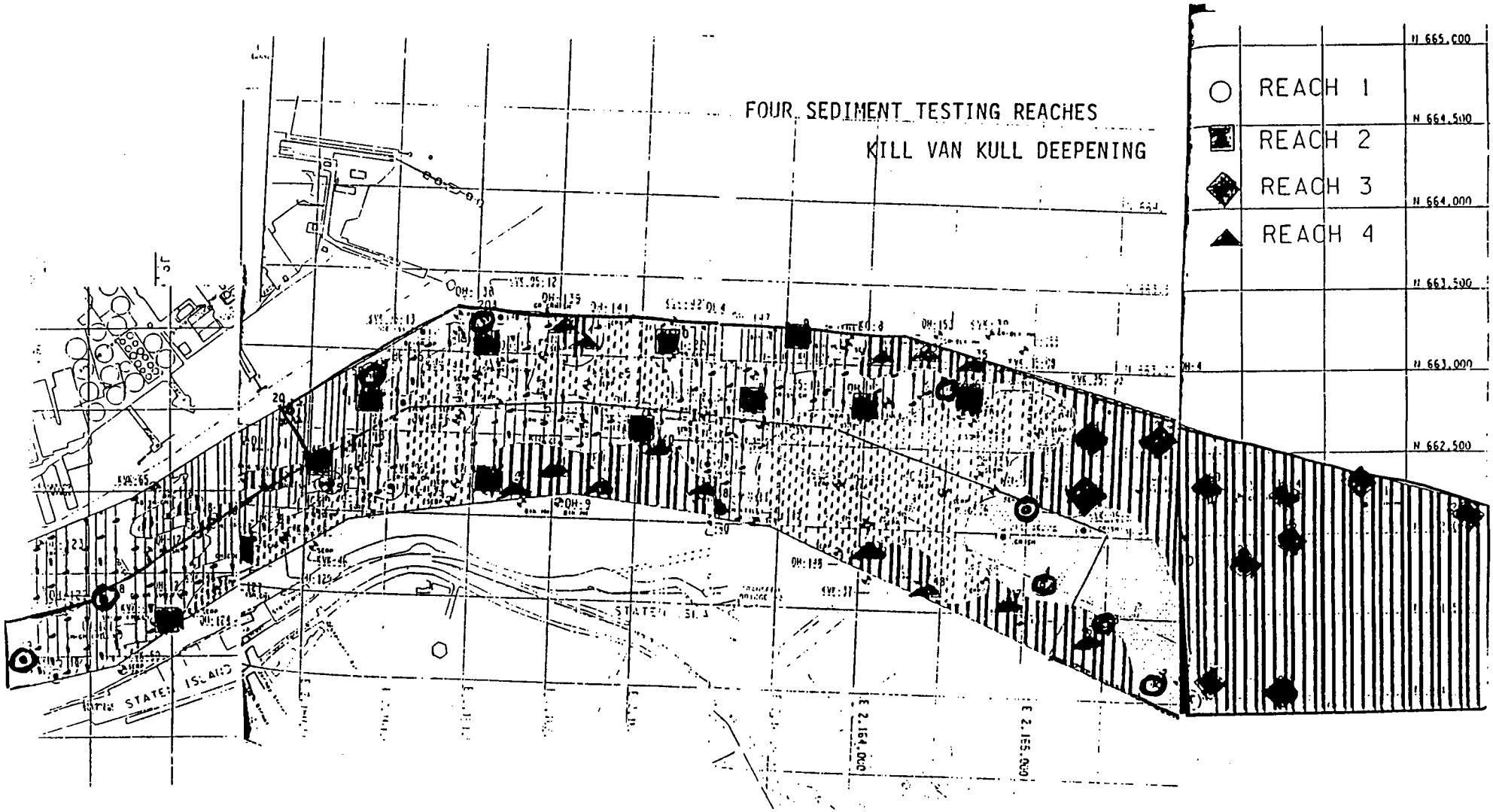

FOUR SEDIMENT TESTING REACHES
KILL VAN KULL DEEPENING
REACH 1
REACH 2
REACH 3
REACH 4
N 665,000
N 664,500
N 664,000
N 663,500
N 663,000
N 662,500
E 2,164,000
E 2,155,000
STATEN ISLAND

FIGURE 3.

KILL VAN KULL - REACH 1

TABLE 1. TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	(b) >100%	>1
Mysidopsis bahia	96 hours	(b) >100%	>1
Mulinia lateralis (larval survival)	48 hours	(b) 66.0%	0.660
Mulinia lateralis (larval normal develop.)	48 hours	(c) 57.5%	0.575

(a) Limiting Permissible Concentration (LPC) is the LC 50 or EC 50 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? (a=0.05)
Ampelisca abdita	98%	89%	9%	YES
Mysidopsis bahia	98%	96%	2%	NO

TABLE 1

KILL VAN KULL - REACH 2

TABLE 1: TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	(b) >100%	>1
Mysidopsis bahia	96 hours	(b) >100%	>1
Mulinia lateralis (larval survival)	48 hours	(b) >100%	>1
Mulinia lateralis (larval normal develop.)	48 hours	(c) >100%	>1

(a) Limiting Permissible Concentration (LPC) is the LC 50 or EC 50 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? (a=0.05)
Ampelisca abdita	93%	93%	-	NO
Mysidopsis bahia	98%	91%	7%	NO

