US Army Corps
of Engineers
New York District

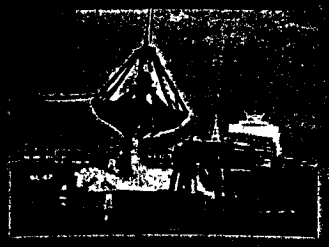
Final Environmental Impact Statement

on the

Newark Bay Confined Disposal Facility

April 1997

In Cooperation with



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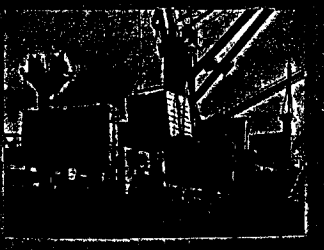

FINAL
ENVIRONMENTAL IMPACT STATEMENT
ON THE
NEWARK BAY CONFINED DISPOSAL FACILITY

April 1997

Responsible Lead Agency
U.S. Army Corps of Engineers
Regulatory Branch
Jacob K. Javits Federal Building
New York, New York 10278-0090

Cooperating Agencies
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
National Marine Fisheries Service
New Jersey Department of Environmental Protection
New Jersey Department of Transportation

Abstract:

In accordance with the National Environmental Policy Act (NEPA), and the U.S. Army Corps of Engineers (USACE) regulations for implementing NEPA, a Final Environmental Impact Statement (FEIS) has been prepared as part of the permit application review process for the Newark Bay Confined Disposal Facility (NBCDF).

Dredging of shipping channels and berthing areas in the Port of New York and New Jersey is necessary to maintain sufficient water depths for safe navigation and maintenance of a viable shipping industry. In recent years this has been hampered by the lack of disposal sites for dredged material. The NBCDF is proposed as an environmentally acceptable short-term method of disposing of contaminated dredged material.

The concept for the NBCDF came from New Jersey Governor Christine Todd Whitman's Dredged Material Management Team (DMMT), which recommended the construction of sub-aqueous borrow pits in Newark Bay as a short-term alternative for the disposal of contaminated dredged material deemed unsuitable for ocean disposal. The team selected the Newark Bay sites because they are located in an area of maritime activity with a history of previous environmental impacts. At the Governor's request, the Port Authority of New York and New Jersey agreed to initiate action and serve as the project sponsor. The NBCDF, as described in this FEIS, is an outgrowth of the DMMT recommendation.

The current application proposes to construct three subaqueous pits with a combined capacity of approximately 3 million cubic yards (MCY) on the west side of Newark Bay near the Port Newark-Port Elizabeth terminals. The dredged material that would be disposed of in the NBCDF would come from waters in New York-New Jersey Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull. Alternatives to the proposed action, described and evaluated in Chapter 2, include construction of only one of the three proposed CDFs, construction of a CDF on the east side of Newark Bay, construction of CDFs on both sides of the Bay, and taking no action. Other alternative disposal options, including but not limited to upland disposal, aquatic peninsulas or containment islands, and

borrow pits in other areas (including other parts of Newark Bay) are described and evaluated in the same chapter.

The database for evaluation of the affected environment and potential impacts included all available literature on the environment and flora and fauna of Newark Bay, a field research program that focused on benthos and fish/shellfish, a hydrographic/sedimentation modeling program, and chemical and geotechnical laboratory analyses of Newark Bay sediments. The affected environment is described in Chapter 3 and the environmental impacts in Chapter 4.

Potential impacts, including indirect and cumulative impacts, were evaluated for the proposed action and the other action alternatives. The analysis indicates that short-term adverse environmental impacts, such as benthic habitat disruption, would be balanced by beneficial impacts, such as removal and isolation of contaminants from the biosphere and revitalization of the maritime industry. Long-term adverse impacts are not expected to occur if the NBCDF is built.

Construction practices, management plans, and postclosure monitoring plans and techniques are discussed in Chapter 5. The purposes of the monitoring are to ensure the integrity of the cap and to document the community successions in recolonization of the site(s).

A 404(b)(1) evaluation has been prepared for the NBCDF and is included in the FEIS as Chapter 6. The preliminary determination is that the proposed action and alternatives do not represent a significant threat of degradation to the aquatic environment and are in compliance with the Section 404(b)(1) guidelines of the Clean Water Act.

A public notice announcing the availability of this document will be published concurrently with an announcement of its availability in the Federal Register.

Send written comments to:

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For further information, or additional copies of this document, write to Dr.Helman at the address above or call him at (212) 264-3912.

Approved by: _____ 1 Apr 97
Gary Thomas
Colonel, U.S. Army Corps of Engineers
New York District Engineer

Date

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S.0 EXECUTIVE SUMMARY

The construction of subaqueous pits in Newark Bay was the primary alternative recommended by New Jersey Governor Christine Todd Whitman's Dredged Material Management Team (DMMT) as a ". . . short-term, environmentally sound, economically viable management option for the disposal of contaminated (Category II and Category III) dredged material . . ." (DMMT 1995). Governor Whitman adopted the report and requested that the Port Authority of New York and New Jersey (PA) take the lead in implementing the recommendation. The Newark Bay Confined Disposal Facility (NBCDF), described in this Final Environmental Impact Statement (FEIS), is the direct result of that original recommendation.

The NBCDF was originally proposed as a two-pit facility (Areas 1 and 2) that together could accommodate approximately 14 million cubic yards (MCY) (10.7 million cubic meters [MCM]) of dredged material deemed unsuitable for ocean disposal. The two sites are located on the west side of Newark Bay, near the Port Newark and Port Elizabeth facilities (DMMT 1995; this document - Section 1.02, Figure 1.02-1). The original two-pit recommendation was based on the assumption that sediment contamination in the project areas was not substantial and existed only to a depth of 3 ft (1.0 m) below the sediment-water interface (DMMT 1995). Subsequent feasibility investigations and historical research revealed substantial areas of disturbance and, locally, sediment contamination to depths greater than 3 ft (1.0 m). The extent of the areas' sediment contamination resulted in the project being redefined as three smaller pits (Areas 1S, 2S, 2N), located within the original areas, with a combined capacity of 3.0 MCY (2.3 MCM) (Section 1.02, Figures 1.02-1 and 1.02-2). During preparation of the Draft Environmental Impact Statement (DEIS), testing to determine the suitability of project area sediments for ocean disposal was conducted; results of the sediment evaluation are discussed in the text and in Appendix 1.02.

S.01 PROJECT NEED AND OBJECTIVES

The NBCDF was conceived as a regional facility for the disposal of dredged material deemed unsuitable for ocean disposal. The region (also referred to as the draw area) is defined as waters in New York/New Jersey (NY/NJ) Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull. Sediment buildup, a product of the natural shallowness of the port (average depth 19 ft [6 m]) and high sedimentation rates (6 in./year [15 cm/year]) (Section 4.04), clogs navigation channels and berthing areas. Harborwide, approximately 4 to 6 MCY (3.1 to 4.6 MCM) of sediment must be dredged annually to maintain mandated safe water depths and to deepen existing navigation channels to accommodate deeper-draft vessels that will call at the port in the near future (USACE 1996).

Maintaining navigation channels and berthing areas offers both economic and environmental benefits. The economic benefits related to waterborne commerce in the region

are well known: more than $20 billion in economic activity, up to 200,000 port-related jobs, approximately $47 billion in exports of New York and New Jersey products, and over 70% of arriving containers having the port as their final destination (DMMT 1995; USACE 1996; this document - Sections 3.17 and 4.18).

Retaining and increasing these economic benefits is dependent, in large measure, on providing sufficient water depths to safely accommodate modern container ships and tankers. The loss or reduction in Port of NY/NJ shipping operations would have far-reaching effects on the local and regional economy (USACE 1996).

Concomitant with maintaining economic competitiveness, environmental benefits can accrue from dredging projects. Sediment analyses from various parts of the Harbor reveal varying degrees of residual contamination from previous activities in the port area and related waterways. Contaminants of particular interest are heavy metals (e.g., cadmium, chromium, mercury, zinc), polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides (e.g., DDT, DDD, DDE), polychlorinated biphenyls (PCBs), and dioxins and furans (e.g., 2,3,7,8-TCDD). Dredging contaminated sediments and disposing of them in a subaqueous confined disposal facility (CDF) can be beneficial. The potential for bioaccumulation and biomagnification of contaminated sediments would be reduced in the short- to mid-term. Longer-term beneficial effects would require remediation/ removal of contaminant sources (Sections 4.17, 4.24).

S.02 ALTERNATIVES ANALYSIS

All reasonable alternatives to the NBCDF are evaluated in this document in accordance with the provisions of the National Environmental Policy Act (NEPA). In accordance with Title 40 of the Code of Federal Regulations, Part 1502.14(e), a preferred alternative is identified. The preferred alternative and the rationale for the selection are discussed below, in Section 2.03.4 and in the response to comment letter F2.

All potential alternatives were subjected to a three-phased screening process. The first phase eliminated alternatives that were not responsive to the purpose of the project as defined in Sections 1.03 and 1.04 and the criteria for alternative selection given in Section 2.01. The second and third screening phases considered alternative locations and construction methods, respectively.

Phase one screening eliminated the greatest percentage of alternate dredged material disposal options. Upland sites were scrutinized under the Phase I screening process as a disposal option, although permitting considerations would render most not feasible. The only currently permitted site, the Orion Site, is potentially infeasible due to operational constraints, timing, availability, and financial factors (Appendix 2.01).

Phase two screening was primarily limited to the evaluation of other CDF sites within Newark Bay - northwest of Shooters Island, north of the I-78 New Jersey Turnpike Bridge, and east of the Federal Navigation Channel opposite Port Newark. Potentially unacceptable adverse impacts related to the number of buried cables and pipelines at the Shooters Island and Turnpike Bridge sites eliminated them from consideration (Section 2.03.1). A site on the east side of Newark Bay (referred to as Area 3) was evaluated as an alternative, although additional data would be required should a CDF in this area become a proposed action. Comparison of potential impacts that would likely result from a project in this area vs a project in Areas 1 and 2 was made on the basis of scale and location (Section 2.03.2).

