US ARMY CORPS
OF ENGINEERS
NEW YORK DISTRICT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2

To All Interested Parties:

Section 506 of the Water Resources and Development Act (WRDA) of 1992, which amended the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), requires the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to prepare a Site Management and Monitoring Plan (SMMP) for all Ocean Disposal Sites.

On May 13, 1997, EPA Region 2 and the USACE-New York District (USACE-NYD) released a supplement to the 1984 Final Environmental Impact Statement (SEIS) for the New York Bight Dredged Material Disposal Site (Mud Dump Site) and draft Historic Area Remediation Site (HARS) SMMP to support the proposed rule entitled, "Simultaneous De-designation and Termination of the Mud Dump Site and Designation of the Historic Area rRemediation Site". The public comment period closed on June 30, 1997. A total of 45 written comments were received in addition to oral comments presented at three public hearings. Based on the comments received on the aforementioned HARS SEIS, draft SMMP, and proposed rule, EPA Region II has prepared a Response to Comments, final rule, and revised the SMMP accordingly. The HARS SMMP is hereby approved and will be in effect until the closure of the HARS.

If you have any questions concerning the HARS SMMP or require a copy, please contact Mr. Douglas Pabst (EPA Region 2) at (212) 637-3797/ Email: Pabst.Douglas@epamail.epa.gov, or Mr. Brian May (USACE-NYD) at (212) 264-1853/Email: Brian.May@NAN01.USACE.Army.Mil.

Kathleen C. Callahan
Director, Division of Environmental
Planning and Protection
Region II
U.S. Environmental Protection Agency

John R. Hartmann
Chief, Operations Division
New York District
U.S. Army Corps of Engineers

Enclosures

US ARMY CORPS
OF ENGINEERS
NEW YORK DISTRICT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2

AUG 25 1997

Site Management and Monitoring Plan for the Historic Area Remediation Site

U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090

U.S. Environmental Protection Agency
Region 2
290 Broadway
New York, New York 10007-1866

Table of Contents

1. Background

As stated in a July 24, 1996 letter to several New Jersey Congressmen, signed by U.S. Environmental Protection Agency Administrator Carol Browner, Secretary of Transportation Federico F. Peña, and Secretary of the Army Togo D. West, Jr. (3-Party Letter):

> "Environmental, tourism, fishing, and other community groups have long contended that the MDS should be closed immediately. These views reflect the important environmental values that New Jersey's communities identify with their coastal environment. Community concerns have been heightened by the unhappy history of other environmental threats that these communities have had to endure -- ranging from oil spills to the littering of shorelines with medical waste. This history warrants sensitivity to concerns about the MDS, including concerns about continued use of the site for so-called "category 2" material. When these concerns are coupled with the limited category 2 disposal capacity we expect the site to provide, we must conclude that long-term use of this site for disposal activity is not realistic.
>
> Accordingly, the Environmental Protection Agency will immediately begin the administrative process for closure of the MDS by September 1, 1997. The proposed closure shall be finalized no later than that date. Post-closure use of the site would be limited, consistent with the management standards in 40 C.F.R. Section 228.11(c). Simultaneous with closure of the MDS, the site and surrounding areas that have been used historically as disposal sites for contaminated material will be re-designated under 40 C.F.R. Section 228 as the Historic Area Remediation Site. This designation will include a proposal that the site be managed to reduce impacts at the site to acceptable levels (in accordance with 40 C.F.R. Section 228.11(c)). The Historical Area Remediation Site will be remediated with uncontaminated dredged material (i.e. dredged material that meets current Category I standards and will not cause significant undesirable effects including through bioaccumulation)."

Consistent with the above provision of the July 24, 1996, 3-Party Letter, on September 11, 1996, EPA announced the following actions: (1) modification of the scope of the existing Supplemental Environmental Impact Statement (SEIS) by eliminating the proposal to expand the Mud Dump Site (MDS) for Category II dredged material disposal and (2) implementation of the July 24, 1996, 3-Party Letter by closing the MDS by September 1, 1997 and simultaneously designating the HARS for the purpose of remediation.

EPA has prepared and issued for public comment a Supplemental Environmental Impact Statement (SEIS) and Proposed Rule to implement the 3-Party Letter. Closure/de-designation of the MDS and designation of the HARS will require the preparation of a final HARS SMMP and Final Rule.

Section 506 of the Water Resources and Development Act (WRDA) of 1992, which amended the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), requires the EPA and the U.S. Army Corps of Engineers (USACE) to prepare a Site Management and Monitoring Plan (SMMP) for the HARS. WRDA provides that after January 1, 1995, no site shall receive a final designation unless an SMMP has been developed. This document constitutes the joint EPA Region 2 and USACE New York District (USACE-NYD) required WRDA SMMP and identifies a number of actions, provisions, and practices to manage the operational aspects of dredging, HARS remediation activities, and HARS monitoring tasks. The HARS SMMP was written to address the SMMP elements specified in WRDA 1992 and is consistent with the joint EPA and USACE National Guidance Document entitled, "Guidance Document for Development of Site Management and Monitoring Plans for Ocean Dredged Material Disposal Sites" **(EPA/USACE, 1996)**. EPA has determined that portions of the HARS are Impact Category I [40 CFR 228.11(c)], and the HARS SMMP has been developed to provide that the site be managed to reduce impacts to acceptable levels, in accordance with 40 CFR 228.11(c).

2. HARS Remediation:

The HARS designation provides that the site be managed to reduce impacts at the site to acceptable levels (in accordance with 40 C.F.R. Section 228. 11(c)). The goal is that, consistent with the 3-Party Letter, "The Historic Area Remediation Site will be remediated with uncontaminated dredged material (i.e., dredged material that meets current Category I standards and will not cause significant undesirable effects, including through bioaccumulation)."**(hereinafter referred to as "the Material for Remediation" or "Remediation Material").**

3. HARS Description (See Section 8)

The HARS (which includes the 2.2 square nautical mile MDS) is approximately 15.7 square nautical miles in size and includes the following 3 areas:

Priority Remediation Area (PRA): 9.0 square nautical mile area to be remediated with at least one meter of the Remediation Material.

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

4. Objectives

The objectives of the SMMP are as follows:

A. Provide for the remediation of required areas within the HARS by placing a one-meter cap (minimum required cap thickness) of the Material for Remediation on sediments within the PRA (inside the HARS). Sediments within the PRA have been found to exhibit Category II and Category III dredged material characteristics and will be remediated.

B. Provide that no significant adverse environmental impacts occur from the placement of the Material for Remediation at the HARS. The phrase "significant adverse environmental impacts" is inclusive of all significant or potentially substantial negative impacts on resources within the HARS and vicinity. Factors to be evaluated include:

1. Movement of materials into estuaries or marine sanctuaries, or onto oceanfront beaches, or shorelines;

2. Movement of materials toward productive fishery or shell fishery areas;

3. Absence from the HARS of pollution-sensitive biota characteristic of the general area;

4. Progressive, non-seasonal, changes in water quality or sediment composition at the HARS, when these changes are attributable to the Material for Remediation placed at the HARS;

5. Progressive, non-seasonal, changes in composition or numbers of pelagic, demersal, or benthic biota at or near the HARS, when these changes can be attributed to the effects of the Material for Remediation placed at the HARS;

6. Accumulation of material constituents in marine biota near the HARS.

C. Recognize and correct any potential unacceptable conditions before they cause any significant adverse impacts to the marine environment or present a navigational hazard to commercial and recreational water-borne vessel traffic. The term "potential unacceptable conditions" is inclusive of the range of negative situations that could arise as a result of the Material for Remediation placement at the HARS such that its occurrence could have an undesirable affect. Examples could include things such as: Remediation Material placement mounds exceeding the required management depth or the Remediation Material barges releasing materials in the wrong locations.

D. Determine/enforce compliance with MPRSA Permit conditions.

E. Provide a baseline assessment of conditions at the HARS.

F. Provide a program for monitoring the HARS.

G. Describe special management conditions/practices to be implemented at the HARS.

H. Specify the quantity of Remediation Material to be placed at the HARS, and the presence, nature, and bioavailability of the contaminants in the Material for Remediation.

I. Specify the anticipated use of the HARS, including the closure date.

J. Provide a schedule for review and revision of the HARS SMMP.

5. HARS Management Roles and Responsibilities

5.1. Regulatory/Statutory Responsibilities

Under MPRSA, the USACE and the EPA have been assigned various duties pertaining to HARS management. EPA and USACE share responsibility for MPRSA permitting and HARS designation and management, as briefly summarized below.

5.1.1. Section 102 of the MPRSA

EPA is assigned permitting authority for non-dredged material. EPA also designates recommended times and sites for ocean disposal (for both non-dredged and dredged material), and develops the environmental criteria used in reviewing permit applications. USACE-NYD determinations to issue MPRSA permits are subject to EPA review and concurrence.

5.1.2. Section 103 of the MPRSA

USACE is assigned permitting responsibility for dredged material, subject to EPA review and concurrence that the material meets applicable ocean disposal criteria. The USACE is required to use EPA-designated ocean disposal sites to the maximum extent feasible.

6. Coordination

EPA Region 2 and the USACE-NYD jointly manage the New York/New Jersey Harbor Dredged Material Disposal Program and the HARS. EPA Region 2 and the USACE-NYD will continue to coordinate the exchange of information, HARS management and monitoring resources, and documentation of site management decisions. USACE-NYD and EPA Region 2 will continue to provide each other with all pertinent data and information as it becomes available. Specifically, upon discovery/notification, any information concerning disposal/dredging violations will be shared between EPA Region 2 and the USACE-NYD.

A regional Memorandum of Understanding (MOU) was prepared for disposal activities at the MDS. Adjustments are being made to the MOU to reflect remediation activities to be conducted at the HARS.

7. Funding

The costs involved in site management and monitoring will be shared between EPA and the USACE-NYD to the extent allowed by funding levels in any given Fiscal Year (subject to appropriations). EPA Region 2 and the USACE-NYD have historically budgeted approximately one million dollars for MDS SMMP activities and anticipate the same funding level through FY 1998. Sufficient funds will be available to implement HARS SMMP activities. This SMMP will be in place until modified and/or the remediation of the HARS is completed and the HARS is closed.

8. BASELINE ASSESSMENT

MPRSA 102 (c)(3)(A) requires that the SMMP include a baseline assessment of conditions at the site.

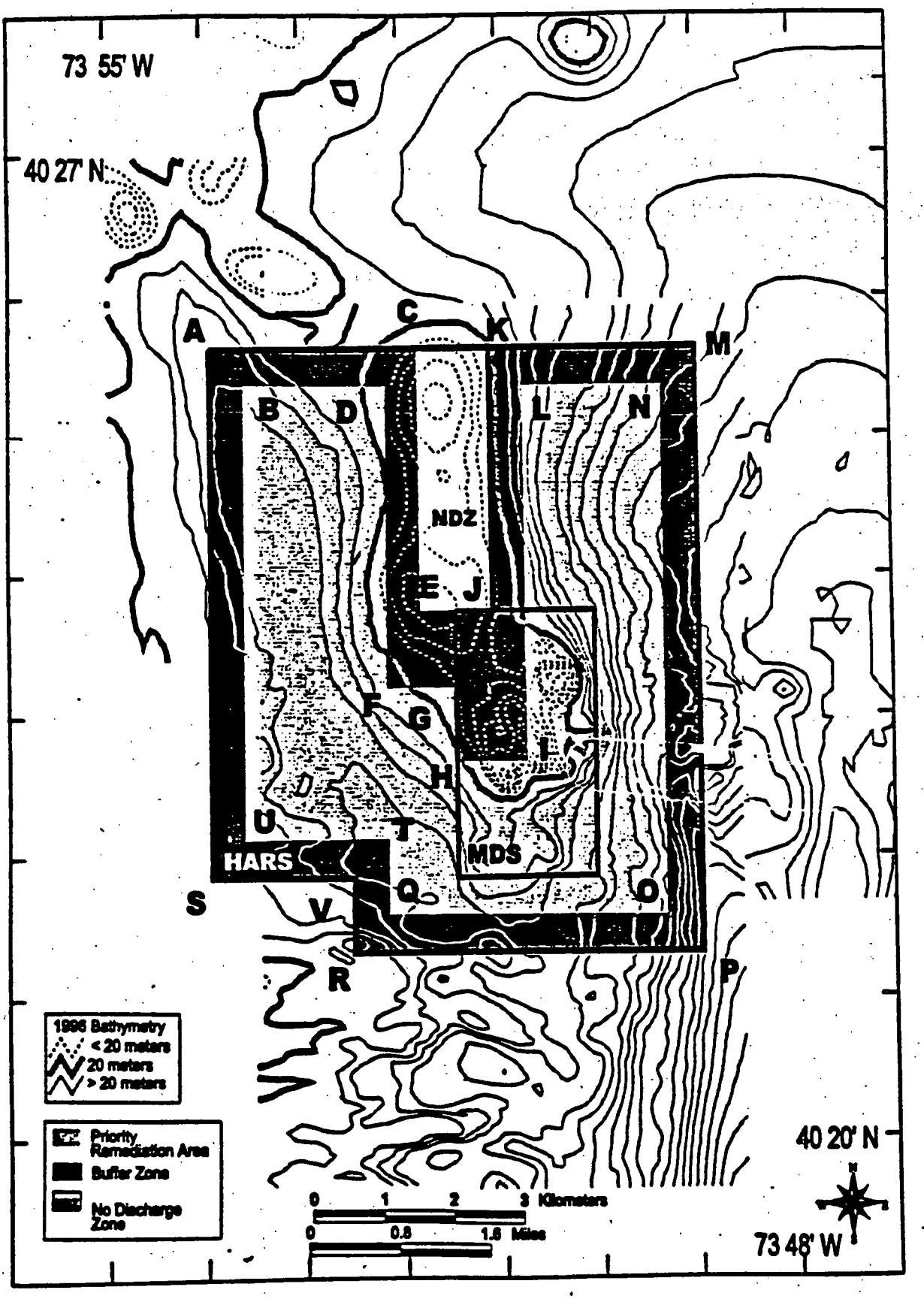
8.1. HARS Characterization:

The HARS (which includes the 2.2 square nautical mile MDS) is a 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, Long Island, bounded by the following coordinates (**Figure 1**):

Point	Latitude DMS	Longitude DMS	Latitude DDM	Longitude DDM
A	40° 25' 39" N	73° 53' 55" W	40° 25.65' N	73° 53.92' W
M	40° 25' 39" N	73° 48' 58" W	40° 25.65' N	73° 48.97' W
P	40° 21' 19" N	73° 48' 57" W	40° 21.32' N	73° 48.95' W
R	40° 21' 19" N	73° 52' 30" W	40° 21.32' N	73° 52.50' W
S	40° 21' 52" N	73° 53' 55" W	40° 21.87' N	73° 53.92' W
V	40° 21' 52" N	73° 52' 30" W	40° 21.87' N	73° 52.50' W

DMS = Degrees, Minutes, Seconds
DDM = Degrees, Decimal Minutes

Figure 1: HARS



The proposed HARS includes the following 3 areas:

