US Army Corps of Engineers®

New York District
26 Federal Plaza
New York, N.Y. 10278
ATTN: CENAN-OP-ST

Public Notice

In replying refer to:
Public Notice No. Perth Amboy Anchorage 2020
Published: 4 February 2020
Expires: 5 March 2020

PERTH AMBOY ANCHORAGE
NEW YORK AND NEW JERSEY CHANNELS
FEDERAL NAVIGATION PROJECT
MAINTENANCE DREDGING

TO WHOM IT MAY CONCERN:

The New York District, U.S. Army Corps of Engineers, pursuant to Section 10 of the Rivers and Harbors Act of 1899, 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 (U.S.C. 1413, 86 Statute 1052) or Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 (commonly referred to as the Ocean Dumping Act), proposes to perform maintenance dredging of Perth Amboy Anchorage, New York and New Jersey Channels, Federal Navigation Project (see Figure No. 1) with subsequent placement of the dredged material for environmental remediation purposes at the Historic Area Remediation Site (HARS, see Figure No. 2A and 2B).

ACTIVITY: Maintenance dredging of Perth Amboy Anchorage, New York and New Jersey Channels, Federal Navigation Project, with placement of the dredged material at the HARS for the purpose of remediation.

WATERWAY: Perth Amboy Anchorage, New York and New Jersey Channels, Federal Navigation Project.

LOCATION: Perth Amboy, Middlesex County, New Jersey

The Perth Amboy Anchorage of the New York and New Jersey Channels, Federal Navigation Project was authorized by the Rivers and Harbors Act of 1933 and subsequently modified by the Rivers and Harbors Act of 1935, 1950, 1965, and 1985.

The proposed activity is to dredge the critical shoal area located in the Perth Amboy Anchorage of the New York and New Jersey Channels.

A detailed description of the proposed activities is enclosed to assist in your review. This activity is being evaluated to determine that the proposed placement of dredged material 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 Corps of Engineers 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 PCB's 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 of Engineers 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. Comments are used in the preparation of an Environmental Assessment (EA) pursuant to the National Environmental Policy Act and to determine the need for a public hearing.

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

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

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 and State FCD program to the maximum extent practicable. This activity is subject to review by the New York State Department of State for its consistency with the enforceable policies of the New York State 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 New York State Coastal Management Program. A copy of this determination has been provided to the New York State

Department of State, Office of Coastal, Local Government and Community Sustainability. Additional information regarding the Corps of Engineers' consistency determination may be obtained by contacting the New York State Department of State, Office of Coastal, Local Government and Community Sustainability, One Commerce Plaza, 99 Washington Avenue, Suite 1010, Albany, NY 12231. The New Jersey Department of Environmental Protection, Office of Dredging and Sediment Technology was also provided the USACE consistency determination. Further information regarding that determination can be obtained at: New Jersey Department of Environmental Protection, Office of Dredging and Sediment Technology, P.O. Box 028, Trenton NJ 08625.

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

The proposed HARS placements will not result in Remediation Material being placed within 0.27 nautical miles of any identified wrecks, as 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 project area. No known archaeological, scientific, prehistorical or historical data are expected to be lost by work accomplished under the required dredging.

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 or waiver from the appropriate state agency 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 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, First District
- New York State Department of Environmental Conservation
- New York State Department of State
- New Jersey Department of Environmental Protection

If you have any questions concerning this notice, you may contact Mr. Alexander Gregory at (917) 790-8427. Questions about the HARS can be addressed to Mr. Mark Reiss, Chief, Dredging, Sediment and Oceans Section, U.S. Environmental Protection Agency, Region 2, at (212) 637-3799.

DESCRIPTION OF PLANNED ACTION:

The New York District U.S. Army Corps of Engineers proposes to perform maintenance dredging of Perth Amboy Anchorage, New York and New Jersey Channels. The Perth Amboy Anchorage was last dredged in 2014, by mechanical clamshell dredge, with the removal of approximately 735,440 cubic yards (CY) of sediment. The dredged material was used as remediation material at the Historic Area Remediation Site. The proposed maintenance dredging would involve the removal of approximately 600,000 CY of material. Maintenance dredging of the channel is usually accomplished by a clamshell dredge or similar plant. The entire reach will generally not require maintenance dredging; only areas where shoaling has reduced the depth of the channel will require dredging.

The purpose of the proposed dredging is to maintain the authorized project dimensions, thereby assuring safe and economical use of the Perth Amboy Anchorage by shipping interests. The material has been tested and meets the criteria for remediation material at the HARS. The dredged material would be used as such by placing it over degraded sediments within the HARS. The proposed dredged material would be transported by bottom dumping vessels to the placement site.

This public notice serves to announce the government's intent and identifies the proposed location for placement of approximately 600,000 CY of material. The dredging and placement at the HARS for this project is anticipated to occur in the fall to winter of 2020.

ENVIRONMENTAL IMPACT STATEMENT:

The material to be placed at the HARS is dredged material that will be removed from Perth Amboy Anchorage, New York and New Jersey Channels Federal Navigation Project. The material has been evaluated and found to meet the regulatory testing criteria of 40 CFR Sections 227.6 and 227.27 and the requirements of the rule establishing the HARS in Section 228.15(d)(6). It has been determined that maintenance dredging of the Perth Amboy Anchorage, 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.

