# DRAFT
# ENVIRONMENTAL ASSESSMENT
# ON THE
# NEWARK BAY AREA
# OF THE NEW YORK AND NEW JERSEY HARBOR
# DEEPENING PROJECT

June 2005

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## EXECUTIVE SUMMARY

As a result of an Administrative Order on Consent (AOC) for the Remedial Investigation / Feasibility Study (RI/FS) in the matter of the Diamond Alkali Superfund Site, specifically the Newark Bay Study Area (NBSA; U.S. EPA Index No. CERCLA-02-2004-2010), claims of significant new circumstances and information were made. This Environmental Assessment (EA) has been prepared to 1) review EPA's designation of Newark Bay and parts of Arthur Kill and the Kill Van Kull as the NBSA pursuant to CERCLA, 2), evaluate whether the dredging activities of the New York and New Jersey Harbor Deepening Project (HDP) will significantly affect the NBSA RI/FS and determine if impacts will significantly differ from those previously identified in the USACE's 1999 Final EIS and the associated Record of Decision (June 2002), and the 2004 Environmental Assessment and the associated Finding Of No Significant Impact and 3) review the information in the Contaminant Assessment and Reduction Program (CARP; NYSDEC 2003) and Inventory Report (Tierra Solutions, 2004).

As the issuance of the AOC is an administrative change to the classification of the area, it must be noted that no physical, chemical, or biological change to the environment in the NBSA has occurred as a result of this administrative process. .

USACE's previous assessments of the NBSA with respect to dredging the Federal channels are still valid as biological, chemical, and physical sampling efforts would not have significantly changed. Designation of the Newark Bay as a CERCLA study area does not alter the existing characterization of the resources in the study area or the proposed dredging plans and therefore has no effect on the previous analysis of impacts presented in the 1999 Final EIS or 2004 EA. No additional impacts from those impacts identified in the 1999 Final EIS are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area.

A main concern for dredging in the NBSA, as currently proposed, was whether the authorized deepening project will significantly affect the execution of the RI/FS or the analysis of data obtained through that study. As a result of continued and extensive USACE coordination with the EPA regarding the potential effects of each project on the other (*i.e.* HDP and EPA's RI/FS), no significant impacts to the RI/FS or the HDP are expected.

Two reports were identified as containing potentially significant new circumstances and information. These reports are the Contaminant Assessment and Reduction Program (CARP) and Inventory Report (Tierra Solutions, 2004). In addition, the USACE examined data bases from the EPA's Regional Environmental Monitoring and Assessment Program (REMAP), and National Oceanic and Atmospheric Administration's (NOAA) Query Manager (that revealed 26 potentially relevant data sets within the NBSA) which assessed levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and its congeners. With regard to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and its congeners in the Newark Bay Study Area, USACE has determined the CARP, the Inventory Report (Tierra Solutions, 2004), the EPA's Regional Environmental Monitoring and Assessment Program (REMAP), and National Oceanic and Atmospheric Administration's (NOAA) Query Manager contains no new pertinent sediment

data concerning dioxin that would alter the analysis of contaminant impacts conducted for the 1999 Final EIS and updated in the 2004 EA.

Sediment resuspension, Best Management Practices and Water Quality Certification Compliance Monitoring was discussed as it pertains to avoiding and minimizing impacts to its most practical extent. It was determined that the proposed dredging of the Harbor Deepening Project in Newark Bay and in portions of the Kill Van Kull and Arthur Kill would not result in significant environmental impacts from those identified in the 1999 Final EIS and 2004 EA as it pertains to the Administrative Order on Consent. Therefore, the recommended plan, as identified in the 1999 Final EIS and 2004 EA, represents sound engineering practices and meets environmental standards.

## ACRONYMS

2,3,7,8-TCDD - 2,3,7,8-tetrachlorodibenzo-p-dioxin
AK-41/40 - Arthur Kill Channel 41/ 40 foot Federal Navigation Project
AOC - Administrative Order on Consent
BMP - Best Management Practice
CARP - Contaminant Assessment and Reduction Program
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CFR – Code of Federal Regulations
CWA - Clean Water Act
EA - Environmental Assessment
EIS - Environmental Impact Statement
EPA – U.S. Environmental Protection Agency
HARS - Historic Area Remediation Site
HDP - New York and New Jersey Harbor Deepening Project
HTRW - Hazardous, Toxic, and Radioactive Waste
KVK/NB-45 - Kill Van Kull and Newark Bay Channels 45 foot Federal Navigation Project
NEPA - National Environmental Policy Act
NBSA - Newark Bay Study Area
N.J.A.C. – New Jersey Administrative Code
NJDEP - New Jersey Department of Environmental Protection
NOAA - National Oceanic and Atmospheric Administration's
NYSDEC - New York State Department of Environmental Conservation
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PCDD - polychlorinated dibenzo-p-dioxin
PCDF - polychlorinated dibenzofuran
PJ-41 - Port Jersey Channel 41 foot Federal Navigation Project
REMAP - Regional Environmental Monitoring and Assessment Program
RI/FS - Remedial Investigation and Feasibility Study
TEQ - Toxicity Equivalency Quotient
TSS - Total Suspended Solid
USACE - United States Army Corps of Engineers
U.S.C. – United States Code
WQC - Water Quality Certification

## Part 1 PURPOSE AND NEED

As a result of an Administrative Order on Consent (AOC) for the Remedial Investigation / Feasibility Study (RI/FS) in the matter of the Diamond Alkali Superfund Site, specifically the Newark Bay Study Area (U.S. EPA Index No. CERCLA-02-2004-2010), claims of *significant new circumstances and information* were made. The Newark Bay Study Area (NBSA) as currently defined by the EPA includes Newark Bay, and portions of the Hackensack River, Arthur Kill and Kill Van Kull. This Environmental Assessment (EA) has been prepared to 1) review EPA's designation of only Newark Bay and portions of Arthur Kill and the Kill Van Kull as the NBSA pursuant to CERCLA, 2) evaluate whether the dredging activities of the New York and New Jersey Harbor Deepening Project (HDP) will significantly affect the NBSA RI/FS and determine if impacts will significantly differ from those previously identified in the USACE's 1999 Final EIS and the associated Record of Decision (June 2002), and the 2004 Environmental Assessment and the associated Finding Of No Significant Impact and 3) to review the information in the Contaminant Assessment and Reduction Program (CARP; NYSDEC 2003) and Inventory Report (Tierra Solutions, 2004) as cited by the Plaintiffs. For purposes of this assessment, the EPA's designation of portions of the Hackensack River as part of the NBSA will not be evaluated as the Hackensack River is not located within the HDP's project area. EPA's designation of site boundaries will be further delineated with the completion of the RI/FS within the NBSA.

An EA is prepared in conformance with procedures established by the National Environmental Policy Act (NEPA) of 1969 to evaluate the environmental effects expected to result from implementation of a proposed action. The assessment ensures that the decision-maker is aware of the environmental effects of the action prior to the decision to proceed with its implementation. An EA concludes with one of two determinations: (1) that the proposed action will not result in significant adverse environmental impacts, in which case a Finding Of No Significant Impact would be prepared, or (2) that significant adverse impacts would indeed result from the proposed action and that an EIS or a Supplemental EIS (as the circumstances may warrant) should be prepared to more fully document those impacts before a decision is made to proceed or not proceed with the action. USACE has previously completed NEPA documentation with extensive environmental analysis regarding the Harbor Deepening Project: the 1999 Final EIS and the associated Record of Decision (June 2002), and the 2004 Environmental Assessment and the associated Finding of No Significant Impact.

### 1.1 **Project Background**

Deep-draft navigation occurs in New York and New Jersey Harbor from outside of the Verrazano Narrows Bridge to the various terminals lining Upper New York Bay, the Kill Van Kull, Newark Bay, and the Arthur Kill. The Federal channel deepening of the Kill Van Kull and Newark Bay Channels to 45 feet (KVK/NB-45), the Arthur Kill Channel to 41 and 40 feet (AK-41/40), and the Port Jersey Channel to 41 feet (PJ-41) (referred to collectively as predecessor projects) were authorized as §101, §102, and §202a of the Water Resources Development Act of 1986, P.L. 99-662.

The Recommended Plan from the 1999 New York and New Jersey Harbor Navigation Study comprised a fourth Federal Channel Deepening Project in the New York and New Jersey Harbor (USACE 1999). The Recommended Plan consisted of deepening the main shipping channels within the New York and New Jersey Harbor to 50 feet (52 feet in rock or otherwise hard material). This action is referred to as the "Recommended Plan" as it became the recommendation in the Report of the Chief of Engineers on the New York and New Jersey Harbor Navigation Study, May 2, 2000 and authorized by Congress in §101 (a) (2) of the Water Resources Development Act of 2000, P.L. 106–541, 11 December 2000.

In 2002, Congress directed the Corps to evaluate opportunities to consolidate implementation of the predecessor projects with the implementation of the Recommended Plan (U.S. Congress 2002). In 2004, the USACE completed a Limited Reevaluation Report and EA to ensure that the Recommended Plan remained environmentally acceptable and economically justified. The Harbor Deepening Project (HDP) is the consolidated implementation of the predecessor projects with the Recommended Plan.

Construction of the channel deepening will impact benthic fish and invertebrate species in the immediate construction area. Those animals unable to move out of the construction area may be lost. Repopulation of the area will occur rapidly; thus much of the loss is temporary. Permanent changes in species composition may occur in areas where habitat types are permanently altered (*e.g*. soft bottom to rock bottom).

Hydrodynamic and water quality modeling indicate that the proposed future with-project deepening will produce minor changes in water surface elevations under low flow conditions (i.e., maximum difference in tidal range is less than 1.6 inches). The changes in salinity between with- and without-project conditions are small with a maximum average change of 0.7 parts per thousand (ppt). The largest relative change occurred near Howland Hook and the maximum average salinity change in the remaining areas of the study area is 0.4 ppt or less. Overall, the average differences in dissolved oxygen between future and baseline conditions are very small. The maximum reduction in New York and New Jersey Harbor dissolved oxygen was 0.18 mg/L. Aquatic life is not expected to be adversely impacted by any predicted changes in Harbor water quality (USACE 1999).

### 1.2 **Study Area**

This evaluation is limited geographically to the area of the HDP that lies within the NBSA. The evaluation includes the Newark Bay and portions of the Kill Van Kull and Arthur Kill Federal channels, ending at the Bayonne and Goethals Bridges to the east and south, respectively, and includes the area to the northern extension of the Federal channels including Elizabeth and South Elizabeth Channels (see Figure titled, "Harbor Deepening Project within the Newark Bay Study Area").

## Part 2 EXISTING ENVIRONMENT

The EPA designation of Newark Bay and portions of the Arthur Kill and Kill Van Kull as a CERCLA Study Area has not changed the existing habitats at the site. A comprehensive

description of the existing environment within the Newark Bay Study Area is adequately described in the 1999 Final EIS (USACE 1999). Those descriptions will not be repeated here. It should be noted that the Port Authority of New York and New Jersey has already dredged Contract Area 5 in the vicinity of Bergen Point, NJ to its authorized depth (50 ft.) under a Clean Water Act Section 404 permit action.

## Part 3 ENVIRONMENTAL EFFECTS AND CONSEQUENCES

Environmental effects of and/or the identification of impacts for the HDP were considered in the 1999 Final EIS and were further evaluated in the 2004 EA. This section is organized by resources, and identifies and evaluates potential additional effects to those considered in the 1999 Final EIS and 2004 EA. Impacts from the no-action alternative have been previously identified in Section 4.4 of the 1999 Final EIS. Potential impacts considered here are those additional effects that would be envisioned to occur 1) with the designation of the Newark Bay Study Area as a CERCLA Study Area per the AOC, 2) with the RI/FS conducted in the HDP project area by the EPA and 3) from any new information regarding contaminants that might have not been considered in preparing either document.

### 3.1 **Administrative Order on Consent and the Harbor Deepening Project**

This section discusses the potential effects of the AOC on the HDP. As this is an administrative change to the classification of the area, it must be noted that no physical, chemical, or biological change to the environment in the NBSA has occurred as a result of the AOC.

#### 3.1.1 BENTHIC COMMUNITIES

No additional impacts to benthic communities in the NBSA from the impacts identified in the 1999 Final EIS and 2004 EA are expected. Refer to the Contaminated Sediment discussion in this Section and the Biological Exposure Potential Section in the 1999 Final EIS, pages 6-11 through 6-19. The designation of the NBSA as a CERCLA study area does not alter either of these analyses.

#### 3.1.2 CONTAMINATED SEDIMENT

Paragraphs 6.59 through 6.65 on pages 6-14 though 6-17 of the HDP's 1999 Final EIS discusses the potential of exposure of contaminants to biota within the Harbor. Paragraphs 6.74 and 6.75 on pages 6-19 of the HDP's 1999 Final EIS summarize biological exposure risk. The designation of the NBSA as a CERCLA study area does not alter either of these analyses.

As described in detail in Part 4 of this EA, Best Management Practices (BMPs) will be used during dredging operations to minimize the suspension of fine/silty sediments and thus contaminants into the water column. This minimizes potential for exposure of biological receptors to contaminants. In addition sediment contaminant analysis for each contract area, where applicable, is performed in coordination with the appropriate regulatory agencies. These measures would not be revised or their effectiveness altered as a result of the CERCLA study area designation.

Individual Water Quality Certification (WQC) requirements allow for the States to review the supporting technical evaluations (e.g., sediment testing data and analysis) for the Newark Bay project contract areas on an individual basis. The state(s) review, conducted under the auspices of the Clean Water Act Guidelines at 40 CFR Part 230, includes the identification of potential adverse impacts to the environment and public health from any discharge of dredged material, including resuspension, which could result from a proposed activity. NJDEP requires Bulk Sediment Chemistry testing of raw sediments and end product (dredged material mixed with Portland cement to make structural fill material) and a Multiple Extraction Procedure (MEP) leachate test (both of which include dioxin analysis) on end product. Testing is performed on a substantial number of samples for every dredging project that would require upland beneficial use of the dredged material in order to fully characterize potential impacts from the placement of the material to human health and the environment (e.g., 66 samples in 22 composites were required for the upland component of Arthur Kill contract areas 2/3). Sample locations are chosen with regard to previous historic potential contaminant levels, areas of significant shoaling in the channel, and/or known sources of pollution. NYSDEC and NJDEP participate in development and review of all sediment testing plans and must approve the plans prior to the onset of said sampling event.

