PUBLIC NOTICE

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

In replying refer to:
Public Notice Number: FP63-AKCA2-2004
Issue Date: 13 August 2004
Expiration Date: 13 September 2004

ARTHUR KILL CHANNEL, HOWLAND HOOK MARINE TERMINAL
NEW YORK AND NEW JERSEY
FEDERAL NAVIGATION PROJECT
CONTRACT AREA 2

TO WHOM IT MAY CONCERN:

Pursuant to Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 (commonly referred to as the Ocean Dumping Act, 33 U.S.C. 1413), this Public Notice serves as the U.S. Army Corps of Engineers (New York District) notification and request for comments relating to the potential placement of Historic Area Remediation Site (HARS) suitable material obtained under the second construction contract of the Arthur Kill Channel, Howland Hook Marine Terminal Navigation Project, New York and New Jersey, as authorized by Section 202(b) of the Water Resources Development Act of 1986, Public Law 99-662, as amended by Section 301(b)(11) of the Water Resources Development Act of 1996, Public Law 104-303 and Section 338 of the Water Resources Development Act of 1999, Public Law 106-53. This proposed placement will allow suitable Pleistocene age red-brown clay and Pleistocene age glacial till material dredged under the second construction contract to be placed at the Historic Area Remediation Site (HARS) - see below for further information.

ACTIVITY: The proposed action is to place approximately 804,000 cubic yards of Pleistocene age red-brown clay dredged material and approximately 83,500 cubic yards of Pleistocene age glacial till dredged material at the Historic Area Remediation Site (HARS) for a total of 887,500 cubic yards of Remediation Material for the HARS, as part of the second construction contract for the deepening and improvement of the upper Arthur Kill Federal Navigation Channel Project.

LOCATION: Arthur Kill Federal Navigation Channel is within the Port of New York and New Jersey. The federal channel extends from its confluence with the Kill Van Kull and Newark Bay Channels, southwesterly approximately 3.3 miles to the Conoco Phillips (Tosco) Oil Terminal and the GATX oil facilities, in New Jersey and New York, respectively, approximately 1 mile south of the Goethals Bridge. The second construction contract area is from about Newark Bay to the southern end of the Howland Hook Marine Terminal berth as shown on attached Figure 1.

DESCRIPTION OF PLANNED ACTION:

The overall channel improvement project involves deepening the existing federal 35-foot Arthur Kill Navigation Channel to a navigable depth of 41 feet below mean low water (MLW) from its confluence with the Kill Van Kull and Newark Bay Channels to the Howland Hook Marine Terminal in Staten Island, New York, and to 40 feet below mean low water from Howland Hook Marine Terminal to the Conoco Phillips (Tosco) oil refinery and the GATX facilities in New Jersey and New York, respectively, plus 2 feet for safety due to the hard underlying material, with up to an additional 1.5 feet allowable pay overdepth. Also included are selected widenings and realignments of the channel, as well as the removal of the U.S. Dike north of Shooters Island. The project also provides for mitigation consisting of restoration and enhancement of approximately 23 acres of intertidal salt marsh. Construction of the overall channel improvement project is planned to be accomplished in four construction contracts (see Figure 1). The action described herein is only for the second construction contract area within the upper Arthur Kill.

Second Construction Contract Area

Contract Area 2 (see Figure 1) contains Holocene age soft black silt and black-gray sands overlying hard Pleistocene age red-brown clay and Pleistocene age glacial till material, as well as Jurassic age rock that are to be dredged to a depth of –43 feet for the 41-foot project depth (i.e., design depth of –41 feet plus an additional –2 feet for safety). It is noted that beyond these required depths, an additional 1.5 feet of dredging depth is allowable to ensure that the dredging contractor will achieve the required depth. The Pleistocene age red-brown clay and Pleistocene age glacial till materials are proposed to be used beneficially as HARS Remediation Material. The following table summarizes the volumes of dredged material proposed to be removed from the second contract area of the Arthur Kill Channel. Attached Figures 2A thru 2D show the vertical and horizontal extent of the various types of dredged materials throughout the approximate two mile long second construction contract dredging area. The construction contract under discussion in this public notice is expected to begin in early autumn 2004 and have duration of approximately 22 months. Water Quality Certifications and Federal Consistency Determinations obtained from the New Jersey Department of Environmental Protection, the New York State Department of Environmental Conservation, and the New York State Department of State for the project, including this second construction contract area are listed in this public notice's section entitled Environmental Documentation.

Table A
Material Volume Estimates for the Arthur Kill Channel (to a total depth of –44.5')

Location of Material / Volume Estimates	HARS Suitable Pleistocene Age Sediments		Upland Sediments	Rock (CY)	Total Material Volume (CY)
	Glacial Till* (CY)	Red-Brown Clay ** (CY)	Black Silt and Black-Gray Sands*** (CY)		
Contract Area 2	83,500	804,000	624,000	473,800	1,985,300

* The USEPA-Region 2 and the USACE New York District determined in a Memorandum For Record dated August 26, 2003 that Pleistocene age glacial till from the upper Arthur Kill is characterized for HARS placement.

** The USEPA-Region 2 and the USACE, New York District determined in a Memorandum for Record dated January 26, 2000 that Pleistocene age red-brown clay from the greater Newark Bay formation (which encompasses the upper Arthur Kill) is characterized for HARS placement.

*** The New York District will send this Holocene age soft black silts and black-gray sands dredged material to a state-approved upland site for amending and beneficial reuse. The volume is included in this table for completeness.

The purpose of this public notice is to solicit comments regarding the proposed placement of these Pleistocene age 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 3 & 4), located in the Atlantic Ocean off the coasts of New York and New Jersey, is described later in this notice.

The approximate 624,000 cubic yards of Holocene age soft black silt and black-gray dredged material will be removed with a standard environmental dredging clamshell bucket and processed into amended dredged material and used beneficially in the ongoing remediation of the former Staten Island Sanitary Landfill (Figure 2) or a similar suitable state approved upland remediation or construction location. In addition the New Jersey Department of Environmental Protection (NJDEP) agrees with the use of the permitted Newark Bay Confined Disposal Facility (NBCDF) (Figure 5) as a contingency for the placement of up to 45,000 cubic yards of non-HARS material that cannot be processed and placed upland as this is consistent with the intent of the NBCDF and the Rules on Coastal Zone Management. There are no other Holocene age dredged materials in the second construction contract beyond the 624,000 cubic yards of black silt and black-gray sands.

Approximately 83,500 cubic yards of the proposed dredged materials from the upper Arthur Kill in this second construction contract area have been demonstrated to be Pleistocene age glacial till. The joint U.S. Environmental Protection Agency - Region 2 and U.S. Army Corps of Engineers - New York District August 26, 2003 Memorandum For The Record titled Joint Federal Position on Testing of Glacial Till Dredged Materials from Selected Areas of New York – New Jersey Harbor concluded that Pleistocene age glacial till is removed from sources of containments and has been adequately characterized by previous testing in the vicinity. As such, further project-specific testing of glacial till, including these 83,500 cubic yards, is not required

In accordance with geological testing and assessment procedures set forth in an August 4, 2004 joint U.S. Environmental Protection Agency - Region 2 and U.S. Army Corps of Engineers - New York District standardized operating procedures these 83,500 cubic yards are glacial till because the material (1) lacks detectible fossils or shells, (2) has a low organic carbon content, (3) has a reddish or red-brown color, (4) is comprised of a poorly sorted layer of clay particles, silts, sands, gravels and boulders, and (5) has a stratigraphic setting consistent with other Pleistocene age deposits in the vicinity of this upper Arthur Kill second construction contract dredging area. A copy of the glacial till determination for this second construction contract area may be requested from Mr. Michael Millard, Project Manager for the Arthur Kill Channel Deepening Project, at telephone number (212) 264-2054.

Several areas of Pleistocene age glacial till in the vicinity of this upper Arthur Kill second construction contract dredging area (including the adjacent upper Arthur Kill first construction contract area) were previously tested to determine suitability for use as Remediation Material at the HARS. This testing of glacial till was conducted in accordance with test protocols for ocean placement established by the U.S. Environmental Protection Agency - Region 2 and U.S. Army Corps of Engineers - New York District. Public notice of previous Pleistocene age glacial till chemical analysis, toxicity and 28-day bioaccumulation test results for a determination of suitability for HARS remediation purposes were provided in U.S. Army Corps of Engineers - New York District Public Notice FP63-AKCA1-2003 issued on September 15, 2003 for the adjacent Arthur Kill Channel deepening first construction contract area. Those chemical analysis, toxicity and 28-day bioaccumulation test results are included in this public notice (attached Tables 4A-4C) for informational purposes only.