An update of the EA and a 404 (b) evaluation as required by the Clean Water Act 40 CFR 230 will be prepared prior to the implementation of the proposed work.

PLACEMENT 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. Based upon review of the latest published version of the National Register of Historic Places, two wrecks, believed to be the HLW Lew and the ORMOND, were found in 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.

INTRODUCTION TO THE HARS:

In 1972, the Congress of the United States 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 (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 in 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 redesigned as the HARS in 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 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 sediments within the Study Area as 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 condition in the Study Area and the surveys performed may be found in the Supplemental Environmental Impact Statement (SEIS) [USEPA, 1997].

The HARS designation identifies an area: (see Figure No. 2A and 2B) 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. This dredged material is referred to as "Material for Remediation" or "Remediation Material."

As of the end of December 2019, dredged materials from one hundred twenty-nine (129) different completed and ongoing Department of the Army (DA) permitted 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 Historic Area Remediation Site (HARS) since the closure of the Mud Dump Site and designation of the HARS in September 1997. This represents approximately 76.52 million cubic yards of 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 York. 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 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 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. Mark Reiss, Chief, Dredging, Sediment and Oceans Section, U.S. Environmental Protection Agency, Region 2, at (212) 637-3799.

HARS SUITABILITY TESTING:

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. USEPA and USACE utilize this testing evaluation process for identifying Category 1 dredged material in determining suitability of dredged sediments as remediation material at the HARS. The Testing Evaluation Memorandum for this project may be obtained by contacting Mr. Mark Reiss, Chief, Dredging, Sediments and Oceans Section, U.S. Environmental Protection Agency, Region 2, at (212) 637-3799.

Sediment Grain Size Analysis

The proposed maintenance dredging area has been characterized by ten (10) sediment core samples taken to 37 feet plus two feet of allowable overdepth for the North Reach dredging area and by seven (7) sediment core samples taken to 25 feet plus two feet of allowable overdepth for the East Reach dredging area. The samples were then combined into one composite sample for each reach, which was subjected to chemical and biological testing. Based on an analysis of the sediment samples from Perth Amboy Anchorage, the grain size characteristics of the proposed dredged material are:

North Reach:	0.1% GRAVEL,	15.4% SAND,	48.3% SILT	36.2% CLAY
East Reach:	0.1% GRAVEL,	24.4% SAND,	46.6% SILT	28.9% CLAY

Results of the chemical and biological testing 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 analysis was conducted on project area site water and elutriate. Results of this evaluation are summarized in Table 1. Please note in reading Table 1 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 USACE Waterways Experiment Station (WES) and described in the joint USEPA/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.

Evaluation of the Liquid Phase

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 (the Mediterranean mussel, *Mytilus galloprovincialis*), 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)(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 / U.S. 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 galloprovincialis)*. 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 galloprovincialis*. 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 Perth Amboy Anchorage composite was calculated as 0.22 for the North reach and 0.22 for the East reach based on the EC_{50} of *Mytilus galloprovincialis.*

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 Perth Amboy Anchorage 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 of this public notice.

Evaluation of the Solid Phase

The solid phase is the whole test sediment before it has undergone processing that might alter its chemical or toxicological properties. The solid phase was evaluated for compliance with 40 CFR Sections 227.6(c)(3) and 227.27(b). This evaluation was made using the results of two specific types of evaluations on the solid phase of the material- one focusing on the acute (10-day) toxicity of the material, and the other focusing on the potential for the material to cause significant adverse effects due to bioaccumulation. Both types of tests used appropriate sensitive benthic marine organisms according to procedures approved by the USEPA and the USACE. 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 the USEPA Region 2/USACE New York District guidance.

1. <u>Toxicity:</u>

Ten-day toxicity tests were conducted on the proposed dredged material using a filter feeding mysid shrimp (*Americamysis bahia)* and a deposit feeding, burrowing amphipod (*Ampelisca abdita),* which are appropriate sensitive benthic marine organisms. The results from the proposed project material are then compared to results for the same organisms that are exposed to reference sediments. The reference sediment represents existing background conditions in the vicinity of the HARS, removed from the influence of any placement operations. These organisms are good predictors of adverse effects to benthic marine communities (see USEPA, 1996). The toxicity of project sediments was not statistically greater than the reference sediments for either mysids or for amphipods, and the difference between percent survivals in test and reference sediments was less than 10% for mysid shrimp and less than 20% for amphipods.

These results show that the solid phase of the material would not cause significant mortality and meets the solid phase toxicity criteria of Sections 227.6, and 227.27. The results of the 10-day toxicity test are summarized in Table 2.

2. <u>Bioaccumulation</u>:

Bioaccumulation tests for sediments 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).

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 Memo for this project. Table 3 indicates that some contaminants bioaccumulated above reference in the clam and/or worm. 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. 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 referenced were all below the acceptable human health risk range and acceptable aquatic effects range, again using conservative approaches and analyses. A discussion of this determination is available in the Testing Evaluation Memo for this project. The determination is that the combined results of the toxicity and bioaccumulation tests indicate that the material meets the criteria of 40 CFR Parts 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.