No additional impacts from those identified in the 1999 Final EIS or 2004 EA are expected to result from the study designation. As these analyses are conducted in advance of each dredging reach any new data that might be produced from the CERCLA study would be considered in defining testing requirements and conducting the analyses.

States issue WQCs to each dredging project only after project specific test data is reviewed by USACE, NYSDEC, NJDEP, and the EPA. Their analysis of that data allows them to determine that the dredging will ensure that state waters are protected pursuant to federal and state statutes.

### 3.1.3 Environmental Justice

No additional impacts from the impacts identified in the 1999 Final EIS (Section 6.8 and Section 5.7) are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area.

### 3.1.4 Essential Fish Habitat

No additional impacts from the impacts identified in the 1999 Final EIS and 2004 EA are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area. Refer to Section 6.4 in the 1999 Final EIS and Appendix E of the 2004 EA.

### 3.1.5 Fisheries

No additional impacts to fisheries from the impacts identified in the 1999 Final EIS and 2004 EA are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area. Refer to the Contaminated Sediment discussion in this Section and the Biological Exposure Potential Section in the 1999 Final EIS, pages 6-11 through 6-19.

### 3.1.6 Hazardous, Toxic, and Radioactive Waste (HTRW)

During the planning phase of the HDP (reconnaissance and feasibility phases), USACE conducted investigations to determine the potential for HTRW in the study. Those results are

documented in the 1999 Final EIS. Because the project involves dredged material and sediments beneath the navigable waters, the USACE HTRW Engineering Regulation 1165-2-132 does not define this material as HTRW except when it is within a designated CERCLA site.

Currently, no part of the HDP occurs within the limits of a CERCLA (Superfund) site.

Dredged material is excluded (Sec. 261.4(g)) from the definition of Resource Conservation and Recovery Act (42 U.S.C. 6901 et seq) hazardous waste when the dredged material is subject to a permit that has been issued under section 404 of the Clean Water Act or under section 103 of the Marine Protection, Research and Sanctuaries Act of 1972.

The USACE made an initial characterization of the dredged material for this project during the feasibility phase based on previous characterizations of dredged material in the NBSA and geological data obtained from previous studies and during the feasibility study. The USACE has also tested the majority of the sediments in the NBSA as a result of prior or interim dredging activities, i.e. KVK 45' and AK 41/40 projects. Since then, the USACE has continued to obtain additional geological data. From the initial sediment characterization and the additional geological data, the USACE has or will develop a sampling and testing plan for each contract area and for each sediment type prior to any dredging in the contract area. This sampling and testing plan is then submitted to both the EPA (HARS testing only) and the two state regulatory agencies (HARS and non-HARS) for their review, modification and approval. Once USACE receives the test results, it provides the results to the EPA (HARS test data) and state regulatory agencies for their review and designation of the suitability of the proposed dredged material to be deposited at the identified placement site requested based on the characterization of the material.

Every reach tested in Kill Van Kull, Newark Bay and Arthur Kill deepening project that falls within the NBSA that has not been beneficially used to remediate the HARS or create artificial reefs has been found to be acceptable by both State's regulatory agencies for beneficial use in remediating upland landfills and contaminated sites in the region. For example, the recently deposited soft, silty dredged material that overlies some areas of the deepening contracts that the District has or is proposing to construct has met the NJDEP criteria established for beneficial use at upland placement sites in New Jersey. Said placement criteria are established for each contaminated site and/or landfill based on the institutional and engineering controls necessary to remediate the site to be protective of human health and the environment. Dredged material from a particular contract is then evaluated for its use as structural fill material (as a barrier layer or low permeability cap) to aid in the remediation of the site through a NJDEP process referred to as an Acceptable Use Determination. The AUD process as detailed in Appendix E of the Department's technical manual entitled "The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters" (October 1997) regulates the use, processing or transfer of dredged material or products containing dredged material. It is noted that the Acceptable Use Determination process does not authorize any dredging project or beneficial use of dredged material or product that contains hazardous wastes pursuant to New Jersey's Hazardous Waste Regulations at N.J.A.C. 7:26G et seq. To date, no dredged material removed from the deepening projects that fall within the NBSA has been deemed a hazardous waste, and in fact only one area of the AK 41/40 project south of the Newark Bay was found unacceptable for beneficial use as structural fill material at upland sites in New Jersey. This

material was disposed of in the Newark Bay Confined Disposal Facility, a fully permitted and operational open water disposal site which lies central to the NBSA.

If for some reason, material proposed for dredging does not meet the standards for remediation purposes at the HARS, is unable to be receive an Acceptable Use Determination for upland placement, or cannot be placed in the Newark Bay Confined Disposal Facility, then USACE, in conjunction with the non-Federal sponsor, would perform the necessary investigations and analyses to determine the best course of action. This would be fully coordinated with the EPA, the appropriate state regulatory agencies and the public.

No additional impacts from the impacts identified in the 1999 Final EIS are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area.

### 3.1.7 Migratory Birds

No additional impacts from the impacts identified in the 1999 Final EIS are expected. Refer to the Contaminated Sediment discussion in this Section and the Biological Exposure Potential Section in the 1999 Final EIS, pages 6-11 through 6-19.

### 3.1.8 Threatened and Endangered Species

No additional impacts from the impacts identified in the 1999 Final EIS are expected. Refer to the Contaminated Sediment discussion in this Section and the Biological Exposure Potential Section in the 1999 Final EIS, pages 6-11 through 6-19.

### 3.1.9 Water Quality

All dredging operations produce some turbidity. The 1999 Final EIS and 2004 EA identified and committed to the use of environmentally acceptable and approved mechanical dredges, such as bucket and clamshell dredges. Potential water quality impacts associated with dredging were addressed in the 404(b)(1) evaluation included in the 1999 Final EIS, and updated in the 2004 EA. The designation of the CERCLA study area would not warrant revising these procedures nor would it alter the analysis of impacts already addressed. No additional 404(b)(1) evaluation for this proposed work is deemed necessary and no impacts are expected to arise from the study area designation.

### 3.1.10 Wetlands

No significant additional impacts beyond those identified in the 1999 Final EIS and 2004 EA are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area.

### 3.1.11 Wildlife

No additional impacts to wildlife from the impacts identified in the 1999 Final EIS are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area. Refer to the Contaminated Sediment discussion in this Section and the Biological Exposure Potential Section in the 1999 Final EIS, pages 6-11 through 6-19.

### 3.1.12 CUMULATIVE IMPACTS

Since, as discussed above, the study area designation does not warrant any changes in the analysis of any individual impacts, there will be no changes in any cumulative impact assessment (Section 6.3 of the 1999 Final EIS) as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area.

In summary of Section 3.1 environmental analyses, USACE's previous assessments of the NBSA with respect to dredging the Federal channels are still valid as biological, chemical, and physical sampling efforts would not have significantly changed. Designation of the Newark Bay CERCLA study area does not alter the existing characterization of the resources in the study area or the proposed dredging plans and therefore has no effect on the previous analysis of impacts presented in the 1999 Final EIS or 2004 EA. Should pertinent data be developed during the course of the study related to this resource or its impact analysis it would be considered on a case-by-case basis and a new EA may be prepared to address any data that may be considered as being substantially new or different. No additional impacts from those impacts identified in the 1999 Final EIS are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a CERCLA study area.

## 3.2 **Remedial Investigation/Feasibility Study and the Harbor Deepening Project**

This section discusses the potential effects of the HDP on the RI/FS (and vice-versa). The main concern is whether the authorized deepening project will significantly affect the execution of the RI/FS or the analysis of data obtained through that study. Below is a discussion on the proposed goals of the RI/FS and the current coordination that has occurred between the USACE and EPA since the AOC.

Tierra Solutions, Inc. (Tierra), on behalf of Occidental Chemical Corporation (formerly known as Diamond Alkali Company), is undertaking a RI/FS for the NBSA in accordance with the terms and provisions of the AOC.

Three Remedial Investigation-related goals are established in the AOC:

- *RI Goal 1*: Determine the horizontal and vertical distribution and concentration of polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), pesticides, and metals for the NBSA sediments (AOC Scope of Work Section A.1);

- *RI Goal 2*: Determine the primary human and ecological receptors (endpoints) of PCDDs, PCDFs, PCBs, PAHs, pesticides, and metals contaminated sediments in the NBSA (Scope of Work Section A.2); and

- *RI Goal 3*: Determine the significant direct and indirect continuing sources of PCDDs, PCDFs, PCBs, PAHs, pesticides, and metals to the sediments in the NBSA (Scope of Work Section A.3).

HDP navigational channels that will be dredged account for approximately twenty-five percent of the NBSA. The proposed sampling plan in the RI/FS shows there are 20 chemical sampling locations and 8 radiochemical sampling locations in areas that are HDP channels. It should be noted that the EPA has not yet approved this RI/FS draft work plan.

Potential impacts of the HDP on the RI/FS would be to interfere with the RI Goal 1. It is expected that RI Goal 2 will not be affected as the receptors will still be the same in the with- or without-project condition. RI Goal 3 will not be significantly affected as dredging activities will affect only the sediments, not any ongoing sources to the sediments. (Refer to Section 3.13 Contaminated Sediments and Section 4.3 Sediment Resuspension and BMPs.)

As part of the USACE coordination with the EPA, the EPA has repeatedly stated that they do not consider the continued construction of the authorized harbor deepening projects to be an interference with the NBSA RI/FS since the material to be removed by the HDP dredging is tested for dioxin (among other contaminants) prior to its removal to determine its placement options. These test results are provided to the state regulatory agencies (which are also responsible for overseeing CERCLA in coordination with the EPA) for their use in issuing Water Quality Certificates. USACE is confident that the material being removed will not impact the results of the RI/FS or any potential remedial action as those results will be readily available to each of the responsible agencies for their use in completing their analyses.

Based on continuing coordination with the EPA, it is noted that the RI/FS sampling plan provided by Tierra Solutions is a "draft" plan that has not been approved by the EPA. During the EPA review, the USACE will assist the EPA in its designation of sampling points by providing the most recent information concerning the dredging schedule and dredging areas. As such, the EPA has referenced plans to review and modify (i.e. sample locations and number of samples are subject to change as approved by the EPA) the study plan to ensure that it meets their requirements as well as considers the HDP dredging activities within the Newark Bay area.

The draft RI/FS sampling plan has a large number of sediment samples proposed to be taken in one segment of Newark Bay (i.e., the navigation channels) that are presently deeper than when the Occidental's pollution releases occurred. The majority of the HDP footprint in the expanded EPA study area has been recently dredged to an interim depth of 45 + ft in the Federal navigation channels in the southern half of Newark Bay and 40 + ft in the Federal navigation channels leading from the Kill Van Kull leading into the Arthur Kill between 1999 and 2004.

As a result of continued and extensive USACE coordination with the EPA regarding the potential effects of each project on the other, no significant negative impacts to the RI/FS or the HDP are expected. In fact, there will be net benefits to the RI/FS provided by the HDP: the sampling that has already been performed by USACE and will be performed in the future as part of the HDP will supplement the RI/FS sampling program, providing information on contaminant levels within the areas to be dredged.

Moreover, the HDP will likely provide other benefits to the overall Superfund process for NBSA, insofar as the data on sediment resuspension during dredging collected as part of the HDP monitoring program will provide information that may be useful to EPA and its goals.

## 3.3 ANALYSIS OF SEDIMENT DATA

Environmental technical evaluations and sediment testing have been performed to support the predecessor projects and the approved HDP dredging activities in the project area. These assessments were conducted to characterize sediments proposed for dredging so an analysis of impacts could be completed in support of the previous regulatory determinations and coordination required under all applicable Federal and State laws and regulations. All appropriate authorizations and State WQCs have been issued to USACE to continue deepening activities in the NBSA. Data collected from these and subsequent sediment characterizations will be provided to EPA for use in their CERCLA investigations.

### 3.3.1 CARP

The CARP began in 1998 when the NYSDEC, NJDEP, Port Authority of New York and New Jersey, and USACE partnered to assess the environmental quality of the Harbor (NYSDEC, 2003). The CARP monitoring program included environmental sampling matrices of the water column, sediments and biota. Sampling began in 1998 and continued until 2001. Forty-two cores (sub-sectioned to 160 samples) and 91 surficial sediment samples were submitted to analytical laboratories for chemical, physical (grain size) and/or biological (toxicity testing) analyses. USACE was responsible for compiling and collating the water, sediment, and biota data collected as part of this program.

### 3.3.2 REMAP

The EPA's Regional Environmental Monitoring and Assessment Program (EPA 2005a) is a long-term research effort to enable status and trend assessments of aquatic ecosystems across the United States with a known statistical confidence. Initiated in the late 1980's within the Office of Research and Development, the Environmental Monitoring and Assessment Program addresses monitoring conditions of estuaries, streams and lakes in selected geographic regions, as well as having examined the surrounding landscapes in which these resources occur. REMAP was initiated to test the applicability of the program's approach to answer questions about temporal ecological conditions at regional and local scales (EPA 2005b).

### 3.3.3 NOAA QUERY MANAGER

Query Manager is a data delivery application developed by NOAA's Office of Response and Restoration/Coastal Protection and Restoration Division (NOAA 2005). Query Manager is a database program that can access sediment chemistry, sediment toxicity, and tissue chemistry data from a relational database for individual watersheds. Query Manager organizes data sets from multiple studies into a consistent and standardized structure, thereby improving data delivery and ease of interpretation for coastal resource managers.