The results of testing to determine the suitability of material for ocean disposal strongly influenced the alternatives analysis. Sediments proposed for ocean disposal are categorized based upon testing (sediment chemistry, bioassay [toxicity], bioaccumulation) proscribed by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) (Section 1.01, Table 1.01-1).

The stratigraphy of Newark Bay consists of three distinct layers of unlithified Holocene and Pleistocene sediments overlying Mesozoic bedrock. The uppermost unit consists of black silts and clays related to postglacial sea level rise. The middle unit consists of glaciofluvial gray sand and the lower unit of glaciolacustrine red-brown clay. The two lower sediment packages were exempted from a requirement for ocean disposal bioassay and bioaccumulation testing because they met exclusionary criteria defined in 40 Code of Federal Regulations (CFR) Part 227.13(b)(3)ii.

The upper layers of all three proposed CDF areas were tested as composites. The upper unit of Area 1S has been determined to be Category II on the basis of bioaccumulation testing. The upper units of Areas 2S and 2N were determined to be Category III on the basis of bioassay (toxicity) testing and bioaccumulation testing, respectively. Test results and a more complete analysis are given in Section 3.04. and in Appendix 1.02.

Five alternatives, including the "no-action" alternative, are discussed in detail (Section 2.03.3). Each alternative offers the potential for a NBCDF with increasingly greater capacities, except for Alternative 5, the "no-action" alternative. The alternative choices are:

1) ***Construct CDF 1S Only.*** Material dredged for construction to the Mud Dump Site (MDS); Capacity = 1.5 MCY (1.2 MCM).

2) ***Construct CDF 1S (as Above), Then Construct CDFs 2S and 2N.*** If Category III from 2S and 2N were disposed of in CDF 1S; net capacity = 2.5 MCY (1.9 MCM). If Category III is placed at a state approved upland disposal site net capacity = 3.09 MCY (2.29 MCM).

3) ***Construct One or More CDFs in Area 3.*** Material dredged for construction presumably would be disposed of a the MDS; capacity (potential) > 10 MCY (> 7 MCM).

4) ***Construct CDF or CDFs in Area 3, Then construct CDFs 1S, 2S, and 2N.*** Category II and III dredged material from CDFs 1S, 2S, and 2N to Area 3; capacity (potential) > 14 MCY (>10 MCM).

5) ***Do not Construct CDFs.*** No construction material; no capacity.

The alternatives were evaluated by comparing them to each other and to the objectives of the project as defined in Sections 1.01, 1.03, and 1.04. Alternative construction methods, including dredging options, transport/placement options, and engineering, design, and construction issues, are discussed in Section 2.04.

In light of comments received in response to the NBCDF DEIS, and in accordance with Title 40 of the Code of Federal Regulation (CFR) Part 1502.14(e), Alternative 2 has been selected as the preferred alternative. This alternative was selected because it meets all the criteria developed in Section 2.01 and provides maximum capacity within the time frame set by the criteria. (NOTE: Also see reply comment F1-1.)

S.03 AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS OF DREDGING/DISPOSAL OPERATIONS

Chapter 3 describes the affected environment and forms the basis for the evaluation of the environmental impacts associated with dredging/disposal operations (Chapter 4). The analysis of alternatives (Chapter 2) was, in large measure, dependent upon a knowledge of existing conditions.

A detailed search and analysis of all available literature, a field research program focused on fish/shellfish and benthos (Sections 3.06 and 3.08, respectively), a hydrographic/sedimentation modeling program (Section 3.02), and chemical and geotechnical laboratory analyses of Newark Bay sediments conducted to determine feasibility, suitability for ocean disposal, and engineering design parameters formed the basis for characterization of the affected environment. To the maximum extent possible, tables and figures were used to present data collected from the various sources. Written text was regarded as a vehicle to amplify and summarize the data.

Results of sediment testing to determine suitability for ocean disposal are briefly discussed above and in detail in Section 3.04 and Appendix 3.04.1. Levels of residual contamination vary both spatially and temporally throughout the Bay. This variation is documented and discussed in Section 3.04.

Newark Bay is a partially stratified estuary and, as such, its water quality is influenced strongly by conditions in the Hackensack and Passaic rivers (upstream) and in the Arthur Kill and Kill Van Kull (downstream). Indicators such as dissolved oxygen (DO) and coliform bacteria counts show a trend toward improving water quality (Section 3.05). Metal concentrations in Newark Bay waters vary with respect to criteria used by EPA to judge water quality in that area. Specific data are provided in Tables 3.05.3, 3.05.4, and 3.05.5.

Faunal surveys and a literature review show that fauna are moderately abundant in Newark Bay but generally limited with respect to species diversity. Surveys of finfish resulted in nearly 30 species being found in shoal areas and over 40 species in channel areas. However, the finfish community is dominated by only a few species (see Table 3.06.4). Seasonal variations in finfish abundance and diversity correspond to normal seasonal patterns for migratory and resident estuarine species.

Studies of benthic organisms (organisms that live within the sediment or at the sediment/water interface) show that a similar pattern, moderate abundance with limited diversity, exists with respect to this type of fauna (Tables 3.08.3 and 3.08.4). Newark Bay benthos is dominated by polychaete worms, with dominant species and population levels varying seasonally in relation to normal changes in environmental conditions. Of particular note is the observation that Newark Bay benthic organisms are least abundant and diverse in areas dominated by fine-grained sediments (silt and clay). Surveys in

other areas of the sand dominated Raritan Bay/New York Harbor system show that polychaete worms ranked fourth in overall abundance.

The impacts associated with the construction and operation of the NBCDF and reasonable alternatives are discussed in Chapter 4. The spatial boundaries for the analysis coincide with Newark Bay because, with the exception of taking no-action, all alternatives are within the Bay. The temporal boundaries for the analysis are two-fold: (1) short term - the time necessary to build, fill, and close the facility, and (2) Long term-the monitoring period after closure of the facility. The impacts to the various aspects of the affected environment described in Chapter 3 are dealt with in Sections 4.01-4.23. Indirect and cumulative impacts are discussed in Sections 4.24.1 and 4.24.2, respectively.

In general, the analysis suggests that direct impacts would be limited, both spatially and temporally. For example, approximately 2% of the Bay bottom shoal area would be disturbed if the proposed action were undertaken. The impact of dredging and disposal operations upon finfish would be temporary, given that they would be able to avoid the area and that they are found in lesser abundance and diversity in shoal areas of the Bay. Similarly, benthic fauna would incur limited, short-term impacts given their preference for coarser sediment than is typical of the proposed project areas.

The results of hydrodynamic and sedimentological modeling studies (Sections 4.02 and 4.04) indicate that the proposed action would have minimal impact upon the hydrodynamics of the Bay or upon the rate of sedimentation in proposed action areas. Current velocity would be expected to decrease in the project area during construction and prior to filling (Figure 4.02.4), but not in other areas of the Bay (Figure 4.02.5). The sedimentation model suggests that suspended sediment concentrations in the water column would not be altered by the proposed action (Figure 4.04.3).

Indirect impacts, those induced by a decision to implement a project, on natural resources would be related to effects due to the disruption of aquatic habitat and disturbance of contaminated sediments. The area of Bay bottom that would be disturbed by the proposed action is small compared to the size of the Bay. Although contaminated sediments will be disturbed, the areas of proposed construction were selected because they were less contaminated than other proposed areas.

Indirect impacts could potentially result from the no-action alternative. The curtailment of dredging activities in other areas, due to the lack of available disposal facilities, would not decrease the region's need for goods that currently arrive by sea. Each container ship that calls at the port carries the equivalent of 2000 tractor-trailer loads of goods (DMMT 1995). A potential adverse impact that could result from decreased shipping is an increase in air pollution. Direct impacts that could result from the no-action alternative include increased double handling of available cargo and increased lightering with a concomitant increase in risks and costs associated with each.

The major impact on human resources would be related to the maintenance of infrastructure related to existing commercial shipping operations in waters contiguous to New Jersey. Loss of shipping could have significant negative impacts on the economic vitality of the region, as well as a traffic burden that could result in further deterioration of the region's highway infrastructure.

Cumulative impacts, those resulting from combined effects of similar projects occurring in the same area or time frame, would involve dredging activities that would occur as a result of the availability of the NBCDF. These are not confined to the proposed project area(s) because the construction of the NBCDF should result in dredging operations throughout the draw area. Adverse impacts that might result from dredging and disposal activities would be of short duration, would be areally restricted, and would be offset by the beneficial effects of removing and isolating contaminated sediments from the biosphere.

S.04 IMPLEMENTATION STRATEGIES FOR THE USE OF THE NBCDF

Chapter 5.0 discusses implementation strategies for the NBCDF. Section 5.04 discusses the application of the hydrodynamic and sedimentation models to the design of the proposed cap for the facility. Section 5.07 discusses the monitoring and management plan for the NBCDF.

The modeling effort was combined with a "worst-case scenario" (i.e., a 100-year storm event) that was projected to occur immediately after cap emplacement. The results of this analysis indicated that a safety margin of 1 ft (0.3 m) could be built into the capping plan, resulting in a sand cap 4 ft (1.2 m) thick. However, given the requirement of a 3-ft (0.9-m) sand cap for Category II and III material at the MDS, NJDEP's suggestion that a 3-ft (0.9-m) cap for subaqueous disposal is sufficient for New Jersey's tidal waters (NJDEP 1996), and the Port Authority's commitment to long-term cap monitoring, planning for closure of the NBCDF focuses on a 3-ft sand cap.

The management plan for the NBCDF focuses on setting up an organizational structure to oversee the operation and monitoring of the facility. The goal of the monitoring plan is to ensure cap integrity, thus ensuring isolation of the contaminated sediments placed in NBCDF, and to determine the extent of benthic organism recolonization. The tasks relate to bathymetry, surficial sediment, cap integrity and function, and water quality. Tasks related to these aspects of the project would occur prior to dredging for construction, after construction but prior to disposal activities, during disposal activities, after disposal activities but prior to capping, and after capping.

S.05 SECTION 404(B)(1) GUIDELINES EVALUATION

Chapter 6 evaluates the proposed action with respect to regulations found in 40 CFR Part 230.2(b), which implements Section 404(b) of the Clean Water Act. The evaluation concludes that the proposed action is in compliance with the guidelines.