CONCLUSIONS:

Based upon the results of testing of the sediments proposed for dredging from Perth Amboy Anchorage, New York and New Jersey Channels, North reach and East reach, the USACE and USEPA have determined that the material is Category 1, meeting the criteria for ocean placement as described in 40 CFR parts 227.6, 227.27, and 228.15, and is Remediation Material as defined under the USEPA Region 2/USACE, New York District, guidance. The specific test results and technical analysis of the data underlying this conclusion are described in the joint USACE, New York District/USEPA, Region 2 memorandum mentioned previously.

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.

ALTERNATIVES TO HARS PLACEMENT:

Regarding ocean placement of dredged material, the Ocean Dumping Regulations [Title 40 CFR Sections 227.16(b)] states 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 Corps has investigated the use of alternative placement sites for the dredged material that include beach placement, upland placement, and open water placement. Beneficial uses such as beach nourishment were found not to be practicable, as the dredged material is silty, fine-grained material that is not suitable for beach nourishment. Processing the dredged material for use in brownfields restoration projects has been considered, but the costs for handling and amending the material would be excessive. The Corps has also investigated the use of upland placement of the dredged material. However, upland disposal locations in the metropolitan area are extremely limited. In addition, upland storage space is limited and there is virtually no commercial use for this type of material, thereby making upland placement not a practicable alternative. Therefore, alternative sites for the placement of the dredged material are either not available, or not available at reasonable incremental costs, thus leaving HARS placement as the Corps preferred alternative.

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.