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
O	40° 21' 35" N	73° 49' 19" W	40° 21.58' N	73° 49.32' W
Q	40° 21' 36" N	73° 52' 08" W	40° 21.60' N	73° 52.13' W
T	40° 22' 08" N	73° 52' 08" W	40° 22.13' N	73° 52.13' W
U	40° 22' 08" N	73° 53' 34" W	40° 22.13' N	73° 53.57' W

DMS = Degrees, Minutes, Seconds
DDM = Degrees, Decimal Minutes

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

Point	Latitude DMS	Longitude DMS	Latitude DDM	Longitude DDM
A	40° 25' 39" N	73° 53' 55" W	40° 25.65' N	73° 53.92' W
B	40° 25' 23" N	73° 53' 34" W	40° 25.38' N	73° 53.57' W
C	40° 25' 39" N	73° 51' 48" W	40° 25.65' N	73° 51.80' W
D	40° 25' 22" N	73° 52' 08" W	40° 25.37' N	73° 52.13' W

E	40° 23' 48" N	73° 51' 48" W	40° 23.80' N	73° 51.80' 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
J	40° 23' 48" N	73° 51' 06" W	40° 23.80' N	73° 51.10' W
K	40° 25' 39" N	73° 51' 06" W	40° 25.65' N	73° 51.10' W
L	40° 25' 22" N	73° 50' 44" W	40° 25.37' N	73° 50.73' W
M	40° 25' 39" N	73° 48' 58" W	40° 25.65' N	73° 48.97' W
N	40° 25' 22" N	73° 49' 19" W	40° 25.37' N	73° 49.32' W
O	40° 21' 35" N	73° 49' 19" W	40° 21.58' N	73° 49.32' W
P	40° 21' 19" N	73° 48' 57" W	40° 21.32' N	73° 48.95' W
Q	40° 21' 36" N	73° 52' 08" W	40° 21.60' N	73° 52.13' W
R	40° 21' 19" N	73° 52' 30" W	40° 21.32' N	73° 52.50' W
S	40° 21' 52" N	73° 53' 55" W	40° 21.87' N	73° 53.92' W
T	40° 22' 08" N	73° 52' 08" W	40° 22.13' N	73° 52.13' W
U	40° 22' 08" N	73° 53' 34" W	40° 22.13' N	73° 53.57' W
V	40° 21' 52" N	73° 52' 30" W	40° 21.87' N	73° 52.50' W

DMS = Degrees, Minutes, Seconds
DDM = Degrees, Decimal Minutes

No Discharge Zone: an approximately 1.0 square nautical mile area in which no placement or incidental spread of the Material for Remediation is allowed, bounded by the following coordinates:

Point	Latitude DMS	Longitude DMS	Latitude DDM	Longitude DDM
C	40° 25' 39" N	73° 51' 48" W	40° 25.65' N	73° 51.80' W
E	40° 23' 48" N	73° 51' 48" W	40° 23.80' N	73° 51.80' W
J	40° 23' 48" N	73° 51' 06" W	40° 23.80' N	73° 51.10' W
K	40° 25' 39" N	73° 51' 06" W	40° 25.65' N	73° 51.10' W

DMS = Degrees, Minutes, Seconds
DDM = Degrees, Decimal Minutes

From 1994 to 1996, EPA Region 2 and the USACE-NYD conducted a variety of oceanographic surveys with their respective contractors Battelle and SAIC within an approximately 30 square nautical mile study area (including the 15.7 square nautical mile HARS). In 1994, sediment samples were collected from within the MDS and the HARS and analyzed for toxicity, sediment chemistry, benthic community structure, and worm tissue analyses **(Battelle, 1996 and 1997)**. In 1995, sidescan sonar, REMOTS®, seafloor photography, and precision bathymetry were conducted within the HARS **(SAIC 1995a, b, and c)**. **Together the data from these surveys represent the baseline conditions against which all future monitoring data will be compared (Baseline Data).** These surveys serve as the HARS Baseline Assessment because they are the most comprehensive surveys conducted to date, utilizing state-of-the-art sampling and analytical techniques/procedures. In addition, these surveys represent the most recent conditions and assessments of the HARS to which any later data can be compared.

These Baseline studies conducted revealed levels of toxicity within the MDS and surrounding area that would fail ocean disposal criteria and qualify as Category III dredged material (See **Table 1**). Analyses conducted on all worm tissue collected from the HARS revealed levels of dioxin in excess of 1 pptr but less than 10 pptr, indicative of Category II dredged material (See **Table 3**).

Bathymetry **(Figure 1)** collected in September 1995 **(SAIC, 1995a)** and side scan sonar data collected in March 1995 **(SAIC, 1995b)** are included in the baseline data set. As of September 1995 and May 1996, water depths in the HARS range from 40 feet (12 meters) to 138 feet (42 meters) BMLW.

8.2 Monitoring Findings

8.2.1 Physical Characteristics

The physical characteristics affecting the placement of Material for Remediation in the HARS, as determined from moored measurements of waves and near-bottom currents, and measurements of suspended solids concentration within plumes of dredged material disposed of at the MDS, can be summarized as follows:

1. Near-bottom, oscillatory tidal currents at the MDS and HARS are relatively weak with maximum speeds on the order of 10 cm/s (0.2 knot; **SAIC 1994a**). Mean currents are also weak (less than 0.2 knot) with directions that are dependent upon location, water depth, and bottom topography (**SAIC 1994b**).

2. Surface waves are generally less than 2 m in height except during major storms, which occur most frequently in the fall and winter seasons (**SAIC 1995c**). Wave-induced near-bottom currents are greater than 20 cm/s (0.4 knot) only when surface wave heights exceed 3 m, wave

periods are in excess of 10 sec, and storm centers are to the east or southeast (this analysis included the significant December 11, 1992 Northeaster). These wave conditions are encountered less than 3% of the time in the fall and winter, and less than 1% of the time in the spring and summer (**SAIC 1994a**).

3. Plume tracking studies of dredged material disposed of at the MDS have demonstrated:

-plume behavior is variable depending upon the type of grain size (coarse to fine-grained material).
-rapid settling of material and turbulent mixing that result in initial dilutions of the plume on the order of 3,000:1 to 600,000:1 within 15 minutes of placement based on total suspended solids (TSS) and dioxin/furans (**Battelle, 1994**).
-plume dilution after 2 hours ranged from approximately 64,000:1 to 557,000:1 (**Battelle,1994**).
-total suspended solids (TSS) near the center of the dredged material placement plume body reach near background levels in 35 to 45 minutes (**Battelle, 1994**).
-the release of dredged material into the water column resulted in rapid dispersal (turbulent mixing) of the plumes within the first few minutes after release; and (2) plume dilution after two hours, based on total suspended solids, ranged from approximately 64,000:1 to 557,000:1 (**Battelle, 1994**).
-a small amount of fine-grained sediment (silt and clay) remained measurable in the water column for up to 3 hours. A review of dredged material placement and the mass balance questions can be found in **SAIC (1994)**.

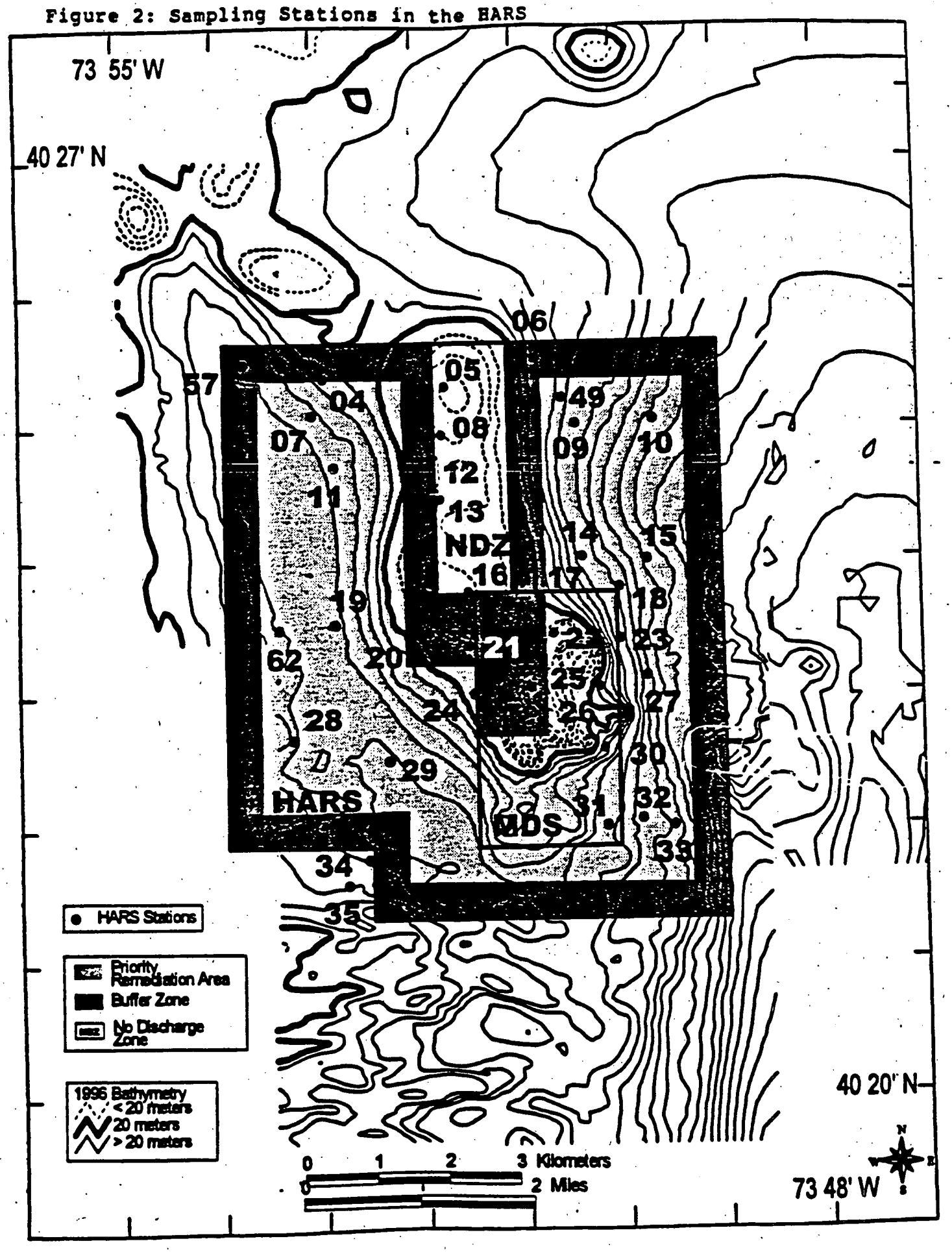
8.2.2 Sediment Contaminant Concentrations/Toxicity Test Results:

The spatial pattern of the sediment grain-size distribution from the HARS was complex and included areas dominated by muddy (fine-grained) sediments and others dominated by coarse sediments (primarily sand). Total organic carbon (TOC) ranged from less than 0.005% to 3.56% (**Battelle, 1996**). The ranges of organic and trace metal contaminant concentrations varied widely within the HARS and are listed in **Table 1**.

Sediments from the HARS were used in 10-day benthic acute toxicity tests using *Ampelisca abdita*. Test results indicate that sediments in the HARS exhibit between 0% and 99% amphipod survival in these laboratory tests (reference sediments exhibited 94% amphipod survival) (**Table 1**). Test results less than 74% (20% less than reference site and statistically significant) would be considered biologically significant to *Ampelisca abdita* and unacceptable for ocean disposal (category III) (**EPA/USACE, 1991**), (**EPA Region 2/USACE-NYD, 1992**). The PRA within the HARS was delineated for remediation purposes based principally upon the *Ampelisca abdita* toxicity test results.

Specific sampling locations for each station are shown in **Figure 2** and **Table 2** (for further

Figure 2: Sampling Stations in the HARS



information see **Battelle, 1996)**

8.2.3 Water Column Characteristics/Circulation:

1. The HARS is located on the shallow continental shelf within the New York Bight. The mean flow of water column, based on long-term current meter moorings on the Atlantic Shelf, is towards the southwest, along depth contours through the New York Bight **(EPA, 1997)**.

2. Physical characteristics of the aquatic systems in the New York Bight are complex. Circulation in the Bight is dominated by a relatively slow flow to the southwest (3.7 cm/sec), occasionally with a clockwise eddy in the New York Bight Apex **(EPA, 1982)**.

3. Nearshore surface currents are strongly influenced by winds and surface runoff. Average surface currents inshore of the 100-meter isobath (which includes the entire Apex) flow southward from Cape Cod to Cape Hatteras, at mean speeds of approximately 3.7 cm/sec. The southerly flow of the Hudson River plume along the New Jersey coast forces an opposing northward flow of more saline waters to the east **(EPA, 1982)**.

4. Average shoreward bottom current speeds of 5 cm/sec (0.1 knot) have been reported in the Hudson Shelf Valley **(EPA, 1982)**. The axis of the Hudson Shelf Valley separates two general bottom current directions. East of the valley, flow is generally in a northwest-northeast direction, towards Long Island; while west of the axis, the flow is generally in a southwest-northwest direction, towards New Jersey **(EPA, 1982)**.

5. Maximum salinities (33 to 34 ppt) occur inshore during the winter (February and March) when sub-freezing conditions reduce river runoff. The spring thaw reduces the surface salinity, particularly nearshore, and strong vertical and horizontal gradients may develop. In summer surface salinities are at the annual minimum (27 to 31 ppt) and bottom salinities are (27 to 29 ppt) **(EPA, 1982)**.

Table 1. Concentration Ranges of Sediment Contaminants in the HARS (Battelle, 1996)[1]

Parameter	Concentration
	(% *Ampelisca* Survival)
Toxicity	0 to 99
	(ng/g dry weight or ppb)
Total PAH	10.7 to 33,067
Total PCB[2]	0.73 to 678.4
Total DDT	<0.07 to 151
	(ng/Kg dry weight or pptr)
2,3,7,8-TCDD	<0.2 to 41.7
	(μg/g dry weight or ppm)
Silver	<0.04 to 7.33
Arsenic	2.3 to 29.7
Cadmium	<0.03 to 3.22
Chromium	15.4 to 187.2
Copper	4.8 to 178.2
Mercury	<0.03 to 2.47
Nickel	<3 to 99.4
Lead	10.2 to 402.0
Zinc	20.5 to 329.0

1 = Values reported for chemicals listed in the Regional Testing Manual (**EPA Region 2/USACE-NYD, 1992**). For additional information see **Battelle, 1996 and EPA, 1997**.
2 = PCB values should be multiplied by 2 in order to compare approximately with values from Regional Testing Manual (**EPA Region 2/USACE-NYD, 1992**).

Table 2. Sampling Stations in the HARS.