### 3.3.4 INVENTORY REPORT – TIERRA SOLUTIONS, INC. (TIERRA)

The Inventory Report is a compilation by Tierra Solutions of biological, chemical or physical data collected by various private entities and public agencies with some regulatory or stakeholder role in the NBSA. All relevant studies cited in the Inventory Report were considered by USACE; however some were not analyzed for reasons outlined here. NOAA's Phase I N&ST Sediment Investigation (1991), USACE's Minish Park Investigation (1995), Tierra Solutions' Newark Bay Reach A Monitoring Program (1999), and Tierra Solutions' 1997 Combined Sewer

Outflow Sampling Program were not examined as none of these data sets contained dioxin or dioxin congener information.

Five additional data sets, not included in the Inventory Report, were evaluated for this current environmental assessment. These data sets are the NYSDEC CARP data (2003), Tierra Solutions' 1994 Combined Sewer Outflow Study, and three USACE sediment sampling events that occurred from 2003 – 2004 (performed under strict regulatory auspices to obtain WQC's from the states). The three sampling events refer to USACE sampling completed in 2003 and 2004 for contract areas within the Arthur Kill, Kill Van Kull, and Newark Bay (USACE 2004a, USACE 2004b, and USACE 2004c). The sampling plans for the dredged material that was initially identified for HARS placement were developed and approved by the EPA and the state regulatory agencies. Sampling plans for the material initially identified for upland placement were developed and approved in concert with the appropriate state regulatory agency. In some cases, coordination with both agencies occurred as contract areas overlapped into both states' jurisdictional waters (See Appendix A, Figure titled "Sediment Core Location and Depth for Soft Silts/Clays Evaluated for Potential Upland Placement").

Of the 26 data sets assessed (USACE 2005a – See Appendix B), eight had data points within the HDP federal navigation channel boundaries. These include EPA's REMAP (1998), NOAA's National Status and Trends Phase II Study (1993), Tierra Solutions' 1991 and 1992 Passaic River Studies, Tierra Solutions' Newark Bay and Elizabeth Channel Sediment Survey (1998), and the three USACE sampling events (USACE 2005a – See Appendix B).

Twenty-two (22) surficial sediment data points from REMAP and the NOAA Query Manager fell within the HDP federal navigation channel boundaries. USACE collected 97 core samples, which were used to create 36 sediment composites, in accordance with State regulatory agency guidance, to evaluate the surficial soft silty material to be dredged from the three aforementioned HDP construction contracts. These data are described in the referenced USACE 2004 reports.

All 22 sediment samples noted in the paragraph above were collected prior to 1998. Since federal channel deepening construction has subsequently occurred in the same locations that 16 of the sediment samples were taken, these sediment sample data points are no longer valid. Consequently, only 6 of the 22 data points located in the Arthur Kill Area 2/3 contract area may potentially still be valid or representative of the sediment contamination that exists at their respective locations. Nonetheless, the figure titled "Dioxin Toxicity Equivalency Quotient (TEQ) in Surficial Sediment and Navigation Channel Deepening Contract Upland Placement Evaluation Composites" (See Appendix A) illustrates that the 22 data point concentrations of dioxin are comparable to and not significantly different (*i.e*. within the same range of values) from the USACE's 36 sediment composite concentrations. For the composites from the Arthur Kill and the Kill Van Kull, the soft silty sediment strata in both of these contract areas has been determined by the NYSDEC and the NJDEP to be suitable for dredging using a closed clamshell "environmental" bucket while incorporating Best Management Practices (BMPs) (See Section 4.2 below for a discussion on BMPs). The USACE expects the remaining sediment composites located in the Newark Bay contract area to be determined by NJDEP to be similarly acceptable for dredging using a closed clamshell "environmental" bucket while incorporating BMPs based upon the results of the extensive sampling done to date.

As noted above, the two reports that were identified as containing potentially significant new circumstances and information are the Contaminant Assessment and Reduction Program (CARP) and Inventory Report (Tierra Solutions, 2004). Additionally, the USACE examined data bases from the EPA's Regional Environmental Monitoring and Assessment Program (REMAP), and National Oceanic and Atmospheric Administration's (NOAA) Query Manager (that revealed 26 potentially relevant data sets within the NBSA) which assessed levels of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and its congeners. The USACE has determined that no new sediment data concerning dioxin is contained in or has been added to these data banks since the 1999 Final EIS that would alter the analysis of contaminant impacts conducted for the Final EIS.

### 3.4 **No Action Alternative**

Consequences of the No Action Alternative were considered in the 1999 Feasibility Report and determined to be primarily related to cost. In the 1999 Final EIS, no action impacts were determined to be potentially more damaging to the environment as resuspension of potentially contaminated sediments due to man-made causes (*e.g.* ship wakes) and natural storm events would continue to occur at more intense and at greater frequencies as compared to constructing the Recommended Plan. An example of this would be that tugboat wakes under the recommended plan are expected to cause less resuspension of sediments due to fewer vessel trips per unit of cargo and deeper channel depths.

## **Part 4 SEDIMENT RESUSPENSION, BEST MANAGEMENT PRACTICES, AND WATER QUALITY CERTIFICATION COMPLIANCE MONITORING**

### 4.1 **SEDIMENT RESUSPENSION**

There are two issues associated with sediment resuspension. First, the extent of resuspension due directly to dredging is likely to be small in comparison with other natural and anthropogenic sources of resuspended sediment. Second, dredging will actually reduce a potentially important source of resuspended sediment, ship and barge traffic.

The fine-grained sediments in the Newark Bay area are continuously resuspended and deposited as a result of both natural and anthropogenic (man-made) forces. Normal tidal flow as well as occasional storm events (e.g., Nor'easters, hurricanes, or current conditions, etc.) typically resuspend and distribute fine grain sediments. Anthropogenic factors, such as the deep-draft container vessels that continually traverse the navigation channels in the Newark Bay area regularly resuspend sediments as they transit through the channels.

Sediment resuspension is an obvious consequence from all dredging events associated with fine-grained sediments. In contrast to natural resuspension and ship traffic, however, the impacts of dredging are short-lived and usually limited to the immediate vicinity of the dredging operation. Sediment particles with (or without) dioxin will tend to stay within the sediment plume, which monitoring confirms do not travel far from the dredging site. Specifically, recent USACE studies show that Total Suspended Solid (TSS) levels return to ambient conditions less than 350

feet from the dredging location (USACE 2002). Furthermore, the resuspension of red clay and glacial till which underlay the surface silts is less of an issue because of the materials' cohesiveness and larger grain sizes, respectively, which results in an even faster settling time and consequently less movement from the dredging area.

Natural physical processes, storm events and ship movements are all likely to account for greater increases, over a longer period of time, in suspended sediment concentrations than dredging operations. Wind-wave resuspension and seasonal variability in the supply of erodable sediment have been found to be the primary factors in surface and near-bottom concentrations in estuarine conditions; these natural processes are more aerially extensive, usually of longer duration, and are more frequent than dredging operations, affecting resuspension at tidal time scales, and were found to control suspended sediment concentrations even during dredging operations (Schoellhamer 2002). Field observations also indicate that the effect of dredging induced resuspension on sediment transport is generally negligible in comparison to the transport induced by natural storm events; in one particular study, dredging plumes increased the total suspended load by approximately 25% over less than 2.5% of the total estuarine area, while storms were observed to increase the total suspended load by a factor of 3 throughout 100% of the estuary (Bohlen 1980).

Dredging actually helps reduce both the natural and man-made impacts by deepening the channel and thereby reducing resuspension of surface sediments. Thus, by removing contaminated sediments, there may very well be a greater overall, long-term reduction in contaminant resuspension and bioavailability than the short-term increases associated with dredging.

Consequently, comparison of the with-project conditions, which would be deeper channels with less vessel traffic to the no action alternative, as required by NEPA, results in a determination of no significant impact from the recommended plan.

### 4.2 **BEST MANAGEMENT PRACTICES (BMPS)**

As stated in the WQCs, NYSDEC and NJDEP require utilization of and compliance with navigational dredging BMPs and performance standards to minimize potential impacts to the environment due to the dredging and disposal action. BMP methods that USACE has included in its contract specifications for dredging in fine-grained sediments are similar to those methods used if the dredged materials had been characterized as HTRW. For example, environmental (closed) buckets, such as the one manufactured by Cable Arm (See Appendix B), are designed for remedial dredging, in order to minimize and/or prevent resuspension of material.

Silt and turbidity curtains are structures commonly used to reduce the spread of turbidity, and thereby the transport of sediment. Design criteria to be considered when designing a silt curtain are current velocity, water depth, wind, and waves (USACE 2005b – See Appendix B). While silt curtains can theoretically be designed for a current up to 3 knots, which is rarely exceeded locally, they must be kept at least 1 ft above the bottom at all times during a full tidal range. Use of curtains must also account for the event of wakes and waves. It is seldom practical to extend a turbidity curtain depth lower than 10 to 12 feet below the surface due to the large loads on the curtain. Due to channel depths in the NBSA, designing a functional silt curtain is impracticable.

In addition, relocation of a silt curtain is not an inconsequential action, due to its anchoring system and large sail area as well as considerations of accumulated silt. Since dredges move during their operation, both to follow the cut and to move out of the way of passing vessel traffic, the use of silt curtains around a dredge is prohibitive. There are some situations where silt curtains are a feasible BMP. Silt curtains placed in the vicinities of wetlands and creeks that feed into the channels are some locations where they can be utilized, thereby effectively reducing impacts.

Other examples of these BMPs include, but are not limited to, requiring no barge overflow for relatively soft silty dredged material (which includes all non-HARS suitable dredged material), placing dredged material into the scow within the confines of the scow and not above it, and limiting hoist speeds. New Jersey WQCs contain conditions requiring no barge overflow and use of an environmental closed clamshell bucket for the relatively soft silty material proposed for upland placement, which will significantly reduce resuspension and its' potential impacts where practicable and possible. NYSDEC WQCs contain similar BMPs. In addition, NJDEP requires an Acceptable Use Determination for all project-dredged material proposed for upland placement.

Every area tested as part of the HDP in the Newark Bay Study Area has met or is expected to meet the NJDEP criteria used in their WQC and Acceptable Use Determination programs and are similarly acceptable to the criteria established for NYSDEC. It is important to note that without these state certifications, no material in the respective state's waters may be dredged. Previous to receiving the BMPs listed in the states' WQCs, USACE had investigated alternative BMPs in the HDP's 1999 Final EIS. The USACE has also since coordinated with the USACE – New England District on the BMPs utilized for a PCB Superfund Cleanup in New Bedford Harbor, Massachusetts and Providence River, Rhode Island Maintenance Dredging Project (USACE 2005c – See Appendix B). From this coordination, it was determined that there was no new information that USACE had not already considered regarding BMPs. New England District dredging procedures, when in similar environmental and physical conditions as the HDP, were the same (*i.e.*, closed environmental bucket when dredging non-suitable ocean disposal material).

### 4.3 **WATER QUALITY CERTIFICATION COMPLIANCE MONITORING**

In order to minimize, to the extent practicable, resuspension of sediment into the water column, NJDEP and NYSDEC umbrella WQCs and specific contract reach WQCs, (*e.g.* S-KVK-2 Contract Reach) issued for the HDP provide project- specific BMPs for the dredging contractor to follow. Some BMPs listed in the states' WQCs are: (1) A "No Barge overflow" on contaminated, non-HARS, silty material, (2) Closed clamshell environmental bucket dredge on non-HARS suitable material, (3) Clamshell bucket hoist speed of 2 feet per second or less (Hoist Speed), (4) Maximization of clamshell bite, (5) Deliberate placement of material into barge (to prevent spillage), and (6) Silt curtains to protect sensitive habitats (where practical).

For purposes of Quality Assurance, USACE personnel (Construction Field Office) inspect dredging activities. NYSDEC umbrella WQC special conditions provides for an "Inspector's Form" to be filled out several times a week and submitted to NYSDEC on a weekly basis by the Corps Field Office staff. This "Inspector's Form" contains information such as the following

(Note: this is not an all inclusive list from the Inspector's Form): (1) Date and time of inspection, (2) Type of bucket, (3) Flaps on environmental bucket intact and operable, (4) Hoist speed, (5) No barge overflow (if appropriate), (6) Placement of dredge material in barge, and (7) Corrective action taken (if necessary).

For additional Quality Control, USACE Planning Division staff, consisting of environmental scientists, will be conducting unannounced inspections using the same “Inspector's Form” as the USACE Field Office staff of engineers. Inspections are proposed to occur (for the S-KVK-2 Contract) from 4 locations: on the dredge, from an alternate vessel on the waterbody, from the shorelines of Bayonne, NJ and Staten Island, NY.

In addition, both states’ umbrella WQC special conditions provide for a “Dewatering Form” to be signed / verified by both the Quality Control Officer (Contractor) and a USACE Field Office Project Engineer and submitted to the state agencies on a weekly basis. This "Dewatering Form" contains information such as: (1) Dredge scow identification, (2) Date of discharge into decant scow, (3) Start and stop time of discharge into decant scow, (4) Rate of pump used to discharge into decant scow, and (5) Volume of discharge into decant scow.

Both forms (Dewatering and Inspector’s Form) allow for USACE to monitor the contractor’s performance as well as serve as a record to update the states on the status of compliance with the WQC conditions.

USACE will be initiating and performing, for the life of the project, an intensive and comprehensive water quality monitoring program that will not only include monitoring of the usual physical parameters, (*e.g*. salinity, dissolved oxygen, temperature, etc.) but also a Total Suspended Solids (TSS) and Turbidity Monitoring Program. The TSS multidimensional study will sample suspended solids, in mg/L, in the water column due to dredging activities. This extension of the previous USACE 2002 Arthur Kill, Newark Bay, Kill van Kull TSS program will survey larger areas containing silt material for longer durations. The specifications of this program are being coordinated with both states and will, at a minimum, be conducted biweekly. This data will be compared to the existing ambient TSS levels within the waterbody which will allow for the USACE to confirm/validate the feasibility phase’s turbidity model assumptions that defined the extent, duration and density of the dredge-generated sediment plume; supporting USACE’s 1999 and 2004 NEPA determinations as well as providing near real time data to NJDEP and NYSDEC for their consideration of future dredging activities in the New York Harbor.