Randall G. Hintz
Chief, Operations Support Branch

Enclosures
as stated

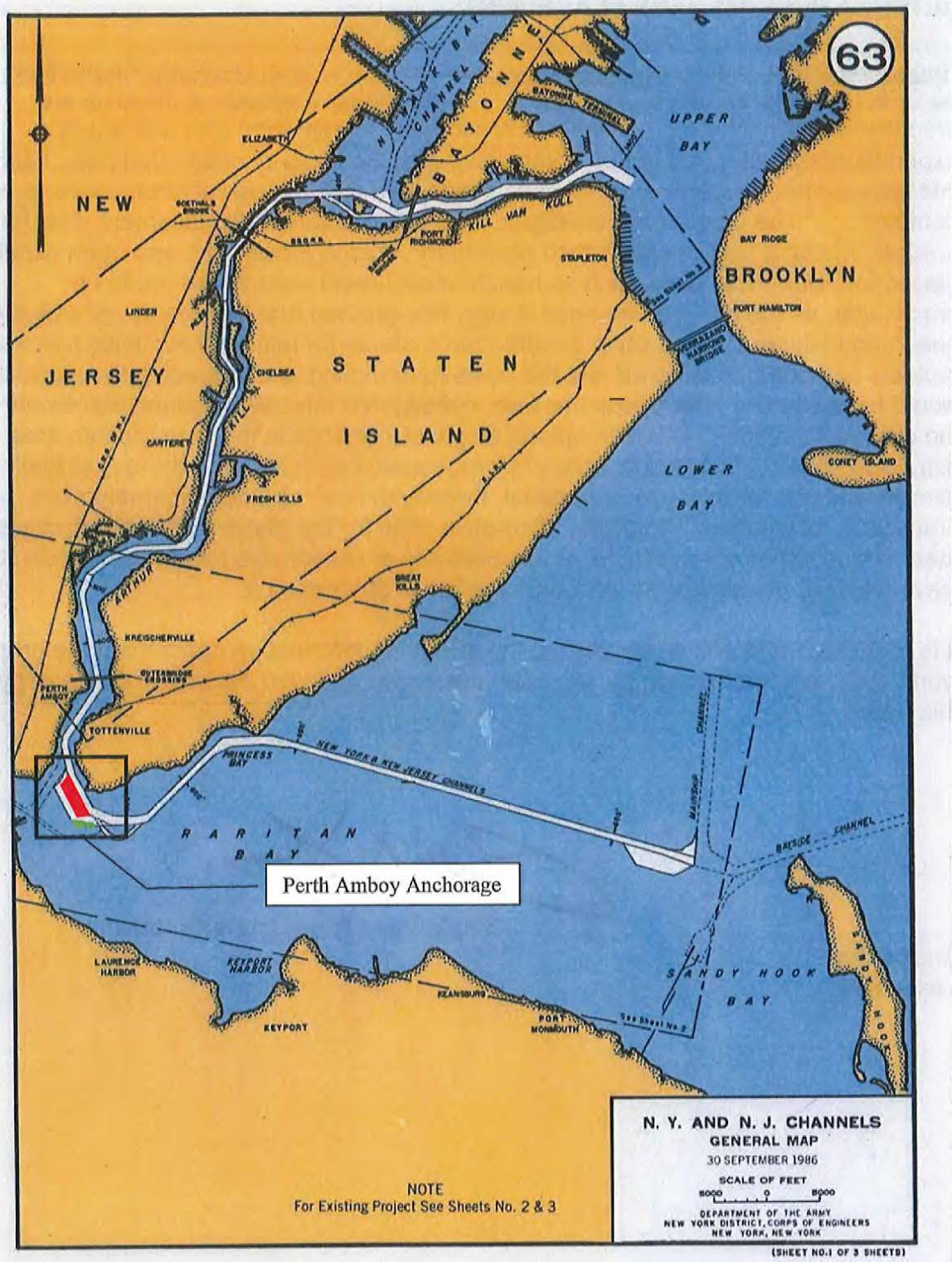

Figure 1: Project Map

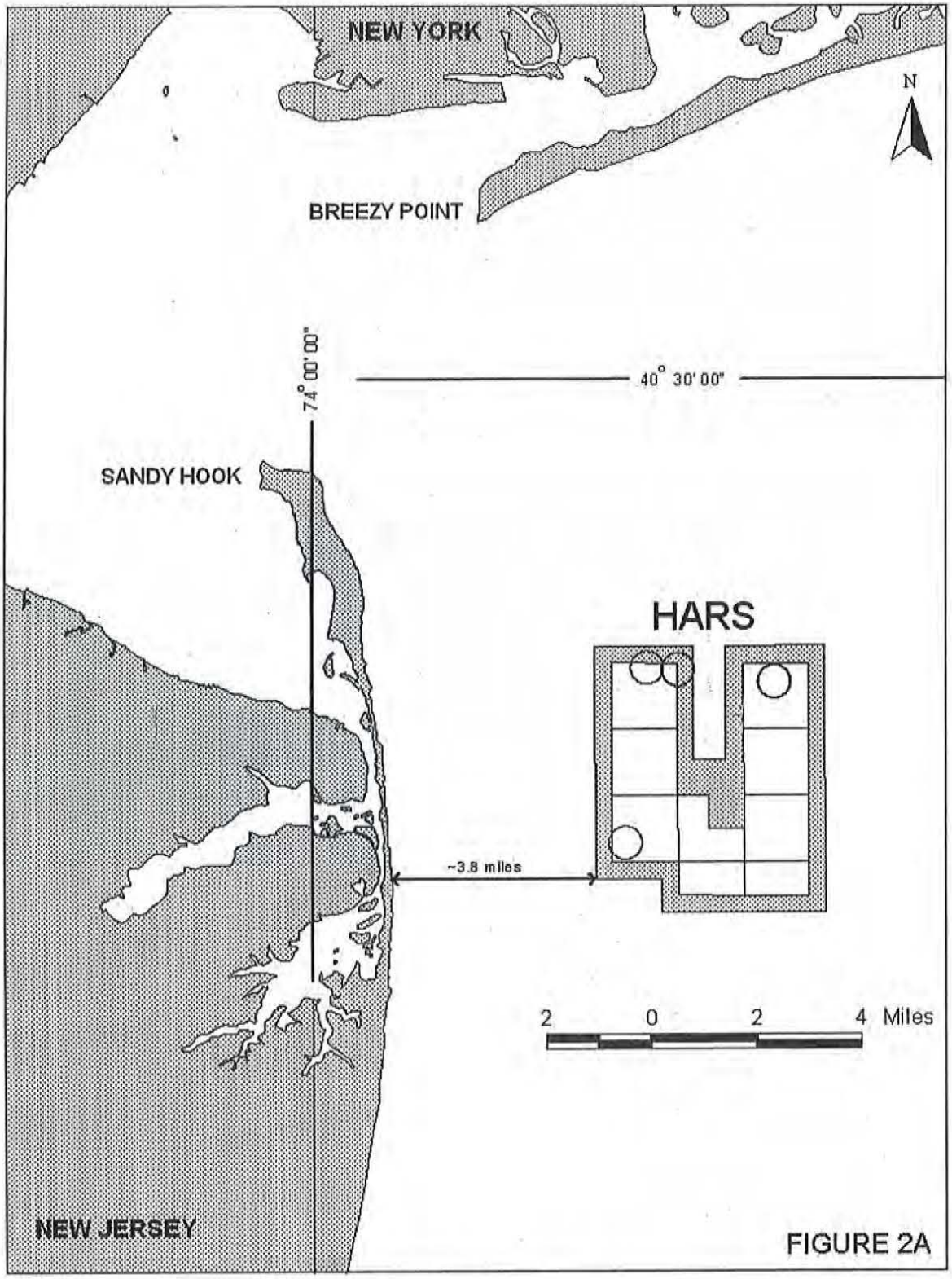

Figure 2A: HARS Location Map 1

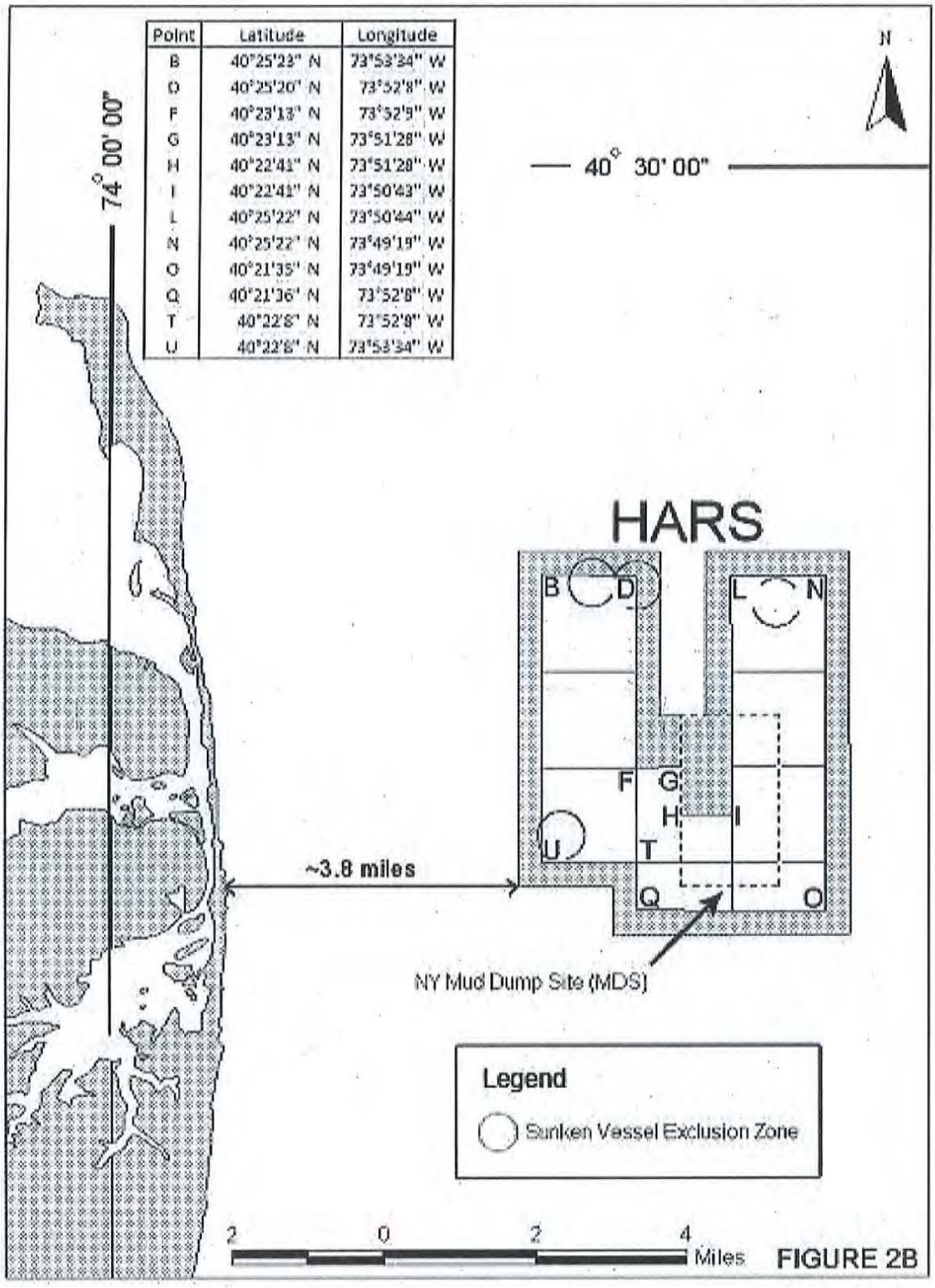

Figure 2B: HARS Location Map 2

TABLE 1. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
Perth Amboy Anchorage NORTH REACH

	SITE WATER		ELUTRIATE	
CONSTITUENTS	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	**ppb (ug/L)**	**ppb (ug/L)**	**ppb (ug/L)**	**ppb (ug/L)**
Ag		0.013		0.035
Cd		0.332		0.037
Cr		0.490		1.24
Cu		1.95		1.88
Hg	0.020	ND		0.230
Ni		2.10		4.20
Pb		0.749		2.58
Zn		6.37		2.77
Pesticides	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
Aldrin	0.531	ND	0.531	ND
a-Chlordane	0.442	ND	0.442	ND
trans Nonachlor	0.436	ND	0.436	ND
Dieldrin	0.544	ND	0.544	ND
4,4'-DDT	0.633	ND	0.633	ND
2,4'-DDT	0.795	ND	0.795	ND
4,4'-DDD	0.531	ND		1.31
2,4'-DDD	0.582	ND	0.582	ND
4,4'-DDE		0.532		1.61
2,4'-DDE	0.557	ND	0.557	ND
Total DDT		**0.532**		**2.92**