This deepening project also includes approximately 804,000 cubic yards of Pleistocene age red-brown clay dredged material (from the Newark Bay complex) for placement as Remediation Material at the HARS. Pleistocene age red-brown clay dredged materials (from the Newark Bay complex), in the vicinity of this upper Arthur Kill second construction contract dredging area were previously tested to determine their suitability for use as Remediation Material at the HARS. Testing was conducted in accordance with test protocols for ocean placement established by the U.S. Environmental Protection Agency - Region 2 and the U.S. Army Corps of Engineers - New York District. Notification of the previous Pleistocene age red-brown clay test results for a determination of suitability for HARS remediation purposes were provided in U.S. Army Corps of Engineers - New York District Public Notice Supplement FP63-345678CC issued on July 14, 2000. Those test results are included in this public notice (attached Tables 1-3) for informational purposes only. A Joint Memorandum for Record (MFR) signed by both agencies on January 26, 2000, concluded that the Pleistocene age red-brown clay found throughout the Newark Bay Complex, including the upper Arthur Kill, was suitable for HARS placement and would not require further testing.

The approximate 473,800 cubic yards of dredged rock will be used beneficially by its placement at the Axel Carlson artificial reef site in the Atlantic Ocean (Figure 6) or at a similar permitted ocean artificial reef.

The proposed transportation of this dredged material for placement in ocean waters is being evaluated to determine that the proposed placement will not unreasonably degrade or endanger human health, welfare or amenities, or the marine environment, ecological systems or economic potentialities. The criteria established by the Administrator, USEPA, pursuant to Section 102(a) of the Ocean Dumping Act will be applied. In addition, based upon an evaluation of the potential effect which the failure to utilize this ocean placement site will have on navigation, economic and industrial development, and foreign and domestic commerce of the United States, an independent determination will also be made of the need to place the dredged material in ocean waters, considering other possible methods of disposal and other appropriate locations.

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

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

The proposed placement 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, 1997) prepared pursuant to Section 7 of the Endangered Species Act (16 USC 1531). Based upon that review, and a review of the latest public listing of threatened and endangered species, it has been preliminarily determined that the proposed activity described herein is not likely to adversely affect any federally-listed threatened or

endangered species (humpback whales, finback whales, right whales, loggerhead turtles, leatherback turtles, green turtles, and Kemp's Ridley turtles) or their critical habitat.

As noted in the designation of the HARS, material proposed for HARS placement will not be placed within 0.27 nautical miles of any identified wrecks or other wrecks that might be found. Other than two wrecks that are located within the Remediation Area Number 1, there are no known sites eligible for, or included in, the National Register of Historic Places within the dredged material placement area. No known archaeological, scientific, pre-historical or historical data is expected to be lost by the anticipated placement of dredged material.

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

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

ENVIRONMENTAL DOCUMENTATION:

The environmental impacts of the Arthur Kill Channel, Howland Hook Marine Terminal, New York and New Jersey Navigation Project have been evaluated in National Environmental Policy Act (NEPA) and other regulatory documents including: (1) the Final Feasibility Report and Final Environmental Impact Statement dated March 1986; (2) the Final Limited Reevaluation Report dated December 1997 and Final Supplemental Environmental Impact Statement dated April 1998; (3) the Final Finding of No Significant Impact/Environmental Assessment for the Selection of Potential Dredged Material Placement Sites dated November 2000; (4) the Final Addendum to the Limited Reevaluation Report and Final Finding of No Significant Impact and Final Environmental Assessment for Wetland Resources and Restoration dated May 2001; (5) the Federal Record-of-Decision executed in August 2001; (6) the Federal Consistency Determination/Water Quality Certification by New Jersey Department of Environmental Protection (No. 0000-92-0031.7) for the project dated November 23, 1998, as amended; (7) the Federal Consistency Determination/Water Quality Certification by New Jersey Department of Environmental Protection (No. 0000-02-049.1) for Arthur Kill Contract 2 dated February 6, 2004, as amended February 24, 2004; an amendment to the generic Federal Consistency Determination will be issued when permitted upland placement sites for Contract 2 have been identified; (8) the Water Quality Certification by the New York State Department of Environmental Conservation (No. 2-6499-00001/00002) for the project dated April 20, 2001, as last amended on February 26, 2004; and (9) the Federal Consistency Determination for the New York State Coastal Management Program by the New York State Department of State for the project dated May 4, 1999. Copies of these documents can be viewed and/or obtained by contacting Mr. Michael Millard, Project Manager for the Arthur Kill 41-foot Channel Deepening Project, at telephone number (212) 264-2054.

HISTORIC AREA REMEDIATION SITE (HARS):

In 1972, Congress enacted the Marine Protection Research and Sanctuaries Act (MPRSA) to address and control the dumping of materials into ocean waters. Title I of the Act authorized the US Environmental Protection Agency and the US Army Corps of Engineers to regulate dumping in ocean waters. USEPA and USACE share responsibility for MPRSA permitting and ocean disposal site management. USEPA regulations implementing MPRSA are found at 40 CFR Sections 220 through 229. With few exceptions, MPRSA prohibits the transportation of material from the United States for the purpose of ocean dumping except as may be authorized by a permit issued under the MPRSA. The MPRSA divides permitting responsibility between the USEPA and USACE. Under Section 102 of the MPRSA, USEPA has responsibility for issuing permits for all materials other than dredged material. Under Section 103 of MPRSA, the Secretary of the Army has the responsibility for issuing permits for dredged material, subject to USEPA concurrence.

In the fall of 1997, the USEPA de-designated and terminated the use of the New York Bight Dredged Material Disposal Site (commonly known as the Mud Dump Site or MDS). The MDS had been designated in 1984 for the disposal of up to 100 million cubic yards of dredged material from navigation channels and other port facilities within the Port of New York and New Jersey. Simultaneous with the closure of the MDS, the site and surrounding areas that had been used historically as disposal sites for dredged materials were redesignated as the HARS (Figures 3 & 4) Under authority of Section 102[c] of MPRSA at 40 CFR Sections 228.15(d)(6) (See 62 Fed. Reg. 46142 (August 29, 1997); 62 Fed. Reg. 26267 (May 13, 1997)). The HARS will be managed to reduce impacts of historical disposal activities at the site to acceptable levels in accordance with 40 CFR Sections 228.11(c). The need to remediate the HARS is supported by the presence of toxic effects, dioxin bioaccumulation exceeding Category 1 levels 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 designation of the HARS 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 meets current Category 1 standards and will not cause significant undesirable effects including through bioaccumulation. This dredged material is referred to as "Material for HARS Remediation" or "Remediation Material".

As of the end of July 2004, dredged materials from at least thirty six different completed and ongoing private and federal dredging projects in the Port of New York and New Jersey has 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 21,700,000 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 Engineer - 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.

ALTERNATIVES TO HARS PLACEMENT:

Regarding ocean placement of dredged material, the Ocean Dumping Regulations (Title 40 CFR Sections 227.16(b)) state that "...alternative methods of disposal are practicable when they are available at reasonable incremental cost and energy expenditures which need not be competitive with the costs of ocean dumping, taking into account the environmental impacts associated with the use of alternatives to ocean dumping....". The U.S. Army Corps of Engineers - New York District has evaluated the regional practicability of potential disposal alternatives in the September 1999

Draft "Implementation Report for the "Dredged Material Management Plan for the Port of New York and New Jersey". The Recommended Plan within the report addresses both the long and short term dredged material placement options in two specific timeframes, heretofore referred to as the "2010 Plan" and the "2040 Plan" respectively.

The 2010 Plan relies heavily on the creation, remediation, and restoration of a variety of existing degraded or impacted sites in the region with material that would or would not be considered suitable for HARS restoration. The Plan anticipates that a considerable volume of HARS suitable material will be placed at alternative beneficial use sites currently under development. Use of these sites performs habitat creation (for shellfish, oyster, and bird), habitat restoration at existing degraded pit sites, landfill and quarry remediation, provision of construction material, and beach nourishment. The remaining dredged material is treated and stabilized, as needed, and then applied to remediate degraded and potentially polluting areas such as brownfields, landfills and abandoned strip mines. Nearly all of the options considered in the 2010 Plan have a placement cost of $29/cubic yard or higher.

Similar to the 2010 Plan, the 2040 Plan relies heavily upon the use of land remediation and decontamination methods for the management of HARS unsuitable materials. As in the 2010 Plan, maximum use of all practicable alternatives to the HARS is envisioned.

Many of the dredged material management options presented in the 2010 Plan however, are not presently permitted and/or are presently under construction at this time, and therefore are unavailable for the purposes of this upper Arthur Kill second construction contract. However, as alternative sites are developed and permitted in the future, they may be evaluated and designated for use for the dredged materials from subsequent (third and fourth) construction contract dredging areas of the overall Arthur Kill 41-foot Channel Deepening Project. As specific alternative sites and their applicable testing/regulatory criteria are subject to change, future public notices on the Arthur Kill 41-foot Channel Deepening Project contracts may be issued as evaluations and testing of the material to be dredged are performed and as other alternative placement sites are developed.

Based upon the lowest responsive and responsible bid prices received for awarded and ongoing upper Arthur Kill first construction contract area, the incremental cost for upland placement (if it were available) versus HARS placement for the 887,500 cubic yards of Pleistocene age red-brown clay and Pleistocene age glacial till materials is estimated to be $33.5 Million, or about $38.00 per cubic yard. This would more than double the dredged materials placement costs to the United States and the Port Authority of New York and New Jersey, the cost-sharing partner in this channel improvement project for the Pleistocene age materials. Consequently, the incremental cost for using this alternative, if available, when compared to the HARS placement, which also contributes to the ongoing remediation of the HARS, is not considered reasonable or practicable.

