US Army Corps of Engineers

PUBLIC NOTICE

US Army Corps of Engineers
New York District
ATTN: Project Mgmt Division (Wisemiller)
26 Federal Plaza, Room 2119
New York, N.Y. 10278-0090

In replying refer to:
Public Notice Number: **FP63-SSR2-2013**
Issue Date: June 5, 2013
Expiration Date: July 5, 2013

NEW YORK AND NEW JERSEY HARBOR DEEPENING
FEDERAL NAVIGATION PROJECT
SHOAL REMOVAL DREDGING

TO WHOM IT MAY CONCERN:

Pursuant to Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 (commonly referred to as the Ocean Dumping Act, 33 U.S.C. 1413), this Public Notice serves as the U.S. Army Corps of Engineers (New York District) notification and request for comments relating to the potential placement of Historic Area Remediation Site (HARS) suitable material to be dredged, as part of the remaining New York and New Jersey Harbor Deepening Project (HDP) construction, as authorized by Section 101(a)(2) of the Water Resources Act of 2000, Public Law 106-541. This remaining HDP construction will remove accumulated HARS suitable shoals in select areas of the existing Kill Van Kull Channel, located between Bayonne, NJ, Staten Island and Brooklyn, NY (see Figure 1). This material was sampled and tested in two distinct testing reaches for potential HARS placement. This construction to remove this material is anticipated to be performed in one planned contract. This construction will facilitate transition of the HDP from construction phase to maintenance. This proposed action will allow suitable, recently deposited Holocene materials dredged to be placed at the HARS - see below for further information.

ACTIVITY: The proposed action is to place approximately 294,000 cubic yards (CY) of dredged material from the western Kill Van Kull Channel (near Bergen Point), and 196,000 CY of dredged material from the eastern Kill Van Kull Channel area at the Historic Area Remediation Site (HARS). The Kill Van Kull Channel area was previously deepened in numerous, separate HDP construction contracts, which were completed as early as 2005 but no later than 2010. In these previously deepened areas, shoals of Holocene age sandy, clayey, silty material have accumulated. Any debris encountered within the dredged material will be separated and managed by placement at permitted upland sites, as approved by the state regulatory agencies that regulate these upland sites.

LOCATION: The Kill Van Kull Channel is an approximately 5 mile long tidal strait located between Bayonne, New Jersey and Staten Island, New York.

DESCRIPTION OF PLANNED ACTION:

Western Kill Van Kull Channel Reach

The western side of the Kill Van Kull Channel, a tidal strait located between Bayonne, New Jersey and Staten Island, New York, was previously deepened as part of the HDP under the prior contracts KVK/NB-Area 5 and S-KVK-2. These prior contracts were completed on or before approximately 2006 deepening the channel to no shallower than -52 ft. mean low water (MLW), (the 2 ft of additional depth beyond -50 ft. MLW was for added safety clearance due to the hard underlying substrate). Since that time, this area has accumulated approximately 294,000 CY of sandy, clayey, silty sediments, most notably near Bergen Point on the inside and outside portions of the channel as the channel turns northward (see Figure 2A). This volume estimate is based on recent surveys with removal to -52 ft. MLW plus one foot of allowable overdepth. To transition this area from construction to Corps maintenance, these shoals of material shall be dredged with a clamshell bucket dredge, any debris encountered during the dredging will be separated, with the resultant split hull scow of material planned to be placed at the HARS.

Eastern Kill Van Kull Channel Shoal Reach

The eastern side of the Kill Van Kull Channel, a tidal strait located between Bayonne, New Jersey and Staten Island, New York where it enters the lower half of the Upper Bay of New York Harbor, was previously deepened as part of the HDP under the several contracts. These prior contracts were completed in 2010 or before, deepening the KVK channel to no shallower than -52 ft. mean low water (MLW), (the 2 ft of additional depth beyond -50 ft. MLW was for added safety clearance due to the hard underlying substrate) or to no shallower than -50 ft. MLW in the areas without a hard underlying substrate. Since that time, this area has accumulated approximately 196,000 CY of sandy, clayey, silty sediments, most notably near Constable Hook/St. George Ferry Terminal (see Figure 2B). This volume estimate is based on recent surveys with removal to -52 ft. MLW in the areas with hard underlying substrate and to -50 ft. MLW in areas without hard underlying substrate, plus one foot of allowable overdepth in both areas. To transition this area from construction to Corps maintenance, these shoals of material shall be dredged with a clamshell bucket dredge. Any debris encountered during the dredging will be separated, with the resultant split hull scow of material planned to be placed at the HARS.

The following Table A summarizes the estimated volumes of material proposed to be dredged in these aforementioned three testing reaches as part of the HDP construction. The attached Figure 3 shows the typical vertical and horizontal extent of the Holocene sandy, clayey silts throughout the construction dredging area. The construction under discussion in this public notice is expected to begin in the fall of 2013. While it is currently planned to be dredged as part of one construction contract, it may be performed under separate Corps construction contracts. The District will request amendment to existing Water Quality Certificates and Federal Consistency Determinations (WQC/FC) previously issued for dredging these areas from the State of New Jersey Department of Environmental Protection and an authorization for work under the existing WQC/FC from New York State Department of Environmental Conservation for this work.

Table A
Contract Material Volume Estimate

Location of Material / Volume Estimates	HARS Suitable Holocene Sediments
	Cubic Yards (CY)
Western Kill Van Kull Channel Shoals	294,000
Eastern Kill Van Kull Channel Shoals	196,000

The purpose of this Public Notice is to solicit comments regarding the proposed placement of these HARS suitable materials at the HARS. These comments, along with all available technical data/information, will form the basis of a determination of whether this proposed placement is in the public interest. The HARS (Figures 4 & 5), located in the Atlantic Ocean off the coasts of New York and New Jersey, is described later in this notice.

The proposed transportation and placement of this dredged material 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. On September 26, 2000, the United States Environmental Protection Agency (USEPA) and U.S. Army Corps of Engineers (Corps) signed a Memorandum of Agreement (MOA) outlining the steps to be taken to ensure that remediation of the HARS continues in a manner appropriately protective of human health and the aquatic environment. In making the determination, the criteria established by the Environmental Protection Agency (EPA) will be applied, including the interim change to one matrix value for PCBs, as described in the MOA. In addition, based upon an evaluation of the potential effect which the failure to utilize this ocean site will have on navigation, economic and industrial development, and foreign and domestic commerce of the United States, an independent determination will be made of the need to place the dredged material in ocean waters, other possible methods of disposal, and other appropriate locations.

The Corps is soliciting comments from the public; federal, state and local agencies and officials; Indian tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Comments are used to assess impacts on navigation, water quality, endangered species, historic resources, wetlands, scenic and recreational values, and other public interest factors.

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.

Pursuant to Section 307 of the Coastal Zone Management Act of 1972, as amended [16 USC 1456(c)], for activities conducted or supported by a federal agency in a state which has a federally approved Coastal Zone Management (CZM) program or Federal Consistency Determination (FCD) program, the Corps must submit a determination that the proposed project is consistent with the State CZM program and/or State FCD program to the maximum extent

practicable. This activity is subject to review by the New Jersey Department of Environmental Protection for CZM consistency with the enforceable policies of the State of New Jersey Coastal Management Program. The U.S. Army Corps of Engineers, New York District, has determined that the proposed activities are consistent to the maximum extent practicable and within the applicable policies of the State of New Jersey CZM program. A copy of this CZM determination has been provided to the State of New Jersey Department of Environmental Protection. Additional information regarding the Corps' consistency determination may be obtained by contacting the State of New Jersey Department of Environmental Protection, Bureau of Coastal Regulation, CN 401, 501 East State Street, Second Floor, Trenton, New Jersey 08625-0401, Attention: Consistency Review.