Endosulfan I	0.531	ND	0.531	ND
Endosulfan II	0.525	ND	0.525	ND
Endosulfan sulfate	0.439	ND	0.439	ND
Heptachlor	0.534	ND	0.534	ND
Heptachlor epoxide	0.442	ND	0.442	ND
Industrial Chemicals	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
PCB 8	0.572	ND	0.572	ND
PCB 18	0.366	ND	0.366	ND
PCB 28	0.423	ND	0.423	ND
PCB 44	0.534	ND	0.534	ND
PCB 49	0.391	ND	0.391	ND
PCB 52	0.499	ND	0.499	ND
PCB 66	0.601	ND	0.601	ND
PCB 87	0.461	ND	0.461	ND
PCB 101	0.388	ND	0.388	ND
PCB 105	0.598	ND		0.492
PCB 118	0.576	ND	0.576	ND
PCB 128	0.417	ND	0.417	ND
PCB 138	0.493	ND		1.83
PCB 153	0.493	ND		1.72
PCB 170	0.452	ND		0.376
PCB 180	0.458	ND		0.374
PCB 183	0.410	ND		0.198
PCB 184	0.576	ND	0.576	ND
PCB 187	0.423	ND		0.431
PCB 195	0.429	ND		0.161
PCB 206	0.464	ND		0.210
PCB 209	0.445	ND		0.293
Total PCB		**ND**		**12.2**

ND = Not detected
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Total PCB = sum of congeners reported x 2

TABLE 1. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
Perth Amboy Anchorage EAST REACH