KILL VAN KULL - REACH 3

TABLE 1 : TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	(b) >100%	>1
Mysidopsis bahia	96 hours	(b) >100%	>1
Mulinia lateralis (larval survival)	48 hours	(b) 63.5%	0.640
Mulinia lateralis (larval normal develop.)	48 hours	(c) 57.0%	0.570

(a) Limiting Permissible Concentration (LPC) is the LC 50 or EC 50 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? (a=0.05)
Ampelisca abdita	94%	98%	4%	NO
Mysidopsis bahia	97%	96%	1%	NO

TABEL 1

KILL VAN KULL - REACH 4

TABLE 1 TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	(b) 86.9%	0.869
Mysidopsis bahia	96 hours	(b) 81.7%	0.817
Mulinia lateralis (larval survival)	48 hours	(b) 26.5%	0.270
Mulinia lateralis (larval normal develop.)	48 hours	(c) 22.0%	0.220

(a) Limiting Permissible Concentration (LPC) is the LC 50 or EC 50 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? (a=0.05)
Ampelisca abdita	94%	98%	4%	NO
Mysidopsis bahia	100%	90%	10%	YES

TABLE 1

KILL VAN KULL - REACH 1

TABLE 2 RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	KILL VAN KULL - REACH 1			
	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)
Ag		0.01		0.01
As		0.59		7.46
Cd		0.05		0.03
Cr		0.97		1.31
Cu		2.25		2.14
Hg		0.01		0.04
Ni		1.19		2.22
Pb		1.22		3.79
Zn		6.85		6.28
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	3.51	ND	4.29	ND
a-Chlordane	3.40	ND	4.16	ND
trans Nonachlor		1.94	3.87	ND
Dieldrin	3.79	ND	4.64	ND
4,4'-DDT	3.48	ND	4.26	ND
2,4'-DDT	1.41	ND	1.72	ND
4,4'-DDD	3.87	ND	4.73	ND
2,4'-DDD		2.53	4.64	ND
4,4'-DDE	3.67	ND	4.49	ND
2,4'-DDE	4.47	ND		6.80
TOTAL DDT		10.98		18.72
Endosulfan I	4.13	ND	5.05	ND
Endosulfan II	3.02	ND	3.69	ND
Endosulfan sulfate	2.18	ND	2.67	ND
Heptachlor	3.07	ND	3.75	ND
Heptachlor epoxide		1.06	3.46	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8		3.76		1.43
PCB 18		3.58		5.00
PCB 28		6.44		2.93
PCB 44	3.10	ND	3.79	ND
PCB 49	3.69	ND	4.51	ND
PCB 52		2.17	4.32	ND
PCB 66	3.21	ND	3.92	ND
PCB 77	4.85	ND	6.06	ND
PCB 87	3.80	ND	4.65	ND
PCB 101	3.03	ND	3.71	ND
PCB 105	3.59	ND	4.39	ND
PCB 118	3.61	ND	4.41	ND
PCB 128	7.69	ND	9.40	ND
PCB 138		4.71		2.92
PCB 153	2.70	ND	3.30	ND
PCB 170	3.69	ND	4.50	ND
PCB 180	3.18	ND	3.89	ND
PCB 183	4.15	ND	5.08	ND
PCB 184	5.11	ND	6.24	ND
PCB 187	3.81	ND	4.66	ND
PCB 195	3.71	ND		0.20
PCB 206	4.14	ND		0.60
PCB 209	3.81	ND		0.44
TOTAL PCB		110.29		103.87

Concentrations shown are the mean of three replicate analyses.
ND = Not detected
Total PCB = 2(x), where x = sum of all PCB congeners detected
Total DDT = sum of 2,4' and 4,4' DDE, DDD, and DDT
Means, total PCBs, and total DDT were determined using conservative estimates of concentrations of constituents below the detection limit.

KILL VAN KULL - REACH 2

TABLE 2 RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	KILL VAN KULL - REACH 2			
	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)
Ag		0.01		0.01
As		0.52		2.46
Cd		0.05		0.02
Cr		0.91		1.51
Cu		2.23		1.84
Hg		0.01		0.02
Ni		1.27		28.37
Pb		1.27		1.54
Zn		7.76		4.84
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	4.21	ND	4.21	ND
a-Chlordane	1.40	ND	1.40	ND
trans Nonachlor		1.49		1.14
Dieldrin	0.90	ND		0.67
4,4'-DDT	1.34	ND	1.34	ND
2,4'-DDT	11.50	ND	11.50	ND
4,4'-DDD	1.29	ND		0.65
2,4'-DDD		1.12	0.90	ND
4,4'-DDE	1.11	ND		0.29
2,4'-DDE	4.37	ND	4.37	ND
TOTAL DDT		10.93		8.99
Endosulfan I	2.39	ND	2.39	ND
Endosulfan II	13.37	ND	13.37	ND
Endosulfan sulfate	4.02	ND	4.02	ND
Heptachlor	1.70	ND	1.70	ND
Heptachlor epoxide	0.95	ND	0.95	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8		2.28		1.69
PCB 18		0.95		2.71
PCB 28		4.95		2.38
PCB 44		1.37		0.46
PCB 49	1.43	ND		0.53
PCB 52		1.68		0.79
PCB 66	1.48	ND		0.83
PCB 77	1.18	ND	1.18	ND
PCB 87	1.10	ND		0.59
PCB 101	1.52	ND		0.28
PCB 105	1.14	ND		0.26
PCB 118	1.13	ND		0.58
PCB 128	1.95	ND	1.95	ND
PCB 138		5.56		3.06
PCB 153	1.27	ND		0.44
PCB 170	2.54	ND	2.54	ND
PCB 180	1.28	ND		0.71
PCB 183	1.12	ND		0.06
PCB 184		0.29		0.29
PCB 187	0.94	ND		0.17
PCB 195	1.45	ND		0.10
PCB 206	2.16	ND		0.11
PCB 209	1.66	ND		0.15
TOTAL PCB		57.93		38.10

Concentrations shown are the mean of three replicate analyses.
ND = Not detected
Total PCB = 2(x), where x = sum of all PCB congeners detected
Total DDT = sum of 2,4' and 4,4' DDE, DDD, and DDT
Means, total PCBs, and total DDT were determined using conservative estimates of concentrations of constituents below the detection limit.