Sta.	Station Description*			Comments
	Latitude (°N)	Longitude (°W)	Depth (ft)	
4	40°25.39′	73°52.91′	73	Fine brown sand.
5	40°25.32′	73°51.70′	50	Medium brown sand; shell hash, crabs.
6	40°25.53′	73°50.79′	75	Medium brown sand.
7	40°25.11′	73°53.02′	80	Fine to medium muddy sand, shell hash.
8	40°24.95′	73°51.74′	56	Fine dark material.
9	40°25.03′	73°50.40′	85	Brown sand and shell hash to sandy brown mud.
10	40°25.06′	73°49.62′	98	Soft brown mud.
11	40°24.71′	73°52.81′	80	Dark brown, muddy, clay-like material.
12	40°24.76′	73°51.85′	58	Fine to medium brown sand.
13	40°24.46′	73°51.76′	59	Fine to medium light brown sand.
14	40°24.02′	73°50.36′	88	Brown/black mud.
15	40°24.00′	73°49.71′	100	Light grey mud with underlying black layer.
16	40°23.76′	73°51.50′	56	Fine brown sand to brown sand over black mud and clay.
17	40°23.70′	73°50.77′	65	Black mud over sand.
18	40°23.79′	73°49.99′	88	Fine mud, dark grey over dark black layer.
19	40°23.53′	73°52.82′	86	Brown sand over mud to black sandy mud.
20	40°23.46′	73°51.90′	66	Fine brown sand.
21	40°23.36′	73°51.50′	62	Light sand.
22	40°23.45′	73°50.66′	66	Fine brown sand over mud.
23	40°23.41′	73°49.99′	86	Black mud with petroleum smell.
24	40°23.00′	73°51.46′	68	Coarse brown sand and black mud to fine brown sand.
25	40°23.05′	73°50.89′	50	Fine to medium to coarse brown sand.
26	40°23.05′	73°50.21′	66	Thick black mud, silty on top.
27	40°23.13′	73°49.73′	99	Brown muddy clay.
28	40°22.67′	73°53.26′	83	Firm brown mud.
29	40°22.51′	73°52.31′	83	Firm, brown mud with sand.
30	40°22.59′	73°50.17′	84	Medium to fine brown sand with some mud; many tubes.
31	40°22.01′	73°50.15′	92	Dark brown sandy mud to medium dark, hard-packed sand. Some coarse sand.
32	40°22.06′	73°49.80′	94	Sandy brown to black mud, large *Nereis*. Rocky.
33	40°22.01′	73°49.48′	100	Brown mud-gravel-sand mix, to coarse brown sand..
34	40°21.77′	73°52.53′	78	Light brown sand.
35	40°21.58′	73°52.73′	72	Light brown sand.
49	40°25.23′	73°50.53′	80	Fine grain, worm tubes.
57	40°25.50′	73°53.71′	76	Surficial sediments fine silt/sand; dark underlying sediments
62	40°23.50′	73°53.38′	78	Coarse sand mixed with fines.

For data from specific stations see Battelle, 1996.

6. A summary of wave climate data in the area of the HARS (National Weather Service offshore meteorological platform at Ambrose Light, 40.5°N/73.8°W) for the period November 1984 through December 1993 shows that the highest waves were recorded in the winter months and in the early spring, with waves exceeding 2 meters about 4% of the time and exceeding 3 meters about 1% of the time **(EPA, 1997)**.

8.2.4 Biological Characteristics **(Battelle, 1996)**

A. Benthic Community

1. Mean total benthic infaunal abundance within the HARS was 26,482 (+/- 28,555) individuals/m^2.

2. The average total number of species per benthic sample within the HARS was 23.9 (+/- 6.5). The proportion of species was: annelids 61%, crustaceans 17%, and molluscs 11%.

3. Benthic species diversity (H') within the HARS was 2.3 (+/-0.8).

4. Benthic distribution of organisms:

a. Annelida: annelids accounted for about 68% of the infaunal abundance in the HARS. The spinoid worm *Prionospio steenstrupi* (a surface deposit feeder) was found in densities of 3,432 (+/-5,314) individuals/m^2. *Polygordius* (an archiannelidan worm) was found in densities of 7,734 (+/-26,091) individuals/m^2. *Pherusa* (a surface deposit feeder) was found in densities of 784 (+/-1,628) individuals/m^2.

b. Crustacea: crustaceans abundance in the HARS averaged 1,000 (+/-2,335) individuals/m^2 and accounted for about 4% of the total infaunal abundance in the HARS. Amphipods were present at densities of 799 (+/-2,173) individuals/m^2.

c. Mollusca: molluscs accounted for about 21% of the total infaunal abundance in the HARS. The nut clam (*Nucula proxima*), a selective deposit feeder, was found in densities of 5,269 (+/-8,844) individuals/m^2.

d. Miscellaneous Phlya: The sand dollar *Echinarachnius parma* (Echinodermata)was found at densities of 867 (+/-1,958) individuals/m^2 in the HARS. Various species of sea anemones (Anthozoa) were found within the HARS at densities of 377 (+/-417) individuals/m^2. *Phoronis*, a tube dwelling suspension feeder, was also found within the HARS at densities of 507 (+/-906) individuals/m^2.

B. Commercial/Recreational Fish Resources:

1. Finfish: The New York Bight Apex is a transitional region for many species of fish and shellfish. The area is occupied by many fish species. The following species of finfish are known to inhabit the New York Bight Apex:

a. Demersal Species: Silver Hake, Red Hake, Yellowtail Flounder, Scup, Summer Flounder, Winter Flounder, Tautog (Blackfish), Cod, Black Sea Bass, Little Skate, Windowpane Flounder, Fourspot Flounder, Ocean Pout, Cunner, Spiny Dogfish, Spotted Hake, Northern Searobin, Striped Searobin, Gulf Stream Flounder, Sea Raven, Longhorn Sculpin

b. Pelagic Species: Butterfish, Atlantic Herring, Bluefish, Weakfish

c. Pelagic/ Anadromous: American Shad, Alewife, Striped Bass

2. Shellfish: Surf Clam, Sea Scallop, American Lobster, Long-finned Squid, Rock Crab, Horseshoe Crab, Short-finned Squid, Jonah Crab

C. Endangered/Threatened Species:

The Material for Remediation placement in the HARS is not likely to affect Endangered/Threatened Species **(Battelle, 1997a)**. Disposal Inspectors (with marine mammal/sea turtle observation certification) are required to accompany each placement trip to the HARS. One of the Disposal Inspectors' duties is to observe the presence of Endangered/Threatened Species. Placement of the Material for Remediation is prohibited at the HARS if Endangered/Threatened Species are observed. EPA Region 2 has prepared a Biological Assessment (BA) **(Battelle, 1997a)** as part of the HARS SEIS Process for Finback Whale, Humpback Whale, Kemps Ridley Sea Turtle, and the Loggerhead Sea Turtle. The BA, which concludes that the designation of the HARS is not likely to affect the Finback Whale, Humpback Whale, Kemps Ridley Sea Turtle, and the Loggerhead Sea Turtle is available upon request.

8.2.5 Worm Body Burden Concentrations

Metals levels in worm **(Polychaetes)** tissue from the study area were similar to those in samples collected from outside the HARS Study Area (30 square nautical miles) but still within the Bight Apex **(EPA, 1997 and Battelle, 1997)**. Worm tissue concentrations of metals were relatively consistent across the HARS **(Table 3)**. Thus, metals levels in the worm tissue can be considered to be relatively invariant over broad regions of the inner Bight.

Organic compounds in worm tissue throughout the HARS were more variable than the metals **(Table 3)**. Generally, total PAH concentrations in the Study Area were significantly higher than those from the Apex **(Battelle, 1997)**. PCB levels in worm tissue from the Study Area were higher relative to outside Apex areas to the east and south **(Battelle, 1997)**. Pesticide levels in worms from the study area were generally low **(Table 3)**; total DDT concentrations

in worm tissue from areas to the east and southeast of the HARS Study Area were consistently lower than measured in samples from the HARS Study Area. Dioxin and furan levels in worm tissue were relatively similar within and outside the HARS Study Area (**Battelle, 1997**).

Table 3. Worm (Polychaetes) Tissue Concentrations in the HARS (Battelle, 1997)[1]

Parameter	Concentration
	(ug/kg wet weight or ppb)
Total PAH	244.28 to 928.18
Total PCB[2]	54.61 to 225.43
Total DDT	13.32 to 44.78
	(ng/Kg wet weight or pptr)
2,3,7,8-TCDD	2.96 to 5.84
	(μg/g wet weight or ppm)
Silver	<0.05 to 0.15
Arsenic	1.85 to 5.53
Cadmium	<0.04 to 0.12
Chromium	0.73 to 3.44
Copper	1.21 to 4.84
Mercury	<0.02 to 0.06
Nickel	0.57 to 1.84
Lead	1.37 to 6.22
Zinc	15.60 to 30.40

1 = Values reported for chemicals listed in the Regional Testing Manual (**EPA Region 2/USACE-NYD, 1992**). For additional information see **Battelle, 1997 and EPA, 1997.**
2 = PCB values should be multiplied by 2 in order to compare approximately with values from Regional Testing Manual (**EPA Region 2/USACE-NYD, 1992**).

8.3 HARS History

The NY Bight Apex which includes the HARS and surrounding area has been historically utilized for ocean disposal of dredged material and a variety of waste products (building materials, sewage sludge, industrial waste, garbage, mud, steam ashes, one man stone, derrick stone, and street sweeping) since the 1800s. The New York Bight Apex is defined as the area

of approximately 2,000 km^2 extending along the New Jersey coastline from Sandy Hook south to 40^0 10' latitude and east along the Long Island coastline from Rockaway Point to 73^0 30' longitude. Ocean disposal of garbage was eliminated in 1934, and other waste product disposal practices ended as a result of the passage of the Ocean Dumping Ban Act (sewage sludge disposal ended in 1992)(**Figure 3** depicts former EPA designated Ocean Disposal Sites in the New York Bight Apex). Dredged material placement in the New York Bight Apex began "officially" in 1888 at a point 2.5 miles south of Coney Island. At that time, the New York Harbor U.S. Congressional Act of 1888, established that the Supervisor of New York Harbor had the authority to grant permits for ocean disposal **(Williams, 1979)**. In 1900 the location was moved to a point one-half mile south and eastward of Sandy Hook Lightship, due to shoaling. In 1903 it was moved 1.5 miles east of Scotland Lightship **(Figure 4)**.

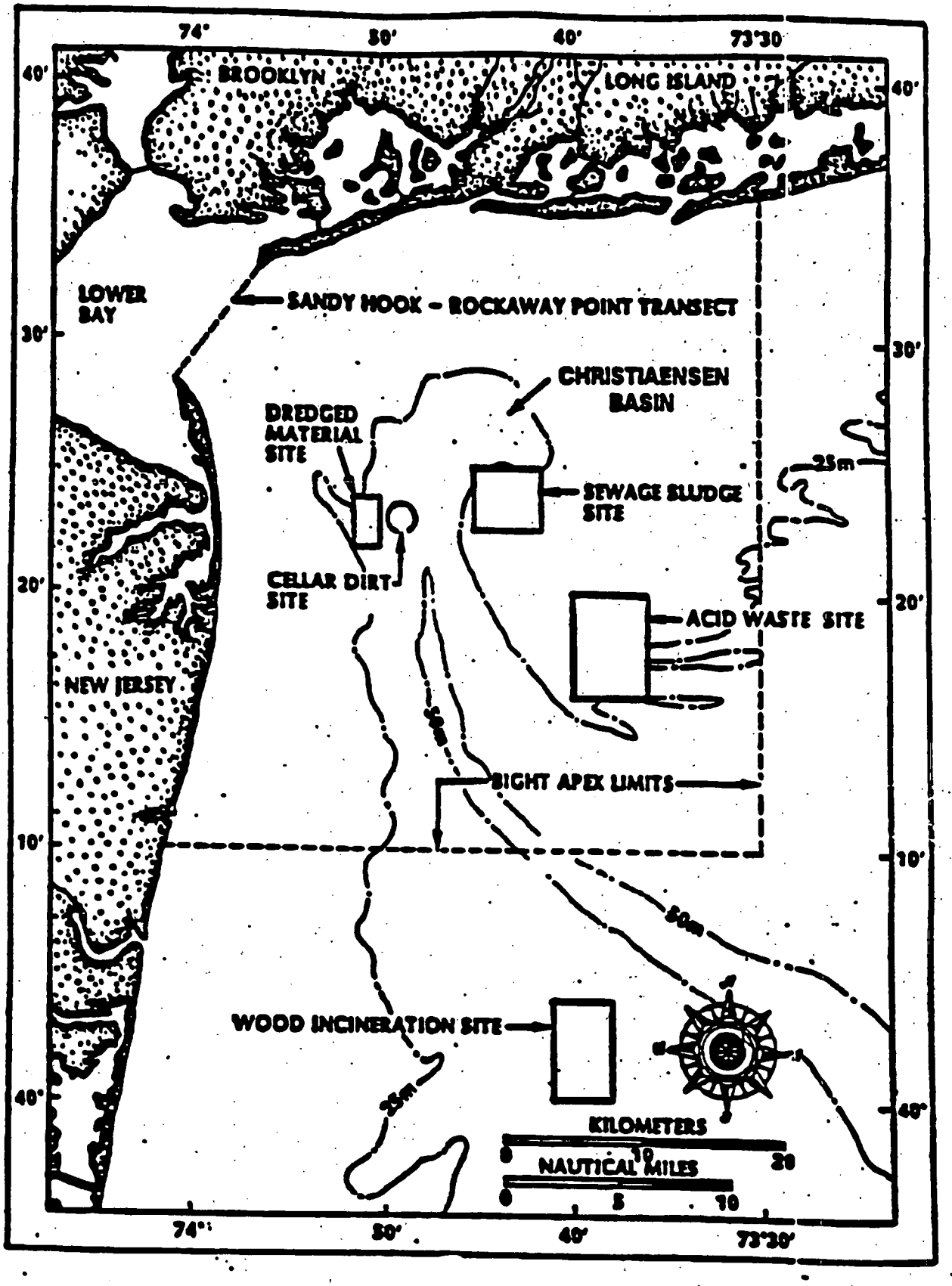
In 1972, the MPRSA was enacted, providing EPA with the authority to designate Ocean Disposal Sites. The MDS was designated as an Interim Ocean Dredged Material Disposal Site in 1973 and incorporated by regulation in 1977. In 1984 the MDS was designated as a "final" Ocean Dredged Material Disposal Site, with a maximum capacity of 100 million cubic yards of dredged material. Since 1984, approximately 72 million cubic yards of dredged material have been disposed of at the MDS. Although available documentation of disposal volumes prior to 1976 is sparse, between 1976 and 1983 approximately 47 million cubic yards of dredged material was disposed within the MDS. Very little information is available on the quantity of material historically disposed in the HARS. However, a description of the types of materials and historical disposal locations in the HARS is provided in **Williams, 1979**.