Finally, NYSDEC intends to utilize its newly expanded enforcement team to inspect the dredging activities for WQC special conditions compliance, in addition to the compliance monitoring activities that are to be conducted by USACE staff and its contractor(s). These NYSDEC representatives have the authority to stop the project if the activities are found to be in noncompliance with the relevant WQC conditions.

**Part 5 COORDINATION**

Navigation dredging in the Port of New York and New Jersey has been regulated in accordance with the Clean Water Act and NEPA since 1969. Interagency coordination has been intense and

continual since 1986, when the predecessor projects in Kill Van Kull/Newark Bay and Arthur Kill were authorized in the Water Resources Development Act of 1986. As part of the USACE's NEPA compliance and the Federal and state permitting processes, USACE has been coordinating with the EPA (Region 2), NJDEP, NYSDEC, the New York State Department of State and the New York City Department of Environmental Protection (NYCDEP) throughout the feasibility, preconstruction engineering and design, and ongoing construction phases of the KVK/NB-45, AK-41/40, and the HDP regarding environmental concerns related to the Federal dredging actions. As part of the USACE's NEPA compliance commitments, USACE also has been coordinating with the NOAA-Fisheries, U.S. Fish and Wildlife Service, and numerous other Federal, state and local natural resource stakeholders. None of these agencies have identified any new information that has a bearing on the impact analyses conducted for the HDP.

NYSDEC and NJDEP issued "umbrella" WQCs (as per the Section 401 of the Clean Water Act; 33 U.S.C. 1341) to the USACE for the HDP in April of 2004. The NJDEP requires USACE to apply for individual WQCs for each contract area of the project. The NYSDEC requires the USACE to apply for individual "Authorizations To Proceed" for each contract area of the project. Each of these contract-specific regulatory actions establishes contract-area specific conditions augmenting those specified in the umbrella WQCs. To date, USACE has obtained individual WQCs for the AK-41/40, the KVK/NB-45, as well as the "umbrella" WQCs for the HDP. It has also received the first contract-specific WQC/Authorization to Proceed for the Kill Van Kull (known as the S-KVK-2 contract area) of the HDP. This contract area encompasses southern portions of Newark Bay.

The foundation for USACE and EPA Superfund integration (navigation-Superfund) coordination began with the initiation of the Lower Passaic River Environmental Restoration Feasibility Study. Thru this process, the USACE has been kept informed of the EPA's progress on the NBSA and USACE has shared with EPA all pertinent and relevant information on the HDP's construction schedule, previous sediment sampling data and other geophysical data. One of the outcomes of the coordination with EPA was the recognition that it would be advantageous if there was ongoing coordination between EPA and the New York District related to the HDP and the RI/FS. As a result of this ongoing relationship, a Project Coordination team has been established that includes representatives from EPA, USACE, the States of New York and New Jersey, and the Port Authority of NY and NJ, who will meet frequently and as needed to review the status of the respective efforts within the Newark Bay Study Area and to identify opportunities to maximize collaboration and coordination with regard to the study and the various dredging activities.

## Part 6 SUMMARY AND CONCLUSIONS

### 6.1 SUMMARY

Through consultation with EPA, the USACE learned that the Newark Bay area is not listed on the National Priority List, but has been designated as an area of study due to the contiguous proximity of Newark Bay with that of the Diamond Alkali Superfund Site on the Lower Passaic River.

EPA, in agreeing to enter into the AOC, has stated that they did so because they wanted to study whether some contaminants may have spread or traveled downstream to Newark Bay from the Lower Passaic River. This determination was not made based on the review of any new information or currently available data of the Newark Bay area. The purpose of the EPA study is to determine if and where contaminants exist, at what levels, and conduct risk assessments to determine the hazards that contaminants may pose to human health and the environment.

If portions of Newark Bay should be designated a "Superfund Site", the designation in and of itself will not prevent all dredging activity. Upon review of multiple dredging projects constructed through HTRW contaminated project areas, (New Bedford, Massachusetts Navigation/Environmental Dredging Project (USACE 2005c – See Appendix B) and Hudson River, New York PCB cleanup (USACE 2005d – See Appendix B)), USACE has determined that the BMP's (including all known environmentally sound engineering practices) and extensive monitoring conditions proposed in the States permits are more than sufficient to avoid, minimize or mitigate for adverse environmental effects. It is therefore not anticipated that implementation of the recommended plan would be substantially hindered or modified and the dredging could proceed in an environmentally sound and practical manner.

The designation of Newark Bay area as an Operable Study Unit pursuant to CERCLA in and of itself does not constitute "new information" that must be evaluated prior to continuing construction of the AK 41/40' and HDP components located within the Newark Bay Study Area. There are no additional regulatory or technical considerations concerning the dredging project that are attached directly to the study area designation by itself.

The dredged material from each contract area within the confines of the Newark Bay Study Area will be sampled and tested separately for placement at the identified upland and/or aquatic permitted placement site(s), as required by the appropriate regulatory agency(s) to ensure that its placement at the sites is fully protective of the public and to ensure the material is not characteristic of Hazardous, Toxic and Radioactive Waste (HTRW).

The proposed action to support the Newark Bay dredging projects is in compliance with environmental laws and regulations. Full compliance of the Newark Bay dredging projects with NEPA requirements and documentation has occurred through the preparation of 1) the Arthur Kill's 1985 EIS, 1986 EIS, 1997 EIS, 2000 Dredged Material Placement EA, and 2001 Mitigation EA, 2) the Kill Van Kull's 1986 EIS, 1987 EIS, 1997 EA, and 1999 Dredged Material Placement EA, and 3) the HDP's 1999 Final EIS and 2004 EA.

The recommended plan has been designed to minimize adverse impacts to the ecological and human environment in the project area and will not significantly affect either the ecological or the human environment. There have been no significant additional environmental impacts due to HTRW, re-suspension, or "new and/or significant" information associated with dredging activities in the Arthur Kill, Kill Van Kull and Newark Bay that have not already been evaluated and approved for the HDP. The action will be implemented in accordance with conditions of the umbrella WQCs issued by NYSDEC and NJDEP in April 2004 and by the individual WQCs issued by NJDEP and Authorizations to Proceed by NYSDEC for each contract area.

Concurrent to the EPA's preparation to issue the AOC for the Newark Bay area study and in coordination with the EPA, the USACE was completing the HDP's supplemental NEPA documentation (2004 EA mentioned above) and permitting process to execute the Project Cooperation Agreement with the Port Authority of New York and New Jersey to begin construction of the HDP. With the completion of all required NEPA documentation and acquisition of WQCs necessary to proceed into construction of the HDP, the Project Cooperation Agreement was executed in May 2004. All technical re-evaluations in the Newark Bay study area performed since the release of the AOC as described in detail above have not elucidated any new or significant information that would trigger the preparation of a Supplemental EIS. Since no new information that would change the determinations made in the 1999 Final EIS and 2004 EA is available, the USACE is in full compliance with the law and all applicable procedures. Therefore, it is USACE's responsibility to not unduly delay the Congressionally authorized and regionally significant projects and to recommend that construction of the Newark Bay projects proceed on schedule.

### 6.2 **CONCLUSION**

To sum up the major points in Section 3 of this EA, USACE's previous assessments of the NBSA with respect to dredging the Federal channels are still valid as biological, chemical, and physical sampling efforts would not have significantly changed. Designation of the Newark Bay CERCLA study area does not alter the existing characterization of the resources in the study area or the proposed dredging plans and therefore has no effect on the previous analysis of impacts presented in the 1999 Final EIS or 2004 EA. No additional impacts from the impacts identified in the 1999 Final EIS are expected as a result of the EPA designation of Newark Bay and portions of the Kill Van Kull and Arthur Kill as a study area.

With past and continued extensive USACE coordination with the EPA regarding the potential effects of each project (*i.e.* HDP and EPA's RI/FS) on the other, no significant impacts to either project are expected.

With regard to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and its congeners in the Newark Bay Study Areas, USACE has determined the CARP, the Inventory Report (Tierra Solutions, 2004), the EPA's Regional Environmental Monitoring and Assessment Program (REMAP), and National Oceanic and Atmospheric Administration's (NOAA) Query Manager contains no new pertinent sediment data concerning dioxin that would alter the analysis of contaminant impacts conducted for the 1999 Final EIS.

The proposed dredging of the Harbor Deepening Project in Newark Bay and in portions of the Kill Van Kull and Arthur Kill would not result in significant environmental impacts from those identified in the 1999 Final EIS and 2004 EA as it pertains to the Administrative Order on Consent. Therefore, the recommended plan, as identified in the 1999 Final EIS and 2004 EA, represents sound engineering practices and meets environmental standards, therefore, construction of the plan should proceed on schedule.

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**Part 8 AUTHOR(S)**

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# DRAFT FINDING OF NO SIGNIFICANT IMPACT

Name of Action: New York and New Jersey Harbor Deepening Project with specific Dredging locations in Kill Van Kull, Arthur Kill, and Newark Bay.

1. Project Description: The proposed work is to dredge specific areas in the New York and New Jersey Harbor to depths of 50+ feet to allow for safe passage of deep-draft navigation vessels into the Port of New York.

2. Coordination: New York District has coordinated this project with Federal (U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Agency [NOAA] Fisheries Department, U.S. Environmental Protection Agency [EPA] and State (New Jersey Department of Environmental Protection [NJDEP], New York State Department of Environmental Conservation [NYSDEC], New York Department of State [NYSDOS]) resource agencies and the interested public in order to inform agencies and individuals of the proposed work and the environmental evaluations. Coordination has included the opportunity for comments on these evaluations and my findings regarding their comments.

3. Environmental Impacts: The proposed action is in compliance with all environmental laws. This Environmental Assessment (EA) has been written to evaluate whether the designation of an area that lies within a portion of the New York and New Jersey Harbor Deepening Project (HDP) as a study area pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) would alter any impact analysis made for the HDP or whether dredging activities to implement the HDP will significantly affect the Remedial Investigation and Feasibility Study (RI/FS). I have also reviewed data reports and inventories identified as potential new sources of relevant information and determined they either contained no new data or the data did not warrant any revision to the impact assessments included in the 1999 Final Environmental Impact Statement (EIS) and the 2004 EA. There have been no additional significant environmental impacts associated with dredging in the Arthur Kill, Kill Van Kull, and Newark Bay with regard to normal dredging activities already evaluated and approved for the HDP (1999 EIS and 2004 EA). As previously considered, turbidity near the construction site would temporarily increase on a short-term basis but should not be substantially different than expected. Overall, the environmental impacts of implementing the proposed action would be relatively minor in scope and have not changed from the initial evaluation as reported in the 1999 Final EIS and again in the 2004 EA.

4. Determination: I have determined that the action, as previously evaluated in the 1999 Final EIS and 2004 EA, will not significantly impact the RI/FS and that there is no significant new information or change in the project or impacts to the quality of the human environment. Therefore, the action does not require the preparation of a detailed statement under Section 102 (2) (c) of the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321, et seq.). My determination was made considering the following factors discussed in the EA:

a. The proposed action has been designed to minimize adverse impacts to the environment and human population occurring in the project area and is not likely to adversely affect the human environment.

b. No unacceptable adverse cumulative or secondary impacts would result from project Implementation.

c. The action will be implemented in accordance with conditions in the "Umbrella" Water Quality Certifications dated respectively, April 8, 2004 and April 12, 2004, from the states of New York and New Jersey.

d. Best Management Practices will be utilized, with the intent to avoid and minimize environmental impacts to the highest practicable extent.

5. Findings: The proposed dredging of the Harbor Deepening Project in the Newark Bay Study Area which includes portions of the Kill Van Kull and Arthur Kill would not result in significant environmental impacts from those identified in the 1999 Final EIS and 2004 EA as it pertains to the Administrative Order on Consent and is the alternative that represents sound engineering practices and meets environmental standards, therefore, construction of the plan should proceed on schedule.

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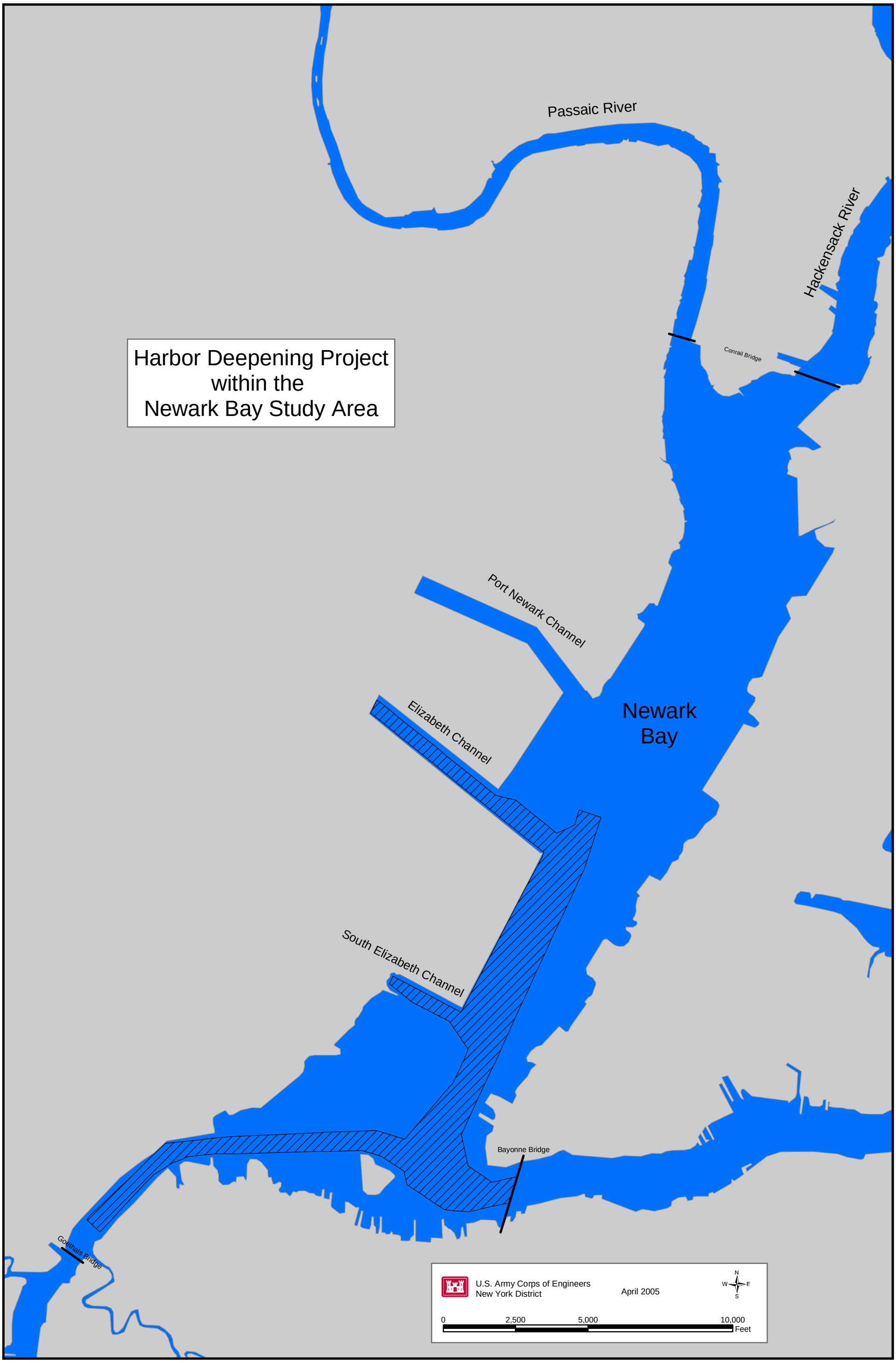
Date: _____