KILL VAN KULL - REACH 3

TABLE 2. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	KILL VAN KULL - REACH 3			
	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)
Ag		0.01		0.01
As		0.58		9.82
Cd		0.06	0.01	ND
Cr		1.25		1.27
Cu		3.12		1.52
Hg		0.01		0.02
Ni		2.73		1.66
Pb		1.63		2.30
Zn		6.49		4.79
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	4.21	ND	4.21	ND
a-Chlordane	1.40	ND		0.15
trans Nonachlor	1.38	ND		0.97
Dieldrin	0.90	ND	0.90	ND
4,4'-DDT		0.28	1.34	ND
2,4'-DDT	11.50	ND	11.50	ND
4,4'-DDD	1.29	ND		0.83
2,4'-DDD		2.06		1.31
4,4'-DDE	1.11	ND		0.35
2,4'-DDE		3.32	4.37	ND
TOTAL DDT		12.62		11.09
Endosulfan I	2.39	ND	2.39	ND
Endosulfan II	13.37	ND		0.45
Endosulfan sulfate	4.02	ND	4.02	ND
Heptachlor	1.70	ND	1.70	ND
Heptachlor epoxide	0.95	ND	0.95	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8		0.83		2.18
PCB 18		0.67		4.16
PCB 28		7.29		5.25
PCB 44		1.91	1.38	ND
PCB 49	1.43	ND	1.43	ND
PCB 52		1.98		1.53
PCB 65	1.48	ND		0.48
PCB 77	1.18	ND	1.18	ND
PCB 87	1.10	ND	1.10	ND
PCB 101	1.52	ND		0.34
PCB 105	1.14	ND	1.14	ND
PCB 118	1.13	ND		1.60
PCB 128	1.98	ND	1.98	ND
PCB 138		4.72		4.27
PCB 153	1.27	ND		0.58
PCB 170	2.54	ND	2.54	ND
PCB 180	1.28	ND		0.29
PCB 183	1.12	ND	1.12	ND
PCB 184		0.28		0.45
PCB 187	0.94	ND	0.94	ND
PCB 195	1.45	ND	1.45	ND
PCB 206	2.16	ND		0.21
PCB 209	1.66	ND	1.66	ND
TOTAL PCB		58.72		58.55

Concentrations shown are the mean of three replicate analyses.
ND = Not detected
Total PCB = 2(x), where x = sum of all PCB congeners detected
Total DDT = sum of 2,4' and 4,4' DDE, DDD, and DDT
Means, total PCBs, and total DDT were determined using conservative estimates of concentrations of constituents below the detection limit.

KILL VAN KULL - REACH 4

TABLE 2. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	KILL VAN KULL - REACH 4			
	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)	ppb (µg/L)
Ag		0.01		0.02
As		0.80		2.97
Cd		0.06		0.02
Cr		0.83		1.29
Cu		1.93		2.18
Hg		0.01		0.03
Ni		1.10		4.02
Pb		1.14		3.43
Zn		11.03		6.48
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	1.29	ND	1.29	ND
a-Chlordane		0.21		0.49
trans Nonachlor		0.43		0.25
Dieldrin	1.18	ND	1.18	ND
4,4'-DDT	1.09	ND	1.09	ND
2,4'-DDT	2.73	ND	2.73	ND
4,4'-DDD		0.33		0.60
2,4'-DDD		0.74		0.55
4,4'-DDE	0.96	ND		0.70
2,4'-DDE	5.45	ND	5.45	ND
TOTAL DDT		6.20		6.49
Endosulfan I	1.87	ND	1.87	ND
Endosulfan II	1.05	ND	1.05	ND
Endosulfan sulfate	1.26	ND	1.26	ND
Heptachlor	1.09	ND	1.09	ND
Heptachlor epoxide	0.47	ND	0.47	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8	2.70	ND	2.70	ND
PCB 18		~ 1.22		2.18
PCB 28	0.81	ND		5.18
PCB 44	0.53	ND	0.53	ND
PCB 49	0.74	ND	0.74	ND
PCB 52	0.80	ND	0.80	ND
PCB 66	0.93	ND	0.93	ND
PCB 77	2.03	ND	2.03	ND
PCB 87		0.31		0.53
PCB 101	0.81	ND	0.81	ND
PCB 105	1.62	ND	1.62	ND
PCB 118		0.21		2.44
PCB 128	2.71	ND	2.71	ND
PCB 138		5.43		4.25
PCB 153	0.99	ND	0.99	ND
PCB 170	2.04	ND	2.04	ND
PCB 180		0.66		0.58
PCB 183	0.82	ND	0.82	ND
PCB 184		0.42		0.97
PCB 187	1.25	ND		0.31
PCB 195	0.99	ND		0.36
PCB 206	0.98	ND		0.38
PCB 209	1.58	ND	1.58	ND
TOTAL PCB		38.81		52.66

Concentrations shown are the mean of three replicate analyses.
ND = Not detected
Total PCB = 2(x), where x = sum of all PCB congeners detected
Total DDT = sum of 2,4' and 4,4' DDE, DDD, and DDT
Means, total PCBs, and total DDT were determined using conservative estimates of concentrations of constituents below the detection limit.