For the material to be dredged from the upper Arthur Kill second construction contract area that has been determined suitable for use as HARS Remediation Material, the U.S. Army Corps of Engineers - New York District will prepare a memorandum for the record for the placement of this material at the HARS, which will fully consider all the comments received in response to this public notice.

Conclusion

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 as described above. 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.

Please contact Mr. Michael Millard, the Arthur Kill 41-foot Channel Deepening Project Manager, at telephone number (212) 264-2054 should you have any questions regarding this public notice or the Arthur Kill 41-foot Channel Deepening Project in general. Comments or questions may be FAXED to (212) 264-2924.

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

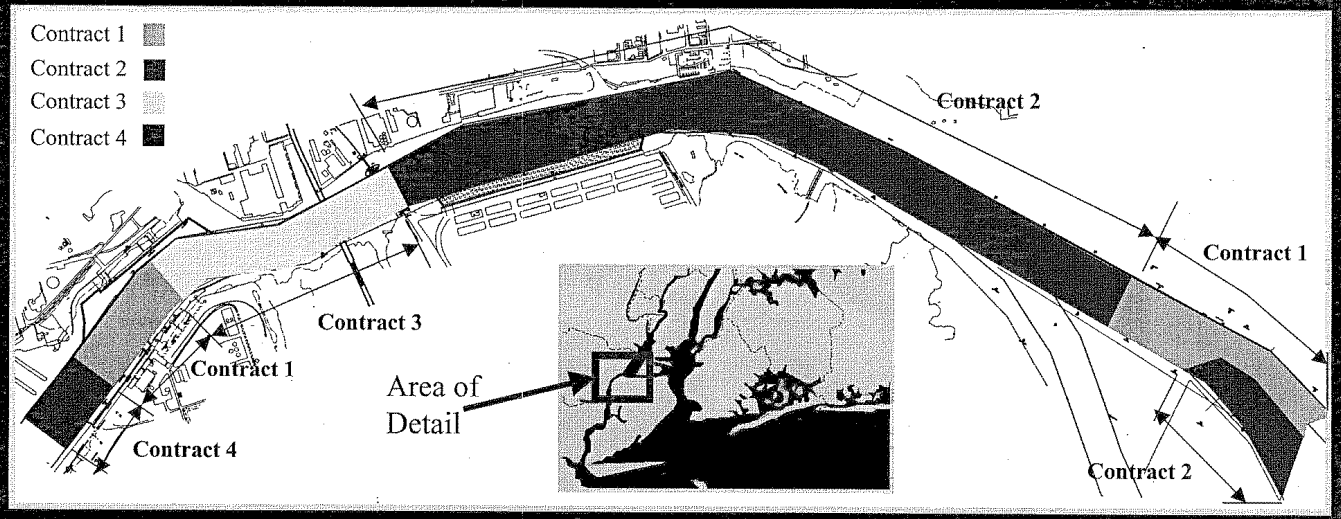
We request that you communicate the foregoing information concerning the proposed work to any persons known by you to be interested and who did not receive a copy of this notice.