The proposed placement at the HARS has been reviewed based upon the "Biological Assessment for the Closure of the Mud Dump Site and Designation of the Historic Area Remediation Site (HARS) in the New York Bight and Apex" (USEPA, 2012) prepared pursuant to Section 7 of the Endangered Species Act (16 USC 1531) and the Biological Opinion (NOAA 2012). 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 (Atlantic sturgeon, humpback whales, finback whales, right whales, loggerhead turtles, leatherback turtles, green turtles, and Kemp's Ridley turtles) or their critical habitat, as designated.

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

Reviews of the activity pursuant to Section 404 of the Clean Water Act will include application of the guidelines announced by the Administrator, U.S. Environmental Protection Agency, under authority of Section 404(b) of the Clean Water Act. The Corps will obtain a water quality certificate from the New Jersey Department of Environmental Protection in accordance with Section 401 of the Clean Water Act, prior to commencement of any work.

In compliance with Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (1996 amendments), an Essential Fish Habitat Assessment will be prepared and submitted to the National Marine Fisheries Service for review and comment.

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

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

ENVIRONMENTAL DOCUMENTATION:

The environmental impacts of the New York and New Jersey Harbor Deepening Project (HDP) have been evaluated in National Environmental Policy Act (NEPA) and regulatory documents including: (1) the Final Feasibility Report and Final Environmental Impact Statement dated December 1999; (2) the Federal Record-of-Decision executed in June 2002; (3) the Final Limited Reevaluation Report and Final Environmental Assessment/Finding of No Significant Impact dated January 2004; and (4) the Final Environmental Assessment of the NY & NJ Harbor Deepening Project on the Remedial Investigation/Feasibility Study of the Newark Bay Study Area, June 2007.

Copies of these documents can be viewed and/or obtained by contacting Mr. Bryce Wisemiller, Project Manager for this contract of the New York and New Jersey Harbor Deepening Project, at telephone number (917) 790-8307.

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

conditions in the HARS Study Area may be found in the Supplemental Environmental Impact Statement (USEPA, 1997).

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

As of the end of April 2013, dredged materials from ninety different completed and ongoing private and federal dredging projects in the Port of New York and New Jersey have been dredged and placed as Remediation Material in the ocean at the HARS since the closure of the Mud Dump Site and designation of the HARS in 1997. This represents approximately 61,219,000 cubic yards of Remediation Material.

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

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

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

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

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

Over the past years, U.S. Environmental Protection Agency – Region 2 and the U.S. Army Corps of Engineers – New York District have been refining the approach to the technical review and scientific and regulatory analysis of dredging projects' dredged materials proposed for placement at the HARS. Sediment testing evaluation processes are evolving, which establish a responsible

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

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

HARS SUITABILITY TESTING:

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, with testing conforming to procedures outlined in the 1991 Green Book. The results of bioassay tests conducted on sediments from each project area are provided in Table 2A and Table 2B: Toxicity Test Results.

In the past years, USEPA and the Corps 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 analyze (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 MPRSA. USEPA and the Corps utilize this testing evaluation process for identifying Category 1 dredged material in determining suitability of dredged sediments as remediation material at the HARS.

The proposed dredging areas are depicted in Figures 2A and 2B.

The Kill van Kull Western End has been characterized using one (1) sediment testing reach with six (6) core samples. The samples were taken to a depth of -53 feet Mean Low Water. The core samples were combined to yield one sediment composite which was submitted to chemical and biological testing. Based upon an analysis of sediment samples from the Kill van Kull Western End, the grain size characteristics of the proposed dredged material are:

1.9% GRAVEL, 40.3% SAND, 38.8% SILT & 19.0% CLAY

The Kill van Kull Eastern End has been characterized using one (1) sediment testing reach with four (4) core samples. The samples were taken to a depth of -53 feet Mean Low Water. The core samples were combined to yield one sediment composite which was submitted to chemical

and biological testing. Based upon an analysis of sediment samples from the Kill van Kull Eastern End, the grain size characteristics of the proposed dredged material are:

0.2% GRAVEL, 49.6% SAND, 30.5% SILT & 19.7% CLAY

Results of the chemical and biological testing of the Kill van Kull Western End and the Kill van Kull Eastern End sediment samples are summarized below.

Evaluation of the Liquid Phase: Chemistry

Under the requirements of 40 CFR Sections 227.6(c)(1) and 227.27(a), chemical analyses was conducted on project area site water and elutriate. Results of this evaluation are summarized in Table 1. Please note in reading Table 1 (Table 1A, Table 1B) that detection limits have been listed for only those constituents which the laboratory reported as not-detected (ND) (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). ADDAMS is a mixing model developed by the Corps Waterways Experiment Station (WES) and described in the joint USEPA/Corps 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 each 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 each project area. Liquid phase bioassays, run as part of the suspended particulate phase on three appropriate sensitive marine organisms (a crustacean (shrimp, *Americamysis bahia),* finfish *(Menidia beryllina),* and larvae of a bivalve (mussel, *Mytilus edulis))*, show that after initial mixing (as determined under 40 CFR Sections 227.29(a)(2)) the liquid phase of the material 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)(l) and 227.27(a). The specific test results and technical analysis of the data underlying this conclusion are described and evaluated in a joint U.S. Army Corps of Engineers,

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 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 *(Americamysis bahia),* finfish *(Menidia beryllina),* and larvae of a bivalve *(Mytilus edulis).* Median lethal concentrations (LC_{50}), which are concentrations of suspended particulate phase resulting in 50% mortality, were determined for all three test species. In addition, the median effective concentration (EC_{50}), based on normal larval development to the D-cell stage, was determined for the bivalve larvae of *Mytilus edulis.* The Limiting Permissible Concentration (LPC) was then calculated as 0.01 of the LC_{50} or EC_{50} of the most sensitive organism. The LPC for the suspended particulate phase of the Kill van Kull Western End composite was calculated as 0.22, based on the EC_{50} of *Mytilus edulis.* The LPC for the suspended particulate phase of the Kill van Kull Eastern End composite was calculated as 0.22, based on the EC_{50} of *Mytilus edulis.*

The information shows that when placed at 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, which indicates 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 KvK Eastern Western End, and KvK Eastern End 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 the project area are presented in Table 2 (Table 2A, Table 2B) of this public notice. The specific test results and technical analysis of the data underlying this conclusion are described in a joint U.S. Army Corps of Engineers, New York District/USEPA Region 2 memorandum previously mentioned.

Evaluation of the solid phase toxicity

The solid phase is 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 *(Americamysis bahia)* and a deposit feeding, burrowing amphipod *(Ampelisca abdita)* to a composite of sediment from the project areas 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/U.S. Army Corps of Engineers, New York District guidance.

The toxicity of project sediments was not statistically greater than the reference for *Ampelisca abdita* and *Americamysis bahia.* 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 (Table 2A, Table 2B).

Evaluation of the solid phase bioaccumulation

Bioaccumulation tests for sediments from the project area 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 Taxies Characterization report (Squibb, *et al.* 1991).

Table 3 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 (Table 3A, Table 3B) indicates that some contaminants bioaccumulated above reference in the clam and/or worm. The testing memos further evaluate these contaminants and conclude 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 USEPA, Region 2.