	SITE WATER		ELUTRIATE	
CONSTITUENTS	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	**ppb (ug/L)**	**ppb (ug/L)**	**ppb (ug/L)**	**ppb (ug/L)**
Ag		0.010		0.076
Cd		0.047		0.025
Cr		0.240		2.45
Cu		1.39		4.21
Hg		0.030		0.390
Ni		1.20		2.50
Pb		0.560		4.45
Zn		3.98		5.77
Pesticides	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
Aldrin	0.531	ND	0.531	ND
a-Chlordane	0.442	ND	0.442	ND
trans Nonachlor	0.436	ND	0.436	ND
Dieldrin	0.544	ND	0.544	ND
4,4'-DDT	0.633	ND	0.633	ND
2,4'-DDT	0.795	ND	0.795	ND
4,4'-DDD	0.531	ND	0.531	ND
2,4'-DDD	0.582	ND	0.582	ND
4,4'-DDE	0.445	ND		1.85
2,4'-DDE	0.557	ND	0.557	ND
Total DDT		**ND**		**1.85**
Endosulfan I	0.531	ND	0.531	ND
Endosulfan II	0.525	ND	0.525	ND
Endosulfan sulfate	0.439	ND	0.439	ND
Heptachlor	0.534	ND	0.534	ND
Heptachlor epoxide	0.442	ND	0.442	ND
Industrial Chemicals	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**	**pptr (ng/L)**
PCB 8	0.572	ND	0.572	ND
PCB 18	0.366	ND	0.366	ND
PCB 28	0.423	ND	0.423	ND
PCB 44	0.534	ND	0.534	ND
PCB 49	0.391	ND	0.391	ND
PCB 52	0.499	ND	0.499	ND
PCB 66	0.601	ND	0.601	ND
PCB 87	0.461	ND	0.461	ND
PCB 101	0.388	ND	0.388	ND
PCB 105	0.598	ND		0.599
PCB 118	0.576	ND	0.576	ND
PCB 128	0.417	ND	0.417	ND
PCB 138	0.493	ND		1.58
PCB 153	0.493	ND		1.67
PCB 170	0.452	ND		0.809
PCB 180	0.458	ND		0.507
PCB 183	0.410	ND	0.410	ND
PCB 184	0.576	ND	0.576	ND
PCB 187	0.423	ND		0.612
PCB 195		0.070		0.247
PCB 206	0.464	ND		0.174
PCB 209	0.445	ND		0.334
Total PCB		**ND**		**13.1**

ND = Not detected
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Total PCB = sum of congeners reported x 2

TABLE 2 **TOXICITY TEST RESULTS**
Perth Amboy Anchorage North Reach

Suspended Particulate Phase

Test Species	Test Duration	LC_{50}/EC_{50}	LPC (a)
Menidia beryllina	96 hours	(b) 44.9%	0.449
Americamysis bahia	96 hours	(b) 70.7%	0.707
Mytilus galloprovincialis (larval survival)	48 hours	(b) 63.8%	0.638
Mytilus galloprovincialis (larval normal develop.)	48 hours	(c) 22.4%	0.224

(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% mortality 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%	94%	5%	No
Americamysis bahia	99%	97%	2%	No

TABLE 2 **TOXICITY TEST RESULTS**
Perth Amboy Anchorage East Reach

Suspended Particulate Phase

Test Species	Test Duration	LC_{50}/EC_{50}	LPC (a)
Menidia beryllina	96 hours	(b) 54.1%	0.541
Americamysis bahia	96 hours	(b) 81.9%	0.819
Mytilus galloprovincialis (larval survival)	48 hours	(b) 44.4%	0.444
Mytilus galloprovincialis (larval normal develop.)	48 hours	(c) 22.4%	0.224

(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% mortality 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%	97%	2%	No
Americamysis bahia	99%	100%	-1%	No

TABLE 3. 28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations
Perth Amboy Anchorage NORTH REACH