Thomas M. Creamer 8/13/2004

for William F. Slezak
Acting Chief, Harbor Programs Branch

Enclosures

Arthur Kill Channel
Project Contract Areas



New York District

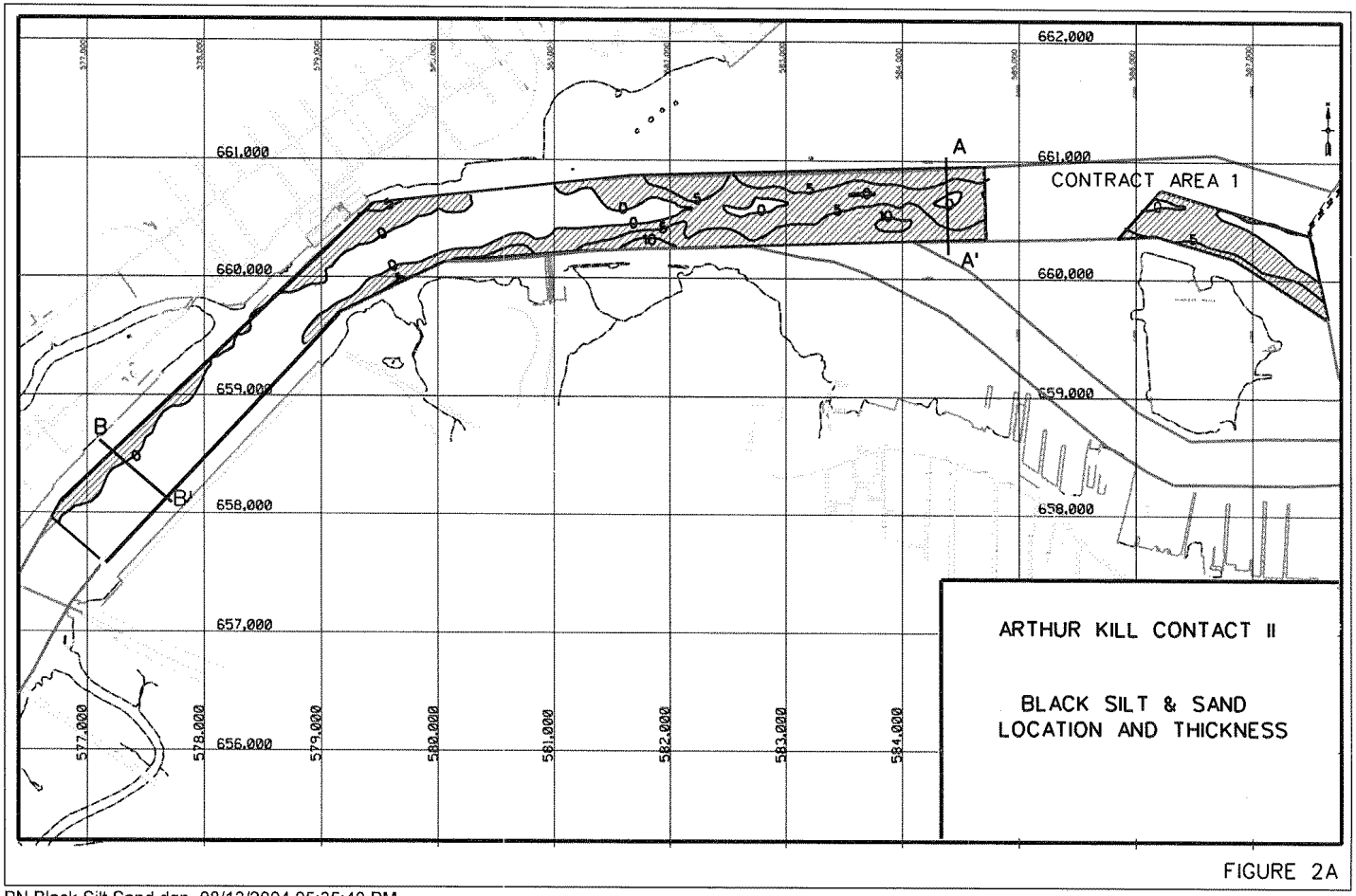


FIGURE 2A

PN Black Silt Sand.dgn 08/13/2004 05:35:40 PM

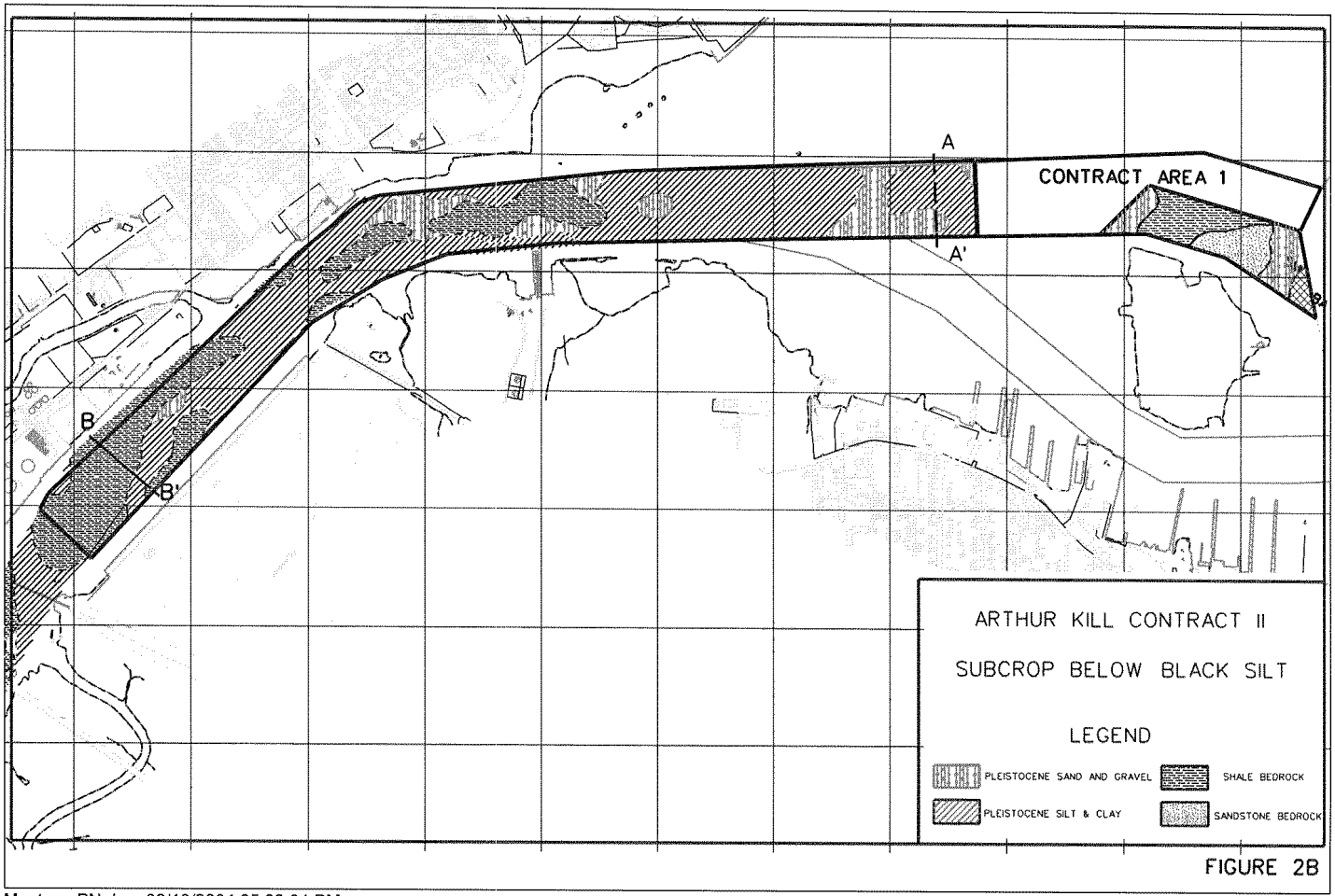


FIGURE 2B

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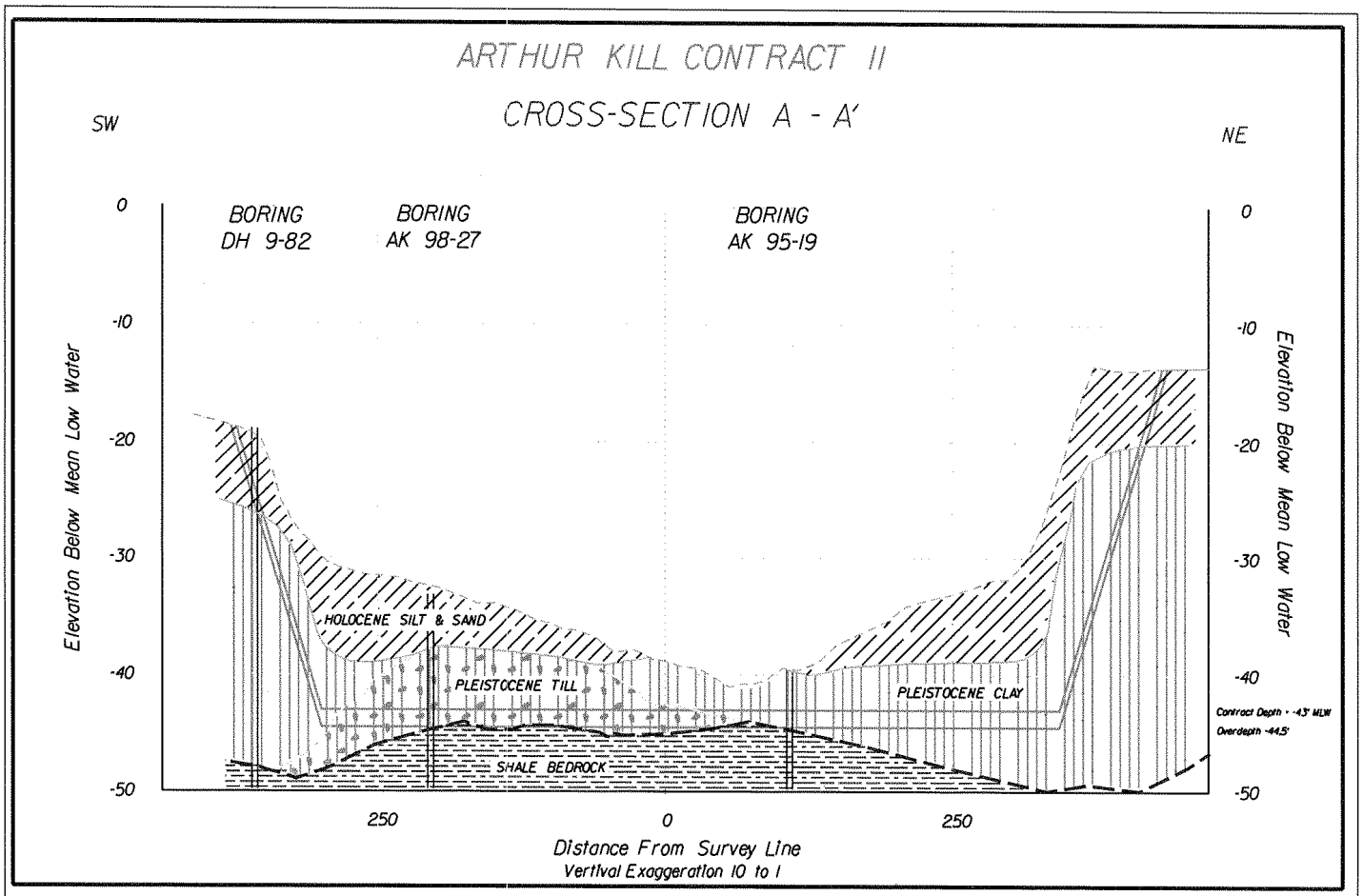