ALTERNATIVES TO HARS PLACEMENT:

The New York District has evaluated the regional practicability of potential alternatives for dredged material disposal in the August 2008 Update of the "Dredged Material Management Plan for the Port of New York and New Jersey". The Recommended Plan within the report

addresses both the short and long term dredged material placement options in two specific timeframes, 2005-2014 and 2015-2065, respectively. 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 will be placed at alternative beneficial use sites currently under development. Use of these sites results in 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.

Based upon several relatively recent New York District navigation dredging solicitations, the cost for dredging and then using an upland placement site for silty or sandy material was approximately $70 per cubic yard as compared to approximately $15 per cubic yard for dredging similar material and placing it at the HARS. This is a substantial increase of approximately $55 per cubic yard over the cost of dredging and placing the material at the HARS.

The shoaling area dredged material currently has no economically viable alternative site for the HARS-suitable material. The District will continue to evaluate all reasonable and beneficial alternatives, as practicable, that may become available as solicitation(s) to dredge this material are advertised and awarded.

Conclusion

The USACE and the USEPA have determined that the material to be dredged meet the criteria for ocean placement as described in the regulator testing criteria of 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(d)(6). Based on the information available at the time of issuing this Public Notice, the Corps has tentatively determined that dredging of the shoals of the HDP as described within this Public Notice, with placement of the dredged material at the HARS, is not likely to have significant adverse environmental impact on water quality, marine resources, fish, wildlife, endangered species, recreation, aesthetics and flood protection of the area.

Placement of this material at the HARS would serve to reduce impacts at the HARS to acceptable levels and improve benthic conditions. Unremediated sediments in the HARS have been found to adversely impact benthic marine organisms. Placement of project material over existing unremediated HARS sediments would serve to remediate those areas. 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.

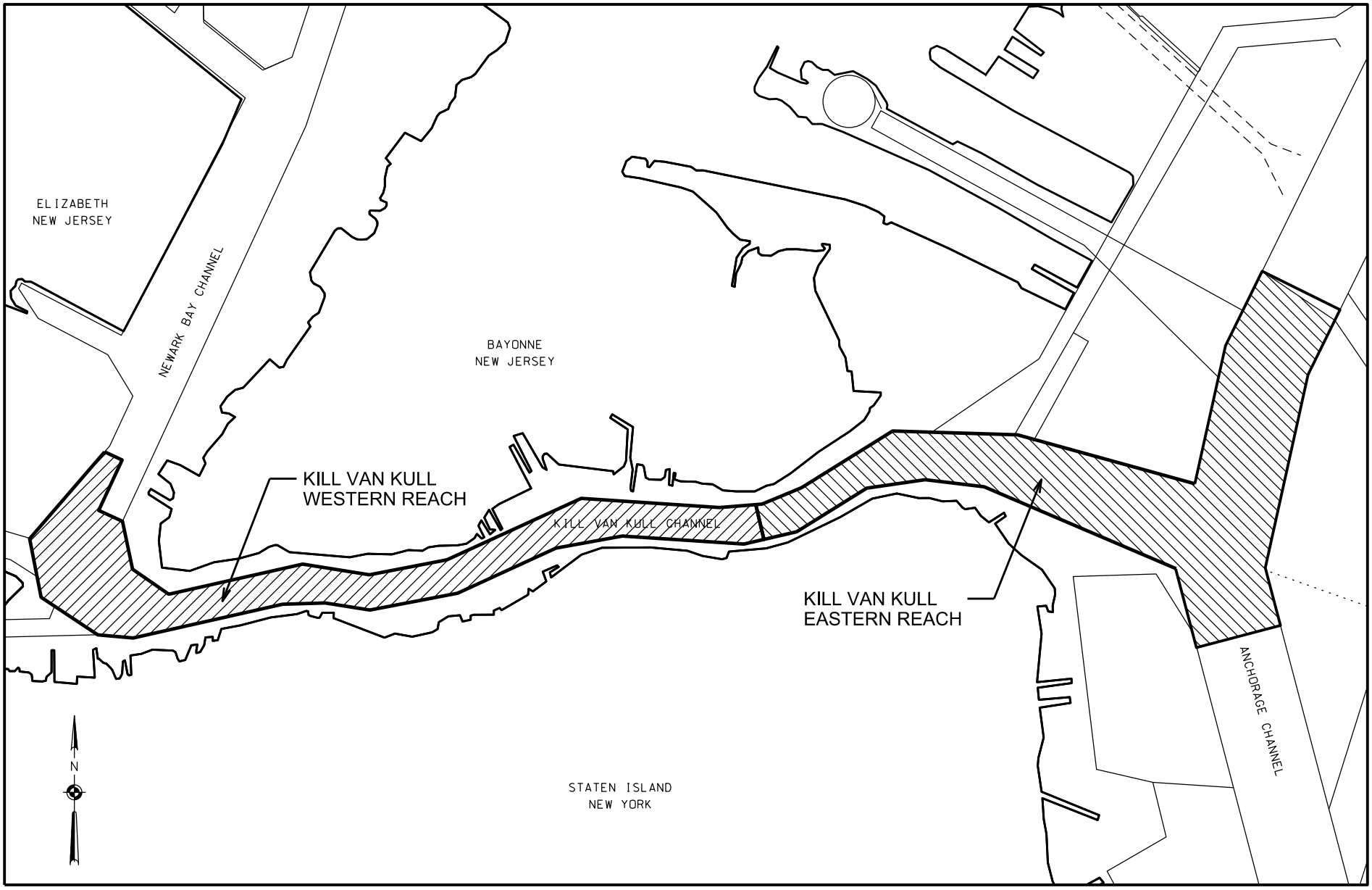
If you have questions regarding this Public Notice or general questions on the NY & NJ Harbor Deepening Project, please contact Mr. Bryce Wisemiller at (917) 790-8307. Comments or questions may be FAXED to (212) 264-2924.

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.