The evaluation is given in outline form, with all elements of the evaluation addressed directly or by reference to the appropriate section of the FEIS.

1.0 NEED AND OBJECTIVES

1.01 INTRODUCTION

The Port of New York and New Jersey (NY/NJ) is vitally important to the New York Metropolitan area and the Northeast. Except for the Port of New Orleans, the Port of NY/NJ handles more tonnage than any other port in the eastern United States. In 1995 imports and exports moving through the Port totaled 120 million tons (108.9 million metric tons) with a total monetary value of more than $20 billion, including support for approximately 200,000 jobs (USACE 1996).

The NY/NJ Harbor is naturally shallow and subject to heavy annual sediment deposition from a number of sources, including major rivers: the Hudson, Passaic, Hackensack, and Raritan (Figure 1.01-1). The Hudson River basin, for example, contributes almost 800,000 tons of sediment per year, accounting for some 67% of the total Hudson/Upper Bay/Newark Bay waterborne solids (Abood et al. 1992). The annual volume of sediments to be dredged in order to maintain the navigation channels in the Port region is approximately 4 to 6 million cubic yards (MCY) (3.1-4.6 million cubic meters [MCM]) (approximately 8 million tons at 100 pounds/cubic foot [7.3 metric tons]).

Until recently, maintenance dredging to maintain ship channels and Harbor berthing facilities was conducted on a routine basis, with the dredged material normally disposed of at the Mud Dump Site (MDS), an ocean disposal site in the New York Bight apex southeast of Sandy Hook (Figure 1.01-1). In 1977 the U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE) developed a testing methodology for determining which sediments are suitable for ocean disposal and which require more contained disposal methods. The testing protocol, Ecological Evaluation of Proposed Discharge of Dredged Material Into Ocean Waters, also known as the Green Book (USACE/USEPA 1977), is national in scope; thus, implementation requirements considering local dredged material concerns are addressed through regional guidance manuals (USACE/USEPA 1984). Under the 1984 regional testing protocols (USACE/USEPA 1984) 90% of the sediments dredged from NY/NJ Harbor were found to be acceptable for ocean disposal and were transported to the MDS.

In 1991 a new guidance manual with modified testing protocols replaced the 1977 Green Book (USEPA/USACE 1991), and regional guidance for performing tests on dredged materials followed in 1992 (USACE/USEPA 1992). Under the new testing protocols the analytical sensitivity of detection limits was expanded, the number of chemicals of concern to be tested was increased, and additional biological assays were included. This 1991 revision significantly decreased the volume of dredged materials that qualified for ocean disposal. Preliminary testing information indicates that approximately 80% of the sediments to be dredged from the NY/NJ Harbor will require special management practices (capping with clean sediment) or will not be eligible for ocean disposal.

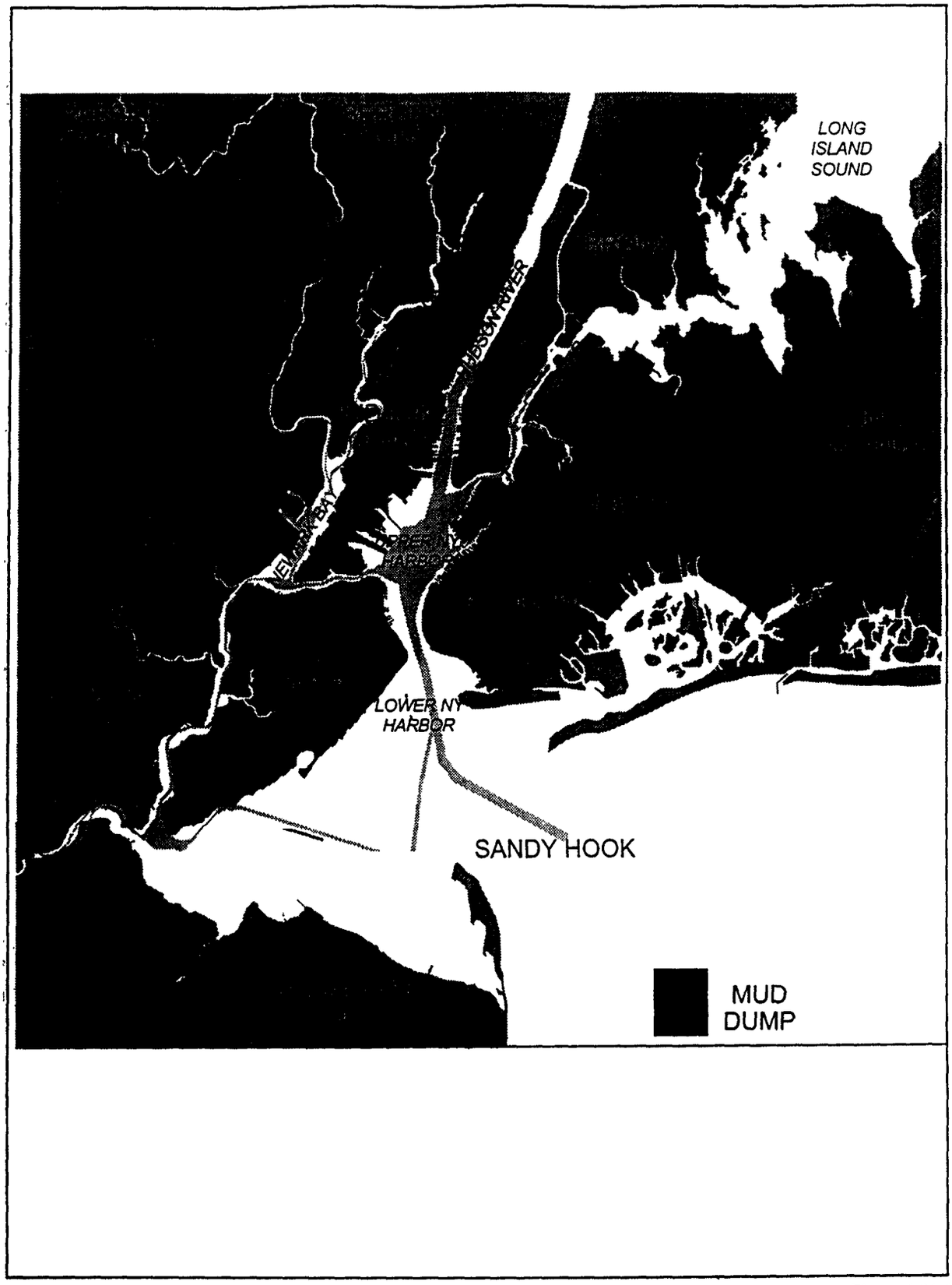


Figure 1.01-1
The New York and New Jersey Harbor

Within this region concerns over bioaccumulation and potential biomagnification of low concentrations of contaminants and potential human health risks led to the development of more stringent ocean disposal methodologies such as capping. To determine which dredged materials are acceptable for unrestricted ocean disposal and ocean disposal with capping, dredged material is tested and evaluated and then assigned to one of three categories. These sediment disposal categories (Table 1.01-1) are used to define the eligibility of different dredged materials for various disposal alternatives. Category I sediments pass toxicity and bioaccumulation testing and are eligible for unrestricted ocean disposal. Category III sediments fail to meet the testing requirements for ocean disposal. Category II sediments, although meeting the ocean disposal criteria defined by USEPA in that they do not pose a threat of mortality to aquatic organisms, contain some characteristics that require additional levels of confinement. Category II sediments do not meet criteria for unrestricted ocean disposal but may be suitable for ocean disposal with capping or used at landfills, borrow pits, and containment facilities.

On 24 July 1996 the Federal government announced a plan to close the MDS by 1 September 1997. After that time only Category I material can be deposited at the site. The volume of material that can be accommodated at the MDS in compliance with the required closure is the subject of a Supplemental EIS being prepared by USEPA and expected to be completed in June 1997.

USACE-NYD is responsible for maintaining the Federal navigation channels in the Port of NY/NJ (Figure 1.01-1). Ultimately, it is hoped that disposal of materials will be conducted under a Dredged Materials Management Plan (DMMP) developed specifically for the NY/NJ Harbor with alternatives selected by each of the states. A Plan of Study (POS) for implementation of the DMMP has been developed by the District (USACE-NYD 1995). The POS identifies short-, mid-, and long-term goals. The POS short-term goal is "to maintain the Port through its current crisis, in an environmentally safe manner." Short-term solutions must be ones that can be put into operation within three years (i.e., by 1998), in a manner that meets environmental standards acceptable to the regulatory agencies and the general public. The POS further states that short-term solutions should be capable of sufficient capacity to accommodate a meaningful proportion of dredged material deemed not acceptable for ocean disposal, either harborwide or from specific projects with urgent or special needs, and should be simple enough to be implemented without extensive study.