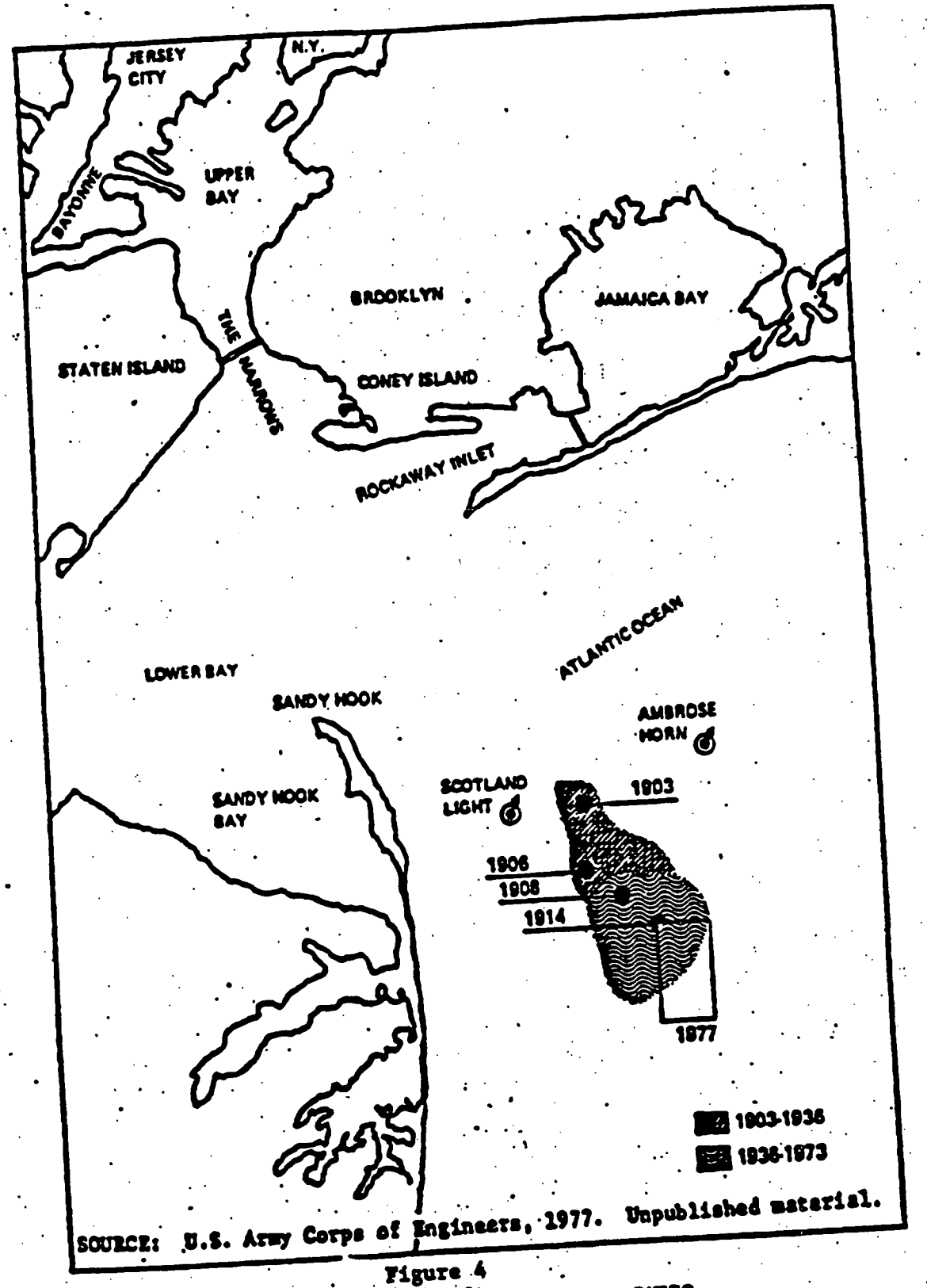
8.4 Transportation and Placement Methods Utilized at the HARS

The Material for Remediation will be placed at the HARS utilizing split-hull barges. Self-contained USACE hydraulic dredges, will be utilized for placement of the Material for Remediation for approximately 30 to 60 days per year. Permits issued will require (by contract specification and/or work order for Federal Navigation Projects) placement at a pre-determined location within the HARS. The placement location will be marked either by a single taut-moored buoy, with a specified placement radius, or a series of buoys designating the placement area boundaries. Buoys will be placed and maintained by the USACE-NYD and/or their representative. Specific instructions/requirements will be contained in the Department of the Army (DA) Permits issued by the USACE-NYD.

The PRA within the HARS is comprised of 9 areas; each area is approximately 1 square nautical mile in size. Placement of Remediation Material will be managed in priority order, beginning with Area 1 (highest priority for remediation) and ending with Area 9 (lowest priority for remediation) **(Figure 5)**. Each area's use will be discontinued upon completion of remedial activities and demonstration through bathymetry that at least a 1 meter cap (minimum required cap thickness) of the Material for Remediation has been placed over the entire area.

Figure 3: Former EPA Designated Ocean Disposal Sites



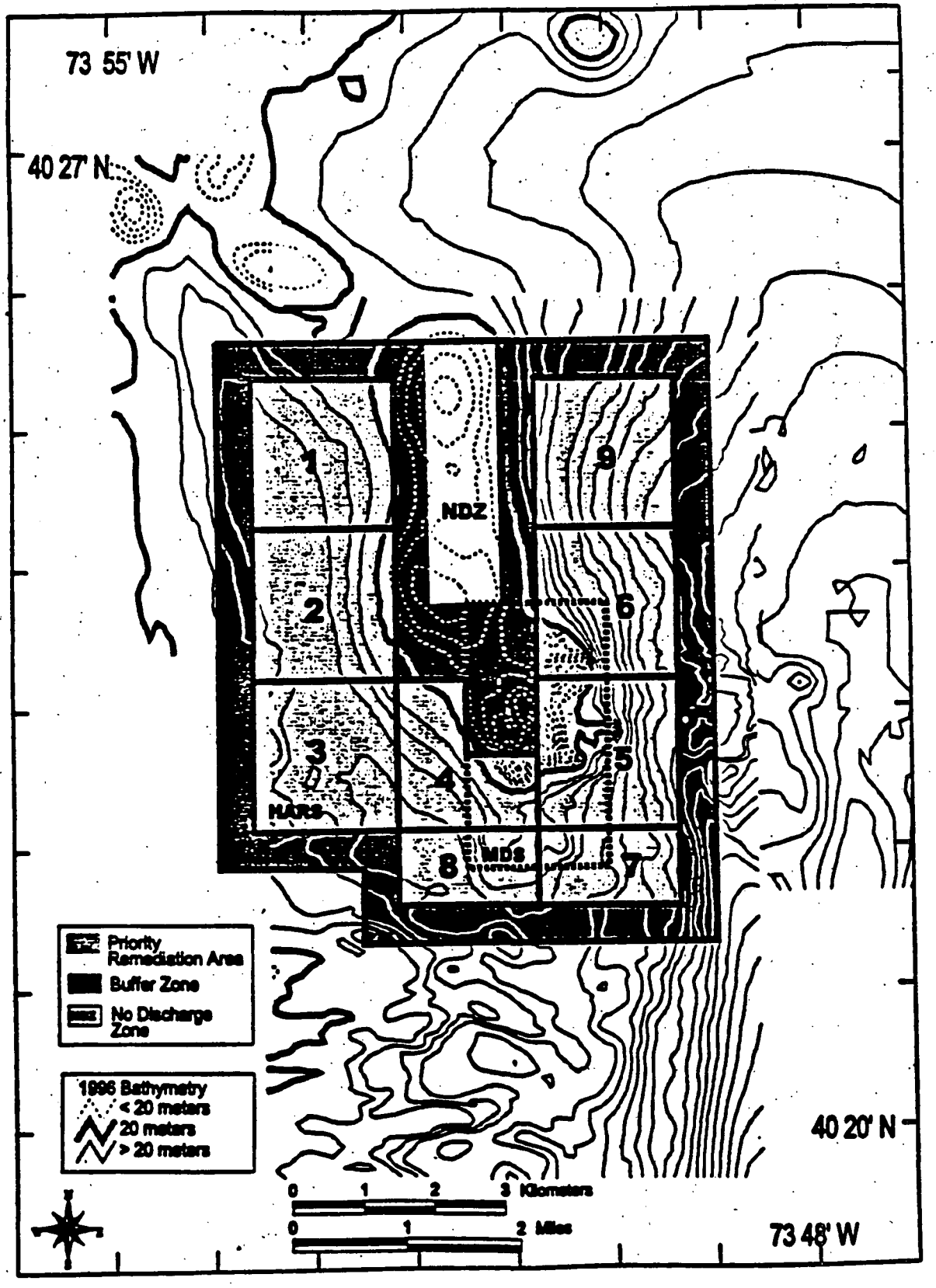


SOURCE: U.S. Army Corps of Engineers, 1977. Unpublished material.

Figure 4

HISTORICAL DREDGING DISPOSAL SITES

Figure 5: Remediation Areas 1-9



8.5 Enforcement Activities

EPA and the USACE-NYD have used past enforcement experiences to modify the guidelines for the ocean placement of the Material for Remediation at the HARS, in order to ensure that the placement of Material for Remediation in the HARS takes place in accordance/compliance with applicable permit conditions **(EPA Region 2/USACE-NYD, 1997)**.

9. Monitoring Program

MPRSA 102 (c)(3)(B) requires that the SMMP include a program for monitoring the site.

EPA Region 2 and the USACE-NYD have developed a tiered monitoring approach, similar in breadth and scope to the New England Division's Disposal Area Monitoring System (DAMOS). DAMOS is a regional program initiated by the New England Division of the USACE to investigate the physical, biological, and chemical impacts of ocean placement of dredged material at sites in the northeast **(Germano, 1993 and SAIC, 1993)**. Incorporating many of the guidelines, principles, and methods first instituted under DAMOS, the EPA Region 2/USACE-NYD's HARS Monitoring Program (HARSMP) will serve to address both the regulatory and technical issues associated with the open-water (i.e., ocean) placement of the Material for Remediation, and the HARS in general. Two different monitoring approaches and levels of intensity will be utilized: (1) for the entire HARS, and (2) for the specific remediation areas (1-9), within the PRA. The tiered approach is comprised of levels of increasing investigative intensity, and is an environmentally sound and cost-effective method for generating the technical information necessary to properly manage the HARS/PRA.

9.1 HARS Monitoring Program (HARSMP)

The HARSMP will focus on the overall impacts of the placement of the Material for Remediation on the entire HARS and each of the 9 individual remediation areas in the PRA. In addition to addressing the Null Hypotheses (H_0) (see Section 9.2) overall goals of the HARSMP are as follows:

A. The HARS will be remediated with uncontaminated dredged material (i.e., dredged material that meets current Category I standards and will not cause significant undesirable effects including through bioaccumulation).

B. To continue to verify that the Material for Remediation placed at the HARS for the purpose of remediation does not cause any significant adverse environmental impacts, and does cause desirable impacts, such as non-toxicity to amphipods. The phrase "significant adverse environmental impacts" is inclusive of all significant or potentially substantial negative impacts on resources within the HARS and vicinity. Factors to be evaluated include:

1. Movement of materials into estuaries or marine sanctuaries, or onto oceanfront beaches, or shorelines;

2. Movement of materials toward productive fishery or shell fishery areas;

3. Absence from the HARS of pollution-sensitive biota characteristic of the general area;

4. Progressive, non-seasonal, changes in water quality or sediment composition at the HARS, when these changes are attributable to the Material for Remediation placed at the HARS;

5. Progressive, non-seasonal, changes in composition or numbers of pelagic, demersal, or benthic biota at or near the HARS, when these changes can be attributed to the effects of the Material for Remediation placed at the HARS;

6. Accumulation of the Material for Remediation constituents in marine biota near the HARS.

C. To continue to assess and monitor sediment quality improvement as a result of remediation activities at the HARS as compared to the HARS Baseline Data (40 CFR Section 228.9 and Section 228.10) and the Impact Category I conditions in the PRA within the HARS (40 CFR Section 228.11).

9.2 Questions/Hypotheses (H_o) to be addressed by Monitoring/Surveillance Activities in the HARSMP:

The most frequent application of statistics in research is to test a scientific hypothesis **(Sokal and Rohlf, 1981)**. The hypothesis being tested is called the null hypothesis (H_o). EPA recommends use of null hypotheses in developing monitoring programs **(EPA, 1991 and EPA/USACE, 1996)**. Acceptance or rejection of the null hypothesis is typically based upon statistical tests (e.g., Analysis of Variance, T-tests, Regressions, Averages, Medians, Standard Deviations) at various standard significance levels. If we reject the null hypothesis, then we are accepting the alternative hypothesis, which is typically stated as the converse of the null hypothesis.

The types of data and frequency of data collection that are necessary to test each hypothesis are described in Section 9 of the HARS SMMP, specifically in **Table 4**. The data collected during each tier will be utilized to accept or reject the specific null hypothesis being tested/evaluated using standard statistical tests for significance.

Null Hypotheses (H_o):

Monitoring information will be utilized to test the following null hypotheses:

H_o1: Placement of the Material for Remediation has modified the sediment characteristics such

that all areas in the PRA within the HARS have been remediated?

Actions:
-Conduct Tier 1 Bathymetry
-Conduct Tier 2 Sediment Toxicity Tests annually in the specific area(s) (1 through 9 depending upon placement schedule) where the Material for Remediation has been placed.
-Upon satisfaction that at least one meter of the Material for Remediation has been placed in any given remediation area (through use of precision bathymetry), Tier 1 and 2 post-remediation monitoring activities will be required.

H_o2: The PRA has been capped with at least 1 meter of the Remediation Material.

Actions:
-Conduct Tier 1 bathymetry quarterly in the specific remediation area(s) (1 through 9 depending upon disposal schedule) where the Material for Remediation has been placed and annually for the entire HARS.
-Continue remediating with Remediation Material until precision bathymetry indicates each of the PRA areas (1 through 9) has been remediated with at least 1 meter of Remediation Material.

H_o3: Remediation Material placement operations are consistent with the requirements of the issued permits.

Actions:

-Utilize the USACE Certified Disposal Inspector Reports and information submitted by permittees to determine compliance.
-Conduct independent surveillance of remediation operations
-See Section 10 for corrective actions/enforcement

H_o4: Major storms (hurricanes, northeasters, etc.) are not causing erosion/loss of cap material such that less than 60 cm (24 in) of cap material exists over the remediated areas within the HARS (including capped mounds inside the boundaries of the former MDS).

Actions:

-Conduct Tier 1 post-storm bathymetry surveys
-Implement contingency capping with Material for Remediation, as necessary to 1 meter.

H_o5: Remediation Material placement operations are not causing significant unacceptable impacts (physical, chemical, biological) at the HARS and surrounding area.

Actions:

-Conduct Tier 1 bathymetry to detect any loss of Remediation Material and pre-HARS dredged material from the HARS.
-Conduct Tier 2 sediment chemistry biennially on the entire HARS or sooner for a specific PRA area (1 through 9) upon determination of successful remediation (Post-remediation monitoring).
-Conduct Tier 3 benthic community structure analyses biennially within the HARS and surrounding area (sooner if Tier 1 and 2 results trigger additional monitoring).

H_o6: Remediation Material placement at the HARS has no significant direct impact on endangered/threatened species.

Actions:

-Review Certified Disposal Inspector Reports to ensure that the Material for Remediation is not being placed in the HARS in the presence of any marine mammals/endangered turtles.
- Monitor marine mammals/sea turtle landings/strandings.

EPA Region 2 and the USACE-NYD have concluded that routine placement of Remediation Material at the HARS will not have any impacts on marine mammals/sea turtles (NMFS concurred with this conclusion on July 30, 1997). However, EPA Region 2 and the USACE-NYD monitor marine mammals/sea turtle landings/strandings in order to determine if there is any correlation between strandings and HARS placement activities.