Figure 2C

Typical Cross-sections PN.dgn 08/13/2004 04:53:10 PM

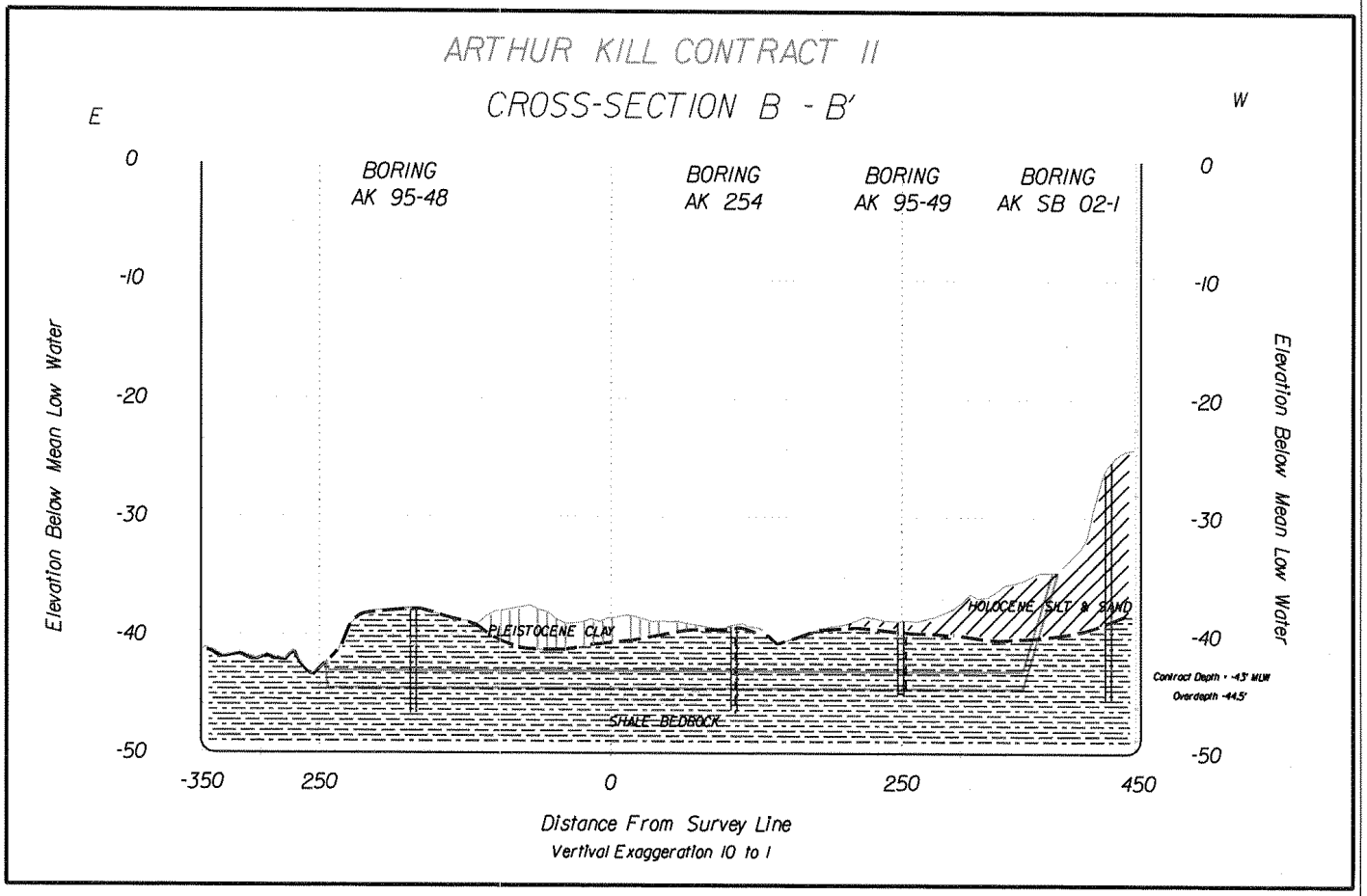
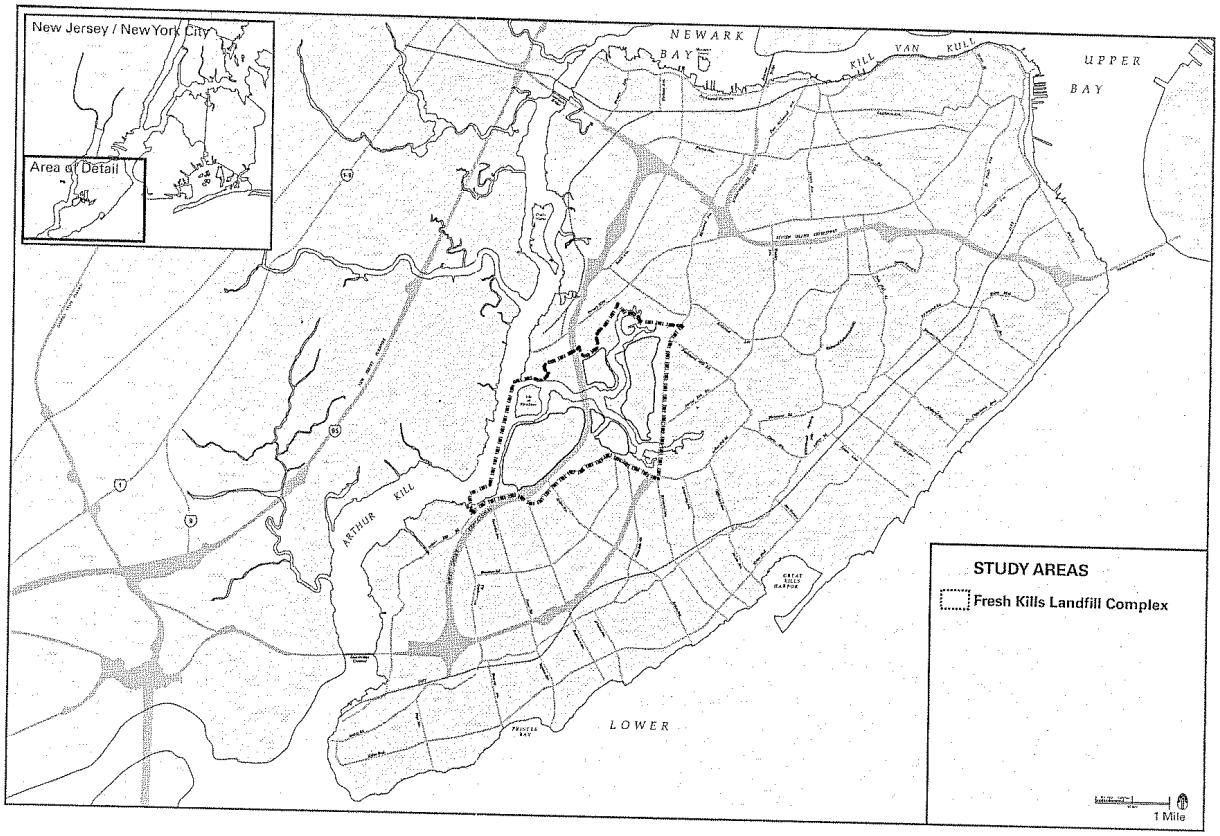
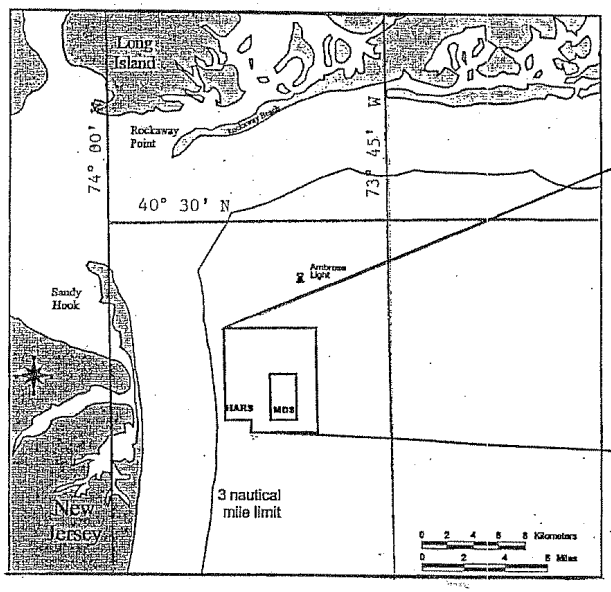


Figure 2D

Typical Cross-sections PN.dgn 08/13/2004 04:52:46 PM

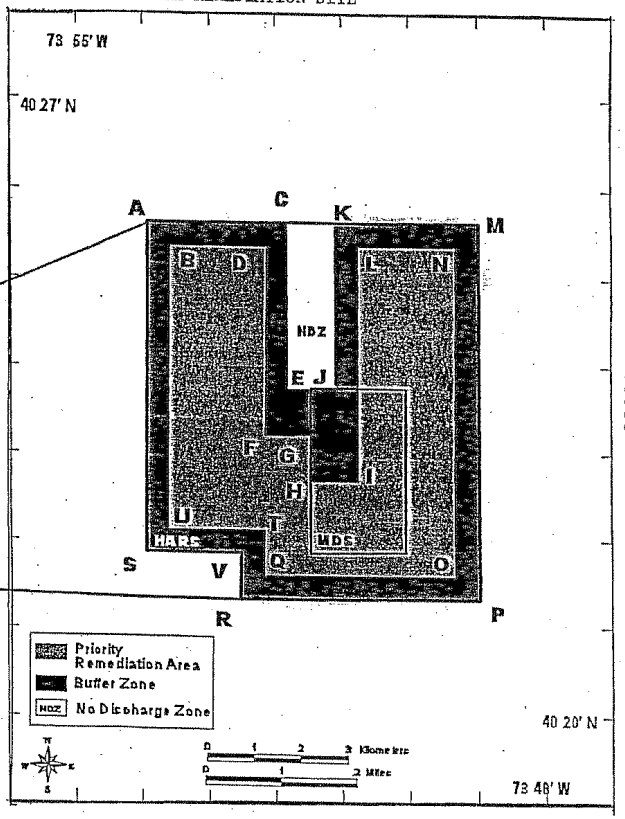

New Jersey / New York City
Area of Detail
NEWARK BAY
KILL VAN KULL
UPPER BAY
ARTHUR KILL
LOWER
STUDY AREAS
Fresh Kills Landfill Complex
1 Mile

HISTORIC AREA REMEDIATION SITE LOCATION MAP



A

LOCATION OF PRIMARY REMEDIATION AREA WITHIN THE HISTORIC AREA REMEDIATION SITE



B

SHEET OF

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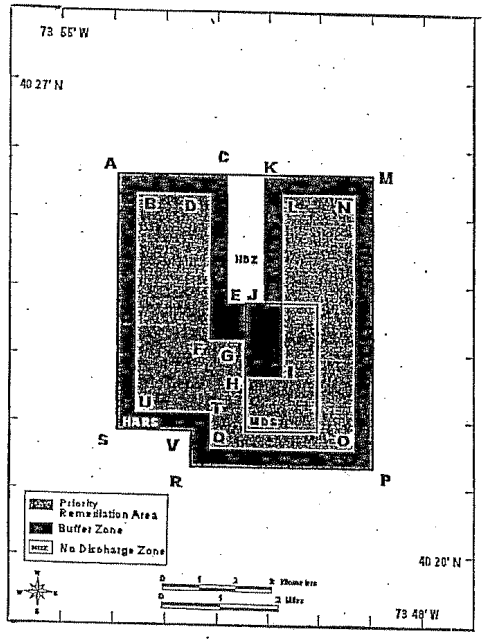