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION
Metals	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Ag		0.053		0.055		0.036		0.022
As		3.33		4.35		2.44		2.15
Cd		0.041		0.048		0.054		0.059
Cr		0.731		0.396		0.160		0.184
Cu		1.68		* 2.57		1.13		1.03
Hg		0.009		* 0.014		0.012		0.010
Ni		0.594		0.395		0.149		0.191
Pb		0.210		* 0.541		0.189		* 0.235
Zn		15.4		18.5		14.5		15.0
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	0.027	ND	0.027	ND		0.020	0.026	ND
a-Chlordane		0.051		* 0.310		0.040		* 0.244
trans Nonachlor		0.019		* 0.187		0.196		* 0.307
Dieldrin		0.079		* 0.407		0.089		* 0.329
4,4'-DDT	0.024	ND		* 0.275	0.024	ND		* 0.034
2,4'-DDT	0.032	ND	0.032	ND		0.043	0.032	ND
4,4'-DDD		0.217		* 2.85		0.101		* 1.67
2,4'-DDD		0.072		* 1.12		0.087		* 0.813
4,4'-DDE		0.462		* 4.91		0.029		* 1.06
2,4'-DDE		0.031		* 0.867	0.018	ND		* 0.088
Total DDT		**0.810**		* **10.0**		**0.281**		* **3.69**
Endosulfan I	0.029	ND	0.030	ND	0.030	ND	0.029	ND
Endosulfan II		0.032	0.032	ND		0.054	0.032	ND
Endosulfan sulfate		0.085		* 0.460		0.061		* 0.287
Heptachlor	0.021	ND	0.021	ND	0.021	ND	0.020	ND
Heptachlor epoxide	0.032	ND	0.033	ND		0.021	0.032	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		0.050		* 0.246	0.059	ND	0.058	ND
PCB 18		0.029		* 0.736	0.027	ND		* 0.722
PCB 28		0.175		* 2.14		0.081		* 1.07
PCB 44		0.206		* 1.04		0.044		* 0.750
PCB 49		0.222		* 2.41		0.097		* 1.33
PCB 52		0.348		* 2.67		0.201		* 1.99
PCB 66		0.322		* 2.09		0.086		* 1.13
PCB 87		0.093		* 0.590		0.028		0.247
PCB 101		0.353		* 2.35		0.279		* 1.56
PCB 105		0.089		* 0.704		0.092		* 0.362
PCB 118		0.300		* 1.70		0.168		* 0.966
PCB 128		0.081		* 0.262		0.104		* 0.292
PCB 138		0.382		* 1.68		0.694		* 1.69
PCB 153		0.501		* 2.53		1.06		* 2.39
PCB 170		0.125		* 0.489		0.165		* 0.388
PCB 180		0.149		* 0.603		0.336		* 0.768
PCB 183		0.078		* 0.259		0.184		* 0.373
PCB 184	0.047	ND	0.047	ND	0.048	ND	0.047	ND
PCB 187		0.221		* 0.686		0.419		* 0.920
PCB 195		0.037		* 0.173		0.089		* 0.218
PCB 206		0.039		* 0.125		0.149		* 0.293
PCB 209		0.041		* 0.114		0.169		* 0.307
Total PCB		**7.73**		* **47.2**		**9.02**		* **35.6**
1,4-Dichlorobenzene		0.190		0.202		0.075		0.128

TABLE 3. (Continued)

Perth Amboy Anchorage NORTH REACH

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
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		0.374		* 0.706		0.369		0.389
Acenaphthylene		0.140		* 0.623		0.052		* 0.133
Acenaphthene		0.131		* 0.578		0.076		* 0.276
Fluorene		0.212		* 0.955		0.060		* 0.139
Phenanthrene		1.70		* 5.10		0.304		* 0.523
Anthracene		0.353		* 2.21		0.024		* 0.114
Fluoranthene		4.14		* 27.6		0.351		* 6.08
Pyrene		5.22		* 33.3		0.288		* 7.84
Benzo(a)anthracene		1.15		* 8.51		0.098		0.196
Chrysene		2.05		* 5.93		0.132		* 2.78
Benzo(b)fluoranthene		1.39		* 12.7	0.115	ND		* 0.345
Benzo(k)fluoranthene		1.83		* 5.63	0.095	ND		* 0.569
Benzo(a)pyrene		1.49		* 7.82	0.228	ND		* 0.256
Indeno(1,2,3-cd)pyrene		0.436		* 2.99	0.103	ND		* 0.090
Dibenzo(a,h)anthracene		0.107		* 0.785	0.092	ND	0.09	ND
Benzo(g,h,i)perylene		0.566		* 4.85		0.049		* 0.174
Total PAH's		**21.3**		* **120**		**2.12**		* **19.9**
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	0.013	ND		0.095		0.390		0.119
12378 PeCDD	0.021	ND	0.021	ND	0.108	ND	0.037	ND
123478 HxCDD	0.019	ND		0.052	0.119	ND		0.049
123678 HxCDD	0.019	ND		0.152		0.546		0.165
123789 HxCDD	0.018	ND		* 0.109		0.681		0.074
1234678 HpCDD		0.199		* 1.43		5.19		2.42
1234789 OCDD		2.60		* 23.1		41.6		17.7
2378 TCDF		0.110		* 0.634		3.58		2.10
12378 PeCDF	0.013	ND		0.158	0.070	ND		0.436
23478 PeCDF		0.016		* 0.250		0.650		0.473
123478 HxCDF	0.017	ND		* 0.367		0.582		0.129
123678 HxCDF	0.017	ND		0.096		0.630		0.207
234678 HxCDF	0.018	ND		0.068		0.624		0.073
123789 HxCDF	0.020	ND		0.190		0.628		0.062
1234678 HpCDF		0.238		* 0.696		3.02		1.19
1234789 HpCDF		0.115		0.161		0.945		0.136
12346789 OCDF		0.355		* 1.24		4.29		1.17

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

TABLE 3. 28 DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations
Perth Amboy Anchorage EAST REACH