H_o7: Remediation Material placement does not significantly (see definition of significant adverse impact) alter the benthic community structure of the HARS or surrounding area in the long-term (i.e., allowing sufficient time for re-colonization by the same or similar organisms).

Actions:

- Utilize annual Tier I REMOTS®/SPI (See Section 9.8 for description of technology) to assess sediments distribution and other sediment properties/characterization.
-Conduct Tier 3 Benthic Community Structure Monitoring biennially or sooner if Tier 1 and Tier 2 results trigger additional monitoring.

9.3 The HARSMP

The tiered HARSMP consists of the following three tiers:

The tiers are structured based upon the type of monitoring (physical, chemical, biological) required and do not need to be conducted sequentially. However, the results of the lower tiers will be evaluated and utilized where applicable to initiate higher tiered monitoring **(Table 4)**.

Tier 1: Physical Monitoring

Determine the physical distribution of the Material for Remediation after its placement at the HARS (i.e., assess whether material conformed to the placement design). Types of measurements will include: plume tracking, bathymetry, sidescan sonar, sub-bottom profiling, REMOTS®/SPI, sediment coring, and wave/current measurements.

Tier 2: Chemical Monitoring

Determine the chemical distribution of contaminants of concern on sediment quality and evaluate bioaccumulation of contaminants of concern in benthic organisms (body burden levels). Types of measurements will include sediment toxicity, sediment chemistry, and analysis of the body burden levels of contaminants within target marine species and/or determination of other sub-acute community effects (i.e., have levels of contaminants in indigenous marine species significantly changed in comparison to those in the surrounding environment?) This tier will be further subdivided so that sediment chemistry will be the trigger to proceed to the next step within the tier. Analytical methods, detection limits, and quality assurance information is contained in the EPA Region 2/USACE-NYD Regional Testing Manual **(EPA Region 2/USACE-NYD, 1992)**. Analyses are typically conducted by EPA Region 2, USACE-NYD, and/or contract laboratories.

Worm tissue (body burden levels) will be collected and archived synoptically with Tier 2 Surficial Sediment Chemistry collections. Worm tissue may be analyzed based upon Tier 2 Surficial Sediment Chemistry results. If EPA Region 2 and the USACE-NYD are unable to collect sufficient worm biomass from the remediation area/capped mound due to insufficient time being allowed for re-colonization, an additional sampling effort will be conducted at a later date (seasonally dependent) to collect the necessary worm tissue samples.

The main sampler utilized for collecting Tier 2 Surficial (up to 20 cm) sediments within the HARS is a Young-Modified Van Veen Grab Sampler. Various coring devices are utilized for collecting sediment cores. A vibro-core is typically utilized for collecting sediment at depths and for Tier 2 coring **(Table 4)**.

Tier 3: Biological Monitoring

Determine the long-term changes, if any, that would occur to benthic marine resources in and around the HARS (i.e., have physical or other effects resulted in potentially adverse impacts on the surrounding marine resources?). Types of measurements will include benthic community structure (utilizing accepted REMOTS®/SPI technology and standard benthic community structure measurements of species diversity, abundance, biomass) and fish/shellfish distribution surveys. The benthic community will be considered to be significantly altered if there is a statistically significant change from the baseline data (Baseline Data) based on the above measurements.

9.5 Frequency of Monitoring: **(Table 4)**

Implementation of HARSMP activities will take place at a required frequency and as necessary depending upon tiered monitoring results **(Table 4)**. If results indicate exceedances of trigger level(s) then decisions will be made as to whether field surveys, additional investigations, or management actions are necessary (Trigger Section 9.6).

EPA Region 2 and the USACE-NYD will convene a Scientific Review Panel (SRP), consisting predominantly of professionals from the fields of engineering, oceanography and representatives of governmental resource agencies, to review the HARS SMMP and relevant monitoring data. Membership will include representatives from academia, federal agencies, state agencies, public interest groups, port representatives, and consultants. Attendance at meetings will be by invitation only. All data reports and meeting minutes will be distributed to any interested person/party upon request. SRP meetings will be scheduled annually.

Table 4. HARSMP Types and Required Frequency of Monitoring

Type of Monitoring	General/Full HARSMP Monitoring	Remediation Area (1-9) Monitoring	Notes/Misc.
Bathymetry Tier I	Annually Post-Storm-as needed[1]	Quarterly per remediation area[2]	[1]Depends on Intensity of Storm [2] Depends on remediation activity
REMOTS®/SPI Tier I	Annually Post-Storm-as needed[1]	Quarterly per remediation area[2]	
Sidescan Sonar + Sub Bottom Tier I	Annual	Not Required[3]	[3]Not required unless data indicate need for further Tier I, II and/or III work
Coring/Surficial Physical Analyses Tier I	As needed[3,4]	As needed[3,4]	[4]Will be decided on a case by case basis
Plume Tracking Tier I	Not Required[3]	As needed[4]	

Type of Monitoring	General/Full HARS Monitoring	Remediation Area Monitoring (1-9)	Notes/Misc.
Surficial Sediment Toxicity Tier 2	biennially or sooner if needed[5]	Annually per remediation area or sooner of needed[2]	[6]Sooner if Tier I results trigger Tier II investigations or if specific remediation area is sufficiently remediated.
Body Burden Levels Tier 2	Collect with sediment and archive. Analyze as needed[6]	Not Required[3]	[6]As needed if results from Tier 1 and Tier 2 trigger additional Tier 2 work
Coring Chemical Analyses Tier 2	Collect as described under coring (Tier 1) above and archive. Analyze as needed[6,7]	Not Required[3]	[7]Toxicity/chemistry may be required in order to differentiate between the Material for Remediation and ambient PRA sediments.
Benthic Community Structure Tier 3	Biennial or sooner if needed[8]	As needed[9]	[8]If Tier II results trigger Tier III investigations
Fish/Shellfish Surveys in Bight/Apex[10] Tier 3	As needed[10]	Not Applicable	[10]Work with NOAA and States on improving/increasing Bight/Apex Monitoring

Additional Information on Notes:

Note#1: Post-storm monitoring is based upon reaching the storm intensity threshold defined in trigger #2.

Note #2: If there is no remediation activity in a given remediation area, then there will be no bathymetry or surficial sediment toxicity conducted.

Notes #5, #6: Upon satisfaction that any Remediation Area (1-9) has been completely covered with at least one meter of Remediation Material, through the use of precision bathymetry, REMOTS®/SPI (Tier 1), Surficial Sediment Chemistry (Tier 2), Surficial Sediment Toxicity (Tier 2), and collection of Body Burden Level samples (Tier 2) will be expeditiously conducted. In addition, should any Tier I data or other information indicate exceedance of a Trigger Level, EPA Region 2 and the USACE-NYD will initiate making decisions as to whether field surveys, additional investigations (Tier II and/or III other than the pre-determined frequency required in the General/Full HARSMP Monitoring Section), or management actions, are necessary.

Note #7: EPA Region 2 and the USACE-NYD will evaluate Tier II monitoring data (Surficial Sediment Chemistry, Surficial Sediment Toxicity, Body Burden Levels, and Coring Chemical Analyses) collected at the pre-determined frequency indicated in the General/Full HARS Monitoring Section and determine if Tier III monitoring is necessary. In addition, should any Tier II data or other information indicate exceedance of a Trigger Level, EPA Region 2 and the USACE-NYD will initiate making decisions as to whether field surveys, additional investigations (Tier II and/or III other than the pre-determined frequency required in the General/Full HARSMP Monitoring Section), or management actions are necessary. Additional sampling will be based upon results from Tier I and II monitoring.

Note #8: Additional sampling will be based upon results from Tier 1 (physical) monitoring.

Note #9: Benthic Community Structure can be affected by grain size, and as such, Tier 3 work could be initiated based on Tier 1 results. Benthic Community Structure (Tier 3) samples will be collected and analyzed no later than one year after the date on which any Remediation Area (1-9) has satisfactorily determined to be completely covered with at least one meter of Remediation Material (the one year is in order to allow re-colonization and equilibration of the benthos).

9.6 Trigger Levels:

The trigger levels are levels that will initiate making decisions as to whether field surveys, additional investigations, or management actions are necessary. Specific trigger levels/actions will be decided between EPA Region 2 and the USACE-NYD on a case-by-case basis. Based on the type of event/action that has occurred, EPA Region 2 and the USACE-NYD will work to implement the appropriate tiered action (or subset of actions) within the tiered HARSMP. Further, appropriate actions will be taken to mitigate the problem or other unacceptable situation. The following general trigger levels will apply:

1. Loss of Remediation Material, such that less than 60 cm (24 in) of remediation/cap material exists over the remediated areas within the HARS (including capped mounds inside the boundaries of the former MDS) will result in appropriate action, which may include the implementation of some type of contingency capping operations and/or trigger Tier 2 investigations in the appropriate location(s) (sediment chemistry, toxicity).

Trigger No. 1 and H_o2 are designed to ensure that there is never less than 60 cm (24 in) of Material for Remediation at any time on the remediated areas within the HARS (including capped mounds inside the boundaries of the former MDS). EPA Region 2 and the USACE-NYD will not average values around the existing caps in the MDS and the Material for Remediation to be placed in the PRA to achieve an average Remediation Material thickness. Instead, all areas of the HARS will be evaluated individually to determine absolute Material for Remediation thickness.

Precision bathymetry (Tier 1) is the most accurate method for determining cap thickness across the entire capped mound/remediation area. Precision bathymetry has an approximate error/sensitivity range of +/- 1 foot (30 cm). Thus, in order to say with statistical confidence that the Tier 1 precision bathymetry is showing a "loss" of the Remediation Material, we need to experience at least a 30 cm loss of cap/Remediation Material.

EPA Region 2 and the USACE-NYD are allowing a 40 cm loss prior to initiating any contingency capping operations and/or additional monitoring. Various experts have concluded that a practical capping thickness for biological isolation/remediation ranges between 30 and 50 cm **(SAIC, 1997)**. EPA Region 2 and the USACE-NYD believe that a 60 cm cap should sufficiently protect against bioturbation; thus, at least a 1 meter cap (minimum required cap thickness) is utilized to be conservative and provide for an extra degree of protection for the Material for Remediation against storm-induced erosion. EPA Region 2 and the USACE-NYD will evaluate the precision bathymetry results on a case-by-case basis (and area-by-area) to decide if any contingency placement and/or additional monitoring is necessary.

2. Sustained storms (hurricane, northeaster, etc...) generating wave heights in excess of 4 meters and/or wave periods of 10 seconds or greater (at the HARS) will "trigger" timely and appropriate post-storm investigations, as to whether field surveys are warranted (See Baseline Section for discussion/analysis of wave patterns).

3. Statistically significant increase in sediment/tissue chemical concentrations above baseline (See Section 6) will trigger timely investigations as to whether Tier 3 biological investigations are warranted. Upon identification of statistically significant sediment concentration increases, EPA Region 2 and the USACE-NYD will examine monitoring data to determine the cause, if possible, and decide upon corrective management actions (additional remediation, move remediation location, etc...).

4. Tier 2 surficial sediment toxicity tests indicating biologically significant amphipod toxicity in areas determined to have been remediated will trigger timely investigation as to whether additional Tier 2 analyses are required and if additional placement of the Remediation Material is needed.

9.7 Quality Assurance:

Monitoring activities will be accomplished through a combination of EPA Region 2 and USACE-NYD resources (employees, vessels, laboratories) and contractors. Documentation of QA/QC is required by both agencies for all monitoring activities (i.e., physical, chemical, and biological sampling and testing). QA/QC is documented in the form of Quality Assurance Project Plans (QAPP) and/or Monitoring Work Plan. QAPPs are required for all EPA Region 2 and USACE-NYD monitoring activities. Analytical methods, detection limits, and QA procedures are contained in the EPA Region 2 and USACE-NYD Regional Testing Manual **(EPA Region 2/USACE-NYD, 1992)**.

9.8 Description of Monitoring Technologies and Techniques:

The following is a description of the various types of monitoring activities/procedures discussed above.

A. Physical Monitoring (Long-term/Short-term)

1. REMOTS® or Sediment Profiling Imagery (SPI)

REMOTS®(Remote Ecological Monitoring of the Seafloor) technology would be implemented at each historic and on-going remediation area to map the distribution and condition of the placed Material for Remediation. The REMOTS® sediment profile imaging camera can rapidly collect and process information on sea floor conditions while documenting organism-sediment relationships. By utilizing a grid sampling strategy at the HARS based on a previous REMOTS®baseline survey in 1995 (**SAIC 1995a+b**), REMOTS®will determine grain size, evaluate benthic habitat conditions, document the process of recolonization in the remediation areas, map out areas of erosion and deposition, determine the redox potential discontinuity depth for degree of bioturbation and recolonization, and determine extreme levels of organic loading by analyzing for sedimentary methane. REMOTS® imagery will be able to derive physical dynamics at the site from the sedimentary structures observed. Automatic disk storage of all parameters measured allows data to be compiled, sorted, statistically compared, and graphically displayed.

EPA Region 2 and the USACE-NYD routinely utilize the patented capability of SAIC REMOTS® and SeaFloor Photography technology to photographically record benthic community structure. Good examples of these technologies can be found in **SAIC (1996 a + b)**. REMOTS® is a formal and standardized technique for sediment-profile imaging and analysis **(Rhoads and Germano, 1982)**. REMOTS ®can be utilized to rapidly and inexpensively measure mud clasts, measurement of the Material for Remediation and cap layers, apparent Redox Potential Discontinuity (RPD) Depth, sedimentary methane, infaunal successional stages, and the Organism-Sediment Index (OSI). Seafloor photography supplements the REMOTS® to provide planform images indicating sediment types, bedforms, and kinetic energy/sediment dynamics.

2. Precision Bathymetry

This type of survey is usually scheduled based on the volume of the Material for Remediation placed, and future Material for Remediation projects. Bathymetric survey lane spacing and the extent of areal coverage will be emphasized in remediation areas such as the historic disposal mounds and all on-going remediation areas. Two and 3-D Topographic Maps and sediment accumulation difference maps will be generated for each survey and compared with the previous surveys to determine remediation cap thickness.

a. The USACE-NYD will schedule hydrographic field surveys of specific areas within the HARS **(See Table 4)**. These bathymetric surveys will encompass: a) the active remediation locations within the confines of the HARS and will be performed by the USACE-NYD, b) surveys of the PRA and HARS will be conducted primarily by firms under contract to the USACE-NYD, c) regions of the site where the placement of the Material for Remediation is proposed (prior to the relocation of placement buoys), and d) additional areas of interest which may be added on an "as needed" basis.

b. Copies of all HARS data and survey results are transmitted to the EPA Region 2.

3. Sidescan Sonar/Sub-bottom Profiling Imagery

Sidescan sonar surveys have been a very effective tool for mapping the configuration and sediment surface features of the seabed within the HARS. Use of this technique permits complete coverage of broadscale surface areas of the HARS and the environs directly adjacent to the HARS. Information pertaining to topographic seafloor morphology is also obtained.