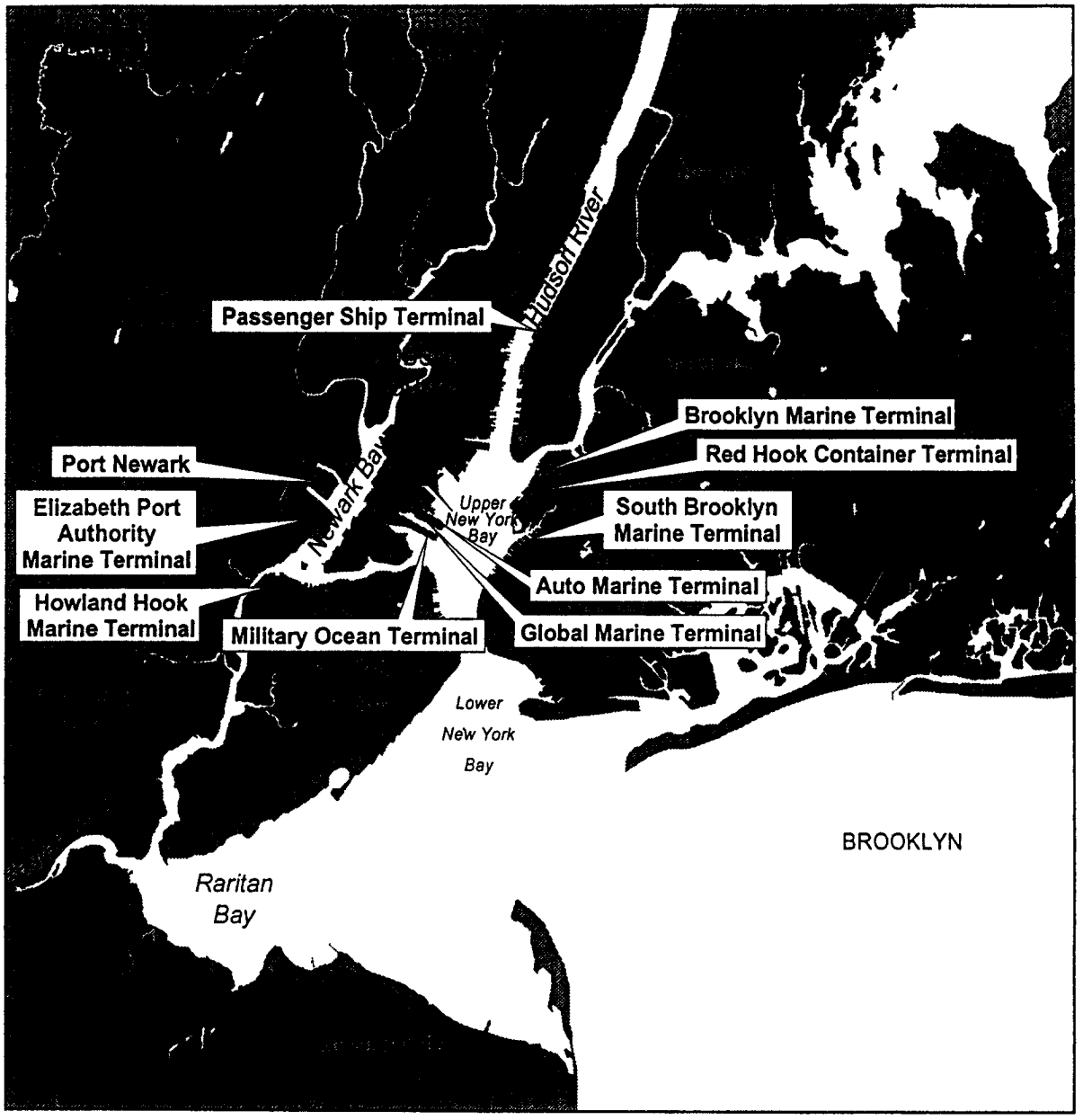
For the Port Authority of New York/New Jersey (Port Authority) to accomplish its mission to strengthen the Region's role as a center for trade and business, required water depths must be maintained at all Port facilities, including Port Elizabeth/Port Newark, New York berthing facilities, and adjacent navigational channels (Figure 1.01-2). The dredging conducted in Port Newark/Port Elizabeth during 1993 experienced greater permitting difficulties and incurred significantly higher costs for the disposal of sediments that were not suitable for unrestricted ocean disposal. This and other events described

Table 1.01-1

Dredged Material Disposal Categories

Category	Test Result Characteristics	Disposal Implications
I	Does not cause unacceptable toxicity or bioaccumulation in biological test systems.	Suitable for unrestricted ocean disposal or beneficial uses. Coarse-grain sand may be used for beach nourishment; coarse-grain and fine-grain material may be used as interim or final cap material; may be used for cover of historical disposal areas.
II	Does not meet criteria for unrestricted ocean disposal but does not pose a definite threat of mortality.	Suitable for ocean disposal with capping; suitable for disposal at landfills, borrow pits, and containment facilities or as daily or interim landfill cover.
III	Fails to meet ocean dumping criteria.	Not suitable for ocean disposal; suitable for disposal at containment facilities and borrow pits or as sanitary landfill cover.

Source: USACE (1995)



U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Figure 1.01-2
Map of Marine Facilities Within the Port Authority of NY/NJ Harbor Region

USACE0007049

USACE-0009183

in Sections 1.02, 1.03, and 1.04 resulted in the determination that materials to be considered for disposal in the Newark Bay Confined Disposal Facility (NBCDF) would be drawn from waters in NY/NJ Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull. The Port Authority's permit application for the construction and operation of a new subaqueous CDF in Newark Bay, Essex County, New Jersey was submitted on 19 April 1995. The purpose of the CDF would be to provide a short-term solution in the form of a disposal site for contaminated dredged material not suitable for ocean disposal. The CDF will not provide sufficient capacity to accommodate all of the dredged materials requiring disposal even in the short-term but it does provide a reasonable first step.

This document (1) identifies the applicant's initial dredged material disposal alternative and (2) assesses the anticipated environmental impacts associated with this alternative, as well as impacts associated with the no action alternative and with other disposal alternatives that meet the goals and objectives of the project. The document identifies appropriate mitigation methods and suggested long-term monitoring plans. The preferred alternative is identified in Section 2.03.4.

At this time the Port Authority is planning to develop the NBCDF in a phased fashion, with the CDF identified as Area 1S (see Section 1.02, Project Description) proceeding first. To achieve this plan, the Port Authority is proceeding to prepare contract specifications for Area 1S, with the expectation of awarding a contract for construction as soon as all necessary permits are in hand. This expeditious approach is driven by the administration's decision to close the MDS in 1997. The Port Authority is positioning itself to use the remaining disposal capacity available at the MDS in order to develop the CDF in a timely, cost effective manner.

1.01.1 STATUTORY AND REGULATORY AUTHORITY

USACE manages the regulatory permitting process for dredging and dredged material disposal activities. In the NY/NJ Harbor region, this responsibility is undertaken by USACE-NYD. The following presents additional Federal, state, and local laws, and rules and regulations that are addressed in this NEPA document.

The Rivers and Harbors Act of 1899 was enacted to control discharges of refuse into navigable waters by requiring issuance of a permit for such actions. Section 10 of the Act delegates to USACE the authority to control and review any obstruction or alteration of any navigable waters of the United States. This Act is the historical basis by which USACE regulates dredging and the disposal of dredged material.

The Clean Water Act of 1972 (CWA), and its amendments of 1977, established a permit program and evaluation guidelines (Section 404(b)(1)) by which USACE regulates discharges of dredged material at disposal sites which are within the waters of the United States. The Act stipulates the criteria to be used in determining the degree of degradation

to waters of the United States that will result from a given action. Issuance of a permit depends upon a determination that the proposed action will not cause a significant degradation of the aquatic environment and is in compliance with the Section 404(b)(1) guidelines. Economic impacts to navigation (and anchorage) must also be considered (Section 404(b)(2)).

The Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972 regulates the transport of materials for the purpose of disposal in ocean waters. Section 103 of the Act authorizes USACE to issue permits for ocean disposal of dredged material, using criteria developed by EPA (in consultation with the Secretary of the Army). The regulations under the Act establish application procedures for ocean disposal permits, environmental review parameters to evaluate applications, and designation and management procedures for ocean disposal sites. The MPRSA regulates and governs ocean disposal of any material that would adversely affect human health, welfare, or the amenities of the marine environment.

The Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1456(c)), established guidelines, and a process, for states to manage the resources and development of coastal zones. An applicant for a Federal permit to do work in a state's coastal zone must certify that the proposed work would comply with the state's coastal zone management program. No permit is issued until the state has concurred.

The National Environmental Policy Act (NEPA) establishes processes designed to ensure that environmental information is available to public officials and citizens before decisions and actions are taken by Federal agencies. A Federal agency's decision to prepare an EIS under NEPA is based on the magnitude of the impacts associated with the project, the similarity of the project to others that normally require an EIS, or the unprecedented nature of the project (40 CFR 1501.4). For this project, USACE NYD is the lead agency. Federal, state, and local agencies and interested persons were invited to participate in public scoping sessions that were held in June 1995.

The Draft EIS was prepared following the outline of a scope of work derived from the scoping meetings, and meets the format requirements of 40 CFR Part 1502.10. The Final EIS includes responses to comments received on the Draft EIS. Comments received and replies to these comments are provided in Appendix 1.01. Transcripts of the public hearings held on February 19, 1997, are available for review by contacting Dr. Marc Helman at the U.S. Army Corps of Engineers at (212) 264-3912. As lead Federal agency USACE reviews all relevant information presented and considers all alternatives described in the EIS in order to render a decision on the proposed action. At the time of a permit decision, USACE will prepare a concise "Record of Decision," or ROD, identifying all alternatives considered by the agency in reaching the decision and specifying the alternative considered to be environmentally preferred. The ROD will state whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why they were not.

There are further opportunities for public review and comment on the selected alternative. Under NEPA, a notice of availability of the FEIS will be published in the Federal Register. This notice is followed by a comment period. Readers who wish to offer comment on this document are advised to contact Dr. Marc Helman at (212) 264-3912 for the date that comment period will close.

The proposed project requires Federal, state, and local permits and approvals. This NEPA document provides a substantial basis for decision making on permit applications. The administrative procedures for acquiring the various permits and approvals will provide opportunities for agency and public comment. Permits from State of New Jersey agencies and USACE cannot be issued until the NEPA process is completed for the project. The permits that will be required to undertake the proposed action are listed in Table 1.01-2.

In addition to the authorities listed, two other pieces of legislation may have an effect on this document and the proposed project: the National Historic Preservation Act of 1966 (NHPA) and the Endangered Species Act of 1973 (ESA).

Under Section 106 of the NHPA, Federal agencies must take into account the effects of activities that would require a Federal license or permit on properties listed in or eligible for listing in the National Register. This FEIS addresses this in Sections 3.14 and 4.14.

Under Section 7 of the ESA, Federal agencies are required to engage in biological assessments whenever their actions may affect endangered or threatened species and to consult with the U.S. Fish and Wildlife Service (USF&WS) and/or the National Marine Fisheries Service (NMFS) whenever such actions will likely affect listed species or their habitats. Those consultations have been conducted.

NJDEP will regulate the construction of any of the NBCDF alternatives pursuant to the Rules on Coastal Zone Management (N.J.A.C. 7:7E-1.1 et seq.). The Rules define Newark Bay as a semi-enclosed bay and generally prohibit the disposal of dredged material in such bays where the water depth is less than 6 ft (2 m) (N.J.A.C. 7:7E-d.2[h]). All of the Newark Bay locations identified in the FEIS have water depths less than 6 ft (2 m) at mean low water.