Paul A. Tumminello, P.E.
Chief, Civil Works Branch

Enclosures



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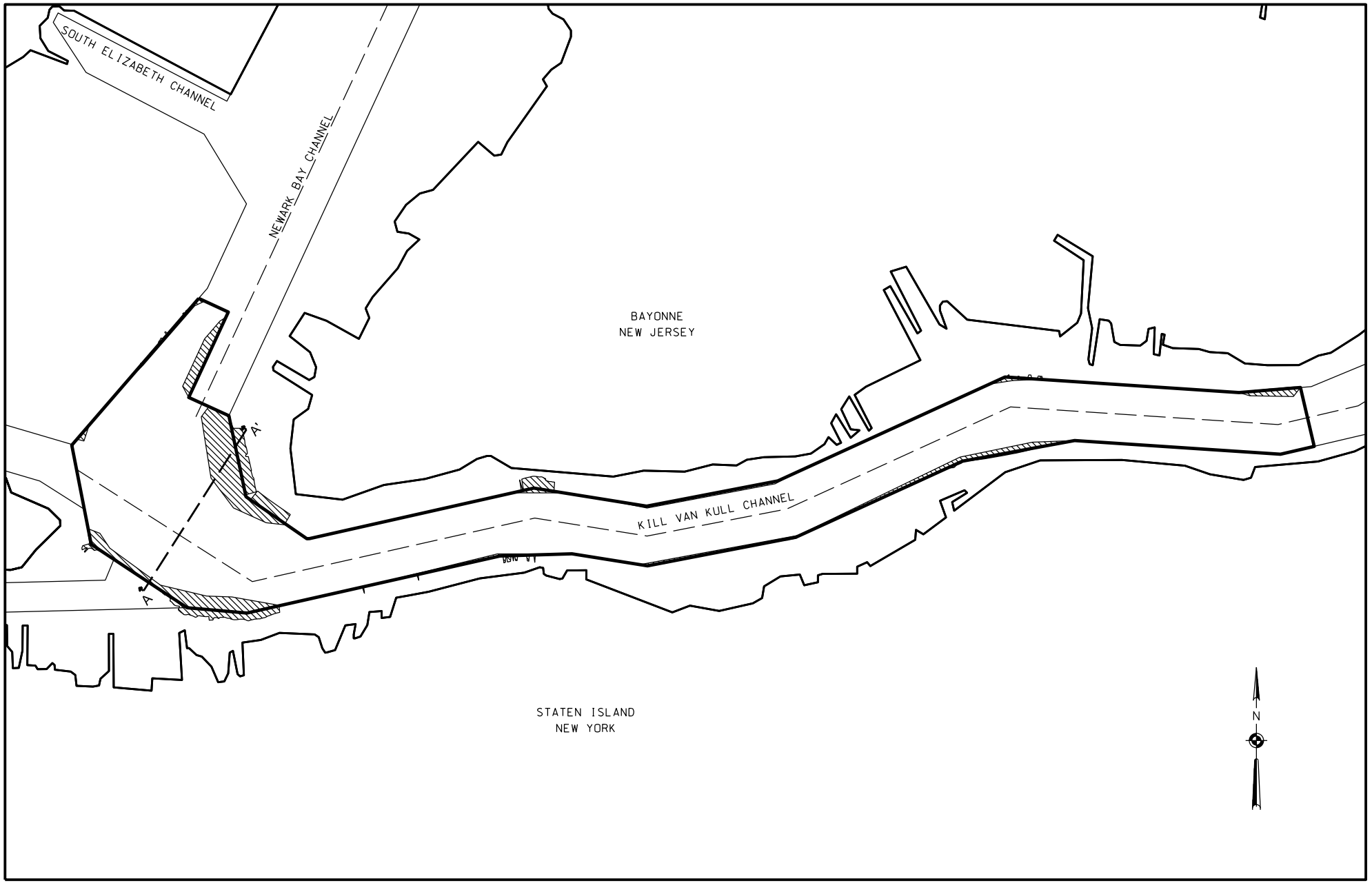
SCALE: 1"= 3200'

NY and NJ Harbor Deepening
Federal Navigation Project
S-SR-2
Contract Area Map
Figure 1



Dredging Areas

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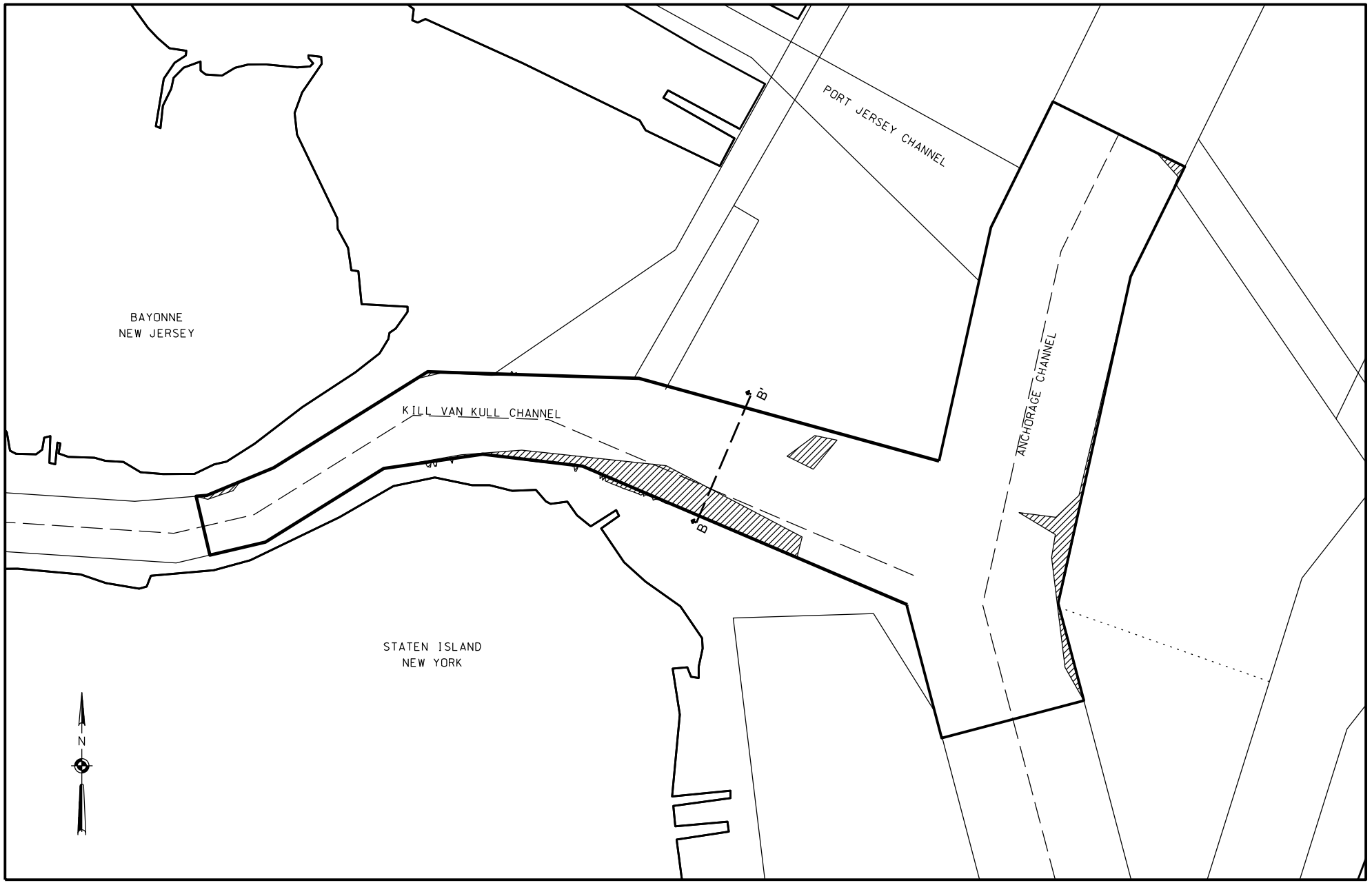
SCALE: 1"= 1800'

NY and NJ Harbor Deepening
Federal Navigation Project
S-SR-2: Western Reach
Dredging Area Map
Figure 2A