Sub-bottom profiling is valuable in determining the maximum depth of burial of various sediment type interfaces (as in a remediation capping operation) where two or more distinctly different layers of material would be encountered. In conjunction with other types of analyses, sub-bottom profiling is useful in determining discrete thicknesses of a cap.

Sidescan sonar and sub bottom profiling provide useful information in determining sediment characteristics, sediment dynamics, remediation cap integrity and thickness. However, this data does not stand alone and is combined with other Tier 1 monitoring tools (bathymetry, coring) to determine remediation cap thickness and integrity. Sidescan sonar is particularly useful in conducting a large-scale sediment quality (fine grained vs. coarse) "snapshot" of the HARS. If a severe storm impacts the HARS causing erosion and transport of in-place material, EPA Region 2 and the USACE-NYD could conduct a sidescan sonar survey to compare with previous annual sidescan sonar survey to determine any change to HARS sediment features. This in turn can be utilized to determine the need for and the location of sediment chemistry samples.

4. Sediment Coring

Gravity and vibro-core surveys of distinct areas within the HARS have been accomplished on an infrequent basis since November 1991. Core heights have ranged between 4-8 ft. penetrating several heterogeneous sediment horizons of the Material for Remediation through to the bed or basement material. In the past, subsamples from discrete core depths from specific sample sites have been taken for chemical analyses to determine the effectiveness of cap thicknesses in isolating contaminants. Should sediment cores be required, they will be collected to a sufficient depth to represent the remediation layer.

5. Wave/Current Measurements

Placement of bottom-mounted, in-situ wave/current meters have been used to measure the wave and current regimes, to determine bottom stress at the HARS. Attached to the meters are underwater cameras to record sediment resuspension, and transmissometers to measure the frequency and duration of the resuspension events.

B. Chemical Monitoring (Long-term/Short-term)

Sediment chemistry of field-collected samples utilizing two techniques (i.e., coring and surficial grabs) are analyzed for numerous contaminants that may be derived from the Material for Remediation placement.

C. Biological Monitoring (Long-term/Short-term)

Recently conducted studies have included: bluefish, blackfish, fluke, sea bass, and lobster **(NOAA, 1995, NOAA, 1996, and NOAA 1996a)**. Target species will be collected utilizing a variety of sampling gear, including but not limited to trawl nets, traps, and hook and line. Targeted contaminants to be analyzed, analytical methods, and detection limits will be the same as in previous studies **(NOAA, 1995, NOAA, 1996, and NOAA 1996a)**.

1. Biological monitoring of resident and migratory fishery resources to determine contaminant effects from pre-HARS dredged material disposal has been performed at locations in and around the HARS.

2. Chemical analyses of tissue collected from invertebrates (polychaete worms), shellfish (crabs and lobsters) and vertebrates (recreational fish) have also been accomplished.

10. HARS Remediation Permit Conditions and Management Practices

MPRSA 102 (c)(3)(C) requires that the SMMP include special management conditions or practices to be implemented at the site that are necessary for the protection of the environment.

10.1. Regulatory Framework

Department of the Army (DA) permits will be issued for HARS remediation activities, and typically are valid for a period of three years. Copies of the issued permits or the letters modifying these permits can be obtained from the USACE-NYD, which issues the documents. Placement of the Material for Remediation cannot occur at the HARS without a permit (or MPRSA Section 103 (e) equivalent, e.g. Federal projects authorized by Congress).

10.1.1. Pre-Dredging Coordination

a) Response Letter

Fourteen (14) days prior to the commencement of dredging operations, the permittee and/or the dredging contractor will be required, as per special condition of the DA permit issued by the USACE-NYD (Contract Specification and/or Work Order for Federal Projects), to send a **Response Letter (Attachment No. 1)** by certified mail. The primary purposes of the Response Letter are to:

i. allow the USACE-NYD to verify before the dredging activity is undertaken that certain conditions and/or requirements listed in the DA permit are being complied with, and

ii. provide the USACE-NYD ample time to respond to the permittee/contractor notification with the exact location where placement of the proposed Material for Remediation will take place.

An appropriate location for remediation is determined through consideration of the best management practices (examples include required volume of the Material for Remediation , proximity to site boundaries, weather conditions, in-situ current and tidal regimes, consideration of water depth criteria, seafloor topography, and remediation priority). The final selection is jointly decided upon by EPA Region 2 and USACE-NYD. Pertinent sections of the Response Letter are to be completed by the permittee; the remaining sections pertaining to the location of placement buoys will be completed by the USACE-NYD before being forwarded to the permittee/dredging contractor.

A management depth will be applied to each project placed at the HARS. The "management depth" will be included as a Permit Condition (Contract Specification and/or Work Orders for Federal Projects) for that particular project. The management depth for dredged material placed at the MDS was 45 feet BMLW. This depth was established in order to address shipping and navigation concerns. This same depth will be established for the HARS in order to address shipping and navigation concerns. However, since most of the areas in the PRA are below 65 feet BMLW, and coverage with at least 1 meter of the Material for Remediation is required, the remediated areas should remain well below 45 feet BMLW. Further, placement buoys will be moved when remediation has been successfully completed around a given placement buoy, thus providing for efficient placement of the Material for Remediation by preventing significant mounding, thereby allowing for faster remediation of the HARS. The placement locations will be chosen to provide for the placement of at least 1 meter of Remediation Material over the PRA. Remediation will begin in Area 1 of the PRA until at least a 1 meter cap (minimum required cap thickness) has been placed over all of Area 1. Area 2 will be next, etc...

10.1.2. Permit Conditions

a) General -- Consist generally of standard maritime industry and U.S. Coast Guard

regulation requirements.

These are standard conditions set forth so that a waterborne/sea-going activity can be carried out within the minimum or basic guidelines set, primarily for safety reasons, by the regulating authority. In most if not all cases the U.S. Coast Guard is that authority.

b) Special/Specific -- Are listed in the text of the Permit and will include:

1) Remediation area (1 through 9).

2) Seasonal restrictions or limitations regarding dredging or special conditions with respect to placement of the Remediation Material.

3) Requirements for the submission of monthly transportation and Remediation Material placement logs and volume summary sheets.

4) Reporting requirements for missing, sinking, and/or off-station placement buoys, etc.

5) Guidance pertaining to aspects of the remediation activity; including placement buoy coordinates, release/discharge procedures, and requirements to discharge at specified buoy location. Further, if upon arrival at the HARS, the placement buoy(s) are not visible and/or missing, remediation shall occur within the area specified by buoy coordinates. In order to ensure such action, the use of recommended navigational aids must be documented. The disposal inspector is required to record this on the **Transportation and Remediation Placement Log (Attachment No. 2)** and notify the USACE-NYD.

6) Records of Project Area history of each Material for Remediation dredging project

7) Timing and location of ocean placement events (single and/or multiple) shall be conducted in order to comply with the required Limiting Permissible Concentration (40 CFR Section 227.27) at any and all locations in and outside the HARS (after allowance for initial mixing (40 CFR Section 227.29)).

8) Remediation instructions: **(See Section 10.2.2).**

9) Prohibition on remediation in 4 locations that contain ship wrecks **(See Section 10.2.2).**

10.1.3. Federal Authorization

In cases where permits are not issued, as is the case with Federal Navigation Projects, the

above permit conditions will be incorporated into the Material for Remediation dredging contract specifications (see MPRSA Section 103 (e)). When USACE vessels conduct the dredging, "permit"-like instructions are contained within the Contract Specifications and/or Work Orders for the project. These conditions are equivalent to permit conditions and will be enforceable under applicable law.

10.1.4. Violation/Enforcement Cases and Corrective Actions

1. If any action takes place which does not conform to authorized activities described in any permit (Contract Specification and/or Work Order for Federal Projects), reauthorization, response letter, remediation requirements, seasonal restriction, and/or remediation operation, the USACE-NYD should be notified immediately by the USACE Certified Disposal Inspector. In cases where activities beyond the scope of those authorized occur, appropriate action will be determined by consultation between EPA Region 2 and the USACE-NYD.

2. Dredging or remediation activity occurs only with prior USACE-NYD and EPA Region 2 approval. Those projects not in compliance with regulatory requirements will be subject to enforcement action.

3. A USACE Certified Disposal Inspector must accompany all trips for placement of Remediation Material at the HARS and be present during all Remediation Material placement events in order to certify compliance with the USACE-NYD permit conditions. The Certified Disposal Inspector is required to complete, sign, and submit a **Transportation and Remediation Placement Log (Attachment No. 2)** for each event.

a. The New England Division (NED) of USACE periodically conducts certification courses, open to all persons interested in becoming a USACE Certified Disposal Inspector. A list of all USACE Certified Disposal Inspectors endorsed by both NED and the USACE-NYD is available from either Corps installation/office. A copy of the list of Corps inspectors who are presently serving on HARS remediation events can be obtained from the USACE-NYD. These individuals are also qualified to serve as Marine Mammal and/or Sea Turtle observers.

b. The USACE-NYD has adopted all aspects and principles of the NED inspector program and has incorporated them into the remediation management practices at the HARS. A copy of the NED guidance manual, entitled: *Guidance for Inspectors on Open Water Disposal of Dredged Material,* can be obtained from the USACE-NYD.

4. USACE-NYD and EPA Region 2 (and/or their designated representatives), reserve all rights under applicable law to free and unlimited access to and/or inspection of (through permit conditions):

I. the Remediation Material dredging project site including the dredge plant, the towing

vessel and scow at any time during the course of the project.

ii. any and all records, including logs, reports, memoranda, notes, etc., pertaining to a specific dredging and Remediation Material placement project (Federal or non-Federal).

iii. towing, survey monitoring and navigation equipment.

5. Navigation logs will be maintained for each vessel (tugboat/barge) utilized for remediation activities. These logs should include the method of positioning (RADAR, LORAN-C, GPS, D-GPS, Dead Reckoning, or other), accuracy, calibration methods, any problems and actions taken. EPA Region 2 and the USACE-NYD recommend that each tugboat/barge utilized for the placement of Remediation Material at the HARS utilize D-GPS for navigation purposes.

6. If the Material for Remediation regulated by a specific DA permit issued by the USACE-NYD or Federal authorization is released, due to an emergency situation to safeguard life or property at sea in locations or in a manner not in accordance with the terms or conditions of the permit or authorization, the master/operator of the towing vessel and/or the USACE Disposal Inspector shall immediately notify, by marine VHF or cellular telephone, the USACE-NYD of the incident, as required by permit. The USACE-NYD shall copy EPA Region 2 on such notification the next business day. In addition, both the towing contractor and the USACE-certified disposal inspector shall make a full report of the incident to the USACE-NYD and EPA Region 2 within ten (10) days. The report should contain factual statements detailing the events of the emergency and an explanation of the actions that were ultimately taken.

7. Results from HARSMP (Section 9) will be continuously reviewed with respect to HARS remediation management practices and permit conditions to determine if any corrective actions or modifications are required.

10.1.5. Inter-Agency Cooperation

If any of the placement buoys are missing, off-station, sinking, or damaged in any way, the USACE-NYD will immediately contact the United States Coast Guard (USCG), First District Offices, Operations Division, Aids to Navigation Section, Boston, Massachusetts (Telephone Number is 617-223-8338), so that a Notice-to-Mariners broadcast and announcement can be issued. The assistance of the USCG in informing vessel traffic of errant placement buoys is accomplished under general inter-agency cooperation. The USACE-NYD is presently responsible for maintenance, repair and/or replacement of all surface markers and placement buoys placed at the HARS.

10.1.6. Data Management: Processing, Evaluation and Interpretation

A. Data collected from HARS surveys are processed and analyzed by the USACE-NYD, EPA Region 2 and/or their respective contractors. These data are used to make management decisions regarding the Material for Remediation placement operations and permit decisions. In addition, the USACE-NYD, WES, and their contractor Science Applications International Corporation (SAIC), have developed a desktop personal computer-driven Geographical Information System (GIS) to better manage the placement of the Material for Remediation at the HARS. The Disposal Analysis Network for New York (DAN-NY) System will allow the USACE-NYD and EPA Region 2 to utilize existing and future field data (bathymetry, sidescan sonar, chemistry, biology, etc...) from the HARS to calculate the Remediation Material needs at the HARS and better manage the remediation of the HARS, and monitor the HARS. USACE-NYD, WES, and EPA Region 2 will both have PC workstations capable of running the DAN-NY System.

The system was designed as a data base for most of the information the USACE-NYD is required to collect and is not limited to survey data.

B. A spreadsheet file containing contractor-reported scow volume information is maintained by the USACE-NYD. All remediation records and submitted monthly Remediation Material placement volumes for each project are proofread, verified and any discrepancies are corrected. The data file contains the following information:

1. Permit/Federal Project number
2. Permittee or Federal Project name
3. Waterway
4. Reach/Channel
5. Was the Remediation Material dredging project maintenance, widening or deepening?
6. Remediation area/buoy at which the Material for Remediation was placed
7. Remediation activity commencement date
8. Remediation activity completion date
9. Volume of Material for Remediation placed at the HARS.
10. Volume of Material for Remediation placed year-to-date at the HARS
11. The break-down of volumes generated by private (non-federal) and federal navigation projects noted separately
12. The year-to-date volumes of private (non-federal) and federal navigation projects noted separately
13. The year-to-date volume of private (non-federal) and federal navigation projects noted collectively (i.e., total volume for the year)

C. An annual HARS Material for Remediation volume summary sheet is compiled and provides information similar to the above but on a yearly basis. This summary also determines the percentage of private (non-Federal) and Federal Material for Remediation volumes placed at the HARS and the percent remediation needs remaining at the HARS.

D. The information is provided to EPA Region 2 during the first quarter of each calendar year and/or upon request. Furthermore, on a yearly basis, all Material for Remediation data will be compiled, analyzed and evaluated in a final end-of-the-year report that will be submitted to EPA Region 2.

E. On a yearly basis, all dredging, HARS remediation and testing data are compiled and submitted to USACE Headquarters (HQUSACE).

10.2 HARS Remediation Management Practices

10.2.1. Reporting Requirements

A. Telephone Record

I) A record of each voyage involving an actual remediation event at the HARS is received from dredging/towing contractors on a daily basis. Utilizing a telephone answering machine (212-264-0165), a phone-in-placement notification system has been instituted and is implemented on a 24-hour, 7-day-a-week basis. All vessels transporting the Material for Remediation for the purpose of placement at the HARS must telephone the USACE-NYD no less than 2 hours prior to departure from the Port. Contractor representatives will furnish information which will include, but not be limited to, estimated transit times and scow volume as required in their DA permit/authorizations. Prompt notification will allow USACE-NYD personnel to review and confirm the permit conditions and status in a reasonable time frame. Upon the vessel's return to the Port, the dredging/towing contractors will also telephone the USACE-NYD to provide the exact information pertaining to the remediation activity which took place. This type of notification system ensures that the USACE-NYD is completely informed of daily dredging and remediation activities undertaken within the Port of New York/New Jersey. The following information is reported for each remediation event which may occur several times during the day, on the telephone answering machine:

1. Permittee's name, if applicable
2. Permit/contract number
3. Estimated scow volume
4. General description of the Remediation Material placed
5. Name and Owner of towing vessel and scow
6. The place of departure/waterway
7. The name of the HARS Remediation Area
8. Name of remediation area placement/buoy where placement will occur
9. The estimated time of arrival at the HARS Remediation Area.
10. The estimated time of return to port
11. The name of the USACE certified ocean Disposal Inspector
12. Observations and general description of placement buoys including determining whether or not they may be off station, missing or sinking

NOTE: All projects, both Federal and non-federal and including those utilizing USACE dredges, are required to follow this condition. In the case of Federal dredges, a standard form containing the required information is kept on file at the USACE-NYD.

ii) The dredging/towing contractor also notifies the Captain of the Port (COTP) of New York/USCG for a reference number before each vessel departs the dredging site en route to the HARS. Every trip made under the permit authorization is required to be recorded and endorsed by the master of the tow or the person acting in such a capacity.