Kill Van Kull Reach 1 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Metals	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
ARSENIC		4.14		3.99		3.89		2.97
CADMIUM		0.0257		0.0259		0.0507		0.0448
CHROMIUM		0.306		0.353		0.29		0.324
COPPER		1.66		* 2.09		1.42		1.47
LEAD		0.105		* 0.516		0.099		* 0.18
MERCURY		0.0138		* 0.0184		0.0323		0.0251
NICKEL		0.332		* 0.66		0.2		* 0.506
SILVER		0.0305		0.0293		0.0243		0.0143
ZINC		16.6		15.4		25.2		22.8
Pesticides	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ALDRIN		0.0463		* 0.482	1.01	ND	1.57	* ND
ALPHA CHLORDANE		0.0767		0.0245		0.116		* 0.164
TRANS-NONACHLOR		0.038		* 0.0698		0.415		0.463
DIELDRIN		0.134		0.327		0.281		* 0.432
PP-DDT		0.0791	0.564	* ND		0.0683		* 0.0967
OP-DDT		0.0996		* 0.424		0.129		0.301
PP-DDD		0.16		0.371		0.186		* 0.542
OP-DDD	0.277	ND		0.143		0.129		* 0.254
PP-DDE		0.452		0.758	1.2	ND		* 1.17
OP-DDE	0.544	ND		* 0.363	0.789	ND		* 0.946
TOTAL_DDT		0.929		* 2.56		0.547		* 3.31
ENDOSULFAN I	0.521	ND	0.599	* ND	0.705	ND		* 0.674
ENDOSULFAN II	0.428	ND	0.477	* ND	0.588	ND		* 0.103
ENDOSULFAN SULFATE		0.493		0.545		0.308		0.522
HEPTACHLOR	0.698	ND	0.85	* ND	0.855	ND	1.1	* ND
HEPTACHLOR EPOXIDE	0.291	ND		0.223		0.0798		* 0.123
Industrial Chemicals	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
CL2_08		0.033		* 0.547	1.74	ND	2.87	* ND
CL3_18		0.0169	0.586	* ND	1.23	ND		* 0.185
CL3_28		0.12		* 0.266		0.116		* 0.392
CL4_44		0.0684		* 0.165	0.86	ND		* 0.162
CL4_49		0.0584		0.13		0.0705		* 0.347
CL4_52		0.193		* 0.581		0.0918		* 0.592
CL4_66		0.0595		* 0.197		0.0207		* 0.278
CL4_77		0.102	0.416	ND		0.0307		* 0.104
CL5_101		0.375		0.313		0.285		* 0.628
CL5_105	0.448	ND		* 0.15		0.162		* 0.255
CL5_118		0.107		* 0.247		0.263		* 0.488
CL5_87		0.119		0.184		0.0219		* 0.125
CL6_128		0.0742		0.0601		0.167		0.191
CL6_138		0.126		0.0864		0.956		1.23
CL6_153		0.096		* 0.247		1.29		1.64
CL7_170		0.108		0.184		0.202		0.286
CL7_180		0.117		* 0.203		0.602		0.744
CL7_183	0.347	ND		0.126		0.211		0.232
CL7_184		0.0662	0.359	ND	0.918	ND	0.972	* ND
CL7_187		0.129		0.167		0.63		0.869
CL8_195		0.0882		0.0762		0.105		* 0.365
CL9_206		0.0454		0.0625		0.201		* 0.311
CL10_209		0.054		0.098		0.171		* 0.22
TOTAL_PCB		4.66		* 10.7		11.4		* 26.9
1,4-DICHLOROBENZENE		0.136		0.23		0.0912		0.161