However, the Rules are intended to represent the consideration of various competing and conflicting interests in coastal zone management. Included in the Rules are eight basic coastal policies intended to guide administrative discretion in the application of the Rules to specific projects (N.J.A.C. 7:7E-1.5). Two of these eight basic policies apply to the proposed NBCDF: (1) to protect and enhance the coastal ecosystem, and (2) to maintain active port facilities, and to provide for necessary expansion in adjacent sites. In the case of the proposed NBCDF, a decision under the Rules cannot be focused upon the narrow language of N.J.A.C. 7:7E-4.2(h), but must necessarily balance the need to protect the estuarine ecosystem of Newark Bay with the need to maintain commerce and Port activities.

Table 1.01-2

Permits Required for the Construction and Operation of the NBCDF

Agency	Permit
State of New Jersey	1) Waterfront Development Permit
	2) Water Quality Certificate
	3) Coastal Zone Management Plan Consistency Concurrence
	4) Tidelands Instrument
USACE	1) Permit

1.02 PROJECT DESCRIPTION

1.02.1 HISTORY

A Dredged Material Management Team (DMMT), whose mission was to investigate and propose nonocean, short-term solutions for Port dredging, was appointed by the Governor of New Jersey, Christine Todd Whitman, in June 1994. Governor Whitman appointed Assemblyman Steven Corodemus to chair the DMMT. The DMMT was given six months to research the problem and to recommend solutions. Assemblyman Corodemus and the DMMT presented their final report to Governor Whitman on 1 February 1995. The Governor adopted the report, stated that she would work to implement its recommendations, and requested the Port Authority to act as lead agency to fulfill the plan's goals.

The principal recommendation, supported by all DMMT members, was a proposal to construct two subaqueous pits on the west side of Newark Bay for the containment of dredged material that was deemed to be unsuitable for ocean disposal. The pits would be dug to a depth of approximately -70 ft (-21.3 m) with a capacity to hold an estimated volume of 14 MCY (10.7 million cubic meter [MCM]). It was assumed that most of the material removed during excavation would be disposed of in the ocean or used beneficially. The proposed CDFs are shown on Figure 1.02-1 as Area 1 and Area 2.

The Dredged Material Management Forum's Containment Workgroup, within the framework of the Harbor Estuary Program (HEP), also considered the proposed Newark Bay CDFs as potential disposal locations. Some earlier investigations indicated that Newark Bay was underlain by fine-grained sediments that could be excavated to form the CDFs. Newark Bay was selected to demonstrate the advantage of a CDF in an already environmentally impacted area. Surficial sediments are contaminated and ultimately this condition could be improved with the construction and closure of the proposed NBCDF.

The Port Authority authorized a preliminary investigation in March 1995. This initial effort consisted of eight borings for environmental and geotechnical testing. A detailed search of historical records was also undertaken. The Port Authority submitted a permit application for the construction of the NBCDF to USACE on 19 April 1995.

USACE issued a public scoping notice on 31 May 1995. The estimated storage capacity stated in the notice was 14 MCY (10.7 MCM).

In June 1995, results of preliminary environmental testing and historical literature reviews indicated that portions of the proposed CDF areas were contaminated, probably as a result of dredging and deposition of contaminated sediments from historic activities. In July 1995 a second series of environmental and geotechnical borings was undertaken to better define the contaminated areas.

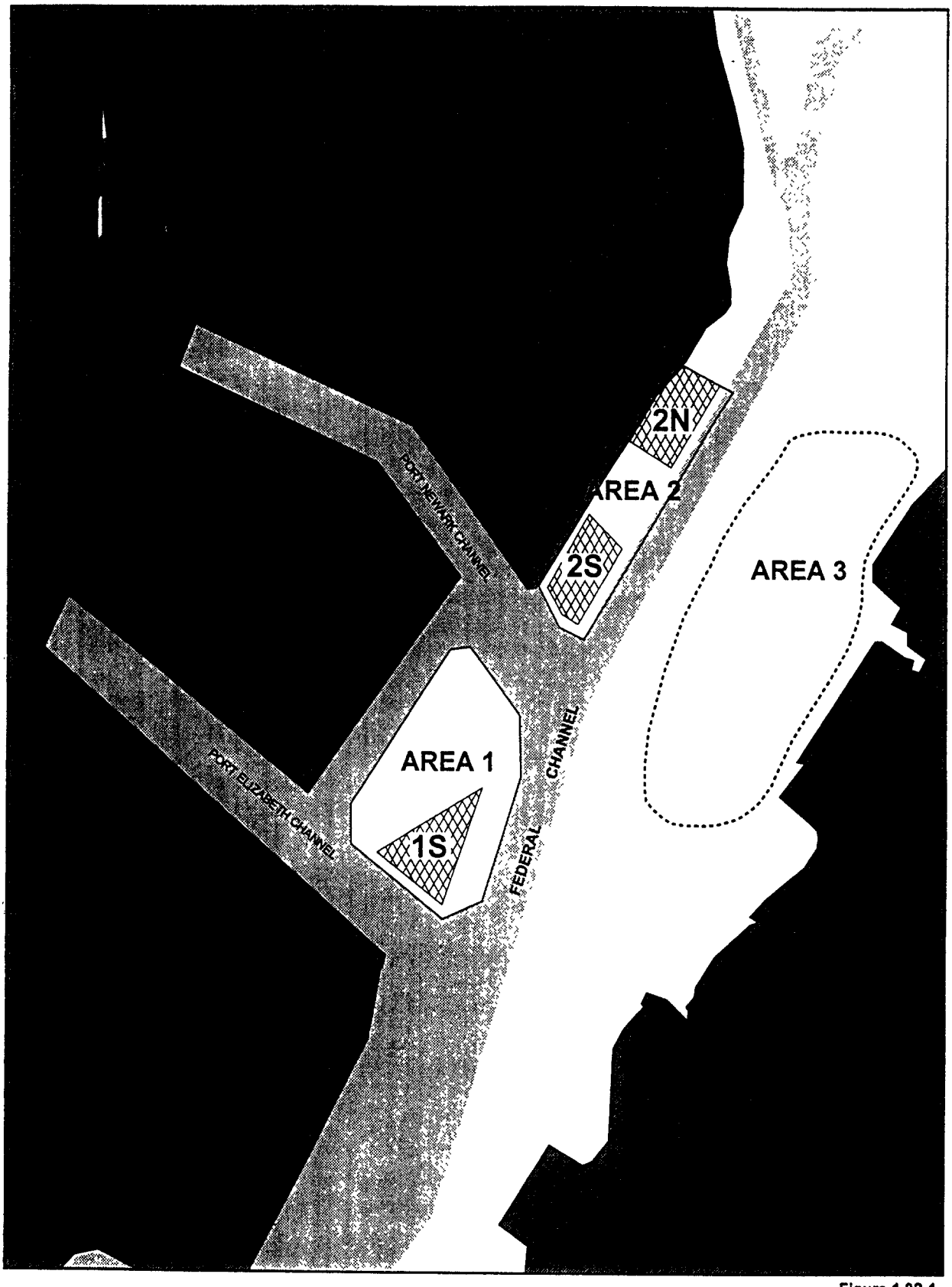


Figure 1.02-1
Proposed Newark Bay CDF Locations

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

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The feasibility investigations, environmental testing, and engineering analyses conducted during 1995 led the applicant to believe that continuation of the project as originally proposed was not possible due to large volumes of contaminated sediments that would need to be disposed of to construct the CDF. The data from the various investigations and testing were used to define subareas within the original boundaries of Areas 1 and 2 in which there appeared to be little significant contamination. These subareas are shown as Areas 1S, 2S, and 2N on Figure 1.02-1. The capacity of the three subareas is approximately 3 MCY (2.3 MCM) of in-situ dredged material.

On 6 November 1995, the Port Authority amended its application to USACE-NYD and requested that a permit be issued to construct and operate CDFs in the areas shown on Figure 1.02-1. The amended application stated that the areal extent of the CDFs would be approximately 60 acres (0.25 km^2) and the capacity would be up to 5 MCY (3.823 MCM), depending upon the depth of construction. USACE-NYD, by letter dated 22 November 1995, notified those who had provided oral and written comments during the scoping process of the amended application, and provided an opportunity for additional public comment on the scope of work for this EIS.

Additional environmental testing was conducted during May 1996 to determine the feasibility of ocean disposal for the unconsolidated upper layer sediments in the three subareas. The results of upper level sediment testing are given in Section 3.04 and Appendix 1.02. The lower layer material was excluded from testing and found acceptable for ocean disposal because it is geologically older than the upper layer material and in a hydrostatic environment, which precludes the migration of contaminants downward. These conditions are in accordance with the criteria for exclusion defined at Title 40 of the Code of Federal Regulations, Part 227.13(b)(3)(iii), as, ". . . the site from which the material is proposed for dumping is to be taken is far removed from known existing and historical sources of pollution so as to provide assurance that such material has not been contaminated by such pollution . . ."

Construction of the NBCDF using the MDS could be a substantial economic advantage to the Port compared to the cost of constructing the NBCDF using an upland disposal site, if used before the MDS closes on 1 September 1997.

1.02.2 GEOTECHNICAL INFORMATION

Borings were conducted to obtain sediment samples for geotechnical and environmental analyses in the course of the feasibility studies. The locations of borings made in Areas 1 and 2 are shown in Figure 1.02-2. A third area, Area 3, located east of the Federal Channel, was also investigated and the boring locations from this area are also shown on Figure 1.02-2.