B. Record Keeping/Documentation

In addition to taped records which provide a verbal record of the remediation activity, daily/weekly/monthly status reports are also required. If the information is incomplete or missing, immediate confirmation of the errors or discrepancies is made with the dredging/towing contractor.

I. The dredging/towing contractors are required to complete and submit a **Monthly Transportation and Remediation Placement Log (Attachment No. 3) and a Monthly Summary Sheet (Attachment No. 4)** of all dredging and remediation activities occurring under a specific permit/authorization. The summary sheet includes monthly and cumulative volumes for each dredging activity. It is required that every trip/voyage to the HARS be endorsed by the master of the tow, or the person acting in such capacity. This information must be submitted to the USACE-NYD no later than the eighth day of the month following the dredging/remediation activity. Periodically, dredging/remediation activity information acquired during the previous month in the form of telephone logs, monthly transportation and remediation placement logs, and monthly activity summaries are checked against each other to ensure accuracy of the reported information. Any inconsistencies are brought to the attention of the permittee or dredging/towing contractors for clarification.

ii. If upon arrival at the HARS placement buoy(s), the tugboat/barge navigation equipment indicates a position outside the HARS, the Certified Disposal Inspector/Shiprider must report this to the tugboat Captain/Master of the vessel and immediately notify the USACE-NYD. Placement of the Material for Remediation is not permitted outside the boundaries of the PRA within the HARS.

C. Site Inspection/Surveillance

Site Inspection

a) HARS

During periods of active remediation, every two weeks a USACE-NYD survey vessel will inspect and assess the condition and location of all moored placement buoys within the HARS. This information is recorded on the **HARS Placement Buoy Surveillance Form (Attachment**

No. 5). Copies are kept on file in the USACE-NYD and forwarded to EPA Region 2. The items investigated consist of latitude, longitude, and LORAN C coordinates, as determined by GPS/DGPS, observed water depth, wind direction and speed, and sea state. Photographs of the placement buoys will be taken periodically on field inspections in order to document buoy's elevation above the surface, and any damage that it may have sustained during remediation operations. This will insure that buoys have not shifted a considerable distance from the original deployment position and that they are visible to the towing vessel and operators/Certified Disposal Inspectors during the disposal event. The relative accuracy of the navigation equipment responsible for positioning, watch circles, wind and sea conditions at the time of deployment are also taken into consideration. When it has been determined that at least one meter of Remediation Material has been placed in the location of the placement buoy and remediation activities at the placement buoy have been successfully completed, EPA Region 2 and the USACE-NYD will then coordinate a new Remediation Material placement buoy location. Initiating new placement buoy locations when remediation has been successfully completed around a given placement buoy provides for efficient placement of the Material for Remediation by preventing mounding, thereby allowing for faster remediation of the HARS.

1) Surveillance and monitoring of conditions at the HARS are also performed by USCG (ships and helicopter), USACE-NYD Vessels, and EPA Region 2 vessels and helicopter. This information is evaluated and acted upon accordingly (i.e., enforcement, re-position buoys, performance of a supplementary hydrographic survey, additional surface marker/placement buoys being placed at the site, and/or remedial action to counteract any violation which may occur).

2) Placement buoys are relocated and/or re-positioned at other locations within the site based upon appropriate mound height and water depth considerations. EPA Region 2 and the USACE-NYD both concur on the placement buoy location for each project in the **Response Letter (Attachment No. 1).**

b) Dredging Site

To ensure compliance with USACE-NYD permit conditions and Federal authorization, routine observations of dredging activities are performed by the USACE-NYD.

D. Placement Buoy Maintenance

1. Presently only one permanently moored USCG regulation buoy is located at the HARS. Designated as the "NY", its position is clearly marked and it appears on NOAA navigation charts of the New York Bight as the center of the former MDS. The "NY" buoy location is monitored at the same frequency as the placement buoys.

2. The USACE-NYD is currently responsible for the placement, recovery, maintenance and

damage repair of all other placement buoys located at the site. Utilizing taut-moored buoy systems has given much greater effectiveness as a location marker for accurate placement of the Material for Remediation. This has been demonstrated by the presence of discrete pre-HARS dredged material disposal mounds evident in bathymetric surveys of the site.

3. If a buoy is reported damaged, off station, drifting, or lost, the USACE-NYD will immediately inform (by telephone, and/or FAX) the dredging/towing contractors who are actively engaged in remediation operations at the HARS. The USCG is also informed so that either a Notice-to-Mariners (NTM) emergency broadcast or local NTM report can be issued.

10.2.2 Remediation Instructions

Specific instructions/requirements for the placement of Material for Remediation are contained in the Department of the Army (DA) Permit issued by the USACE-NYD. The PRA within the HARS is comprised of 9 areas; each area is 1 square nautical mile in size. Placement will be managed so as to remediate in order of remediation priority, beginning with Area 1 (highest priority for remediation) and ending with Area 9 (lowest priority for remediation) **(Figure 4)**. Each remediation area will be closed to further placement of Remediation Material (unless additional material is required (See Trigger Levels in Section 9.6) upon completion of remedial activities and demonstration through bathymetry that a 1-meter cap (minimum required cap thickness) of the Remediation Material has been placed over the entire area). The Remediation Material placement buoy locations will be moved as necessary, to evenly spread the Remediation Material throughout each remediation area to minimize mounding.

To the maximum extent practicable, each Remediation Area will be remediated with Remediation Material of similar grain size/composition as sediments within that particular Remediation Area. In the event that the Material for Remediation is a different grain size/composition (e.g., clay instead of silt) than the grain size/composition of the sediments located in the Remediation Area, after placement operations with the dissimilar Material for Remediation is completed, a final layer of Remediation Material with similar grain size/composition as the original sediment found in the Remediation Area will be placed on top, to the maximum extent practicable. The combined layers will total at least one meter of Remediation Material. This ensures that the biological communities will be able to re-colonize on similar type sediments that existed prior to the remediation activity.

To the maximum extent practicable and depending upon the grain size of the available Remediation Material, each Remediation Area should first be completely covered with at least 0.5 meter of Remediation Material. Upon demonstration that the remediation area has been successfully covered with at least a 0.5 meter layer (either through bathymetry or volumetric calculations/estimations) an additional layer of at least 0.5 meter should be placed, such that the total thickness of Remediation Material is at least 1 meter. However, should this approach prove infeasible, EPA will return to the approach of covering each remediation area continuously with at least one meter of Remediation Material, or some combination of approaches may be applied.

Placement of the Material for Remediation in the No Discharge Zone and/or in a 0.27 nautical mile radius around the following coordinates due to the presence of ship wrecks is prohibited:

1. 40° 25.30' W 73° 52.80' N
2. 40° 25.27' W 73° 52.13' N
3. 40° 25.07' W 73° 50.05' N
4. 40° 22.46' W 73° 53.27' N

Remediation Areas Nos. 4 and 8 (located in the SW quadrant of the MDS) contain areas that were capped with one meter of sand in 1994 as part of a Category II disposal and capping project. As of August 1997, Remediation Areas Nos. 5 and 7 are in the process of being capped with one meter of sand as part of a 1997 Category II disposal and capping project. Monitoring results to date indicate that the 1994 area remains sufficiently capped. While this area does not require remediation, the surrounding area requires remediation and will be remediated with at least one meter of Remediation Material. Similarly, upon completion of capping activities for the 1997 Category II disposal footprint, located in portions of Remediation Areas Nos. 5 and 7, portions of these areas will not require additional remediation. However, the surrounding portions of Remediation Areas Nos. 5 and 7 will be remediated with at least one meter of Remediation Material. During the remediation process some of the Material for Remediation may incidentally spread into already remediated portions of Remediation Areas Nos. 4, 5, 7, and 8 and may even be placed on the edges of the capped category II mounds.

In addition, in Remediation Areas where water depths are shallower than 68.3 feet BMLW, EPA Region 2 and the USACE-NYD may use more than one meter of Remediation Material.

11. Material for Remediation Testing Requirements

MPRSA 102 (c)(3)(D) requires that the SMMP include consideration of the quantity of material to be placed at the site, and also consider the presence, nature, and bioavailability of the contaminants in the material to be placed of at the HARS.

As part of the permitting process, applicants are required to test/characterize the material to be dredged in order to determine that it is suitable for use as Remediation Material in the HARS. Dredged material testing procedures/requirements (including quality assurance requirements) are contained in the following documents:

i. EPA's Ocean Dumping Regulations 40 CFR Part 227, "Criteria for the Evaluation of Permit Applications for Ocean Dumping of Materials"

ii. EPA/USACE 1991, "Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual" as amended (otherwise known as the Green Book) **(EPA/USACE, 1991)**.

iii. EPA/USACE-NYD1992, "Guidance for Performing Tests on Dredged Material proposed for Ocean Disposal" (otherwise known as the Regional Testing Manual)**(EPA Region 2/USACE-NYD, 1992)**.

12. Anticipated HARS Use and Quantity of the Material for Remediation to be Placed at the HARS

MPRSA 102 (c)(3)(D) and (E) requires that the SMMP include consideration of the quantity of material to be placed at the HARS, and the presence, nature, and bioavailability of the contaminants in the material, as well as the anticipated use of the site over the long-term.

12.1 Anticipated HARS Use

The PRA within the HARS will be remediated by the placement of at least 1 meter of Remediation Material over all areas within the PRA.

12.2 Estimated Quantity of Material Required to Remediate (1 meter cap [minimum required cap thickness]) the PRA within the HARS:

Estimated Total to Remediate the PRA: **40,548,000 yards**

The above estimate is based upon the placement of a 1-meter cap (minimum required cap thickness) of Remediation Material on sediments within the PRA inside the HARS where sediments exhibit Category III and Category II dredged material characteristics. The total volume to remediate the PRA is an estimate. Based upon past capping experience we expect that the actual remediation volume will be higher.

13. HARS SMMP Review and Revision

MPRSA 102 (c)(3)(F) requires that the SMMP include a schedule for review and revision of the SMMP which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter. EPA Region 2 and the USACE-NYD will evaluate the effectiveness of the HARS SMMP as the results of the monitoring program are developed and will be reviewing the SMMP annually to ensure it is effective and up to date.

14. References

Battelle. 1994. Plume Tracking of Dredged Material Containing Dioxin. Report prepared under contract to U.S. Environmental Protection Agency, Region 2, New York. Contract No. 68-C2-0134, Work Assignment 7. February 14, 1994.

Battelle. 1996. Sediment Survey at the Mud Dump Site and Environs. Report prepared under contract to U.S. Environmental Protection Agency, Region 2, New York. Contract No. 68-

C2-0134, Work Assignment 3-133. May 15, 1996.

Battelle. 1997. Draft. Contaminants in Polychaetes from the Mud Dump Site and Environs. Report prepared under contract to U.S. Environmental Protection Agency, Region 2, New York. Contract No. 68-C2-0134, Work Assignment 4-133. March 4, 1997.

Battelle. 1997a. Biological Assessment for the Designation of a Historic Area Remediation Site in the New York Bight Apex. Report prepared under contract to U.S. Environmental Protection Agency, Region 2, New York. Contract No. 68-C2-0134, Work Assignment 4-233. April 16, 1997.

EPA. 1982. Final Environmental Impact Statement for the New York Dredged Material Disposal Site Designation. U.S. Environmental Protection Agency, Office of Water, Washington, DC. August 1982.

EPA. 1991. Monitoring Guidance for the National Estuary Program. EPA, Office of Water, Washington, DC. August 1991.

EPA/USACE. 1991. Evaluation of Dredged Material Proposed for Ocean Disposal (Testing Manual). EPA 503/8-91/001.

EPA Region 2/USACE-NYD. 1992. Guidance for Performing Tests on Dredged Material Proposed for Ocean Disposal (Regional Testing Manual). EPA Region 2/USACE-NYD.

EPA Region 2/USACE-NYD. 1997. Site Management and Monitoring Plan for the New York Bight Dredged Material Disposal Site (Mud Dump Site).

EPA/USACE. 1996. Guidance Document for Development of Site Management and Monitoring Plans for Ocean Dredged Material Disposal Sites. EPA/USACE, Washington, DC. March 1996.

EPA. 1997. Supplemental to the Environmental Impact Statement on the New York Dredged Material Disposal Site Designation for the Designation of the Historic Area Remediation Site (HARS) in the New York Bight Apex. U.S. Environmental Protection, Region 2, New York, May 1997.

Germano, J.D. and D.C. Rhoads, 1993. An integrated, tiered approach to monitoring and management of dredged material disposal sites in the New England Region. SAIC report No. SAIC-90/7575&234 submitted to the U.S. Army Corps of Engineers, New England Division.

NOAA. 1995. Chemical contaminant levels in flesh of four species of recreational fish from the New York Bight Apex. NOAA, NMFS, NEFSC, James J. Howard Marine Sciences Laboratory, Highlands, NJ. 94 pp.

NOAA. 1996. Contaminant levels in muscle and hepatic tissue of lobsters from the Mew York Bight Apex. NOAA, NMFS, NEFSC, James J. Howard Marine Sciences Laboratory, Highlands, NJ. 137 pp.

NOAA. 1996a. Levels of seventeen 2,3,7,8-Chlorinated Dioxin and Furan congeners in muscle of four species of recreational fish from the New York Bight Apex. NOAA, NMFS, NEFSC, James J. Howard Marine Sciences Laboratory, Highlands, NJ. 38 pp.

Rhoads, D.C. and J.D. Germano. 1982. Interpreting Long- term Changes in Benthic Community Structure: A New Protocol. Hydrobiologia. 142 :291-308 .

SAIC. 1993. Sediment Capping of Subaqueous Dredged Material Disposal Mounds: An Overview of the New England Experience 1979-1993. Report prepared under Contract to the U.S. Army Corps of Engineers, New England Division. Work Order No. 2 of Contract No. DACW33-90-D-00001. March 1993.

SAIC. 1994. Monitoring of Dredged Material Disposal: The Mass Balance Issue. Report prepared under contract to the U.S. Army Corps of Engineers, New York District. Delivery Order No. 9 of Contract No. DACW33-93-D-0002. June 1994.

SAIC. 1994a. Analyses of Moored Current and Wave Measurements from the New York Mud Dump Site: The Year 1 Program - March 1992 to March 1993. Report prepared under contract to the U.S. Army Corps of Engineers, New York District. Delivery Order No. 11 of Contract No. DACW51-92-D-0045. June 1994.