RICHARD J. POLO
Colonel, US Army
District Engineer

# Appendix A

# Figures


Harbor Deepening Project
within the
Newark Bay Study Area
Passaic River
Hackensack River
Conrail Bridge
Port Newark Channel
Elizabeth Channel
Newark
Bay
South Elizabeth Channel
Bayonne Bridge
Goethals Bridge
U.S. Army Corps of Engineers
New York District
April 2005
N
W
E
S
0
2,500
5,000
10,000
Feet

# Sediment Core Location and Depth for Soft Silts/Clays Evaluated for Potential Upland Placement

**Depth of Core Used in Composite**

- 0.0 - 1.0 Feet
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1 - 10.0
- 10.1 - 15.0
- 15.1 - 25.0

S-NB-1

AK-2/3

S-KVK-2

U.S. Army Corps of Engineers
New York District

February 2005

N
W E
S

0 1,500 3,000 6,000
Feet

# Dioxin Toxicity Equivalency Quotient (TEQ) in Surficial Sediments and Navigation Channel Deepening Contract Upland Placement Evaluation Composites

## Navigation Deepening Contracts

| S-KVK-2 | S-NB-1 | AK-2/3 | |
|---|---|---|---|
| ★ | ▲ | ■ | 0-99 Parts Per Trillion (PPT) |
| ★ | ▲ | ■ | 100-199 |
| ★ | ▲ | ■ | 200-299 |
| ★ | ▲ | ■ | 300-399 |
| ★ | ▲ | ■ | 400-499 |
| ★ | ▲ | ■ | 500-599 |
| ★ | ▲ | ■ | 600-699 |
| ★ | ▲ | ■ | 700-799 |
| ★ | ▲ | ■ | 800-899 |
| ★ | ▲ | ■ | 900-999 |
| ★ | ▲ | ■ | >=1000 |

## All Available Surficial Sediment Concentration Data

- 0-99 Parts Per Trillion (PPT)
- 100-199
- 200-299
- 300-399
- 400-499
- 500-599
- 600-699
- 700-799
- 800-899
- 900-999
- >=1000

U.S. Army Corps of Engineers
New York District

February 2005

N
W E
S

0 2,500 5,000 10,000 Feet

# Appendix B

# Memorandums For Record

CENAN-PP-H 22 March 2005

MEMORANDUM FOR RECORD

SUBJECT: Review and Comparison of Plaintiffs referenced data to sediment data from the Harbor Deepening Projects

1. NRDC, on behalf of four named plaintiffs (hereinafter identified as the "Plaintiffs"), filed a complaint against the United States on January 21, 2005. In their complaint and in a previous Notice of Intent (NOI) letter dated January 4, 2005, the Plaintiffs referenced sediment contamination data that they considered to be "new and significant" with respect to the continued deepening of selected federal channels within and leading from Newark Bay. Specifically, these two "new" sources of sediment contaminant data were the NYSDEC Contaminant Assessment and Reduction Project Report (CARP; 2003) and Tierra Solution's Newark Bay Study Area Inventory and Overview Report of Historical Data (Inventory Report; Tierra Solutions, Inc. 2004). This memorandum summarizes the evaluation and comparison of sediment contaminant data from these two sources to the sediment contaminant data collected by the New York District to obtain the Water Quality Certifications (WQCs) from the appropriate State regulatory agency(ies) as required by the Clean Water Act (the regulatory statute used to manage the dredging and disposition of material to be removed in the construction and maintenance of the federal navigation channels in the Port of New York and New Jersey).

2. For purposes of this evaluation, and due to the large number of possible contaminants that can be found within the recently deposited sediments in the estuary, this evaluation was limited to polychlorinated dioxins and furans based upon the Plaintiffs comment (page 3, paragraph 7 of NOI) that dioxin levels are "of particular note". Further, given that the Plaintiffs' complaint references the designation of the Newark Bay as a new study area related to the Diamond Alkali Superfund Site, this evaluation was limited geographically to the area that defines the Newark Bay Study area (i.e., the evaluation ends at the Bayonne and Goethals Bridges). Lastly, as described in the Corps' Final Environmental Impact Statement for the NY & NJ Harbor Navigation Study (Dec 1999), the top layer of sediment to be removed from construction of the project is expected to be relatively recent deposits of material resuspended from areas nearby or adjacent to the channel since that area of the channel was last dredged. For this reason, surficial sediment contaminant data from the Plaintiff's referenced data from areas within and adjacent to the federal channel construction boundaries were used in this analysis. Similarly, the sediment composite test data for the material to be dredged from the federal channel construction were included in this analysis. Sediment composites are based on testing a mixture of one to three cores of the full thickness of sediment strata being evaluated – in this case, the top layer of silty sediment – so that they are most representative of the material that is proposed to be dredged.

3. To be complete and fully considerate of the potential toxic effects from all 17 congeners of dioxins/furans, the sediment contaminant data were evaluated using the Toxicity Equivalence Quotient (TEQ) for the various data points in the Newark Bay and Passaic River to the extent that data for the 17 congeners were available. This process involved computing the total toxicity of all the congeners for each sample by applying the Toxic Equivalency Factors (TEF) as accepted by the World Health Organization in 1998. Calculating the dioxin TEQ involved multiplying the concentrations of individual congeners by their respective TEF, then adding the individual TEQ's to obtain a total dioxin TEQ concentration. Dioxin TEQs were computed for all surficial sediment data and for the composite sediment samples tested by the USACE for the three current federal channel deepening contracts that fall within the Newark Bay study area.

4. The Plaintiff's referenced Inventory Report is a recent compilation of data from 26 previous sediment contaminant data collection efforts performed from 1990 to 2000 in the Harbor area. Therefore, the data contained in this report are not considered "new". Of these, only 8 sampling efforts had data points that fell within the boundaries of the federal channel deepening construction (i.e., the channel bottom and side slope). Also, we included five other sampling efforts in our analysis that were not included in the Inventory Report. These sampling efforts were documented in the NYSDEC CARP data report (2003), Tierra's 1994 CSO Study, and the three USACE sampling events for the WQCs (2004). On a related note, the Corps has been a proponent of and actively involved in the CARP program for several years (e.g., the Corps is a CARP Management Committee member). In fact, early in the program, the Corps provided sediment data management and collation support to the program. Consequently, the plaintiffs' referenced data were previously known by and available to the Corps.

5. The enclosed figure entitled "Dioxin Toxicity Equivalency Quotient (TEQ) in Surficial Sediments and Navigation Channel Deepening Contract Upland Placement Evaluation Composites" illustrates the TEQ dioxin sediment contaminant concentration of the surficial samples from all available sediment contaminant data collection efforts as well as the composite concentration of material tested for the three current federal channel deepening construction contracts. While no standard dioxin sediment contamination guideline or criteria has been developed for Passaic River or Newark Bay sediments, the sediment data points with concentrations higher than the upland "action level" of 1,000 parts per trillion are denoted in red with black outline. The other enclosed figure entitled "Sediment Core Location and Depth for Soft Silts/Clays Evaluated for Potential Upland Placement" illustrates the number and depth of cores taken for use in preparing the sediment composites tested to evaluate the material from the three current federal channel deepening construction contracts.

6. As noted above, of the 26 sediment sampling efforts that had data available for review (see Table 1), only 8 had data points within the federal channel construction boundaries (shown in bold on Table 1). Aside from the three sediment sampling efforts performed by the USACE for the WQCs for the three current federal channel deepening

construction contracts, the most recently collected surficial sediment contaminant data characterized by the Plaintiffs as "new" that fell within the federal channel construction boundaries were from 1998.

Table 1: Sampling Efforts Considered in the Analysis

| | **Sampling Event**** | **Study Agency** |
|---|---|---|
| 1 | EPA Surficial Sediment 1993 | EPA |
| 2 | Maxus Passaic R. CSO Study, 1994 | *Maxus Energy Corporation |
| 3 | Maxus Passaic R. Sediment Study, 03/93 | *Maxus Energy Corporation |
| 4 | Maxus Passaic R. Sediment study, 07/93 | *Maxus Energy Corporation |
| 5 | Maxus Passaic R. Sediment Study, 1990 | *Maxus Energy Corporation |
| 6 | **Maxus Passaic R. Sediment Study, 1991** | *Maxus Energy Corporation |
| 7 | **Maxus Passaic R. Sediment Study, 1992** | *Maxus Energy Corporation |
| 8 | Minish Park Monitoring 1999-2000 | *Tierra Solutions |
| 9 | **Newark Bay Elizabeth Channel 1998** | *Tierra Solutions |
| 10 | Newark Bay Reach A 1996 | *Tierra Solutions |
| 11 | Newark Bay Reach B, C, D 1997 | *Tierra Solutions |
| 12 | Newark Bay Reach ABCD 1999 | *Tierra Solutions |
| 13 | **NOAA NS&T Hudson-Raritan Phase II, 1993** | NOAA |
| 14 | Passaic R. EcoRisk 1999 | *Tierra Solutions |
| 15 | Passaic R. EcoRisk 2000 | *Tierra Solutions |
| 16 | Passaic R., EPA RI, 1995 | *Tierra Solutions |
| 17 | Passaic R., EPA RI, 1995, Maxus Sup. | *Tierra Solutions |
| 18 | Passaic R., EPA RI, 1995, Nearshore Sup. | *Tierra Solutions |
| 19 | REMAP, 1993-94 | EPA |
| 20 | **REMAP, 1998** | EPA |
| 21 | Sediment Grab Sampling 1995 | *Tierra Solutions |
| 22 | Sediment Sampling 1999 | *Tierra Solutions |
| 23 | CARP 1999-2001 | NYSDEC |
| 24 | **USACE Arthur Kill Samples for WQC** | USACE |
| 25 | **USACE Newark Bay Samples for WQC** | USACE |
| 26 | **USACE Kill Van Kull Samples for WQC** | USACE |

* Tierra Solutions is a subsidiary of the Maxus Energy Corporation, both of which are named as Responsible Parties in the Diamond Alkali Site, Passaic River Directive (NJDEP 2003).
** Boldfaced events include data points that fall within the boundaries of the federal channel deepening construction in the Newark Bay Study area.

7. Fifty-eight (58) data points from the 8 sampling efforts fell within the federal channel deepening construction boundaries. This included 22 data points from the Plaintiff's referenced data and 36 sediment composites taken by USACE for the WQCs.

8. Of the 22 data points from the Plaintiff's referenced data, all were collected in or prior to 1998. Since federal channel deepening construction has subsequently occurred in the same locations that 16 of these sediment samples were taken, these sediment sample data points are no longer valid. Consequently, only 6 data points from the Plaintiff's referenced sampling efforts that were taken in the Arthur Kill Area 2/3 contract could be argued to still be valid or representative of the sediment contamination that exists at their respective locations.

9. Table 2 shows the surficial sediment dioxin TEQ concentrations in parts per trillion (dry weight basis) from the Plaintiffs' referenced data that fall within the federal channel construction boundaries (i.e., channel bottom and side slope). Table 3 shows the sediment composite concentration in parts per trillion (dry weight basis) from the three current federal channel deepening construction contracts that fall within the Newark Bay study area.

Table 2: Dioxin TEQs for surface sediment samples within the Federal channel construction boundaries

| Study | Sample date | TEQ (PPTr)* | Status** |
|---|---|---|---|
| Maxus Passaic R. Sediment Study, 1992 | 12/1/1992 | 1.12 | Dredged |
| Maxus Passaic R. Sediment Study, 1992 | 12/1/1992 | 4.11 | Dredged |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 7.86 | Existing |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 24.1 | Dredged |
| Maxus Passaic R. Sediment Study, 1991 | 12/2/1991 | 25.62 | Dredged |
| REMAP 98 | 8/18/1998 | 29.15 | Dredged |
| REMAP 98 | 8/17/1998 | 33.87 | Existing |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 58.07 | Dredged |
| Newark Bay Elizabeth Channel 1998 | 4/7/1998 | 62.83 | Dredged |
| Maxus Passaic R. Sediment Study, 1991 | 11/19/1991 | 65.8 | Existing |
| REMAP 98 | 8/15/1998 | 68.62 | Dredged |
| REMAP 98 | 8/15/1998 | 72.73 | Dredged |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 85.72 | Existing |

| | | | |
|---|---|---|---|
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 87.02 | Dredged |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 89.16 | Dredged |
| Maxus Passaic R. Sediment Study, 1992 | 12/1/1992 | 98.41 | Dredged |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 102.24 | Existing |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 103.64 | Dredged |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 110.79 | Existing |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 124.14 | Dredged |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 142.84 | Dredged |
| NOAA NS&T Hudson-Raritan Phase II, 1993 | Jan-93 | 296.55 | Dredged |
| | | Mean = 77.0 | |
| | | Standard Deviation = 63.3 | |

* - PPTr: part per trillion (ng/kg dry weight)
* * - "Dredged" denotes a location that has been dredged since the sample was collected, whereas "Existing" denotes a location that may not have been dredged for federal navigation channel deepening.