TABLE 3

Kill Van Kull Reach 1 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION	CONCEN-	DETECTION	CONCEN-	DETECTION	CONCEN-	DETECTION	CONCEN-
Dioxins and Furans	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
2378-TCDD	0.382	ND	0.366	ND		0.143		0.183
12378-PeCDD	0.382	ND	0.396	ND		0.135	0.34	ND
123478-HxCDD	0.288	ND	0.224	ND	0.43	ND	0.406	ND
123678-HxCDD	0.262	ND	0.224	ND	0.358	ND	0.394	ND
123789-HxCDD	0.386	ND	0.39	ND		0.146	0.224	ND
1234678-HpCDD		0.249		* 0.508		1.15		1.09
OCDD		1.29		* 3.67		7.04		6.76
2378-TCDF		0.193		0.353		1.1		1.01
12378-PeCDF		0.239		0.192		0.188		0.166
23478-PeCDF		0.209		0.224		0.255		0.281
123478-HxCDF		0.253		0.238		0.21		0.25
123678-HxCDF		0.117		0.141		0.112		0.09
123789-HxCDF	0.236	ND	0.292	ND	0.14	ND	0.288	ND
234678-HxCDF		0.141		0.198	0.174	ND	0.292	ND
1234678-HpCDF		0.242		0.34		0.544		0.484
1234789-HpCDF	0.238	ND	0.298	ND	0.228	ND	0.37	ND
OCDF	0.548	ND		0.268		0.481		0.396
PAHs	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ACENAPHTHENE		21.1		23.2		0.0398		* 1.95
ACENAPHTHYLENE	0.791	ND		1.44	15.5	ND		* 1.08
ANTHRACENE		0.273		* 24.4	15	ND		* 2.11
FLUORENE		0.555		1.29	16.6	ND		* 0.467
NAPHTHALENE		0.881		1.6		1.51		1.74
PHENANTHRENE		0.914		* 14.8		0.104		* 1.95
BENZO[A]ANTHRACENE		0.159		* 54.9		0.0179		* 4.95
BENZO[A]PYRENE		0.125		* 28.3	12.8	ND		* 5.11
BENZO[G,H,I]PERYLENE	1.23	ND		* 4.23	9.05	ND		* 1.18
BENZO[B]FLUORANTHENE		0.222		* 20.7	13.6	ND		* 3.16
BENZO[K]FLUORANTHENE		0.149		* 18.7	14.5	ND		* 3.35
CHRYSENE		0.546		* 63.6		0.217		* 21.8
DIBENZ[A,H]ANTHRACENE	1.72	ND		1.62	8.34	ND		* 1.12
FLUORANTHENE		1.17		* 89.7		0.247		* 35
INDENO[1,2.3-C,D]PYRENE	1.79	ND		* 3.92	12.3	ND		* 0.495
PYRENE		1.04		* 151		0.335		* 62
TOTAL PAHS		29.91		* 503.4		2.47		* 147.46

Concentrations shown are the mean of 5 replicate analyses in wet weight.

'* Significantly higher than reference at 95% confidence

ND = Not Detected

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 replicates that were below the detection limits.

TABLE 3

Kill Van Kull Reach 2 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Metals	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
ARSENIC		4.14		3.8		3.89		2.8
CADMIUM		0.0257		0.0237		0.0507		0.0437
CHROMIUM		0.306		* 0.394		0.29		0.284
COPPER		1.66		* 2.25		1.42		1.46
LEAD		0.105		* 0.336		0.099		0.125
MERCURY		0.0138		* 0.0164		0.0323		0.0236
NICKEL		0.332		* 1.38		0.2		* 0.781
SILVER		0.0305		* 0.0387		0.0243		0.0237
ZINC		16.6		14.4		25.2		12.3
Pesticides	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ALDRIN		0.0463	0.571	* ND	1.01	ND	0.941	* ND
ALPHA CHLORDANE		0.0767		0.15		0.116		* 0.601
TRANS-NONACHLOR		0.038		* 0.092		0.415		* 0.788
DIELDRIN		0.134		0.148		0.281		* 0.662
PP-DDT		0.0791		0.241		0.0683		* 0.129
OP-DDT		0.0996		* 0.352		0.129		* 0.993
PP-DDD		0.16		* 0.835		0.186		* 1.83
OP-DDD	0.277	ND		0.103		0.129		* 0.824
PP-DDE		0.452		* 1.29	1.2	ND		* 0.723
OP-DDE	0.544	ND	0.498	* ND	0.789	ND		* 0.397
TOTAL_DDT		0.929		* 3.32		0.547		* 4.89
ENDOSULFAN I	0.521	ND	0.658	* ND	0.705	ND		* 0.477
ENDOSULFAN II	0.428	ND	0.51	* ND	0.588	ND		* 0.312
ENDOSULFAN SULFATE		0.493		0.477		0.308		0.359
HEPTACHLOR	0.698	ND	0.973	* ND	0.855	ND	0.805	* ND
HEPTACHLOR EPOXIDE	0.291	ND		* 0.319		0.0798		0.12
Industrial Chemicals	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
CL2_08		0.033		* 0.542	1.74	ND		* 1.59
CL3_18		0.0169		* 0.328	1.23	ND		* 0.635
CL3_28		0.12		* 0.689		0.116		* 1.11
CL4_44		0.0684		* 0.222	0.86	ND		* 0.55
CL4_49		0.0584		* 0.544		0.0705		* 1.2
CL4_52		0.193		* 0.779		0.0918		* 2.08
CL4_66		0.0595		* 0.738		0.0207		* 0.931
CL4_77		0.102		0.277		0.0307		* 0.18
CL5_101		0.375		0.765		0.285		* 2.09
CL5_105	0.448	ND		* 0.253		0.162		* 0.641
CL5_118		0.107		* 0.58		0.263		* 1.39
CL5_87		0.119		0.198		0.0219		* 0.25
CL6_128		0.0742		0.075		0.167		* 0.382
CL6_138		0.126		* 0.53		0.956		* 2.64
CL6_153		0.096		* 0.635		1.29		* 3.34
CL7_170		0.108		0.171		0.202		* 0.429
CL7_180		0.117		* 0.296		0.602		* 1.65
CL7_183	0.347	ND		0.0494		0.211		* 0.413
CL7_184		0.0662	0.381	ND	0.918	ND	0.875	* ND
CL7_187		0.129		0.111		0.63		* 1.32
CL8_195		0.0882		0.0747		0.105		* 0.203
CL9_206		0.0454		0.0458		0.201		* 0.318
CL10_209		0.054		0.0666		0.171		* 0.254
TOTAL_PCB		4.66		* 16.6		11.4		* 48.9
1,4-DICHLOROBENZENE		0.136		0.181		0.0912		* 0.643