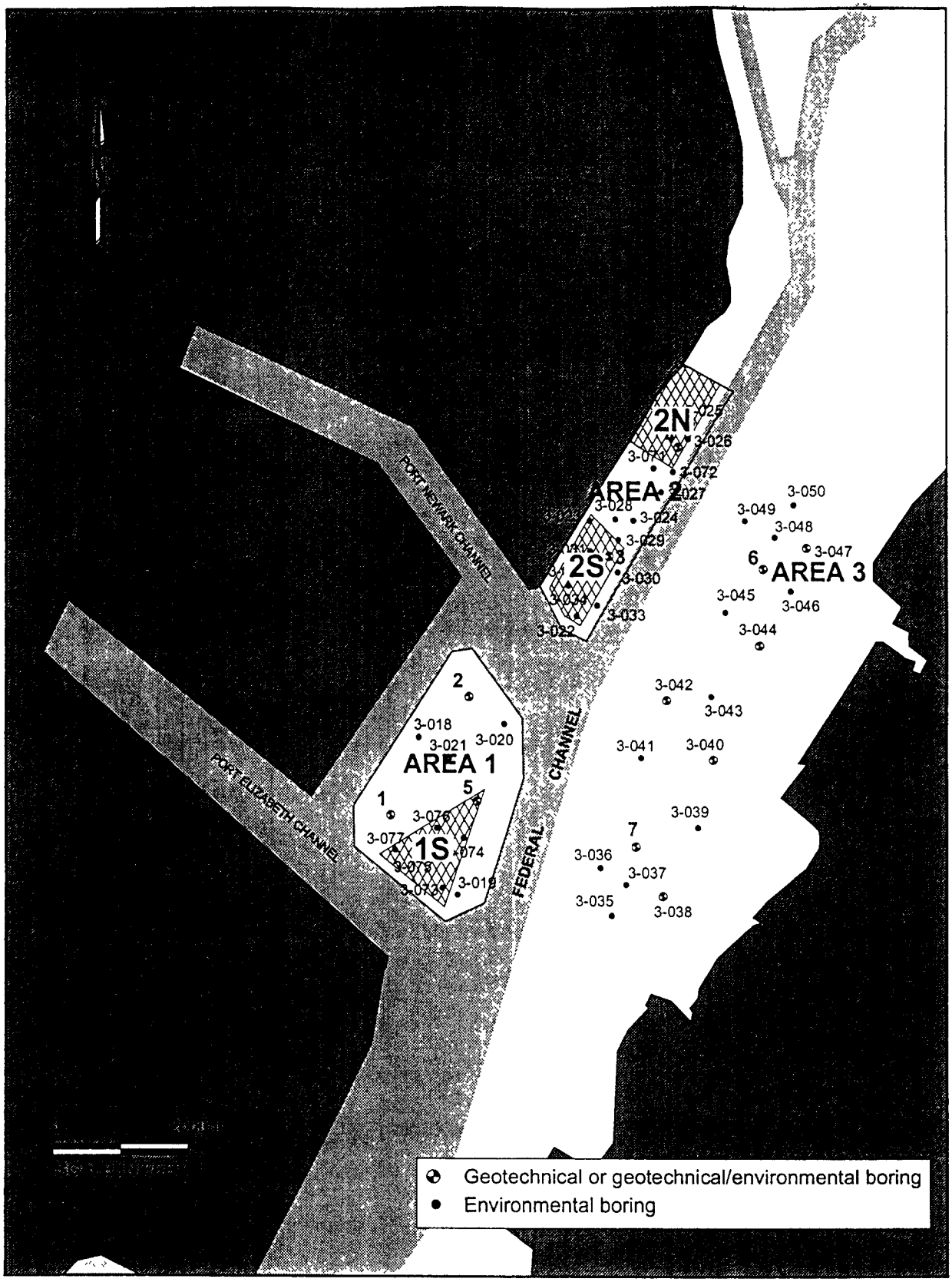

Figure 1.02-2
Location of Existing Stations

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Newark Bay Confined Disposal Facility

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Environmental borings were made to an approximate depth of 20 ft (6.1 m) below the sediment-water interface using a piston coring device. Geotechnical borings were made using an auger drill and were made from the sediment-water interface to bedrock.

Data acquired from the deep borings allowed the construction of a generalized geologic section for the proposed NBCDF areas. The general geologic section, starting from the surface and moving down, consists of about 15 to 20 ft (4.6-6.1 m) of soft black silty clay, 4 to 9 ft (1.2-2.7 m) of gray silty sands, 50 to 65 ft (15.2-19.8 m) of stiff red-brown silty clay, 6 to 15 ft (1.8-4.6 m) of very stiff gravelly silty clay, and bedrock consisting of red shale and sandstone.

Figure 1.02-3 presents detailed information concerning possible contamination in Area 1 and indicates that there is potential contamination to a depth of -25 ft (-7.6 m) or more, roughly down the center of Area 1 and toward the Port Newark Pierhead Channel and Federal Channel. CDF Area 1S would be located between these two areas to minimize the potential of excavating contaminated sediments.

The extent of potential contamination was inferred from historical data published on navigation charts, aerial photographs, and chemical and amphipod toxicity testing. The historical record was reviewed from 1812 to the present. The first indication of dredging in Area 1 was found on a U.S. Coast & Geodetic Survey (C&GS) chart dated 1937.

The depth and shape of the excavation area shown on the 1937 C&GS map are not consistent with a navigation project. An individual familiar with the area is reported to have stated that the excavation was performed to recover clay for commercial purposes (i.e., brick making). This seems consistent with information shown in Figure 1.02-3. The excavation is irregular, making it difficult to define its areal limits from the navigation chart. It is also not possible to define the depth limit on the basis of visual differences because both the potentially contaminated and clean soils are black silty clays and visually indistinguishable.

Figure 1.02-4 shows a similar plot for Area 2. The subarea CDFs, Area 2S and Area 2N, have been located to minimize the potential for excavating contaminated materials. The potentially contaminated portions of Area 2 were determined in the same manner used for Area 1. A C&GS chart from January 1944 shows a channel dredged to -11 ft (-3.4 m) traversing the central portion of Area 2. It is believed that this channel may have been excavated for access to shipways that are visible on an aerial photograph dating from 1952.

A C&GS chart from 1978 shows both of these excavation features. However, a subsequent National Oceanic and Atmospheric Administration (NOAA) chart from 1983 does not show either of these excavated areas. The disappearance of these features was originally thought to be the result of filling; however, it is probably the result of revising charts to reflect the latest data received by the agency publishing the charts. The 1937 and 1944 data were new and therefore recorded on the charts. If no new data were