Table 3: Dioxin TEQs (PPTr) for sediment composite samples within the Arthur Kill, Newark Bay and Kill Van Kull Federal Channel Deepening Boundaries

| AK 2/3 (2003) 20 Composites | S-NB-1 (2004) 10 Composites | S-KVK-2 (2004) 6 Composites* |
|---|---|---|
| 21.56 | 8.42 | 16.49 |
| 28.7 | 10.42 | 23.46 |
| 37.73 | 16.67 | 23.63 |
| 50.24 | 24.4 | 26.6 |
| 53.35 | 27.12 | 84.53 |
| 59.95 | 27.19 | 161.82 |
| 61.32 | 29.33 | - |
| 66.78 | 32.21 | - |
| 71.06 | 44.94 | - |
| 88.5 | 197.36 | - |
| 97.07 | - | - |
| 100.36 | - | - |
| 100.88 | - | - |
| 105.32 | - | - |
| 105.86 | - | - |
| 108.43 | - | - |
| 146.1 | - | - |
| 152.53 | - | - |
| 153.4 | - | - |
| 273.26 | - | - |

| Mean = 73.25 |
| --- |
| Standard Deviation = 60.23 |

* - Composites shown for S-KVK-2 are those that fall within the Newark Bay study area.

10. While Table 2 and 3 show that sediment contaminant concentration of dioxin in TEQ can vary considerably, the average and standard deviation of the surficial sediment concentration from the Plaintiff's referenced data that fall within the federal channel deepening boundaries are remarkably similar to that of the three federal channel deepening construction contract composites, which is in accordance to the Corps' NEPA evaluation referenced above.

11. In terms of significance of the Plaintiffs' referenced data to the continued deepening of the federal navigation channels in the Newark Bay study area, two key questions must be addressed: a. Are the data relevant to the action proposed? and b. Are the data substantially dissimilar to what was expected or tested as part of the proposed action?

a. As to the first question of whether the Plaintiffs' referenced data are relevant, it is only relevant indirectly, if at all, because the data are not sufficiently representative or recent enough for the involved regulatory agency(ies) to use in making a determination of suitability to dredge and place the material at the proposed upland beneficial use location(s) (as prescribed by the CWA). As background, characterization of each sediment strata in each dredging contract (regardless of whether it is federal or non-federal, maintenance or deepening), is fully and thoroughly evaluated by the involved regulatory agency(ies) just prior to the proposed construction action commencing in accordance with the sampling and testing methods established for the ultimate placement site proposed for the material. In this case, the top layer of recently deposited silty material from each federal channel deepening contract that is proposed to be dredged and processed with approximately 8% Portland cement or other acceptable admixture to make it structurally suitable for beneficial use as grading material for a permitted upland landfill and/or brownfield remediation effort. For this type of proposed placement site, involved state regulatory agencies require extensive coring, compositing and testing of the top silty sediment strata for bulk sediment chemistry (both before and after being processed with the proposed admixture material) as well as extensive leachate testing to ensure that the contaminants remain bound to the sediment matrix once placed at the proposed upland site(s). Therefore, the Plaintiff's referenced data is not considered directly relevant to evaluating the proposed action of deepening the federal navigation channels. Rather, general data such as this, albeit already considered by the Corps, may be indirectly relevant in the same way that knowledge of nearby point source discharges or possible contaminant sources may help to better refine and focus the development of a thorough and detailed sampling plan for the material proposed to be dredged.

b. Regarding the second question, the TEQ dioxin concentration of the Plaintiffs' referenced data are remarkably similar to that of the three current federal

deepening contracts that fall within the Newark Bay study area as noted in paragraph 10. One should note that the average concentration of either table 2 or 3 is over 12 times less contaminated than what would be considered at the "action level" were the sediments an upland soil material subject to Superfund cleanup, and the highest measured data point is over three times less. Of course, Superfund cleanup criteria that may be established for contaminated sediments in the Newark Bay study area may differ substantially from that which was used for upland contaminated soils at the Diamond Alkali site. However, since the top layer of recently deposited soft silty sediment within the federal channel deepening construction contract areas is generally proposed for placement at a fully permitted upland beneficial use site, the established soil "action level" is of regulatory importance. Also, in recent years when a private permit applicant had proposed dredging material from their berthing area within Newark Bay that was above the upland soil "action level", it was found to be acceptable to be dredged and disposed into the Newark Bay Confined Disposal Facility (NBCDF), an open-water dredged material disposal site that was permitted to and constructed by the Port Authority of New York and New Jersey in the late 1990's and continues to be in operation in Newark Bay.

12. The sediment composite data from two of the three current federal channel deepening construction contracts have been examined by NJDEP and NYSDEC prior to issuance of the Water Quality Certifications. Water Quality Certifications for Arthur Kill (Contract Area 2/3) and Kill Van Kull (S-KVK-2 Contract Area) were issued in 2004. The Water Quality Certificate for the Newark Bay (S-NB-1 Contract Area) is pending.

13. In reviewing the Inventory Report and presentations of it prepared by Tierra Solutions, a subtle yet clear implication is made that contaminant "hot spots" lie within the Port areas of Newark Bay. The statistical analyses used by Tierra Solutions to support this view appears to derive largely from a single, rather anomalous, sediment sample that had a concentration of 6,200 parts per trillion of 2,3,7,8 TCDD. This sample was collected next to the bulkhead in the Port Newark Channel, an area NOT included within the current federal channel deepening project. Tierra Solutions further reinforces this implication by proposing (as noted by the Plaintiffs in footnote 6. on page 6. of the NOI) that 22 of the 31 sediment cores to be collected as part of the Newark Bay study area Work Plan be taken from within the existing channels and/or side slopes. Tierra Solutions' evaluation of existing data and their apparent omission in contrasting recently dredged/deepened channels with those which have not been dredged in decades is questionable in purpose and intent. Further, Tierra Solutions' draft Work Plan proposes to exclude large areas known to be depositional in Newark Bay because of the single permitted, constructed and operational NBCDF, which comprises a considerably smaller area than that which Tierra Solutions proposes to exclude. These factors along with the potential ulterior motive related to their culpability, raises serious and substantial concerns regarding the implications and observations of Tierra Solutions.

14. In a letter dated September 28, 2004 and included in as Attachment 17 in the NOI, three of the four entities comprising the Plaintiffs raised similar concerns regarding the Tierra Solutions' draft Inventory Report and Work Plan. In this letter, NRDC and the

Baykeeper highlighted that "... the Inventory Report offers only a cursory mention of relevant studies and data." They further commented "The Inventory Report omits, or misrepresents, several key post-1990 studies." Regarding the presentations made by Tierra Solutions, NRDC and Baykeeper also commented "Unsurprisingly, these "analyses" pointed in the direction of Tierra's non-culpability for contamination in Newark Bay, Arthur Kill, and Kill van Kull." NRDC and the Baykeeper further commented "...the statistical analyses underlying these "observations" – which were repeated so often as to give the impression that Tierra would have the listener accept them as "conclusions" – were based on extremely small data-sets."

15. The Plaintiffs' view of Tierra Solutions draft Inventory Report and Work Plan are, at best, inconsistent and confusing, and at worst, contradictory. Seemingly, NRDC and Baykeeper criticize the Tierra Solutions documents as being "cursory" and based upon "extremely small data-sets" when commenting to EPA. Yet, the Plaintiffs' remark in their complaint that the Inventory Report is "...a significant new compilation..." and that it "...includes substantial new sediment data..." even though, as explained above, the Plaintiffs' referenced data that falls within the boundaries of the federal channel deepening in the Newark Bay study area are not new, anomalous or even directly relevant to the NEPA and regulatory evaluation of the material proposed to be dredged from construction of the federal channels. Further, the NRDC and Baykeeper noted in their letter of September 28, 2004 to EPA, the "ongoing and future dredging in the study area." and that "the Corps of Engineers is in the midst of undertaking the nation's largest port deepening project, in New York Harbor, including deepening the navigation channels in Newark Bay, Arthur Kill, and Kill van Kull to fifty (50) feet." Whereas in the complaint, the Plaintiffs' refer to the deepening as "planned" and "poised ... to begin..." Clearly, concerns regarding possible ulterior motives relate not just to Tierra Solutions.

BRYCE W. WISEMILLER
Project Manager

Enclosures:

1. Figure entitled "Dioxin Toxicity Equivalency Quotient (TEQ) in Surficial Sediments and Navigation Channel Deepening Contract Upland Placement Evaluation Composites"
2. Figure entitled "Sediment Core Location and Depth for Soft Silts/Clays Evaluated for Potential Upland Placement"

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CENAN-EN-MM 20 January 2005

MEMORANDUM FOR Record

SUBJECT: Approaches on Minimizing Re-suspension of Sediment in Dredging

1. Resuspension of material has long been an issue as it may bury demersal eggs from species such as winter flounder as well as other benthic dwellers. For the sake of perspective some background information on turbidity and New York Harbor is provided.


**Figure 1. Comparison of dredge and vessel induced turbidity in Elizabeth Channel 28 Dec 2001.**

a. Data on turbidity and total suspended solids (TSS) was collected in Newark Bay between March 2001 and March 2002. Data was also collected after a storm on 25 May 2001.[1] Data was also collected after the passage of a container ship and in the vicinity of ongoing dredging.[2]

[1] 2001 Total Suspended Sediment and Turbidity Monitoring in Newark Bay, Kill van Kull and Port Jersey, November 2002 pages 6-7
[2] Ibid page 7

b. To establish the ambient TSS level, samples were taken between March 2001 and March 2002. These samples varied between 3.3 mg/L and 40.0 mg/L at the surface and 4.3 mg/L and 43.7 mg/L at the bottom.[3]
c. Post storm samples showed a TSS that varied between 7.7 mg/L and 12.3 mg/L at the surface and 11.0 mg/L and 27.0 mg/L at the bottom.[4]
d. TSS values following the passage of container ships at the surface was 14.1 mg/L to 952.0 mg/L and at the bottom 10.0 mg/L to 797.0 mg/L.[5]
e. On 26 April 2001 samples were taken from 100 m up-current to 300 m down-current during the dredging of rock. Sampled TSS levels were found to be within ambient levels.[6]
f. On 14 November 2001 samples were taken during the dredging of fine material from Elizabeth Channel using a similar protocol to the rock dredge. TSS values were between 12.3 mg/L and 30.0 mg/L at the surface and 8.0 mg/L and 78.0 mg/L at the bottom[7].
g. The study found that:

> *Close to the dredging operation, TSS was elevated with bottom values being the greatest. TSS values dropped off quickly with distance downstream from the dredge, with mid-water values decreasing to a lesser degree than those on the bottom. At the last two sampling stations (those furthest from the dredge), TSS values observed at the mid-water column stratum were slightly higher than those at the bottom.*[8]

2. When dredging fine sediment the Corps is required, and advocates the use of "best management practices" (BMPs) to reduce the resuspension of material.

3. Typical BMPs as identified by the States of NY and NJ from Arthur Kill 2/3 are attached.

4. Broadly speaking, BMPs fall into two categories. The first are those that reduce the amount of resuspension, the second are those that ameliorate the impacts of resuspention via scheduling.

5. Reduction of resuspension

   a. Environmental buckets:
      i. Environmental buckets are those that are designed specifically to dredge soft sediments. They are routinely specified by the New York District for material that fine-grained (such as recent silts) in nature. As well they are widely used in industry for remedial and HTRW dredging.[9]

[3] Ibid, page 8
[4] Ibid
[5] Ibid
[6] Ibid page 15
[7] Ibid table 12
[8] Ibid page 15
[9] The Cable Arm Clamshell: Development and Track Record for Environmental Dredging; Bergeron, R.E., Cushing, B.S., Hammaker, M.K.

ii. Typically environmental buckets are lightweight and without teeth so as to minimize overdredging. They have a variety of flaps and seals to minimize return of sediment to the water column during hoisting and placement.

iii. Typical New York District specification language for an environmental bucket, taken from Arthur Kill 2/3 section 02900 paragraph 6.3 follows:

> a. The bucket shall be provided with welded steel covers and rubber seals specifically designed and installed by the bucket manufacturer to minimize leakage from the closed bucket.
> b. The closed bucket shall be equipped with vertical side plates, with rubber seals, which overlap or some method to reduce sediment loss at closure and shall act as an enclosure to eliminate redeposit of soil from the bucket.
> c. The bucket shall be equipped with a switch, with signal light in the control station, to verify bucket closure and seal.
> d. The bucket will be designed to produce a flat cut and to minimize resuspension during closing and lifting.
>
> A shop drawing of the contractor's bucket shall be provided to the Contracting Officer for approval prior to the commencement of dredging.