TABLE 3

Kill Van Kull Reach 2 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Dioxins and Furans	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
2378-TCDD	0.382	ND	0.39	ND		0.143		* 0.426
12378-PeCDD	0.382	ND	0.579	ND		0.135	0.205	ND
123478-HxCDD	0.288	ND	0.389	ND	0.43	ND	0.377	ND
123678-HxCDD	0.262	ND	0.36	ND	0.358	ND		0.213
123789-HxCDD	0.386	ND	0.254	ND		0.146		0.117
1234678-HpCDD		0.249		* 0.899		1.15		1.28
OCDD		1.29		* 5.06		7.04		6.21
2378-TCDF		0.193		0.397		1.1		* 1.65
12378-PeCDF		0.239		0.411		0.188		0.18
23478-PeCDF		0.209		0.317		0.255		0.367
123478-HxCDF		0.253		0.301		0.21		0.255
123678-HxCDF		0.117		0.152		0.112	0.114	ND
123789-HxCDF	0.236	ND	0.239	ND	0.14	ND	0.213	ND
234678-HxCDF		0.141		* 0.297	0.174	ND		0.0957
1234678-HpCDF		0.242		* 0.583		0.544		0.525
1234789-HpCDF	0.238	ND	0.151	ND	0.228	ND		0.136
OCDF	0.548	ND		* 0.411		0.481		0.355
PAHs	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ACENAPHTHENE		21.1		22.5		0.0398		* 0.912
ACENAPHTHYLENE	0.791	ND		0.249	15.5	ND		* 0.215
ANTHRACENE		0.273		1.01	15	ND		* 1.55
FLUORENE		0.555		0.511	16.6	ND	15.6	* ND
NAPHTHALENE		0.881		1.01		1.51		1.85
PHENANTHRENE		0.914		2.77		0.104		* 0.367
BENZO[A]ANTHRACENE		0.159		* 3.99		0.0179		* 0.398
BENZO[A]PYRENE		0.125		* 3.87	12.8	ND		* 0.522
BENZO[G,H,I]PERYLENE	1.23	ND		0.961	9.05	ND		* 4.96
BENZO[B]FLUORANTHENE		0.222		* 4.09	13.6	ND		* 0.505
BENZO[K]FLUORANTHENE		0.149		* 3.5	14.5	ND		* 0.477
CHRYSENE		0.546		* 5.84		0.217		* 2.96
DIBENZ[A,H]ANTHRACENE	1.72	ND		0.32	8.34	ND	7.86	* ND
FLUORANTHENE		1.17		* 10.2		0.247		* 4.24
INDENO[1,2,3-C,D]PYRENE	1.79	ND		0.876	12.3	ND	11.7	* ND
PYRENE		1.04		* 18.1		0.335		* 8.33
TOTAL PAHs		29.91		* 80.34		2.47		* 62.91

Concentrations shown are the mean of 5 replicate analyses in wet weight.

'* Significantly higher than reference at 95% confidence

ND = Not Detected

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 replicates that were below the detection limits.

TABLE 3

Kill Van Kull Reach 3 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Metals	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
ARSENIC		4.14		3.96		3.89		3.11
CADMIUM		0.0257		0.0217		0.0507		0.0468
CHROMIUM		0.306		0.364		0.29		0.28
COPPER		1.66		* 2.16		1.42		1.4
LEAD		0.105		* 0.384		0.099		0.146
MERCURY		0.0138		* 0.0176		0.0323		0.0262
NICKEL		0.332		* 0.493		0.2		* 0.285
SILVER		0.0305		0.0296		0.0243		0.0191
ZINC		16.6		14.3		25.2		26.2
Pesticides	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ALDRIN		0.0463	0.565	* ND	1.01	ND	0.866	* ND
ALPHA CHLORDANE		0.0767		0.0563		0.116		* 0.196
TRANS-NONACHLOR		0.038		0.0651		0.415		0.445
DIELDRIN		0.134		0.362		0.281		0.394
PP-DDT		0.0791		0.369		0.0683		0.0984
OP-DDT		0.0996		0.34		0.129		0.368
PP-DDD		0.16		0.368		0.186		* 0.442
OP-DDD	0.277	ND		0.134		0.129		* 0.258
PP-DDE		0.452		* 0.905	1.2	ND		* 1.03
OP-DDE	0.544	ND		* 0.266	0.789	ND	0.665	* ND
TOTAL_DDT		0.929		* 2.38		0.547		* 2.82
ENDOSULFAN I	0.521	ND	0.654	* ND	0.705	ND	0.636	* ND
ENDOSULFAN II	0.428	ND	0.505	* ND	0.588	ND		* 0.45
ENDOSULFAN SULFATE		0.493		0.341		0.308		0.566
HEPTACHLOR	0.698	ND	0.975	* ND	0.855	ND	0.763	* ND
HEPTACHLOR EPOXIDE	0.291	ND	0.391	ND		0.0798		0.0811
Industrial Chemicals	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
CL2_08		0.033		* 0.5	1.74	ND	1.47	* ND
CL3_18		0.0169		* 0.403	1.23	ND		* 0.213
CL3_28		0.12		* 0.355		0.116		* 0.45
CL4_44		0.0684		0.144	0.86	ND		* 0.357
CL4_49		0.0584		* 0.202		0.0705		* 0.317
CL4_52		0.193		* 0.457		0.0918		* 0.59
CL4_66		0.0595		* 0.381		0.0207		* 0.27
CL4_77		0.102	0.277	ND		0.0307		* 0.106
CL5_101		0.375		0.352		0.285		* 0.576
CL5_105	0.448	ND		* 0.167		0.162		* 0.224
CL5_118		0.107		* 0.328		0.263		* 0.567
CL5_87		0.119		0.107		0.0219		* 0.0846
CL6_128		0.0742		0.0762		0.167		0.188
CL6_138		0.126		* 0.218		0.956		1.13
CL6_153		0.096		* 0.322		1.29		1.5
CL7_170		0.108		0.174		0.202		0.254
CL7_180		0.117		* 0.22		0.602		0.663
CL7_183	0.347	ND		0.0384		0.211		0.211
CL7_184		0.0662	0.377	ND	0.918	ND	0.848	* ND
CL7_187		0.129		0.0809		0.63		0.818
CL8_195		0.0882		0.0585		0.105		0.116
CL9_206		0.0454		0.063		0.201		0.202
CL10_209		0.054		0.106		0.171		0.163
TOTAL_PCB		4.66		* 10.6		11.4		* 22.5
1,4-DICHLOROBENZENE		0.136		0.146		0.0912		0.416