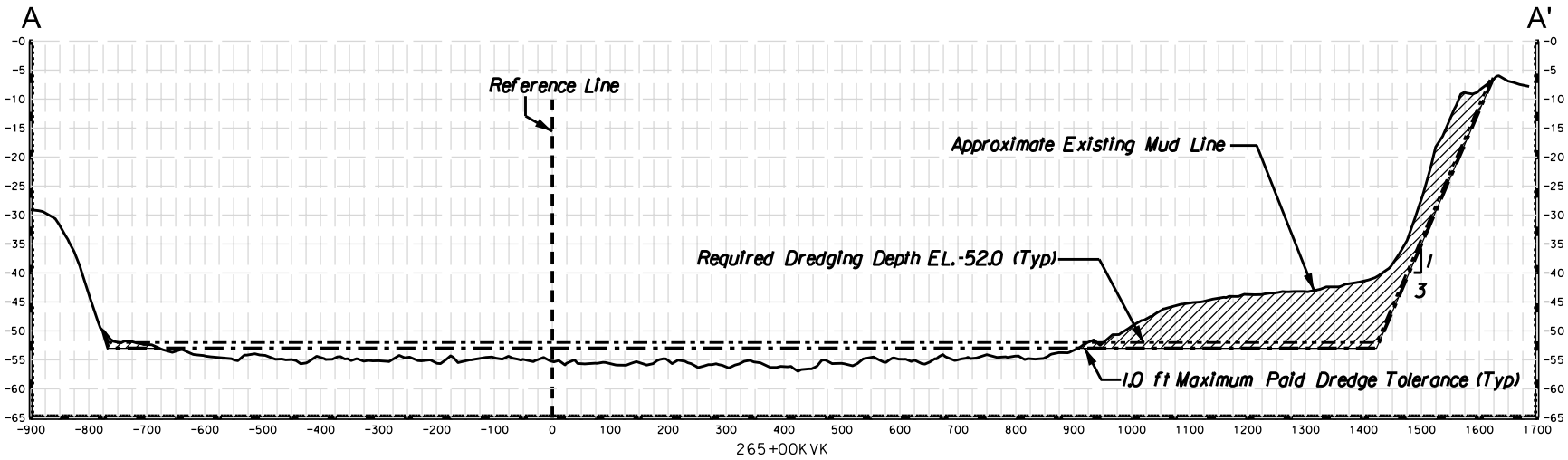


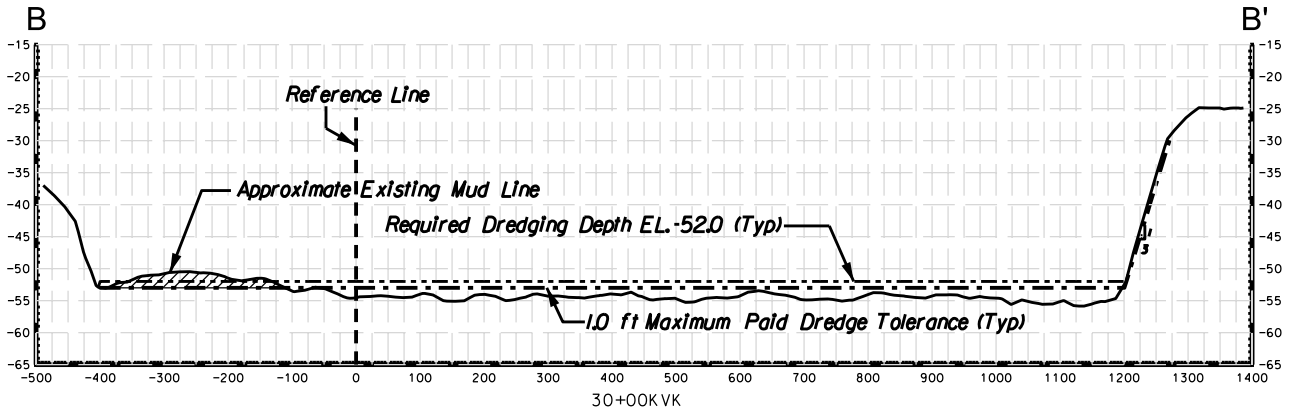
Dredging Areas

1800 900 0 1800 3600FT

SCALE: 1"= 1800'

NY and NJ Harbor Deepening
Federal Navigation Project
S-SR-2: Eastern Reach
Dredging Area Map
Figure 2B





Dredged Material

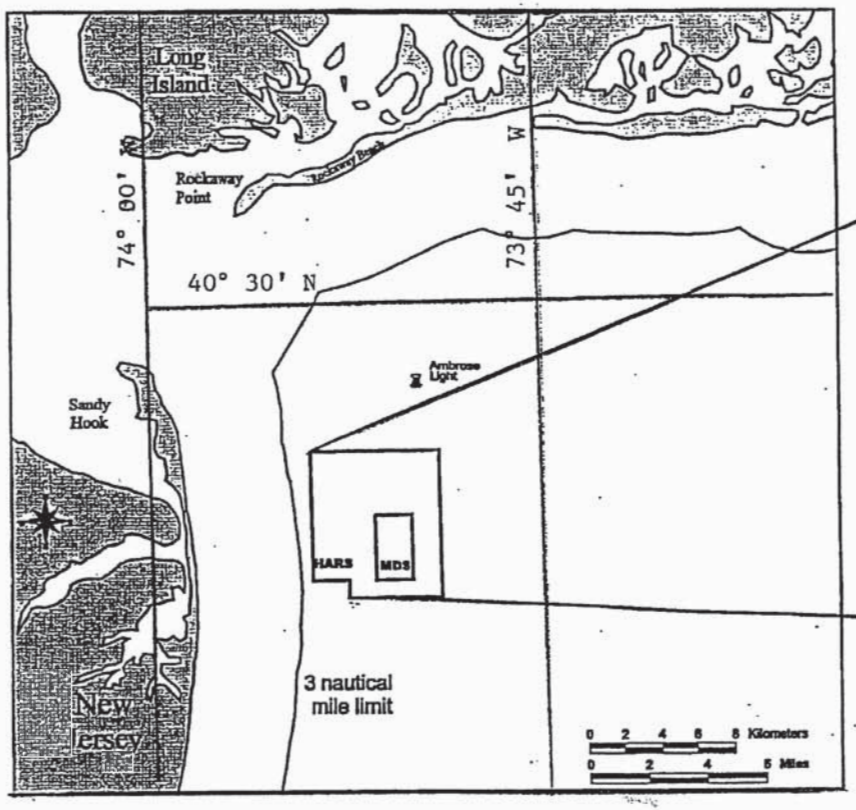
Holocene Silt

300 150 0 300 600FT

SCALE: 1"= 300'

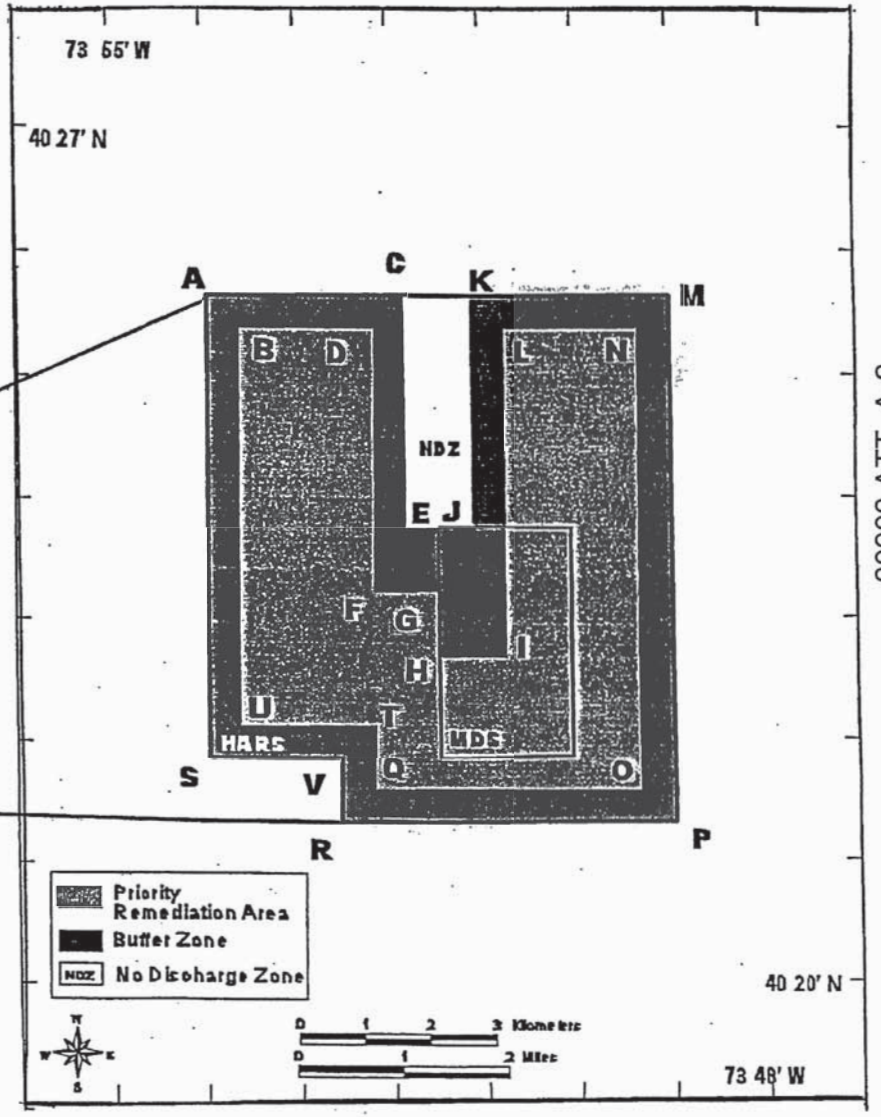
NY and NJ Harbor Deepening
Federal Navigation Project
S-SR-2
Cross Sections
Figure 3