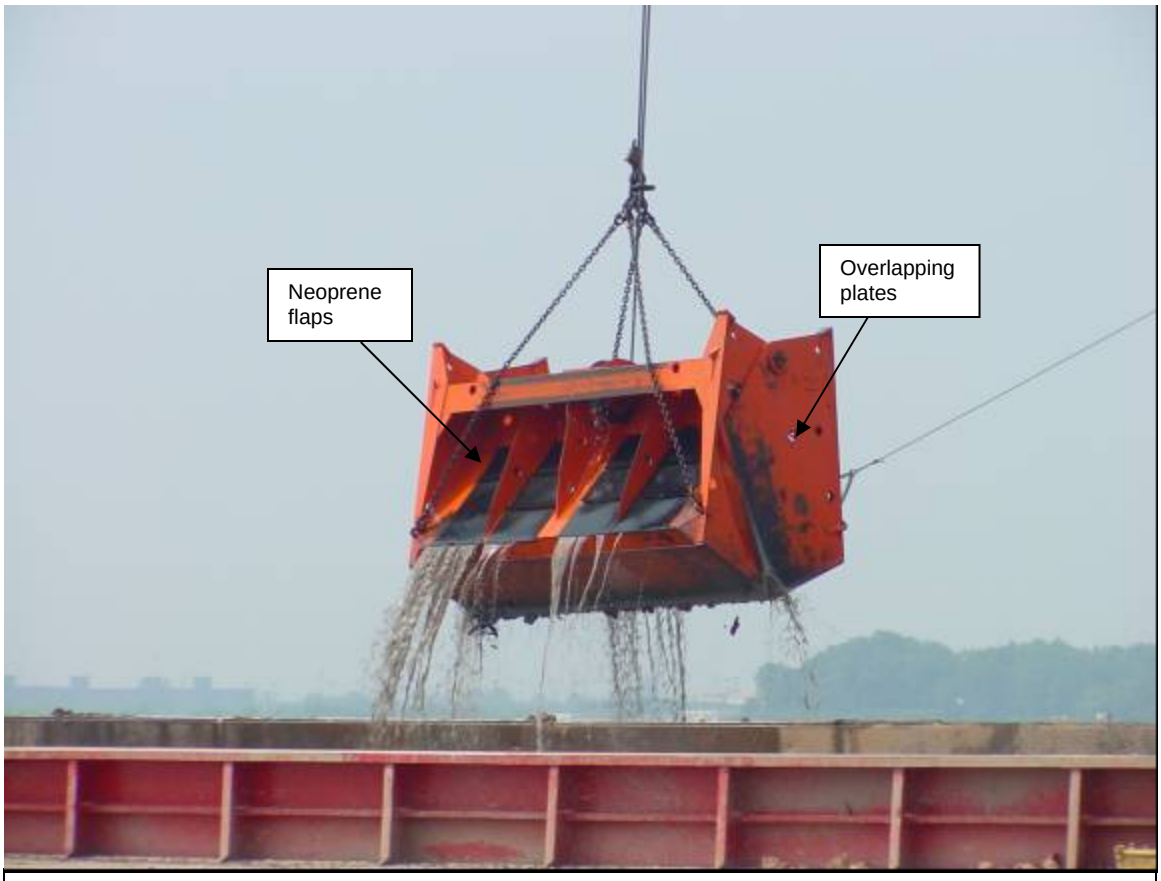


**Figure 2. Typical clamshell environmental bucket.**

iv. Figure 2 is of a typical clamshell environmental bucket. This particular unit was manufactured by "Cable Arm Inc.", a major manufacturer of this type of bucket. Note the neoprene flaps that close during hoisting to minimize resuspension, the overlapping side plates, and the lack of teeth. The flaps let water out from the top of the bucket while allowing silt to collect in the bottom of the bucket. This type of bucket is commonly used in New York Harbor for dredging fine sediments unsuitable for placement at the HARS. Studies have found such a bucket to be effective in reducing resuspension[10]

[10] Op Cit Bergeron


**Figure 3. Typical backhoe environmental bucket.**

dredge with an environmental bucket. In this type of operation the bucket is rotated against the sealing plate before the arm is lifted. In conversations with the regulatory community this type of bucket has received positive comments. It is, however, prone to having the sealing flap, which juts out, damaged. This type of bucket is therefore uncommon, and has only been used on this one dredge, Bean Dredging's "Maricavor".

b. Silt Fence/Turbidity Curtains

**Figure 4. Turbidity curtain.**

i. Silt fences and turbidity fences are structures commonly used to reduce the spread of turbidity, and thereby the transport of sediment.

ii. There are several design criteria to be considered when designing a silt fence[11]
    1. Velocity of current
    2. Depth of water
    3. Wind
    4. Waves

iii. While silt fences can theoretically be designed for a current up to 3 knots, which is rarely exceeded locally, they must be kept at least 1 ft above the bottom at all times, including during tides, wakes and waves. Even then, due to the great depth of water in our channels designing a functional silt fence may not be possible. To quote a design guide for silt fences:

> *In tidal and/or wind and wave action situations, it is seldom practical to extend a turbidity curtain depth lower than 10 to 12 feet below the surface, even in deep water. Curtains which are installed deeper than this will be subject to very large loads, with consequent strain on curtain materials and the mooring system. In addition, a curtain installed in such a manner can "billow up" towards the surface under the pressure of the moving water, which will result in an effective depth significantly less than the skirt depth.*[12]

iv. Moving a silt fence is not an inconsequential action, due to its anchoring system and large sail area as well as considerations of accumulated silt.

[11] http://www.parkersystemsinc.com/siltmaster_booklet.htm#DESIGN CRITERIA
[12] Ibid.

Since dredges move during their operation, both to follow the cut and to move out of the way of passing traffic the use of silt fences around a dredge is prohibitive. There are, however, situations where silt fences are a feasible BMP. There are wetlands and creeks that feed into the channels being dredged. These, depending upon the factors discussed above and in further detail in the cited sources, may be logical sites for such control measures.

c. Cofferdams

**Figure 5. Cofferdam at Olmstead Dam.**

i. Cofferdams are temporary or permanent structures constructed with sheetpile, concrete, timber, or earth. They extend from the bottom above the high water line. These structures permit the interior to be completely dewatered.
ii. Cofferdams offer several advantages.
    1. Work may proceed “in the dry”.
    2. The area is isolated from the surrounding water.

d. Environmental Windows
    i. Windows do not actually reduce turbidity. An environmental window is a method to reduce environmental impacts by avoiding dredging during certain times of the year.
    ii. Environmental windows commonly are established by negotiations between the US Army Corps of Engineers, National Marine Fisheries Service (NMFS), NJDEP, and NYSDEC.
    iii. In the New York Harbor windows are often instituted to protect benthic organisms and their dermersal eggs. Winter flounder is often selected as the species to be protected.

e. Air Barriers
    i. Air barriers have been utilized in New York Harbor to reduce sedimentation in berthing areas.

ii. They function by producing bubbles that rise. The rising bubbles create mixing currents. Bubble curtains do not work by blocking silt.[13]
iii. As they do not block silt, their application is more suited toward reducing maintenance then it is to blocking resuspension.

6. Blasting
    a. Blasting is used to fracture rock in order to facilitate its removal.
    b. Significant research has been done on fish mortality, including blasting in the Kill van Kull (KVK).[14] There have also been many studies on vibration of marine blasting, again including KVK and Arthur Kill (AK).[15] Literature on the effects of blasting on resuspension of sediment is limited though.
    c. Measures taken to reduce resuspension and vibration include:
        i. Contractors are required to remove overlaying silt before commencing rock work.[16]
        ii. Surface blasting is prohibited except when encountering large boulders that may not otherwise be removable.[17]
        iii. Contractors will stem (pack the top with non-explosive material) holes, helping to contain blast energy
        iv. Contractors will use delays between each hole, limiting the amount of explosive going off at any one time.
        v. Contractors are required to measure and report vibrations, and to stay within legal vibratory limits.

STEVEN WEINBERG
Team Leader, Engineering Division

[13] Evaluation of a Berth Sedimentation Control Technology in Kill van Kull: The AirGuard Pneumatic Barrier System; Chapman, J; Douglas, S; page 3.
[14] Blast Monitoring Program for the Kill Van Kull Deepening Project; Ruben
[15] Stuctural Investigation/Blasting Analysis NYNJ Harbor 50' Channel Project; Master Harbor Partnership; July 2003.
[16] For example, W912DS-CIVIL-04-B-0003 02900-5.5.1
[17] For example, W912DS-CIVIL-04-B-0003 02200-2.8

To protect winter flounder, dredging and blasting is limited as follows in the 'areas of concern' depicted in green on the attached Appendix 1 map. The areas selected were agreed to by all the involved regulatory agencies and in no way suggest that the New York State Department of Environmental Conservation has regulatory control over activities occurring outside its borders.

a. Dredging of silt is prohibited in the areas of concern between 01 February and 31 May.

b. Dredging and blasting of non-silt material is prohibited in the areas of concern between 01 March and 31 May.

To protect winter flounder, dredging and blasting is limited as follows in the 'areas of concern' depicted in green on the attached Appendix 1 map. The areas selected were agreed to by all the involved regulatory agencies and in no way suggest that the New York State Department of Environmental Conservation has regulatory control over activities occurring outside its borders.

a. Dredging of silt is prohibited in the areas of concern between 01 February and 31 May.

b. Dredging and blasting of non-silt material is prohibited in the areas of concern between 01 March and 31 May.

Sediment test results shall be submitted at least 30 days prior to the anticipated dredging start date of any project contract reach to verify the applicability of the restrictions stated in Special Condition #22.

An 'environmental bucket' is required for dredging silt and other fine-grained unconsolidated material. Drawings and performance specifications of the environmental bucket must be provided to the Department 15 days prior to the anticipated start date of dredging.

a. The following bucket specifications are required:

i. The bucket shall be constructed with sealing gaskets or overlapping sealed design at the jaws, and seals or flaps positioned at locations of vent openings to minimize the loss of material during transport through the water column and into the barge.

ii. Any seals or flaps designed and/or installed at the jaws and locations of vent openings must tightly cover these openings while the bucket is lifted through the water column and into the barge. If excessive loss of water and/or sediments from the bucket is observed from the time of its breaking the water surface to crossing the barge gunwale, the inspector shall halt dredging operations and inspect the bucket for defects. Operations shall be suspended until all necessary repairs or replacements are made.

An 'environmental bucket' is required for dredging silt and/or other fine-grained unconsolidated material.

1: Bucket hoist speed shall be limited to approximately 2 feet per second. The bucket shall be lifted in a continuous motion through the water column and into the barge.

2: The bucket shall be lowered to the level of the barge gunwales prior to the release of load.

3: There shall be no barge overflow when dredging silt and/or other fine-grained unconsolidated material.

Silt curtain(s) must be deployed across Bridge Creek to minimize resuspended sediments entering Bridge Creek. The silt curtains are to be placed 100 feet landward of the new top of slope of the channel, as depicted on the condition survey titled 'New York Harbor Arthur Kill Channel Navigation Improvement Project Contracts 1-5', sheet 3 of 6, dated 8 May 2003. Silt curtain(s) must be properly deployed and maintained whenever dredging operations are conducted within 1,500 feet of the mouth of Bridge Creek.

A sediment sampling plan for purposes of conducting bulk sediment chemistry analysis for each contract reach shall be submitted for DEC approval in coordination with the state of New Jersey at least 60 days prior to the anticipated dredging start date for a given reach.

Sediment test results shall be submitted at least 30 days prior to the anticipated dredging start date of any project contract reach to verify the applicability of the restrictions stated in Special Condition #22.

To protect winter flounder, dredging and blasting is limited as follows in the 'areas of concern' depicted in green on the attached Appendix 1 map.

a. Dredging of silt is prohibited in the areas of concern between 01 February and 31 May.

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An 'environmental bucket' is required for dredging silt and/or other fine-grained unconsolidated material. Drawings and performance specifications of the environmental bucket must be provided to the Department 15 days prior to the anticipated start date of dredging.

a. The following bucket specifications are required:

   i. The bucket shall be constructed with sealing gaskets or overlapping sealed design at the jaws, and seals or flaps positioned at locations of vent openings to minimize the loss of material during transport through the water column and into the barge.

   ii. Any seals or flaps designed and/or installed at the jaws and locations of vent openings must tightly cover these openings while the bucket is lifted through the water column and into the barge. If excessive loss of water and/or sediments from the bucket is observed from the time of its breaking the water surface to crossing the barge gunwale, the inspector shall halt dredging operations and inspect the bucket for defects. Operations shall be suspended until all necessary repairs or replacements are made.

b. Bucket hoist speed shall be limited to approximately 2 feet per second. The bucket shall be lifted in a continuous motion through the water column and into the barge.

c. The bucket shall be lowered to the level of the barge gunwales prior to the release of load.

d. There shall be no barge overflow when dredging silt and/or other fine-grained unconsolidated material.

CENAN-PL-E 23 February 2005

MEMORANDUM FOR RECORD

SUBJECT: New Bedford Harbor PCB Cleanup and Providence River Maintenance Dredging

1. A Conference Call was held on 15 February 2005 with NAE and NAN to discuss dredging and monitoring methods for two NAE projects. The projects are the New Bedford Harbor, MA, Superfund Cleanup and the Providence River, RI, Maintenance Dredging.

2. The following individuals were present for the conference call:

| Name | Organization | Phone Number |
|---|---|---|
| Ed O'Donnell | USACE CENAE | 978 318 - 8375 |
| Joseph MacKay | USACE CENAE | 978 318 - 8142 |
| Gary Morin | USACE CENAE | 978 318 - 8232 |
| Ronald Pinzon | USACE CENAN | 917 790 - 8627 |
| Ellen Simon | USACE CENAN | 917 790 - 8158 |
| Steve Weinberg | USACE CENAN | 917 790 - 8391 |

3. NAN described a brief history of navigational dredging (Phases I, II and III of the Harbor Deepening Project) in NY & NJ Harbor and discussed the spatial relation with Corps dredging and the Diamond Alkali Superfund Site and study area.

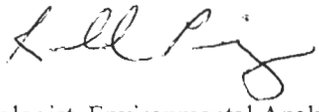
4. NAE described the Superfund Cleanup Project in New Bedford Harbor, MA and the Providence River, RI Maintenance Dredging Project. Physical parameters, dredging methods best management practices (BMPs) and water quality monitoring conducted in both projects were discussed.

5. New Bedford is a HTRW remediation project, the majority of which is in a shallow area outside of navigation channels. NAE employed a horizontal auger dredge in the recent 2004 dredging season, which is best suited to shallow waters without traffic. They cannot dig in deep water, and their anchor cables present a hazard to navigation. Full-depth silt curtains were not used in 2004 because they were found to be impractical in past dredging activities at the site. The curtain would sit in the contaminated sediments at low tide, which would then be mobilized as the curtain expanded with the rise of the tide. Shorter (~ 2' depth) floating silt curtains combined with oil booms were used in 2004 to minimize the dispersion of floating oils and the minimal silt that was mobilized during dredging.