SAIC. 1994b. Analyses of Sub-bottom Profile Results for the New York Mud Dump Site: December 1993 - January 1994. Report prepared under contract to the U.S. Army Corps of Engineers, New York District. Delivery Order No. 13 of Contract No. DACW51-92-D-0045. December 1994.

SAIC. 1995a. Results from the September 1995 Bathymetric Survey of the New York Mud Dump Site. Report prepared under contract to the U.S. Army Corps of Engineers, New York District. Delivery No. 2 of Indefinite Quantity Contract No. 38. October 1995.

SAIC. 1995b. Sidescan and Bathymetry Results from the Expanded Mud Dump Area in the New York Bight. Report prepared under contract to U.S. Environmental Protection Agency, Region 2, New York. Contract No. 68-W2-0026, Work Assignment No. 56-II. November 1995.

SAIC. 1995c. Analysis of Waves and Near-Bottom Currents During Major Storms at the New York Mud Dump Site. Report prepared under contract to the U.S. Army Corps of Engineers, Waterways Experiment Station. Delivery No. 1.1.1 of Contract No. DACW39-

94-C-0117. October 1995.

SAIC. 1996a. Results from the October 1995 Seafloor Photography and Sediment Sampling Survey of the Expanded Mud Dump Area. Report prepared under contract to the U.S. Army Corps of Engineers, New York District. Delivery Order No. 5 of Indefinite Quantity Contract No. 38. September 1996.

SAIC. 1996b. Results from the October 1995 REMOTS® Survey of the Expanded Mud Dump Area. Report prepared under contract to the U.S. Army Corps of Engineers, New York District. Delivery Order No. 3 of Indefinite Quantity Contract No. 38. October 1996.

SAIC. 1997. Capping Dredged Materials in the New York Bight: Evaluation of the Effects of Bioturbation. Report prepared under contract to the U.S. Army Corps of Engineers, Waterways Experiment Station. Task 2.1.1 of Contract No. DACW39-94-C-0117. January 1997.

Sokal, S.R. and R.J. Rohlf. 1981. Biometry. W.H. Freeman and Company.

Williams, S.J. 1979. Geologic Effects of Ocean Dumping on the New York Bight Inner Shelf. Pp. 51-72 in Palmer and Gross (eds.), Ocean Dumping and Marine Pollution.

Attachment No. 1

RESPONSE LETTER

Dredged Material
Management Section

IMPORTANT

Several placement buoys are presently located at the Historical Area Remediation Site (HARS). These buoys are periodically relocated or removed. In an effort to better manage the HARS, placement of the material for remediation will be made at a specific buoy location on a case-by-case basis. Because of this, it is necessary to contact this office to determine the appropriate placement buoy and its exact location, upon commencement of the material for remediation dredging.

This letter must be completed and returned by certified mail to

Department of the Army
New York District Corps of Engineers
Jacob K. Javits Federal Building
Operations Division, Room 1937
New York, New York 10278-0090
ATTN: Chief, Dredged Material Management Section

a maximum of thirty (30) days and a minimum of fourteen (14) days prior to the anticipated commencement of dredging to allow the New York District to notify you of the exact location of the appropriate placement buoy at the HARS.

MATERIAL FOR REMEDIATION TO BE DREDGED:

Permittee:_____ Permit No.:_____

Date of Issuance:_____ Date of Expiration:_____

Authorized volume to be dredged with placement at the HARS:_____CY

Proposed volume to be dredged with placement at the HARS:_____CY

Proposed commencement date of work:_____

Proposed completion date of work:_____

Dredging Contractor:_____

Point of Contact and Telephone No.:_____

YOU WILL BE NOTIFIED BY MAIL OF THE APPROPRIATE PLACEMENT BUOY AND ITS EXACT LOCATION AT THE HARS. **NO DREDGING AND PLACEMENT OF THE MATERIAL FOR REMEDIATION SHALL OCCUR WITHOUT PRIOR CORPS OF ENGINEERS NOTIFICATION OF THE APPROPRIATE PLACEMENT BUOY AND ITS EXACT LOCATION FOR EACH MATERIAL FOR REMEDIATION DREDGING PROJECT.**

_____ _____

SIGNATURE OF PERMITTEE OR DESIGNEE — DATE AUTHORIZED

_____

NAME (PRINT)

TO BE COMPLETED BY THE NEW YORK DISTRICT CORPS OF ENGINEERS

You are hereby notified that the _____ placement buoy will be located at the following coordinates until further notice.

LATITUDE: _____

LONGITUDE: _____

LORAN C: _____

_____ _____

JOSEPH J. SEEBODE
Chief, Regulatory Branch — DATE

Attachment No. 2

TRANSPORTATION AND REMEDIATION PLACEMENT LOG

PROJECT NAME: **PERMIT NUMBER:**
TOW OWNER: **TRIP NUMBER:** _____
DESCRIPTION OF MATERIAL: _____
LORAN UNIT MANUFACTURER/MODEL #: _____
INSPECTOR'S NAME: _____
SIGNATURE: _____ **DATE:** _____

TUG AND SCOW INFORMATION:

Tug Name: _____ Tug Captain: _____
Scow Name or Number: _____ Volume of Material (cu yds): _____

Length of Tow Line (ft): _____
Scow Draft Forward (ft): _____ Scow Draft Aft (ft): _____

TRANSIT INFORMATION:

Depart Dredge Site (date/time): _____
Arrive at HARS (date/time): _____
Return to Dredge Site (date/time): _____

DISPOSAL SITE INFORMATION:

Wind Direction: _____ Wind Speed (mph): _____
Weather Conditions: _____ Visibility: _____
Wave/Swell Height (ft): _____ Marine Mammal/Sea Turtles Sighted (Y/N): _____

Placement Buoy Identification:

Placement Buoy Visible (Y/N)?: _____
Day (Placement Buoy Name and Color): _____
Night (Signal Light Color): _____

START PLACMENT/DOORS OPEN: Start Time (hh:mm:ss): _____

Lane Number (ex: 1N to 1S): _____ Observed Water Depth (ft): _____
Tug Speed (kts): _____ Tug Heading (degrees): _____
Approximate Barge/Scow Distance from Placement Buoy (ft): _____

Tug Position: Determined By (Check One): LORAN: _____ GPS: _____ DGPS: _____

LORAN Time delays (2 ea): X = _____ Y = _____
Latitude (dd mm.mm): _____ Longitude (dd mm.mm): _____

Barge Position (In relation to the Tug):

Direction of Barge from Towing Bit (degrees): _____

END PLACEMENT: End Time (hh:mm:ss): _____

Tug Position: Determined By (Check One): LORAN: _____ GPS: _____ DGPS: _____

Tug Speed (kts): _____ Tug Heading (degrees): _____

Continued on Next Page (Over)

LORAN Time delays (2 ea): X = _____ Y = _____
Latitude (dd mm.mm): _____ Longitude (dd mm.mm): _____

Barge Position (In relation to the Tug):

Direction of Barge From Towing Bit (degrees): _____

DOORS CLOSED: End time (hh:mm:ss): _____

Tug Position: Determined By (Check One): LORAN: _____ GPS: _____ DGPS: _____

Tug Speed (kts): _____ Tug Heading (degrees): _____
LORAN Time delays (2 ea): X = _____ Y = _____
Latitude (dd mm.mm): _____ Longitude (dd mm.mm): _____

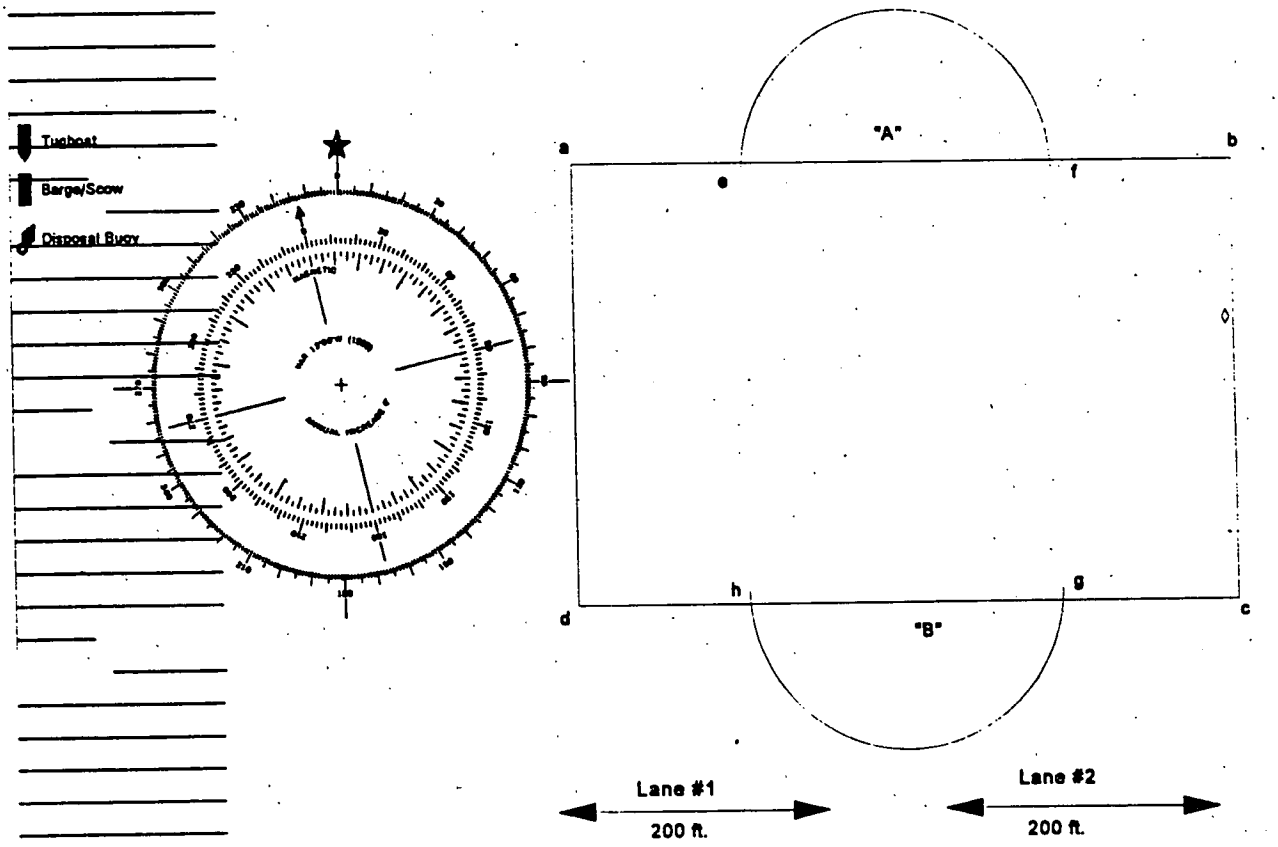
Barge Position (In relation to the Tug):

Direction of Barge from Towing Bit (degrees): _____

COMMENTS:

Obstructions in HARS Placement Path ? _____
Disruptions During Remediation Operation ?
_____

Other Comments: _____



Attachment No. 3
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
26 Federal Plaza
New York, New York 10278-0090
Attn: CENAN-OP-SD

Monthly Transportation and Remediation Placement Log

PermitteeName: _____

Permit/Contract No: _____
Dredging/Towing Contractor: _____
Waterway: _____

Trip Number	Placement Date	Towing Vessel Name	Scow Number	Material for Remediation Type	Material for Remediation Volume	Total Project Volume	Placment Location/ Remediation Area	Placement Buoy	Depart. Time	Arrival Time	Return Time

Authorized Signature: _____ Date: _____

Attachment No. 4

Operations Division
Water Quality
Compliance Branch

MATERIAL FOR REMEDIATION PLACEMENT
MONTHLY SUMMARY SHEET

MONTH:

CONTRACTOR:

POINT OF CONTACT:

TELEPHONE NUMBER:

_____

_____

PERMIT/CONTRACT NO:	MONTHLY VOLUME	CUMULATIVE VOLUME

Comments:

_____

_____

_____

Attachment No. 5

HARS PLACEMENT BUOY SURVEILLANCE

INSPECTION DATE: _____ **INSPECTION VESSEL:**
TRIP NUMBER: _____ **VESSEL MASTER/OPERATOR:** _____
LORAN UNIT MANUFACTURER/MODEL#: _____

TRANSIT INFORMATION:

Depart Caven Point (time):_____ Arrive at HARS (time):_____
Depart HARS(time): _____ Return to Caven Point (time):_____

HARS CONDITIONS:

Wave/Swell Height (ft):_____ Wind Direction:_____
Wind Speed/Velocity (kts):_____ Weather Conditions: _____
Visibility: _____ Marine Mammals Sighted? _____

PLACEMENT BUOY NAME: _____

Time (hh:mm:ss): _____ Observed Water Depth (ft): _____
Tail of Buoy: _____ Placement Buoy Visible (Y/N) : _____
Charactersitics (i.e., color, lighted (amber/white), etc.): _____

Buoy Position: Determined By (Check One): LORAN: _____ GPS: _____ DGPS: _____

LORAN Time Delays (2 ea): _____ _____
Latitude (dd mm ss.s): _____ Longitude (dd mm ss.s): _____
Approximate distance from placement buoy (ft): _____

PLACEMENT BUOY NAME: _____

Time (hh:mm:ss): _____ Observed Water Depth (ft): _____
Tail of Buoy: _____ Placement Buoy Visible (Y/N): _____
Characteristics (i.e., color, lighted (amber/white), etc.): _____

Buoy Position: Determined By (Check One): LORAN: _____ GPS: _____ DGPS: _____

LORAN Time Delays (2 ea): _____ _____
Latitude (dd mm ss.s): _____ Longitude (dd mm ss.s): _____
Approximate distance from disposal buoy (ft): _____

PLACEMENT BUOY NAME: _____

Time (hh:mm:ss): _____ Observed Water Depth (ft): _____
Tail of Buoy: _____ Placement Buoy Visible (Y/N): _____
Characteristics (i.e., color, lighted (amber/white), etc.): _____

Buoy Position: Determined By (Check One): LORAN: _____ GPS: _____ DGPS: _____

LORAN Time Delays (2 ea): _____ _____
Latitude (dd mm ss.s): _____ Longitude (dd mm ss.s): _____

Approximate distance from placement buoy (ft): _____

PLACEMENT BUOY NAME: _____

Time (hh:mm:ss): _____ Water Depth (ft): _____

Tail of Buoy: _____ Placement Buoy Visible/Present: _____

Characteristics (i.e., color, lighted (amber/white, etc.): _____

Buoy Position: Determined By (Check One): LORAN: _____ GPS: _____ DGPS: _____

LORAN Time Delays (2 ea): _____ _____

Latitude (dd mm ss.s): _____ Longitude (dd mm ss.s): _____

Approximate distance from placement buoy (ft): _____

COMMENTS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

MASTER/OPERATOR'S SIGNATURE: _____ **DATE:** _____

ROUTING SLIP

DATE: September 9, 1997

TO:

F. McDonough ✓	A. Bergeron ✓
G. Boehm ✓	
S. Douglas ✓	J. DiLorenzo ✓

RE: Site Management and Monitoring Plan for the Historic Area Remediation Site

Please read the attached, initial and give to next individual on list when complete.