HISTORIC AREA REMEDIATION SITE LOCATION MAP



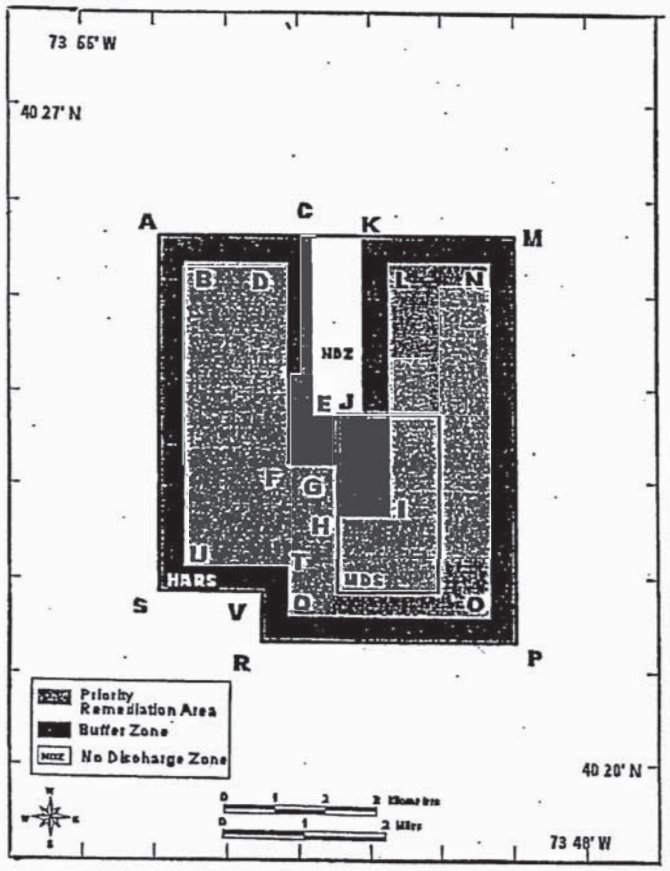
A

LOCATITON OF PRIMARY REMEDIATION AREA WITHIN THE HISTORIC AREA REMEDIATION SITE



B

Figure 4



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 5

TABLE 1A. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
Kill Van Kull Western End

	SITE WATER		ELUTRIATE	
CONSTITUENTS	**DETECTION LIMITS**	**CONCENTRATION**	**DETECTION LIMITS**	**CONCENTRATION**
Metals	**ppb**	**ppb**	**ppb**	**ppb**
Ag		0.014		0.040
Cd		0.062		0.018
Cr		0.792		2.050
Cu		2.55		2.027
Hg		0.011		0.025
Ni		1.45		11.07
Pb		1.34		2.69
Zn		7.27		8.26
Pesticides	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
Aldrin	0.32	ND	0.31	ND
a-Chlordane	0.34	ND		1.047
trans Nonachlor	0.58	ND		0.417
Dieldrin	0.59	ND		0.503
4,4'-DDT	0.27	ND	0.26	ND
2,4'-DDT	0.46	ND	0.44	ND
4,4'-DDD	0.54	ND		0.95
2,4'-DDD	0.68	ND		0.68
4,4'-DDE	0.34	ND		2.13
2,4'-DDE	0.64	ND		0.400
Total DDT		**1.5**		**4.5**
Endosulfan I	0.52	ND	0.50	ND
Endosulfan II	0.41	ND	0.40	ND
Endosulfan sulfate	0.45	ND	0.43	ND
Heptachlor	0.49	ND	0.47	ND
Heptachlor epoxide	0.58	ND	0.55	ND
Industrial Chemicals	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
PCB 8	0.31	ND		0.513
PCB 18	0.44	ND		1.27
PCB 28	0.31	ND		1.0
PCB 44	0.23	ND		1.35
PCB 49	0.28	ND		1.01
PCB 52	0.43	ND		2.10
PCB 66	0.45	ND		1.13
PCB 87	0.35	ND		0.44
PCB 101	0.32	ND		1.45
PCB 105	0.30	ND		0.32
PCB 118	0.37	ND		0.89
PCB 128	0.47	ND	0.46	ND
PCB 138	0.73	ND		1.34
PCB 153	0.32	ND		1.70
PCB 170	0.66	ND		0.38
PCB 180	0.52	ND		1.00
PCB 183	0.31	ND		0.22
PCB 184	0.42	ND	0.40	ND
PCB 187	0.26	ND		0.60
PCB 195	0.20	ND	0.20	ND
PCB 206	0.26	ND	0.25	ND
PCB 209	0.34	ND	0.33	ND
Total PCB		**10.19**		**35.0**

ND = Not detected
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Total PCB = sum of congeners reported x 2
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 1B. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
Kill Van Kull Eastern End

	SITE WATER		ELUTRIATE	
CONSTITUENTS	**DETECTION LIMITS**	**CONCENTRATION**	**DETECTION LIMITS**	**CONCENTRATION**
Metals	**ppb**	**ppb**	**ppb**	**ppb**
Ag		0.020		0.066
Cd		0.052		0.028
Cr		0.967		3.363
Cu		2.31		3.030
Hg		0.009		0.031
Ni		1.41		4.37
Pb		1.34		3.50
Zn		4.70		8.03
Pesticides	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
Aldrin	0.32	ND	0.31	ND
a-Chlordane	0.34	ND		0.787
trans Nonachlor	0.58	ND		0.342
Dieldrin	0.59	ND		0.615
4,4'-DDT	0.27	ND	0.26	ND
2,4'-DDT	0.46	ND	0.44	ND
4,4'-DDD	0.54	ND		0.93
2,4'-DDD	0.68	ND		0.76
4,4'-DDE		0.3		3.52
2,4'-DDE	0.64	ND		0.500
Total DDT		**1.6**		**6.1**
Endosulfan I	0.52	ND	0.50	ND
Endosulfan II	0.41	ND	0.40	ND
Endosulfan sulfate	0.45	ND	0.43	ND
Heptachlor	0.49	ND	0.47	ND
Heptachlor epoxide	0.58	ND	0.55	ND
Industrial Chemicals	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
PCB 8	0.31	ND		1.895
PCB 18		0.36		3.49
PCB 28		0.29		4.0
PCB 44		0.60		3.75
PCB 49		0.17		4.43
PCB 52		0.48		5.61
PCB 66		0.67		4.02
PCB 87	0.35	ND		1.57
PCB 101	0.32	ND		4.32
PCB 105	0.30	ND		1.18
PCB 118	0.37	ND		3.16
PCB 128	0.47	ND		0.49
PCB 138	0.73	ND		3.96
PCB 153	0.32	ND		4.97
PCB 170	0.66	ND		0.80
PCB 180	0.52	ND		2.73
PCB 183	0.31	ND		0.50
PCB 184	0.42	ND	0.40	ND
PCB 187	0.26	ND		1.72
PCB 195	0.20	ND		0.39
PCB 206	0.26	ND		0.68
PCB 209	0.34	ND		0.88
Total PCB		**13.19**		**109.6**