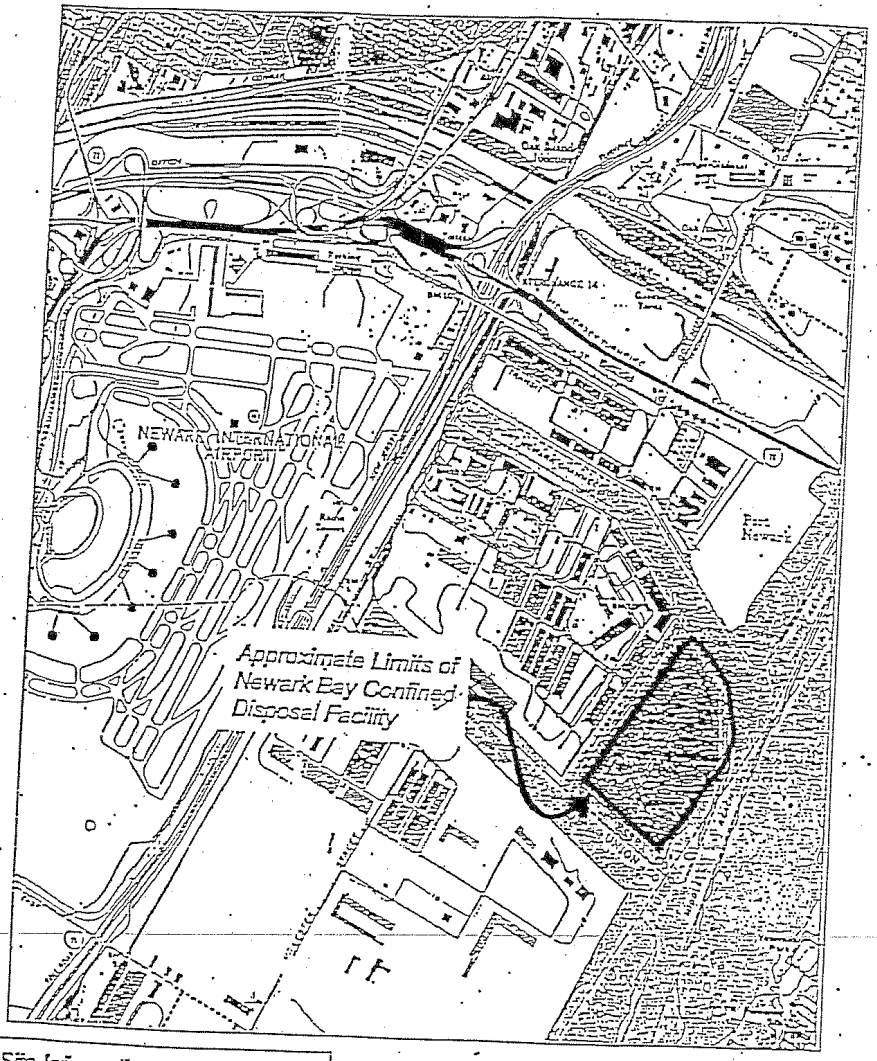
Priority Remediation Area (PRA): 9.0 square nautical mile area to be remediated with at least one meter of Remediation Material, bounded by the following coordinates:

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

SHEET OF



Site Information

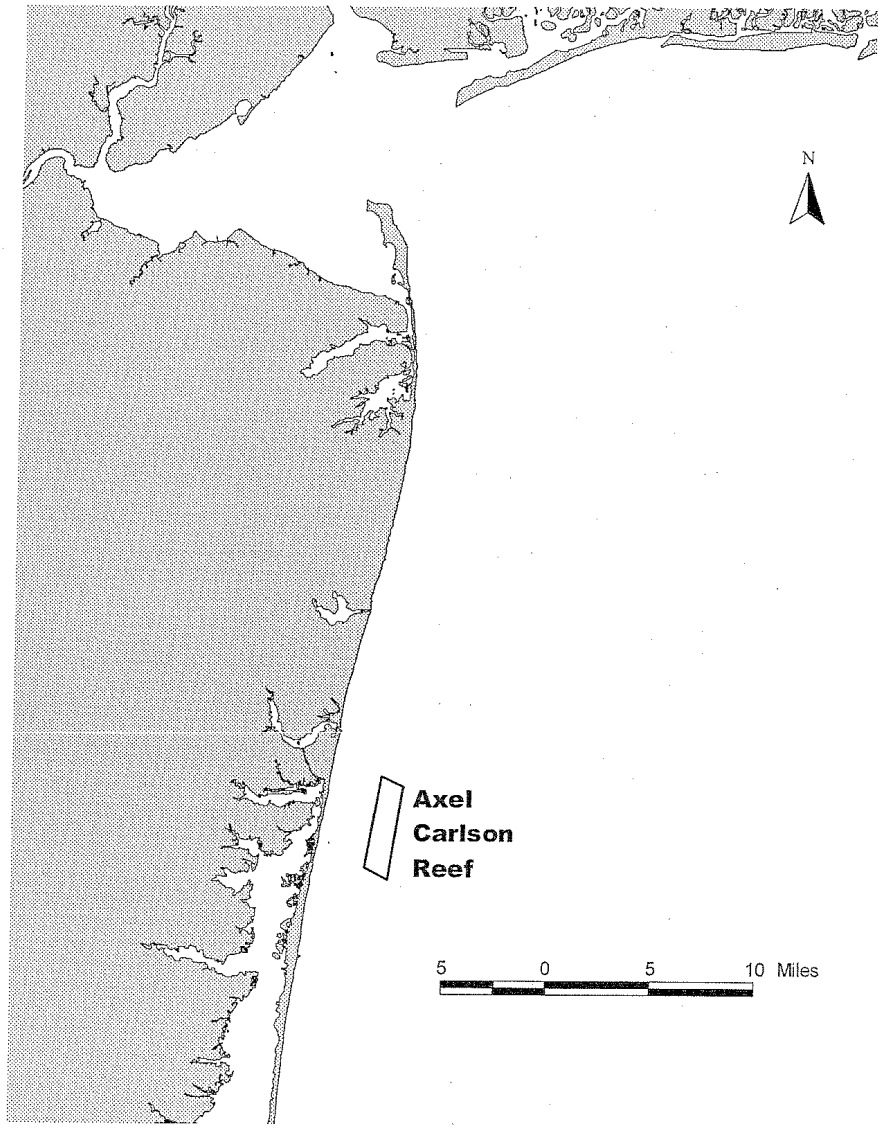
County: Essex
Site Owner: State of New Jersey
Site Manager: Port Authority of New York and New Jersey

State Plane Coordinates of Disposal Site

Easting: 669,500 ft to 676,000 ft
Northing: 591,000 ft to 595,000 ft

Newark Bay Confined Disposal Facility

Claremont Channel Dredging Project
NJ Waterfront Development Permit Application
April 26, 1999



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

TABLE 1. NEWARK BAY/STATEN ISLAND KILLS COMPLEX - NATURAL CLAYS
RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE

CONSTITUENTS	SITE WATER		ELUTRIATE	
	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)	ppb (ug/L)
Cadmium		0.093		0.267
Chromium		1.42		1.11
Copper		2.45		6.42
Lead		1.46		0.259
Mercury		0.011		0.002
Nickel		1.58		1.70
Silver		0.054		0.016
Zinc		11.7		3.56
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	0.8	ND	0.8	ND
alpha-Chlordane		1.9		1.1
trans-Nonachlor		3.7		1.8
Dieldrin	0.3	ND		3.1
4,4'-DDT		4.6		3.1
2,4'-DDT	0.7	ND	0.7	ND
4,4'-DDD		2.5		5.0
2,4'-DDD		1.7		1.0
4,4'-DDE		4.6		6.0
2,4'-DDE	1.4	ND	1.4	ND
Total DDT		14.45		16.15
Endosulfan I		2.0		1.2
Endosulfan II	0.5	ND		1.8
Endosulfan sulfate	2.4	ND		2.7
Heptachlor		3.3		4.0
Heptachlor epoxide		11		5.3
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB BZ-8		0.9	0.2	ND
PCB BZ-18		7.6	0.1	ND
PCB BZ-28	0.1	ND	0.1	ND
PCB BZ-44	0.1	ND	0.1	ND
PCB BZ-49	0.1	ND	0.1	ND
PCB BZ-52	0.1	ND	0.1	ND
PCB BZ-66		0.6	0.1	ND
PCB BZ-87	0.1	ND	0.1	ND
PCB BZ-101		0.7	0.1	ND
PCB BZ-105	0.1	ND	0.1	ND
PCB BZ-118	0.1	ND	0.1	ND
PCB BZ-128	0.1	ND	0.1	ND
PCB BZ-138	0.1	ND	0.1	ND
PCB BZ-153	0.1	ND	0.1	ND
PCB BZ-170	0.1	ND	0.1	ND
PCB BZ-180	0.1	ND	0.1	ND
PCB BZ-183	0.1	ND	0.1	ND
PCB BZ-184	0.1	ND	0.1	ND
PCB BZ-187	0.1	ND	0.1	ND
PCB BZ-195	0.2	ND	0.2	ND
PCB BZ-206	0.2	ND		0.5
PCB BZ-209	0.1	ND	0.1	ND
Total PCB		21.6		3.3

ND = Not detected
Total PCB = sum of all congeners * 2.
Total DDT = sum of 2,4' and 4,4' DDD, DDE, and DDT.