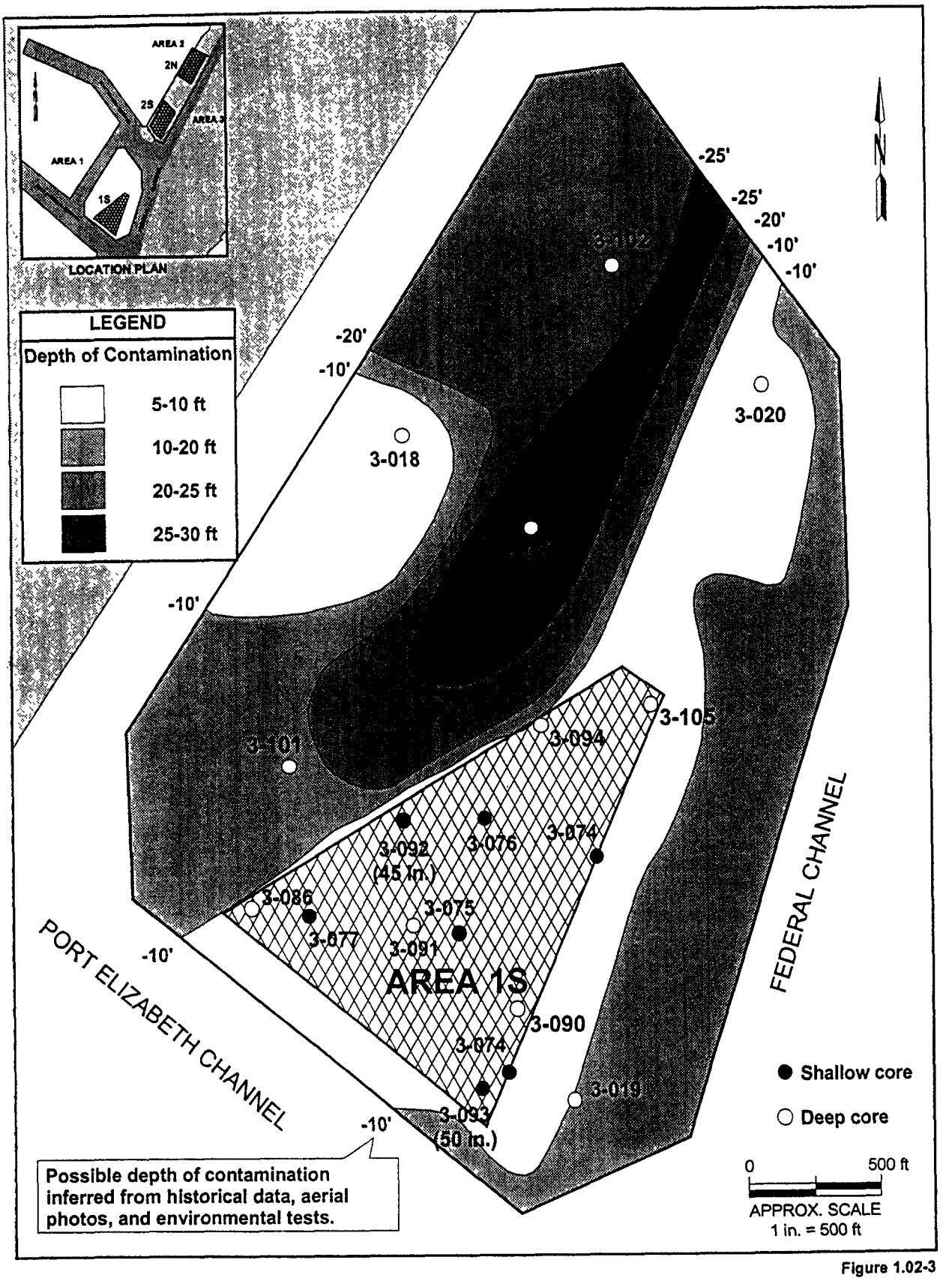

Figure 1.02-3

U.S. Army Corps of Engineers

Newark Bay Confined Disposal Facility

Possible Depth of Contamination in CDF Area 1

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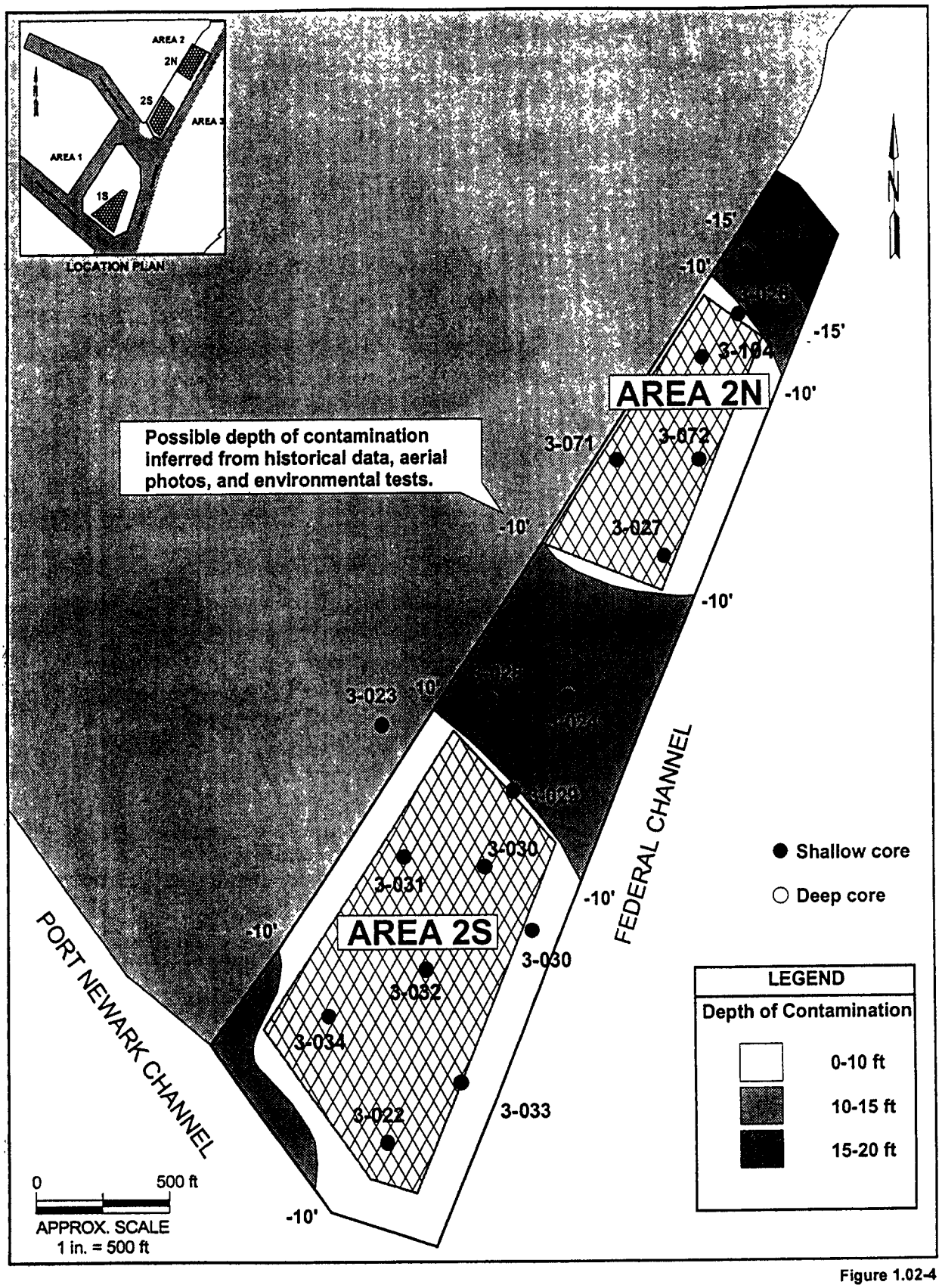

Figure 1.02-4

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Newark Bay Confined Disposal Facility

Possible Depth of Contamination in CDF Area 2

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USACE-0009194

received, the original data would be shown until revised. Therefore, the excavation was shown until 1983 when, presumably, NOAA was notified of the shallow water depths in the proposed NBCDF areas. Thus, it is inferred that the original excavations probably filled with sediments during the time from initial excavation. until 1983. Any contaminants in these areas probably reflect contaminated sediments originating or carried into the Bay during that time period.

There is an area of deep contamination evident to the north of Area 2 in Figure 1.02-4. This may have been the result of contaminated sediments collecting in areas where dredging occurred to accommodate large waterborne equipment used for the construction of the New Jersey Turnpike Extension Bridge located immediately north of Area 2.

In addition to providing information on zones of possible contamination, soil borings conducted as part of the feasibility studies provided geotechnical data such as shear strength and water content. These data were used to develop proposed preliminary CDF design slopes and storage capacity calculations.

The storage capacity of the CDFs has been estimated on the basis of a series of conditions including, no interim caps, a final surficial cap thickness of 3 ft (1 m), and no consolidation prior to cap emplacement because of the anticipated short life span of the proposed CDFs. A bulking factor of 1.2, considered representative of maintenance-dredged material in the Port of NY/NJ area, was employed in estimating the amount of dredged material that could be placed in the CDFs.

1.02.3 SEDIMENT CHEMISTRY AND TOXICITY

A number of environmental tests were performed on the sediment samples recovered from within the CDF areas to support a feasibility evaluation of the project. These are described in detail in Chapter 3.0, Affected Environment, Section 3.04. Figure 1.02-3 shows a plan of Area 1S. The potential depths of contamination are shown graphically. Figure 1.02-4 shows similar data for areas 2S and 2N.

The test data were used along with other data (Section 1.02.2) to identify possible subareas for the proposed CDFs to minimize the potential for excavating contaminated materials. The dredging or excavation perimeter would be within the outer testing perimeter so that potential sloughing of the surficial sediments would not extend beyond the area tested. Based on geotechnical information on Newark Bay CDF (NBCDF) sediment samples collected during 1995 and 1996, the proposed CDFs will be set back a minimum of 175 ft (53.3 m) from the Federal Navigation Channels to allow for a -50-ft (-15.2-m) deep channel at some future date. Initial amphipod bioassay test data and chemical analyses indicated that the soils to be excavated in the selected subareas might pass ocean disposal criteria; however, the results of chemical and biological analyses conducted on composited surficial sediment samples collected from the NBCDF subareas during 1996, indicates that surface sediments from Area 1S meet the criteria for ocean

disposal with capping (Category II), but surface sediments from Areas 2S and 2N do not. Results of upper level sediment testing are given in Section 3.04 and Appendix 1.02. Based on the data available through October 1996 the total storage capacity of the three subareas is about 3 MCY (2.3 MCM) (Table 1.02-1).

1.02.4 CONSTRUCTION CONCEPT

The potential areas identified for the construction of the CDFs were selected on the basis of geotechnical and environmental investigations performed during 1995 and 1996. The construction concepts discussed herein, apply equally to any or all of the potential CDFs that might be developed within Newark Bay. Evaluation of site geotechnical information results in side slope designs of 3 horizontal to 1 vertical (3.0:1.0) in the surficial unconsolidated clayey silts, and 1.5 horizontal to 1 vertical (1.5:1.0) in the underlying consolidated soils. The side slope would have a 15-ft (4.6-m) offset (bench) at the interface between the unconsolidated surface sediments and the underlying consolidated sediments. Based on the use of currently available construction equipment, the proposed depth of the CDFs -70 ft (-21.3 m) below mean low water (MLW).

The Newark Bay CDF would be constructed by excavating in situ soils using standard dredge and disposal procedures. Using ocean disposal for all material deemed acceptable for ocean disposal removed during construction of the NBCDF will provide a cost effective, short-term, environmentally sound disposal option in keeping with the recommendations of the DMMT.

Proposed NBCDF Area 1S, shown in Figure 1.02-5 with section line A-A drawn through the proposed CDF disposal area and the entrance channel (Site Plan), will be used to describe typical construction techniques. NBCDF construction would begin with a clamshell dredge excavating an entrance channel from the Port Elizabeth Channel (channel entrances to Areas 2S and 2N would be from the Federal Channel). The location of the entrance channels would be selected to provide the shortest access to the CDF. The CDF entrance channels would be approximately 300 ft (90 m) wide at the top, 200 ft (60 m) wide at the bottom, and 20 ft (6.1 m) deep. Existing water depths at the three proposed NBCDF entrance channels referenced to MLLW are Areas 1S, 2.2-2.6 ft (0.6-0.8 m); Areas 2S, 6.9-8.0 ft (2.1-2.4 m); and Area 2N, 4.6-5.3 ft (1.4-1.6 m). The proposed dimensions of the CDF entrance channel would provide adequate width and depth to maneuver loaded scows.

Once within the area of the CDF, the clamshell dredge would widen the excavation but would maintain a minimum setback of 40 ft (12.2 m) from the edge of the CDF footprint. This would ensure that any local sloughing of material would not cause material from outside the identified CDF footprint to enter the CDF area. The slope behavior would be monitored to verify side slope stability and determine what final side slope may be achieved. This would allow for the maximum storage capacity to be developed later in the excavation process, without concern that material that had not been environmentally

Table 1.02-1

Capacity of Newark Bay Subaqueous Confined Disposal Facility (NBCDF)

Physical Parameter		CDF Area			
		1S	2S	2N	3
CDF Surface Area	ft^2	1,133,400	910,000	427,500	9,000,000
	m^2	105,293	84,539	39,715	836,100
	Acres	26.0	20.9	9.8	206.6
	km^2	0.11	0.08	0.04	0.84
Volume of unconsolidated surface sediments	CY	579,000	485,000	200,000	2,274,987
	CM	442,700	370,830	152,920	1,739,455
Depth of unconsolidated surface sediments	ft	16	16	14	7
	m	4.9	4.9	4.3	2.1
Total CDF volume to sediment surface	CY	1,984,000	1,360,000	645,000	17,838,900
	CM	1,516,965	1,039,855	493,165	13,639,620
Cap volume[a]	CY	125,000	97,000	50,000	1,000,000
	CM	95,575	74,165	38,230	764,600
Net storage capacity[b]	CY	1,549,000	1,050,000	495,000	16,100,000
	CM	1,184,365	802,830	378,475	12,310,060