ND = Not detected
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Total PCB = sum of congeners reported x 2
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. **TOXICITY TEST RESULTS**
Kill Van Kull Western End

Suspended Particulate Phase

Test Species	Test Duration	LC_{50}/EC_{50}	LPC (a)
Menidia beryllina	96 hours	**(b)** 46.8%	0.47
Americamysis bahia	96 hours	**(b)** >100%	1.00
Mytilus edulis **(larval survival)**	48 hours	**(b)** >100%	1.00
Mytilus edulis **(larval normal develop.)**	48 hours	**(c)** 22.4%	0.22

(a) Limiting Permissible Concentration (LPC) is the LC_{50} or EC_{50} multiplied by 0.01

(b) Median Lethal Concentration (LC_{50}) resulting in 50% mortatlity at test termination

(c) Median Effective Concentration (EC_{50}) based on normal development to the D-cell, prodissoconch 1 stage

Whole Sediment (10 days)

Test Species	% Survival Reference	% Survival Test	% Difference Reference - Test	Is difference statistically significant? (a=0.05)
Ampelisca abdita	99%	98%	1%	No
Americamysis bahia	98%	99%	-1%	No

TABLE 2B. **TOXICITY TEST RESULTS**
Kill Van Kull Eastern End

Suspended Particulate Phase

Test Species	Test Duration	LC_{50}/EC_{50}	LPC (a)
Menidia beryllina	96 hours	**(b)** 31.4%	0.31
Americamysis bahia	96 hours	**(b)** 77.6%	0.78
Mytilus edulis **(larval survival)**	48 hours	**(b)** >100%	1.00
Mytilus edulis **(larval normal develop.)**	48 hours	**(c)** 22.4%	0.22

(a) Limiting Permissible Concentration (LPC) is the LC_{50} or EC_{50} multiplied by 0.01

(b) Median Lethal Concentration (LC_{50}) resulting in 50% mortatlity at test termination

(c) Median Effective Concentration (EC_{50}) based on normal development to the D-cell, prodissoconch 1 stage

Whole Sediment (10 days)

Test Species	% Survival Reference	% Survival Test	% Difference Reference - Test	Is difference statistically significant? (a=0.05)
Ampelisca abdita	100%	96%	4%	No
Americamysis bahia	98%	100%	-2%	No

TABLE 3A. 28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations
Kill van Kull Western End

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	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		0.02		* 0.03		0.03		0.03
As		2.77		* 3.16		4.01		2.99
Cd		0.03		0.03		0.04		0.03
Cr		0.25		* 0.87		0.18		* 0.86
Cu		1.04		* 1.44		1.55		1.44
Hg		0.010		* 0.012		0.035		0.028
Ni		0.36		* 1.45		0.68		* 1.56
Pb		0.17		* 0.50		0.12		0.11
Zn		11.56		12.50		22.52		23.08
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	0.10	ND	0.08	ND	0.08	ND	0.08	ND
a-Chlordane		0.07		* 0.28		0.12		* 0.51
trans Nonachlor		0.03		* 0.10		0.23		* 0.39
Dieldrin		0.08		* 0.22		0.26		* 0.61
4,4'-DDT		0.09		0.08		0.08		0.08
2,4'-DDT	0.11	ND		0.05		0.08		* 0.11
4,4'-DDD		0.14		* 0.90		0.23		* 1.54
2,4'-DDD		0.05		* 0.44		0.14		* 0.74
4,4'-DDE		0.14		* 1.87		0.06		* 0.82
2,4'-DDE	0.04	ND		* 0.30	0.03	ND	0.03	ND
Total DDT		**0.49**		* **3.63**		**0.60**		* **3.30**
Endosulfan I	0.15	ND	0.12	ND	0.12	ND	0.13	ND
Endosulfan II	0.09	ND	0.07	ND	0.07	ND	0.07	ND
Endosulfan sulfate	0.20	ND	0.17	ND	0.17	ND	0.18	ND
Heptachlor	0.10	ND	0.08	ND	0.08	ND	0.08	ND
Heptachlor epoxide	0.10	ND	0.08	ND	0.08	ND	0.08	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		0.02		* 0.14	0.04	ND	0.04	ND
PCB 18		0.02		* 0.39		0.02		* 0.79
PCB 28		0.05		* 1.19		0.06		* 1.00
PCB 44		0.03		* 0.54		0.08		* 0.90
PCB 49		0.08		* 1.56		0.07		* 1.31
PCB 52		0.09		* 1.57		0.17		* 2.15
PCB 66		0.07		* 1.10		0.09		* 0.90
PCB 87		0.04		* 0.35	0.07	ND		* 0.21
PCB 101		0.13		* 1.32		0.39		* 1.69
PCB 105		0.03		* 0.30		0.15		* 0.42
PCB 118		0.09		* 0.95		0.22		* 0.90
PCB 128		0.02		* 0.19		0.17		* 0.34
PCB 138		0.13		* 0.81		0.94		* 1.66
PCB 153		0.18		* 1.16		1.89		* 2.86
PCB 170		0.05		* 0.13		0.30		* 0.47
PCB 180		0.06		* 0.38		0.77		* 1.21
PCB 183	0.05	ND		* 0.10		0.31		* 0.43
PCB 184	0.06	ND	0.05	ND	0.05	ND	0.05	ND
PCB 187		0.05		* 0.34		0.79		* 1.12
PCB 195	0.06	ND	0.05	ND		0.10		0.13
PCB 206	0.06	ND		* 0.05		0.33		* 0.45
PCB 209	0.08	ND		0.03		0.26		* 0.34
Total PCB		**2.57**		* **25.26**		**14.37**		* **38.61**
1,4-Dichlorobenzene		0.07		* 0.15		0.07		0.09

TABLE 3A. (Continued)