NEWARK BAY/STATEN ILAND KILLS COMPLEX - NATURAL CLAYS

TABLE 2. TOXICITY TEST RESULTS

Suspended Particulate Phase - Raw Clay

Test Species	Test Duration	LC50/EC50	LPC (a)
Menidia beryllina	96 hours	>100% (b)	> 1
Mysidposis bahia	96 hours	>100% (b)	> 1
Mytilus sp. (larval survival)	48 hours	>100% (b)	> 1
Mytilus sp. (larval normal development)	48 hours	>100% (c)	> 1

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

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

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

Whole Sediment (10 days) - Raw Clay

Test Species	% Survival in Reference	% Survival in Test	% Difference Reference -Test	Is Difference statistically significant? (a=0.05)
Ampelisca abdita	89%	86%	3%	No
Mysidopsis bahia	93%	95%	0%[(a)]	No

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

TABLE 3. NEWARK BAY / STATEN ISLAND KILLS COMPLEX - NATURAL CLAYS
28-DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE (in wet weight concentration)

	Macoma nasuta				*Nereis virens*			
	REFERENCE		TEST		REFERENCE		TEST	
Constituents	Detection Limits	Mean Concentration	Detection Limits	Mean Concentration	Detection Limits	Mean Concentration	Detection Limits	Mean Concentration
Metals	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
Arsenic		3.5		3.36		3.26		3.2
Cadmium		0.05		0.048		0.068		0.064
Chromium		0.948		0.768		0.338		0.328
Copper		8.84		10.18		2.32		2.14
Lead		0.536		0.47		0.704		0.558
Mercury		0.16		0.088		0.13		0.138
Nickel		1.18		1.176		0.648		0.666
Silver		0.08		0.072		0.036	0.04	ND
Zinc		23.68		22.52		24		14.56
Pesticides	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Aldrin		1.793	0.164	ND		4.36		5
alpha-Chlordane		0.601		0.16		0.2		0.625
trans-Nonachlor		0.469		0.445	0.18	ND	0.182	ND
Dieldrin		1.234		1.314		1.814		1.278
4,4'-DDT		0.185		0.27		1.108		0.521
2,4'-DDT		1.224		0.634	0.532	ND		* 0.908
4,4'-DDD		2.82		2.52		3.88		5.92
2,4'-DDD		0.738		0.493		0.67		0.616
4,4'-DDE		3.98		4.66		1.505		0.589
2,4'-DDE	0.14	ND	0.138	ND		0.762		0.77
Total DDT		9.152		8.646		7.925		9.324
Endosulfan I		1.96		1.6		1.88		2.08
Endosulfan II		0.175		0.127	0.216	ND		0.196
Endosulfan sulfate		0.36	1.106	* ND	1.16	ND	1.16	* ND
Heptachlor	0.252	ND		0.157	0.258	ND		* 0.582
Heptachlor epoxide		1.62		1.92		1.128		1.04
Industrial Chemicals	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
PCB BZ-08		1.542		0.976		1.235		1.563
PCB BZ-18		1.404		0.902		0.62		0.798
PCB BZ-28	0.54	ND	0.508	* ND		0.22		* 0.738
PCB BZ-44		0.738		0.498		0.486		0.397
PCB BZ-49		0.959	0.36	ND		0.974	0.36	ND
PCB BZ-52		0.134	0.47	* ND	0.486	ND		* 0.628
PCB BZ-66		1.04	1.008	ND	1.06	ND	1.012	* ND
PCB BZ-101		1		0.798		0.906		0.614
PCB BZ-105	0.394	ND	0.37	ND		0.363		0.324
PCB BZ-118	0.578	ND	0.544	* ND		0.812		0.604
PCB BZ-87		0.138	0.46	* ND	0.476	ND	0.46	* ND
PCB BZ-128	0.658	ND	0.618	* ND	0.642	ND	0.616	* ND
PCB BZ-138	0.412	ND	0.386	* ND		1.144		0.848
PCB BZ-153	0.384	ND	0.36	ND		1.94		1.634
PCB BZ-170	0.354	ND	0.334	ND	0.346	ND	0.332	ND
PCB BZ-180	0.344	ND	0.324	ND		0.382		0.244
PCB BZ-183	0.422	ND	0.376	* ND	0.412	ND	0.396	ND
PCB BZ-184	0.568	ND	0.534	* ND		1.2		0.928
PCB BZ-187	0.304	ND	0.286	ND	0.296	ND		0.239
PCB BZ-195	0.254	ND	0.238	ND		0.306		0.298
PCB BZ-206	0.254	ND	0.238	ND	0.248	ND	0.238	ND
PCB BZ-209	0.206	ND	0.194	ND	0.2	ND	0.194	ND
Total PCB		16.562		20.536		22.424		25.58
1,4-Dichlorobenzene	0.2	ND	0.2	ND	0.2	ND	0.2	ND

Dioxins and Furans	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g	pg/g
2378-TCDD	0.115	ND	0.105	ND		0.237		0.177
12378-PeCDD	0.172	ND	0.134	ND		0.431		0.252
123478-HxCDD		0.197	0.177	ND		0.296		0.172
123678-HxCDD		3.250		1.632		3.230		1.580
123789-HxCDD		1.410		0.665		1.423		0.661
1234678-HpCDD		16.250		7.424		10.308		5.255
OCDD		12.441		7.929		11.220		6.714
2378-TCDF	0.239	ND	0.145	ND		1.001		0.691
12378-PeCDF		0.650		0.317		1.130		0.442
23478-PeCDF	0.874	ND		0.336		0.713		0.259
123478-HxCDF		0.410		0.282		0.631	0.347	ND
123678-HxCDF		0.689		0.348		0.919		0.384
123789-HxCDF	0.668	ND	0.310	ND	0.155	ND	0.407	* ND
234678-HxCDF		0.900		0.476		1.145		0.279
1234678-HpCDF		4.140		2.194		2.473		1.515
1234789-HpCDF		0.276	0.273	ND	0.347	ND	0.446	ND
OCDF		2.022		2.355		0.809		0.731
PAHs	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g	ng/g
Acenaphthene		4.29		3.84	3.75	ND	3.78	ND
Acenaphthylene	56.4	ND	56.2	* ND	56.5	ND	56.4	* ND
Anthracene	1.98	ND	2.0	ND	2.0	ND	2.0	ND
Fluorene	3.56	ND	3.6	ND	3.55	ND	3.58	ND
Naphthalene	1.7	ND	1.7	ND	1.7	ND	1.7	ND
Phenanthrene		0.78	1.3	ND	1.3	ND	1.3	ND
Benzo[a]anthracene	1.6	ND	1.6	ND	1.6	ND	1.6	ND
Benzo[a]pyrene		0.8	1.3	ND	1.3	ND	1.3	ND
Benzo[g,h,i]perylene	1.4	ND	1.4	ND	1.4	ND	1.4	ND
Benzo[b]fluoranthene	1.4	ND	1.4	ND	1.4	ND	1.4	ND
Benzo[k]fluoranthene	1.2	ND	1.2	ND	1.2	ND	1.2	ND
Chrysene		2.44	2	ND	2	ND	2	ND
Dibenz[a,h]anthracene	1.6	ND	1.6	ND	1.6	ND	1.6	ND
Fluoranthene	3.16	ND	3.2	ND	3.15	ND	3.18	ND
Indeno[1,2,3-cd]pyrene	0.822	ND	0.822	ND	0.812	ND	0.822	ND
Pyrene		2.12		1.68		1.263		1.1
Total PAHs		19.64		* 73.281		11.72		* 70.931

Concentrations shown are the mean of 5 replicate analyses in wet weight with the following exceptions:
PAH concentrations for *Nereis virens* Reference tissue are the mean of 4 replicate analyses;
1,4 dichlorobenzene concentration for *Nereis virens* Test tissue is the mean of 4 replicate analyses due to limited tissue volume;
1,4 dichlorobenzene concentration for *Nereis virens* Reference tissue is the result of one set of analyses due to limited tissue volume.

*** Significantly higher than reference at 95% confidence.**

ND = Not Detected
Total PAHs = sum of all PAHs
Total PCB = sum of congeners reported * 2
Total DDT = sum of 2,4'- and 4,4'-DDD, DDE, and DDT
Means and statistical comparisons were determined using conservative estimates of concentrations of constituents that were at concentrations below the detection limit.