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION	DETECTION LIMITS	CONCEN TRATION
Metals	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
Ag		0.053		0.061		0.036		0.024
As		3.33		4.10		2.44		2.06
Cd		0.041		0.045		0.054		0.055
Cr		0.731		1.10		0.160		0.278
Cu		1.68		* 2.51		1.13		1.04
Hg		0.009		0.010		0.012		0.009
Ni		0.594		0.85		0.149		0.225
Pb		0.210		* 0.605		0.189		* 0.238
Zn		15.4		18.1		14.5		21.7
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	0.027	ND	0.027	ND		0.020	0.027	ND
a-Chlordane		0.051		* 0.259		0.040		* 0.293
trans Nonachlor		0.019		* 0.102		0.196		* 0.336
Dieldrin		0.079		* 0.390		0.089		* 0.407
4,4'-DDT	0.024	ND	0.024	ND	0.024	ND		* 0.036
2,4'-DDT	0.032	ND	0.032	ND		0.043		0.453
4,4'-DDD		0.217		* 1.80		0.101		* 1.464
2,4'-DDD		0.072		* 0.793		0.087		* 0.737
4,4'-DDE		0.462		* 4.43		0.029		* 1.262
2,4'-DDE		0.031		* 0.682	0.018	ND		* 0.088
Total DDT		**0.810**		* **7.73**		**0.281**		* **4.04**
Endosulfan I	0.029	ND	0.029	ND	0.030	ND	0.029	ND
Endosulfan II		0.032		0.094		0.054	0.032	ND
Endosulfan sulfate		0.085		* 0.468		0.061		* 0.305
Heptachlor	0.021	ND	0.021	ND	0.021	ND	0.021	ND
Heptachlor epoxide	0.032	ND	0.032	ND		0.021	0.032	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		0.050		* 0.411	0.059	ND	0.059	ND
PCB 18		0.029		* 0.995	0.027	ND		* 1.09
PCB 28		0.175		* 2.28		0.081		* 1.41
PCB 44		0.206		* 1.14		0.044		* 0.987
PCB 49		0.222		* 2.58		0.097		* 1.59
PCB 52		0.348		* 2.98		0.201		* 2.46
PCB 66		0.322		* 2.32		0.086		* 1.304
PCB 87		0.093		* 0.652		0.028		0.286
PCB 101		0.353		* 2.33		0.279		* 1.82
PCB 105		0.089		* 0.570		0.092		* 0.376
PCB 118		0.300		* 1.76		0.168		* 1.15
PCB 128		0.081		* 0.254		0.104		* 0.318
PCB 138		0.382		* 1.68		0.694		* 1.77
PCB 153		0.501		* 2.41		1.06		* 2.45
PCB 170		0.125		* 0.480		0.165		* 0.380
PCB 180		0.149		* 0.590		0.336		* 0.77
PCB 183		0.078		* 0.256		0.184		* 0.375
PCB 184	0.047	ND	0.047	ND	0.048	ND	0.047	ND
PCB 187		0.221		* 0.680		0.419		* 0.949
PCB 195		0.037		* 0.190		0.089		* 0.230
PCB 206		0.039		* 0.111		0.149		* 0.251
PCB 209		0.041		* 0.100		0.169		* 0.272
Total PCB		**7.73**		* **49.6**		**9.02**		* **40.6**
1,4-Dichlorobenzene		0.190		* 0.235		0.075		0.244

TABLE 3. (Continued)

Perth Amboy Anchorage EAST REACH

CONSTITUENTS	*Macoma nasuta*				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
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		0.374		* 0.674		0.369		0.396
Acenaphthylene		0.140		* 0.540		0.052		* 0.122
Acenaphthene		0.131		* 0.567		0.076		* 0.203
Fluorene		0.212		* 0.902		0.060		* 0.114
Phenanthrene		1.70		* 5.22		0.304		* 0.484
Anthracene		0.353		* 2.09		0.024		* 0.107
Fluoranthene		4.14		* 28.2		0.351		* 5.52
Pyrene		5.22		* 36.5		0.288		* 8.68
Benzo(a)anthracene		1.15		* 7.63		0.098		0.135
Chrysene		2.05		* 4.78		0.132		* 2.83
Benzo(b)fluoranthene		1.39		* 12.4	0.115	ND		* 0.379
Benzo(k)fluoranthene		1.83		* 5.35	0.095	ND		* 0.595
Benzo(a)pyrene		1.49		* 7.38	0.228	ND		* 0.250
Indeno(1,2,3-cd)pyrene		0.436		* 2.91	0.103	ND		* 0.100
Dibenzo(a,h)antracene		0.107		* 0.641	0.092	ND	0.09	ND
Benzo(g,h,i)perylene		0.566		* 4.71		0.049		* 0.218
Total PAH's		**21.3**		* **120**		**2.12**		* **20.2**
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	0.013	ND		* 0.916		0.390		0.259
12378 PeCDD	0.021	ND		* 0.22	0.108	ND		0.106
123478 HxCDD	0.019	ND	0.125	* ND	0.119	ND		0.030
123678 HxCDD	0.019	ND		* 0.403		0.546		0.207
123789 HxCDD	0.018	ND		* 1.05		0.681		0.040
1234678 HpCDD		0.199		* 7.09		5.19		1.07
1234789 OCDD		2.60		* 129		41.6		8.49
2378 TCDF		0.110		* 3.47		3.58		1.05
12378 PeCDF	0.013	ND		0.634	0.070	ND		0.237
23478 PeCDF		0.016		* 0.291		0.650		0.316
123478 HxCDF	0.017	ND		* 1.48		0.582		0.073
123678 HxCDF	0.017	ND		* 0.786		0.630		0.060
234678 HxCDF	0.018	ND		0.569		0.624		0.053
123789 HxCDF	0.020	ND		0.656		0.628		0.062
1234678 HpCDF		0.238		* 4.05		3.02		0.345
1234789 HpCDF		0.115		* 0.378		0.945		0.088
12346789 OCDF		0.355		* 6.70		4.29		0.516

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.