6. Providence was a maintenance-dredging project. About 4 million CY went to an open water site in Rhode Island Sound, and about 1 million CY went to a Confined Aquatic Disposal (CAD) cell located under the channel in the upper river. All maintenance material (predominantly silt and clay) was dredged using a closed bucket. Water Quality monitoring was conducted during disposal of unsuitable material into the CAD. No violations of WQ standards were observed. NYD's unsuitable material is being disposed of upland, so turbidity monitoring is not meaningful. Both NAE and NYD's dredging had/will occur respectively with a closed/environmental bucket.

7. It was determined there was no information that was new, the dredging issues discussed were all known prior to this coordination. Methods used to dredge the NYNJ Harbor are similar to methods used for the NAE dredging, where situations are similar. The major difference between the New Bedford Harbor dredging and the HDP is that some of the methods in the New Bedford site are only applicable in shallow areas (littoral zone areas and at times exposed mudflats) where a horizontal auger dredge is very effective in the range of up to 20 feet deep. The HDP dredging has depths greater than 50 feet deep. The NAN and NAE dredging projects are similar in that non-suitable ocean disposal material would be dredged in all cases using a closed/environmental bucket and that the suitable ocean disposal material could be dredged using an open bucket.

Ronald Pinzon



Biologist, Environmental Analysis Branch
Planning Division, USACE-NYD (917) 790 - 8627

CENAN-EN-M 11 January 2005

MEMORANDUM FOR Record

SUBJECT: Comparison of Hudson River PCBs Cleanup and NY Harbor 50

Comparisons have been made between the General Electric Hudson River PCB cleanup (HRPCB) and the New York Harbor 50ft deepening (NYH50) within the Newark Bay Study area. We have reviewed available documents on the HRPCB and have the following observations.

## BACKGROUND

### General Electric Hudson River Cleanup

The Hudson River PCBs Site occurs within a nearly 200-mile stretch of the Hudson River. For purposes of the HRPCB, EPA further divided the Upper Hudson River area into three main sections known as River Section 1, River Section 2, and River Section 3. From approximately 1947 to 1977, the General Electric Company (GE) discharged as much as 1.3 million pounds of polychlorinated biphenyls (PCBs) from its capacitor manufacturing plants at the Hudson Falls and Fort Edward facilities into the Hudson River.[1] This portion of the Hudson River has been declared a superfund site, and GE will be required to perform the "removal of all PCB-contaminated sediments within areas targeted for remediation, with an anticipated residual of approximately 1 mg/kg Tri+ PCBs"[2]. "Tri+ PCB" refers to all PCBs with three or more chlorine atoms. The primary purpose, therefore, of GE's dredging is the removal of PCB contaminated material. There is also a very limited navigational dredging component, in connection with allowing dredging access and maintaining safe navigation of vessels during construction.[3] Resuspension of material is an issue due to the need to "keep the water column concentrations (of PCBs) close to current baseline levels"[4]. This will reduce uptake by fish into their tissue[5] and maintain drinking water standards at water intakes[6]. Water depths for the HRPCB are typically less than 20ft and typical dredging face is 2-3ft.[7] Depending upon reach and year the HRPCB is expected to remove 265,000-530,000 cy per year.

As of December 2004 the latest progress of the HRPCB was to select dewater/sediment transfer sites.[8] Remedial dredging has not yet begun.

[1] http://www.epa.gov/hudson/background.htm
[2] Hudson River PCBs Site New York Record of Decision, pg iii
[3] Preliminary Design Report Hudson River PCBs Superfund Site, pg 4-10
[4] Hudson River PCBs Superfund Site Engineering Performance Standards Volume 2 pg. 46
[5] Ibid
[6] Ibid pg 47
[7] Preliminary Design Report Hudson River PCBs Superfund Site, pg 5-4
[8] http://www.epa.gov/region02/news/2004/04182.htm

**New York Harbor Navigation Project**

The NYH50 project has as its primary goal to improve the channels leading to various container ports in New York Harbor to accommodate the current generation of container vessels. Design depth in the Newark Bay area is 52ft mean low water (mlw) plus 1.5ft of paid overdepth. Typical dredging face is 5-10ft, but can be greater or less in specific locations. The NYH50 is the latest in a series of dredging construction and maintenance projects that have been executed in this area. Other projects include Kill Van Kull and Newark Bay Phase I which completed in 1991, Kill Van Kull and Newark Bay Phase II which was initiated in March 1999 and completed in December 2004 and Arthur Kill 41 which is currently ongoing. The NYH50 started as a permit action by the Port Authority of New York and New Jersey (PANYNJ) in early 2002 with Area 5. In none of these prior projects, or in the currently tested portions of NYH50, have the sediments to be dredged ever been identified as characteristic of HTRW material. Turbidity control is a concern relative to water quality issues, not HTRW and as such is regulated under the Clean Water Act and not CERCLA.

## COMPARISON OF PROJECTS

It is clear based upon the information reviewed in General Electric's PRELIMINARY DESIGN REPORTS HUDSON RIVER PCBs SUPERFUND SITE APRIL 2004 that there are major differences between the HRPCB and NYH50. First, the area to be dredged as part of the NYH50 project is not in a superfund site. The second major difference is that the majority of the NYH50's footprint in the expanded EPA study area has been recently dredged to an interim depth of 47ft in the Federal navigation channels in the southern half of Newark Bay and 43ft in the Federal navigation channels leading from the Kill van Kull leading into the Arthur Kill between 1999 and 2004. Turbidity control is a major concern for the HRPCB as the PCBs in the resuspended sediment could be uptaken by fish tissues or end up in drinking water intakes. In the NYH50 resuspension is a concern primarily due to its physical effects as it may bury benthic organisms. The NYH50 in the Newark Bay area will be dredged to 52ft plus 1.5ft of paid overdepth.

## HUDSON RIVER PCBs CLEANUP, DREDGING DESIGN

General Electric has considered several dredging technologies for the HRPCB. In summary the dredging technologies considered and some of their strengths and weaknesses (according to the report) were:[9]

a. Conventional "open" clamshell
   Would create relatively large amounts of turbidity, but handled rock and debris better than other dredges.[10]

b. Environmental "closed" clamshell
   May reduce turbidity. Level cut reduces overdredging. Long cycle time reduces production. Can only be used in very soft material. GE declares that "This dredge

[9] Preliminary Design Report Hudson River PCBs Superfund Site, pgs 5-10 thru 5-21
[10] Ibid pg 5-11

type is primarily suitable for areas of the Upper Hudson River with fine-grained sediment."[11]

c. Articulated mechanical dredge (backhoes)
Similar advantages to the environmental clamshell, but with increased digging ability. Disadvantages are also somewhat similar to environmental clamshells. However, these dredges are also scarce. There isn't much documentation to their effectiveness as compared to an environmental clamshell. These too were found to be suitable for the Upper Hudson River.[12]

d. Amphibious dredges
It was found that the "primary application of this dredge is for shoreline areas where there may be a variety of wetlands, mud flats, or very shallow areas with standing water." Other than that other types of dredges performed better.[13]

e. Excavation in the dry
While an effective way of isolating turbidity, there were still issues with dewatering material. The report also found that:

*The isolation of the portion of the river's cross-section targeted for excavation could impact navigational and recreational river traffic, and cause localized increases in surface water velocities that may increase erosion potential for adjacent river banks and structures. This may serve to undermine the existing structures or cause flooding under elevated flow conditions. Given these concerns, application of this sediment removal technique is limited to select portions of the Upper Hudson River that lend themselves to hydraulic isolation (e.g., shallow backwater areas and shallow near shore areas).*[14]

f. Hydraulic dredges
These were further divided by the type of dredge.

- Plain suction
  This type of dredge is very accurate and clean, but since they're small and diver operated production is poor and safety is an issue. There is also the issue of disposing of large amount of water generated by the dredge. The report stated that:

  *The potential use of plain suction dredges for the Upper Hudson River is expected to be limited to diver-assisted re-dredging operations. Plain suction dredging would only be implemented if the primary dredge method is unsuccessful in achieving the USEPA's draft residuals standard.*[15]
- Cutterhead dredges

[11] Ibid 5 pgs 5-11 thru 5-13
[12] Ibid 5-14
[13] Ibid
[14] Ibid 5-15
[15] Ibid 5-16 thru 5-17

Cutterheads are widely available, and can be effective at this type of dredging. Resuspension is still an issue, however. Cutterheads also produce tremendous amounts of water, which require appropriate management, and are vulnerable to clogging from debris. The report found that "the cutterhead dredge is expected to be suitable to the Upper Hudson River with the possible exception of areas with shallow bedrock."[16]

- Horizontal auger dredge
  In many ways similar to the cutterhead dredge. It is however more likely to resuspend sediment than a cutterhead, restricted to shallow water, and is operated on a network of cables that interfere with the navigation of other vessels. The report found that "The horizontal auger dredge is potentially suitable for the non-navigational portions of the river."
- Pneumatic Dredges/High Solids Pumps
  A relatively new technology, these dredges are scarce and without much of a track record. They are asserted to be relatively clean. They apparently also produce quite a bit of water, although less than other hydraulic dredges. Debris remains an issue. The report finds that:

  *The dredges appear to have some applicability to the Upper Hudson River, yet the limitations (including the general lack of quantitative eperformance data for residuals and resuspension) could limit their use.*[17]

**COMPARISON OF DREDGING DESIGN**

Comparing the conclusions of the General Electric report, which is for a Superfund site with our non-Superfund project provided an interesting result.

Based on the above, hydraulic dredges seem to be a poor fit to our project. When used in fine sediments a large settling/containment area would be required to settle the slurry from the dredge. Several past studies by the Corps have shown that no feasible area is available. Debris is frequently encountered in our dredging projects. Add to this the local regulatory agency's concerns about hydraulic dredges in Newark Bay, Arthur Kill and Kill van Kull and it appears to be an unsuitable technology. Due to these concerns, use of hydraulic dredging in this area has been prohibited in the Corps' contracts for the ongoing deepening contracts. Two of the hydraulic dredges have additional problems. The plain suction dredge would require divers to operate in relatively deep water in the proximity of traffic for weeks at a time. From a safety perspective alone, this is likely unacceptable. The horizontal auger dredge's cables present a hazard to navigation.

Amphibious dredges are limited to shallow water, something there is very little of in our navigational channel construction project.

Once you eliminate the hydraulics and amphibious dredges, conventional clamshells, environmental clamshells, and backhoes remain. The Corps of Engineers did a dredgability

[16] Ibid 5-17 thru 5-18
[17] Ibid 5-19 thru 5-21

analysis for the NYH 50 project[18],[19]. The same types of dredges that were recommended for dredging the navigable areas of the HRPCB project were recommended for the NYH50 project, and are currently being used. Based on the information reviewed it appears that the dredges identified to be used to remove the hard material in the HRPCB are similar to those currently being used for the NYH50. Also, the use of an environmental clamshell for NYH50 to dredge soft Holocene silt appears to be consistent with the findings of the Corps of Engineers reports.

**RESUSPENSION CONTROL TECHNOLOGIES**

General Electric's report also discussed various sediment control technologies for the HRPCB. In summary the dredging technologies considered and some of their strengths and weaknesses were:

a. Silt curtains
   Silt curtains were found to be an effective solution in water depths less than 20ft and currents less than 1.5 fps. It did note that using silt curtains in navigable areas presented a small risk to vessels. Silt curtains were more effective at reducing surface control than bottom control as curtains have to remain 1-2ft above the bottom. [20]
b. Sheetpile walls
   Found to be extremely effective, installation and removal was slow and expensive. Installation of sheetpile into rock or through rip-rap is impracticable. Also, as the walls cannot be moved they cannot be used in navigable areas. [21]
c. Other resuspension control processes
   - King piles
     Similar to a sheetpile system, these are a series of H piles driven into the bottom with walls installed between them. Better suited to hard bottoms than sheetpile. Like sheetpile they're a hazard to navigation. [22]
   - Air curtains
     Large infrastructure system required, and there is little evidence supporting to efficacy. [23]
   - Cassions
     A tube is lowered to the bottom, and the material is removed through the tube. A highly effective system, it is limited by a small footprint. The report concludes that "For the Hudson River project, this resuspension control system may be considered for small areas of relatively highly contaminated sediment."[24]
   - Portable dams
     Inflatable structures that once installed have the water pumped out of them allowing work to proceed in the dry. Their flexible nature makes them well suited to

[18] Feasibility Study NY and NJ Harbor Navigation Study December 1999 pages F11-F25
[19] Limited Reevaluation Report and Environmental Assessment on Consolidated Implementation of the New York and New Jersey Harbor Deepening Project January 2004, pages F8-F15
[20] Preliminary Design Report Hudson River PCBs Superfund Site 6-8 thru 6-10
[21] Ibid 6-10 thru 6-12
[22] Ibid 6-12 thru 6-13
[23] Ibid 6-13
[24] Ibid 6-13 thru 6-14

undulating bottoms. However, the dams can only be utilized in shallow water. They are vulnerable to punctures. They do not readily allow the passage of vessels.

d. No containment
   Has been utilized at a variety of sites. Report states "will be considered as first engineering contingency for all dredge areas and scenarios."[25]

The Corps of Engineers also evaluated sediment control technologies and came to similar conclusions[26]. Generally the results of our findings are similar to those in General Electric's plan for the navigable portions of their project.

Comparing the conclusions of the General Electric report, which is for a Superfund site with our non-Superfund project is interesting.

The various containment technologies all have at least one of the following problems. They are either unsuited to deep water or are a hazard to navigation. As such none of the technologies could be used in the navigable waters. The Corps has committed to the use of silt curtains to protect specific shallow water habitats with low current velocities from resuspension. These protections are to protect dermersal eggs from burial and not due to Superfund concerns as all past and all planned future dredge material from continued construction of the NYH50 is far less contaminated than what is characteristic of HTRW material as has been defined by the appropriate regulatory agencies.

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[25] Ibid 6-23
[26] Approaches on Minimizing Re-suspension of Sediment in Dredging 20 January 2005