TABLE 3

Kill Van Kull Reach 3 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION	CONCEN-	DETECTION	CONCEN-	DETECTION	CONCEN-	DETECTION	CONCEN-
Dioxins and Furans	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
2378-TCDD	0.382	ND	0.368	ND		0.143		0.162
12378-PeCDD	0.382	ND	0.404	ND		0.135	0.333	ND
123478-HxCDD	0.288	ND	0.222	ND	0.43	ND	0.401	ND
123678-HxCDD	0.262	ND	0.226	ND	0.358	ND	0.393	ND
123789-HxCDD	0.386	ND	0.394	ND		0.146		0.117
1234678-HpCDD		0.249		* 0.6		1.15		1
OCDD		1.29		* 4.55		7.04		6.69
2378-TCDF		0.193		0.277		1.1		0.843
12378-PeCDF		0.239		0.201		0.188		0.166
23478-PeCDF		0.209		0.289		0.255		0.198
123478-HxCDF		0.253		0.251		0.21		0.128
123678-HxCDF		0.117		0.146		0.112	0.149	ND
123789-HxCDF	0.236	ND	0.306	ND	0.14	ND	0.309	ND
234678-HxCDF		0.141		0.21	0.174	ND	0.293	ND
1234678-HpCDF		0.242		0.263		0.544		0.395
1234789-HpCDF	0.238	ND	0.318	ND	0.228	ND	0.428	ND
OCDF	0.548	ND		0.275		0.481		0.365
PAHs	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ACENAPHTHENE		21.1		38.5		0.0398		* 0.504
ACENAPHTHYLENE	0.791	ND		1	15.5	ND		* 0.461
ANTHRACENE		0.273		* 7.03	15	ND		* 0.335
FLUORENE		0.555		0.523	16.6	ND		* 10
NAPHTHALENE		0.881		1.1		1.51		1.6
PHENANTHRENE		0.914		* 7.08		0.104		* 0.454
BENZO[A]ANTHRACENE		0.159		* 35.8		0.0179		* 1.88
BENZO[A]PYRENE		0.125		* 19.6	12.8	ND		* 1.75
BENZO[G,H,I]PERYLENE	1.23	ND		3.02	9.05	ND		* 0.313
BENZO[B]FLUORANTHENE		0.222		* 13.4	13.6	ND		* 1.03
BENZO[K]FLUORANTHENE		0.149		* 13.8	14.5	ND		* 1.31
CHRYSENE		0.546		* 36.8		0.217		* 7.74
DIBENZ[A,H]ANTHRACENE	1.72	ND		1.05	8.34	ND		* 6.73
FLUORANTHENE		1.17		* 61.1		0.247		* 15.3
INDENO[1,2,3-C,D]PYRENE	1.79	ND		2.84	12.3	ND		* 9.37
PYRENE		1.04		* 114		0.335		* 34.2
TOTAL PAHs		29.91		* 356.64		2.47		* 92.98

Concentrations shown are the mean of 5 replicate analyses in wet weight.

'* Significantly higher than reference at 95% confidence

ND = Not Detected

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 replicates that were below the detection limits.