TABLE 4A. RESULTS OF CHEMICAL ANALYSIS OF SITE WATER AND ELUTRIATE
ARTHUR KILL - CONTRACT AREA 1A

	SITE WATER		ELUTRIATE	
CONSTITUENTS	DETECTION LIMITS	CONCENTRATION	DETECTION LIMITS	CONCENTRATION
Metals	ppb	ppb	ppb	ppb
Ag		0.073		0.027
Cd		0.069		0.020
Cr		1.823		2.333
Cu		3.31		2.430
Hg		0.029		0.001
Ni		1.52		2.83
Pb		2.13		0.67
Zn		8.15		8.61
Pesticides	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
Aldrin	2.83	ND	2.83	ND
a-Chlordane	1.08	ND	1.08	ND
trans Nonachlor	1.01	ND	1.01	ND
Dieldrin	0.98	ND	0.98	ND
4,4'-DDT	0.56	ND	0.56	ND
2,4'-DDT	1.98	ND	1.98	ND
4,4'-DDD	0.59	ND	0.59	ND
2,4'-DDD	0.75	ND	0.75	ND
4,4'-DDE	0.84	ND	0.84	ND
2,4'-DDE	1.71	ND	1.71	ND
Total DDT		3.2		3.2
Endosulfan I	1.11	ND	1.11	ND
Endosulfan II	0.51	ND	0.51	ND
Endosulfan sulfate	0.56	ND	0.56	ND
Heptachlor	1.17	ND	1.17	ND
Heptachlor epoxide	0.95	ND	0.95	ND
Industrial Chemicals	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)	pptr (ng/L)
PCB 8	16.00	ND	16.00	ND
PCB 18	1.38	ND	1.38	ND
PCB 28	1.73	ND	1.73	ND
PCB 44	1.45	ND	1.45	ND
PCB 49	1.49	ND	1.49	ND
PCB 52	1.43	ND	1.43	ND
PCB 66	1.49	ND	1.49	ND
PCB 87	1.13	ND	1.13	ND
PCB 101	1.14	ND	1.14	ND
PCB 105	0.57	ND	0.57	ND
PCB 118	0.87	ND	0.87	ND
PCB 128	1.40	ND	1.40	ND
PCB 138	1.32	ND	1.32	ND
PCB 153	1.06	ND	1.06	ND
PCB 170	1.01	ND	1.01	ND
PCB 180	0.96	ND	0.96	ND
PCB 183	0.93	ND	0.93	ND
PCB 184	0.92	ND	0.92	ND
PCB 187	0.86	ND	0.86	ND
PCB 195	1.08	ND	1.08	ND
PCB 206	1.22	ND	1.22	ND
PCB 209	1.26	ND	1.26	ND
Total PCB		81.4		81.4

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 4B. ARTHUR KILL - CONTRACT AREA 1A

TOXICITY TEST RESULTS

Suspended Particulate Phase

Test Species	Test Duration	LC_{50}/EC_{50}	LPC (a)
Menidia beryllina	96 hours	>100% (b)	1.00
Mysidposis bahia	96 hours	>100% (b)	1.00
Mytilus edulis (larval survival)	48 hours	>100% (b)	1.00
Mytilus edulis (larval normal development)	48 hours	>100% (c)	1.00

(a) Limiting Permissible Concentration (LPC) is the LC 50 or EC 50 times 0.01.

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

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

Whole Sediment (10 days)

Test Species	% Survival in Reference	% Survival in Test	% Difference |Reference -Test|	Is difference statistically significant? (a=0.05)
Ampelisca abdita	80%	95%	15%	No
Mysidopsis bahia	99%	97%	2%	No

ARTHUR KILL - CONTRACT AREA 1A
TABLE 4C. 28-DAY BIOACCUMULATION TEST RESULTS: CHEMICAL ANALYSIS OF TISSUE
Wet weight concentrations

CONSTITUENTS	*Tapes japonica*				*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		0.11		0.11		0.01	0.01	ND
As		1.99		1.94		3.33		3.11
Cd		0.25		0.24		0.06		0.06
Cr		0.04		* 0.06		0.06		0.06
Cu		1.10		1.00		1.40		1.37
Hg		0.01		0.01		0.02		0.02
Ni		0.73		0.71		0.26		* 0.37
Pb		0.02		0.02		0.20		0.17
Zn		8.35		7.55		21.11		24.58
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	0.010	ND	0.01	ND	0.02	ND	0.08	ND
a-Chlordane		0.04		0.02		0.13		0.11
trans Nonachlor		0.02		0.01		0.45		0.41
Dieldrin	0.01	ND		0.02		0.16		0.13
4,4'-DDT	0.01	ND	0.01	ND		0.02	0.09	ND
2,4'-DDT	0.02	ND	0.02	ND		0.08	0.12	ND
4,4'-DDD		0.03		0.01		0.18		0.18
2,4'-DDD	0.01	ND	0.01	ND		0.10		0.06
4,4'-DDE		0.03		0.01	0.02	ND	0.13	* ND
2,4'-DDE	0.05	ND	0.05	ND	0.06	ND	0.33	* ND
Total DDT		**0.11**		**0.07**		**0.42**		**0.80**
Endosulfan I	0.02	ND	0.02	ND	0.02	ND	0.12	* ND
Endosulfan II	0.03	ND	0.03	ND		0.11	0.17	ND
Endosulfan sulfate	0.03	ND	0.03	ND		0.20		0.17
Heptachlor	0.01	ND	0.01	ND	0.02	ND	0.10	ND
Heptachlor epoxide	0.01	ND	0.01	ND		0.04		0.06
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	0.17	ND	0.17	ND	0.22	ND		* 0.80
PCB 18	0.02	ND	0.02	ND	0.02	ND	0.13	* ND
PCB 28		0.10	0.02	ND	0.03	ND	0.16	* ND
PCB 44		0.14		0.12	0.02	ND	0.11	* ND
PCB 49	0.01	ND	0.01	ND	0.02	ND	0.09	ND
PCB 52	0.01	ND	0.01	ND	0.02	ND	0.08	ND
PCB 66	0.02	ND	0.02	ND	0.02	ND	0.10	ND
PCB 87		0.05		0.03		0.05		0.11
PCB 101		0.16		0.11		0.42		0.34
PCB 105	0.02	ND	0.02	ND		0.17	0.15	ND
PCB 118	0.02	ND	0.02	ND		0.16	0.13	ND
PCB 128	0.05	ND	0.05	ND		0.17		0.12
PCB 138		0.32		0.13		1.46		1.20
PCB 153		0.08		0.04		2.04		2.20
PCB 170		0.10		0.11		0.39	0.13	ND
PCB 180	0.02	ND	0.02	ND		1.00		0.15
PCB 183	0.02	ND	0.02	ND		0.35		0.30
PCB 184	0.03	ND	0.03	ND	0.03	ND	0.18	* ND
PCB 187	0.02	ND	0.02	ND		0.83		0.69
PCB 195	0.02	ND	0.02	ND		0.12		0.11
PCB 206		0.02	0.02	ND		0.18	0.12	ND
PCB 209	0.02	ND	0.02	ND		0.22		* 0.38
Total PCB		**2.39**		**1.54**		**15.51**		**15.15**
1,4-Dichlorobenzene		0.19		0.25		0.42		0.76

TABLE 4C. (Continued) **ARTHUR KILL - CONTRACT AREA 1A**

CONSTITUENTS	*Tapes japonica*				*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		0.51		0.57		2.10		2.16
Acenaphthylene		0.05		0.05		0.16		0.13
Acenaphthene		0.07		0.08		0.30		0.21
Fluorene		0.12		0.15		0.19		0.11
Phenanthrene		0.55		0.67		0.23		0.31
Anthracene		0.08		0.06		0.07		0.07
Fluoranthene		0.66		0.79		0.50		0.44
Pyrene		0.41		0.78		0.39		0.38
Benzo(a)anthracene		0.57		0.60		0.12		0.12
Chrysene		0.67		0.72		0.32		0.30
Benzo(b)fluoranthene		0.17		0.14		0.13		0.12
Benzo(k)fluoranthene		0.10		0.06		0.13		0.11
Benzo(a)pyrene		0.04		0.05		0.20		0.23
Indeno(1,2,3-cd)pyrene	0.01	ND		0.06	0.02	ND	0.06	* ND
Dibenzo(a,h)antracene	0.03	ND		0.04	0.03	ND		0.07
Benzo(g,h,i)perylene	0.02	ND		0.07	0.03	ND		* 0.19
Total PAH's		**4.03**		**4.89**		**4.88**		**4.97**
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)
2,3,7,8 TCDD	0.10	ND	0.08	ND		0.24		0.14
1,2,3,7,8 PeCDD	0.12	ND	0.10	ND		0.06	0.24	ND
1,2,3,4,7,8 HxCDD	0.06	ND		0.03		0.03		* 0.06
1,2,3,6,7,8 HxCDD		0.04		0.05		0.13		* 0.08
1,2,3,7,8,9 HxCDD	0.07	ND		0.04		0.05		0.09
1,2,3,4,6,7,8 HpCDD		0.20		0.31		0.91		0.75
1,2,3,4,7,8,9 OCDD		1.33		1.85		5.85		5.70
2,3,7,8 TCDF		0.14		0.10		1.52		0.91
1,2,3,7,8 PeCDF		0.07		0.06		0.12	0.25	ND
2,3,4,7,8 PeCDF		0.07		0.05		0.20		0.15
1,2,3,4,7,8 HxCDF		0.09		0.07		0.12		0.13
1,2,3,6,7,8 HxCDF		0.03		0.03		0.05		0.06
2,3,4,6,7,8 HxCDF		0.03		0.03		0.04		0.11
1,2,3,7,8,9 HxCDF		0.03	0.05	ND	0.06	ND	0.11	* ND
1,2,3,4,6,7,8 HpCDF		0.06		0.06		0.32		0.32
1,2,3,4,7,8,9 HpCDF	0.08	ND		0.04	0.10	ND		* 0.23
1,2,3,4,6,7,8,9 OCDF		0.11		0.10		0.42		0.55

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