Kill van Kull Western End

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION
PAH's	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Naphthalene		0.62		* 1.09		1.35		* 2.03
Acenaphthylene		0.07		* 0.50		0.22		* 0.52
Acenaphthene		0.19		* 0.58		0.45		* 0.80
Fluorene		0.32		* 0.92		0.34		0.43
Phenanthrene		1.86		* 5.73		1.01		1.21
Anthracene		0.28		* 3.54		0.13		* 0.48
Fluoranthene		5.24		* 27.95		1.84		* 10.70
Pyrene		3.59		* 33.38		1.20		* 13.51
Benzo(a)anthracene		0.64		* 9.85		0.06		* 0.54
Chrysene		1.25		* 14.76		0.50		* 5.33
Benzo(b)fluoranthene		0.67		* 8.69		0.06		* 0.87
Benzo(k)fluoranthene		0.69		* 7.97		0.08		* 0.96
Benzo(a)pyrene		0.43		* 7.15		0.06		* 0.31
Indeno(1,2,3-cd)pyrene		0.18		* 2.23		0.07		* 0.19
Dibenzo(a,h)antracene		0.07		* 0.67	0.23	ND		0.10
Benzo(g,h,i)perylene		0.25		* 3.47		0.07		* 0.39
Total PAH's		**16.35**		* **128.47**		**7.55**		* **38.38**
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		0.08		0.24	0.01	ND		* 0.47
12378 PeCDD	0.22	ND	0.35	ND	0.02	ND		0.04
123478 HxCDD	0.19	ND	0.31	ND	0.02	ND	0.03	ND
123678 HxCDD		0.14	0.28	ND	0.02	ND		0.05
123789 HxCDD	0.19	ND	0.24	ND	0.02	ND	0.03	ND
1234678 HpCDD	0.23	ND		* 0.78		1.37		0.84
1234789 OCDD		2.18		* 8.58		9.29		8.41
2378 TCDF	0.11	ND	0.20	ND		1.24		1.54
12378 PeCDF	0.15	ND		* 0.50	0.02	ND	0.03	ND
23478 PeCDF		0.14		0.20	0.02	ND	0.04	* ND
123478 HxCDF	0.12	ND		* 1.88	0.01	ND		* 0.18
123678 HxCDF	0.12	ND		* 1.49	0.01	ND	0.02	* ND
234678 HxCDF		0.33		0.15	0.01	ND	0.02	* ND
123789 HxCDF		0.39	0.29	ND	0.01	ND	0.02	ND
1234678 HpCDF	0.14	ND		* 8.09		0.41		0.42
1234789 HpCDF		0.51		0.78	0.01	ND	0.02	ND
12346789 OCDF		1.44		1.61		0.36		0.39

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 3B. 28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations
Kill van Kull Eastern End

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	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		0.02		* 0.04		0.03		0.03
As		2.77		* 3.30		4.01		3.16
Cd		0.03		0.03		0.04		0.03
Cr		0.25		* 0.41		0.18		0.12
Cu		1.04		* 1.41		1.55		1.44
Hg		0.010		* 0.013		0.035		0.029
Ni		0.36		* 0.54		0.68		* 0.75
Pb		0.17		* 0.47		0.12		0.13
Zn		11.56		11.88		22.52		31.99
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	0.10	ND	0.08	ND	0.08	ND	0.08	ND
a-Chlordane		0.07		* 0.24		0.12		* 0.41
trans Nonachlor		0.03		* 0.11		0.23		* 0.36
Dieldrin		0.08		* 0.28		0.26		* 0.63
4,4'-DDT		0.09	0.17	ND		0.08		0.05
2,4'-DDT	0.11	ND		0.06		0.08		* 0.11
4,4'-DDD		0.14		* 0.57		0.23		* 0.89
2,4'-DDD		0.05		* 0.26		0.14		* 0.38
4,4'-DDE		0.14		* 1.26		0.06		* 0.41
2,4'-DDE	0.04	ND		0.06	0.03	ND	0.03	ND
Total DDT		**0.49**		* **2.28**		**0.60**		* **1.85**
Endosulfan I	0.15	ND	0.12	ND	0.12	ND	0.12	ND
Endosulfan II	0.09	ND	0.07	ND	0.07	ND	0.07	ND
Endosulfan sulfate	0.20	ND	0.17	ND	0.17	ND	0.17	ND
Heptachlor	0.10	ND	0.08	ND	0.08	ND	0.08	ND
Heptachlor epoxide	0.10	ND	0.08	ND	0.08	ND	0.08	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		0.02		* 0.27	0.04	ND	0.04	ND
PCB 18		0.02		* 0.90		0.02		* 1.39
PCB 28		0.05		* 2.09		0.06		* 1.21
PCB 44		0.03		* 0.78		0.08		* 0.96
PCB 49		0.08		* 2.39		0.07		* 1.47
PCB 52		0.09		* 2.53		0.17		* 2.57
PCB 66		0.07		* 1.65		0.09		* 0.93
PCB 87		0.04		* 0.52	0.07	ND		* 0.21
PCB 101		0.13		* 1.74		0.39		* 1.65
PCB 105		0.03		* 0.44		0.15		* 0.40
PCB 118		0.09		* 1.22		0.22		* 0.83
PCB 128		0.02		* 0.23		0.17		* 0.32
PCB 138		0.13		* 1.10		0.94		* 1.64
PCB 153		0.18		* 1.55		1.89		* 2.81
PCB 170		0.05		* 0.24		0.30		* 0.43
PCB 180		0.06		* 0.60		0.77		* 1.15
PCB 183	0.05	ND		* 0.16		0.31		* 0.42
PCB 184	0.06	ND	0.05	ND	0.05	ND	0.05	ND
PCB 187		0.05		* 0.46		0.79		* 1.07
PCB 195	0.06	ND		0.02		0.10		* 0.13
PCB 206	0.06	ND		* 0.05		0.33		* 0.40
PCB 209	0.08	ND		* 0.03		0.26		* 0.32
Total PCB		**2.57**		* **38.03**		**14.37**		* **40.76**
1,4-Dichlorobenzene		0.07		* 0.15		0.21		0.14

TABLE 3B. (Continued)

Kill van Kull Eastern End

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION
PAH's	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)	ppb (ug/kg)
Naphthalene		0.62		* 1.17		1.35		* 1.57
Acenaphthylene		0.07		* 0.51		0.22		* 0.46
Acenaphthene		0.19		* 0.67		0.45		* 0.80
Fluorene		0.32		* 0.77		0.34		* 0.44
Phenanthrene		1.86		* 4.70		1.01		1.29
Anthracene		0.28		* 1.93		0.13		* 0.37
Fluoranthene		5.24		* 20.72		1.84		* 6.70
Pyrene		3.59		* 28.86		1.20		* 9.39
Benzo(a)anthracene		0.64		* 8.67		0.06		* 0.47
Chrysene		1.25		* 11.90		0.50		* 3.43
Benzo(b)fluoranthene		0.67		* 6.32		0.06		* 0.47
Benzo(k)fluoranthene		0.69		* 6.31		0.08		* 0.65
Benzo(a)pyrene		0.43		* 5.62		0.06		* 0.37
Indeno(1,2,3-cd)pyrene		0.18		* 1.66		0.07		* 0.13
Dibenzo(a,h)antracene		0.07		* 0.48	0.23	ND		0.09
Benzo(g,h,i)perylene		0.25		* 2.45		0.07		* 0.30
Total PAH's		**16.35**		* **102.76**		**7.55**		* **26.93**
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		0.08	0.07	ND	0.01	ND		* 0.23
12378 PeCDD	0.22	ND	0.08	ND	0.02	ND	0.03	ND
123478 HxCDD	0.19	ND	0.08	ND	0.02	ND	0.03	ND
123678 HxCDD		0.14	0.08	ND	0.02	ND		0.03
123789 HxCDD	0.19	ND	0.08	ND	0.02	ND	0.03	ND
1234678 HpCDD	0.23	ND		0.33		1.37		0.18
1234789 OCDD		2.18		* 10.67		9.29		8.78
2378 TCDF	0.11	ND		0.13		1.24		1.42
12378 PeCDF	0.15	ND		0.33	0.02	ND		* 0.05
23478 PeCDF		0.14	0.08	ND	0.02	ND		0.05
123478 HxCDF	0.12	ND		1.60	0.01	ND		* 0.04
123678 HxCDF	0.12	ND		1.40	0.01	ND	0.01	ND
234678 HxCDF		0.33		0.18	0.01	ND	0.01	ND
123789 HxCDF		0.39	0.07	ND	0.01	ND	0.01	ND
1234678 HpCDF	0.14	ND		3.88		0.41		0.41
1234789 HpCDF		0.51		0.56	0.01	ND	0.02	ND
12346789 OCDF		1.44	0.27	ND		0.36		0.18

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.