TABLE 3

Kill Van Kull Reach 4 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Metals	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
ARSENIC		4.14		3.85		3.89		2.7
CADMIUM		0.0257		0.0253		0.0507		0.0461
CHROMIUM		0.306		* 0.426		0.29		0.31
COPPER		1.66		* 2.36		1.42		1.54
LEAD		0.105		* 0.5		0.099		0.166
MERCURY		0.0138		* 0.018		0.0323		0.0244
NICKEL		0.332		* 0.88		0.2		* 0.677
SILVER		0.0305		* 0.0405		0.0243		0.0212
ZINC		16.6		15.2		25.2		17.5
Pesticides	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ALDRIN		0.0463		* 0.35	1.01	ND	0.879	* ND
ALPHA CHLORDANE		0.0767		0.128		0.116		* 0.386
TRANS-NONACHLOR		0.038		* 0.0907		0.415		0.472
DIELDRIN		0.134		0.155		0.281		* 0.515
PP-DDT		0.0791		0.359		0.0683		0.0873
OP-DDT		0.0996		0.249		0.129		0.199
PP-DDD		0.16		* 0.834		0.186		* 1.19
OP-DDD	0.277	ND		* 0.308		0.129		* 0.552
PP-DDE		0.452		* 1.43	1.2	ND		* 0.979
OP-DDE	0.544	ND		* 0.306	0.789	ND		* 0.469
TOTAL_DDT		0.929		* 3.49		0.547		* 3.48
ENDOSULFAN I	0.521	ND	0.594	* ND	0.705	ND		* 0.433
ENDOSULFAN II	0.428	ND		* 0.389	0.588	ND		* 0.212
ENDOSULFAN SULFATE		0.493		0.413		0.308		0.407
HEPTACHLOR	0.698	ND	0.849	* ND	0.855	ND	0.78	* ND
HEPTACHLOR EPOXIDE	0.291	ND	0.346	ND		0.0798		0.065
Industrial Chemicals	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
CL2_08		0.033		* 0.666	1.74	ND	1.48	* ND
CL3_18		0.0169		* 0.425	1.23	ND		* 0.602
CL3_28		0.12		* 1.06		0.116		* 1.07
CL4_44		0.0684		* 0.352	0.86	ND		* 0.49
CL4_49		0.0584		* 0.658		0.0705		* 0.911
CL4_52		0.193		* 1.43		0.0918		* 1.57
CL4_66		0.0595		* 1.02		0.0207		* 0.759
CL4_77		0.102	0.385	ND		0.0307		* 0.199
CL5_101		0.375		0.779		0.285		* 1.28
CL5_105	0.448	ND		* 0.315		0.162		* 0.442
CL5_118		0.107		* 0.64		0.263		* 0.909
CL5_87		0.119		0.3		0.0219		* 0.225
CL6_128		0.0742		0.107		0.167		* 0.255
CL6_138		0.126		* 0.453		0.956		* 1.62
CL6_153		0.096		* 0.637		1.29		* 2.03
CL7_170		0.108		0.211		0.202		* 0.383
CL7_180		0.117		* 0.319		0.602		* 0.927
CL7_183	0.347	ND		0.06		0.211		0.283
CL7_184		0.0662	0.354	ND	0.918	ND	0.872	* ND
CL7_187		0.129		0.188		0.63		0.959
CL8_195		0.0882		0.116		0.105		* 0.219
CL9_206		0.0454		0.133		0.201		* 0.381
CL10_209		0.054		0.157		0.171		0.266
TOTAL_PCB		4.66		* 21.2		11.4		* 36.1
1,4-DICHLOROBENZENE		0.136		0.237		0.0912		0.725

TABLE 3

Kill Van Kull Reach 4 (WorkOrder 20)

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

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
CONSTITUENTS	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION	DETECTION LIMITS	CONCEN-TRATION
Dioxins and Furans	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
2378-TCDD	0.382	ND		0.184		0.143		* 0.385
12378-PeCDD	0.382	ND	0.392	ND		0.135		0.18
123478-HxCDD	0.288	ND	0.21	ND	0.43	ND	0.528	ND
123678-HxCDD	0.262	ND	0.208	ND	0.358	ND		0.267
123789-HxCDD	0.386	ND		0.148		0.146	0.284	ND
1234678-HpCDD		0.249		* 1.12		1.15		1.53
OCDD		1.29		* 7.8		7.04		11.9
2378-TCDF		0.193		* 0.566		1.1		1.36
12378-PeCDF		0.239		0.308		0.188		0.231
23478-PeCDF		0.209		0.313		0.255		0.345
123478-HxCDF		0.253		0.364		0.21		* 0.332
123678-HxCDF		0.117		0.184		0.112		0.122
123789-HxCDF	0.236	ND	0.228	ND	0.14	ND	0.336	ND
234678-HxCDF		0.141		* 0.284	0.174	ND	0.258	ND
1234678-HpCDF		0.242		* 0.62		0.544		0.818
1234789-HpCDF	0.238	ND		0.143	0.228	ND		0.672
OCDF	0.548	ND		0.388		0.481		1.25
PAHs	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
ACENAPHTHENE		21.1		57.5		0.0398		* 1.23
ACENAPHTHYLENE	0.791	ND		* 1.15	15.5	ND		* 0.475
ANTHRACENE		0.273		* 6.95	15	ND		* 0.534
FLUORENE		0.555		0.961	16.6	ND		* 7.93
NAPHTHALENE		0.881		1.4		1.51		1.62
PHENANTHRENE		0.914		* 9.53		0.104		* 0.849
BENZO[A]ANTHRACENE		0.159		* 31.6		0.0179		* 2.1
BENZO[A]PYRENE		0.125		* 18.6	12.8	ND		* 2.01
BENZO[G,H,I]PERYLENE	1.23	ND		* 3.54	9.05	ND		* 0.601
BENZO[B]FLUORANTHENE		0.222		* 14.4	13.6	ND		* 1.48
BENZO[K]FLUORANTHENE		0.149		* 13.3	14.5	ND		* 1.59
CHRYSENE		0.546		* 37.7		0.217		* 9.47
DIBENZ[A,H]ANTHRACENE	1.72	ND		1.25	8.34	ND		* 4.84
FLUORANTHENE		1.17		* 52.5		0.247		* 14.7
INDENO[1,2,3-C,D]PYRENE	1.79	ND		* 3.15	12.3	ND		* 4.74
PYRENE		1.04		* 82.6		0.335		* 27.9
TOTAL PAHs		29.91		* 336.13		2.47		* 82.07

Concentrations shown are the mean of 5 replicate analyses in wet weight.

'* Significantly higher than reference at 95% confidence

ND = Not Detected

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 replicates that were below the detection limits.

TABLE 3