[a]Assumes 3 ft (0.9 m) cap depth.
[b]Based on bulking factor of 1.20.

m = meter
ft = foot
CY = cubic yard
CM = cubic meter
km^2 = square kilometer

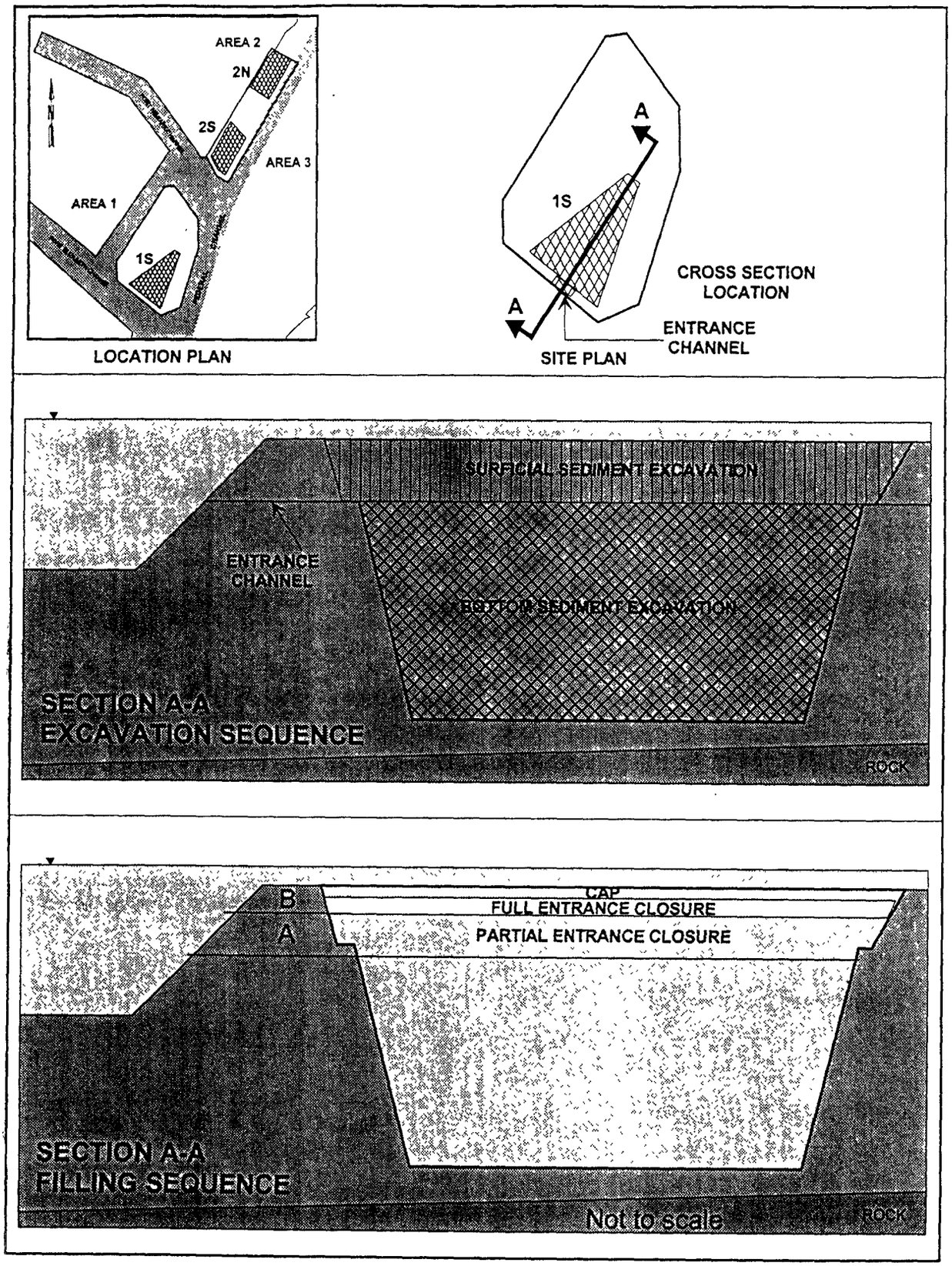

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Figure 1.02-5
Excavation and Filling Sequence

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characterized would have an impact on the construction of the CDF. The surficial, Category II material (black clayey silt/clay) (Area 1S approximately 579,000 CY [442,700 CM] including access channel material) will be removed using a clamshell dredge equipped with a large environmental bucket. The surficial sediment excavation is shown by the vertical lines on Figure 1.02-5.

When the mud bucket is no longer effective in removing deeper or stiffer material, a smaller more aggressive bucket will be used or a different dredge type (such as a dipper dredge or hydraulic marine excavator dredge [backhoe]) will be brought to the site to complete the excavation. Existing dipper dredges and hydraulic marine excavation dredges are capable of dredging to depths of -70 ft (21 m). The consolidated bottom sediment excavation that would remove approximately 1.4 MCY (1.1 MCM) from proposed CDF Area 1S is shown by the cross hatching on Figure 1.02-5.

At this stage the CDF excavation would be complete and disposal of dredged material from facilities in the draw area as defined in Section 1.01 deemed not suitable for ocean disposal can commence. The perimeter of the CDF will be marked by buoys which will eliminate any potential for disposal of dredged material outside the CDF area. Dredged material can be deposited into the CDF by bottom dumping from split-hull scows until the material reaches the base of the entrance channel. The entrance channel would then be partially filled (A on Figure 1.02-5) to result in a bottom depth of approximately -10 ft (3.1 m) MLW, and bottom dumping continued using smaller scows, more lightly loaded scows, or high water transit. When bottom dumping is no longer feasible due to water depth, the entrance channel will be filled to about three ft below the original surface elevation.

Final filling of the CDF storage capacity will be by removing dredged material from scows using a barge-mounted clamshell bucket. Scows will be positioned inside the CDF at high tide by shallow draft tugs. Dredged material will then be moved with clamshells, lowered through the shallow water to the depth of the previously placed dredged material and opened to release the dredged material. This process will allow a high degree of accuracy in placement location, minimize water quality impacts, prevent the surge due to bottom impact, and obviate the need for hydraulic pumping of dredged material.

The filling of the CDF will proceed from the area farthest away from the entrance channel and proceed in the direction of the entrance channel for all methods of filling in order to maintain the maximum clearance at the entrance channel and to measure the natural slope for the placed dredged material.

When the fill reaches the base of the planned cap, placement of dredged material will cease and the cap will be placed on the CDF to isolate the contaminated sediments from the overlying water column. The sand cap will be placed by sprinkling sand from the end of a hydraulic pipeline. Sprinkling the cap material minimizes displacement of dredged material and the potential for resuspension of contaminated sediment. At this stage the CDF is complete and the long-term integrity monitoring will begin.

1.03 NEED FOR THE PROJECT

The proposed project is a short-term solution designed to address the immediate disposal needs of the Port with a facility that can be constructed by October 1997. The proposed project, if fully developed, will serve the immediate need for a disposal site for dredged material deemed unsuitable for ocean disposal. This project is meant to help keep the Port viable, especially taking into consideration the introduction of larger ships with deeper drafts, while more efficient mid- and long-term disposal alternatives are being developed (USACE-NYD 1995; NJ/NY 1996).

1.03.1 NEED TO DREDGE

Use of the Port facilities requires maintaining adequate water depths in the shipping channels and berthing areas. As the average natural channel depth is approximately 19 ft (5.8 m) and the equilibrium depth of nearshore zones, where berthing facilities are located is approximately 3 ft (1 m), dredging is necessary to maintain authorized depths. If authorized depths are not maintained in the Harbor, water-related industry and commerce are likely to relocate outside the region in order to avoid closing or changing their operations by developing less economic procedures (USACE-NYD 1995; NJ/NY 1996). Examples of changes in operations would include (1) light-loading large vessels or using a larger number of small vessels; (2) additional lightering of petroleum products from large deep-draft ocean-going vessels to smaller shallower-draft vessels; and (3) moving through the Harbor only at high tide.

At present, lightering is necessary in order to use bulk facilities throughout the Harbor (USACE-NYD 1995). Lightering is estimated to involve approximately 913,920,000 gal (3.5 MCM) of fuel per year and increases the amount of vessel traffic between eight and 36 barges per facility per year (N.J. Petroleum Council). Lightering results in an increased risk for serious environmental consequences attributable to spills and safety hazards to vessels due to increased traffic. Risks associated with the additional handling of flammable material are similarly increased.

If the short-term dredging requirements for the Port are not met, commercial users are likely to invest in facilities located in another harbor. Once these investments are made it is unlikely that commercial users will return to the Port of NY/NJ.

In the interests of maintaining short-term viability while working toward a longer-term stability, the following, ongoing efforts have been undertaken:

1. USACE has published the Interim Report on its DMMP and made it available for public review and comment. This document presents a menu of 53 options for the disposal of contaminated dredged material. An Environmental Impact Statement associated with the Final DMMP Report is in preparation with issuance anticipated in September 1998.

2. Regulatory actions related to new opportunities for the disposal of contaminated dredged material are being reviewed by Federal and/or state agencies. The scope of these actions ranges from a few hundred thousand cubic yards to ten million cubic yards. The smaller proposals may serve to meet some very short-term needs for individual facilities whose need to dredge is urgent. The time frame for larger-scale proposals is much more problematic.

3. Six pilot-scale demonstrations of decontamination technologies are ongoing at this time. Pending completion of these demonstrations and evaluation of their results, the most successful of the technologies may be included in a Water Resource Development Act of 1996 authorized 500,000 CY/year/ facility production-scale demonstration and/or move on to full-scale operation. Decontamination may offer a mid- to long-term solution to the dredged material disposal issue.

4. Proposals for "predredging" parts of Newark Bay after the next round of maintenance dredging have been suggested. This would involve deepening channel and/or berthing areas beyond authorized depths and allowing them to become more active depositional areas for the accumulation of sediment.

5. A very short-term technique that has been successful is reprofiling of berthing areas to maintain water depths. Limited amounts of sediment are moved from areas of greatest accumulation to areas of lesser accumulation.

The aforementioned efforts do not provide a panacea. Rather, they indicate the extraordinary lengths to which effort is being made to preserve the viability of the Port.

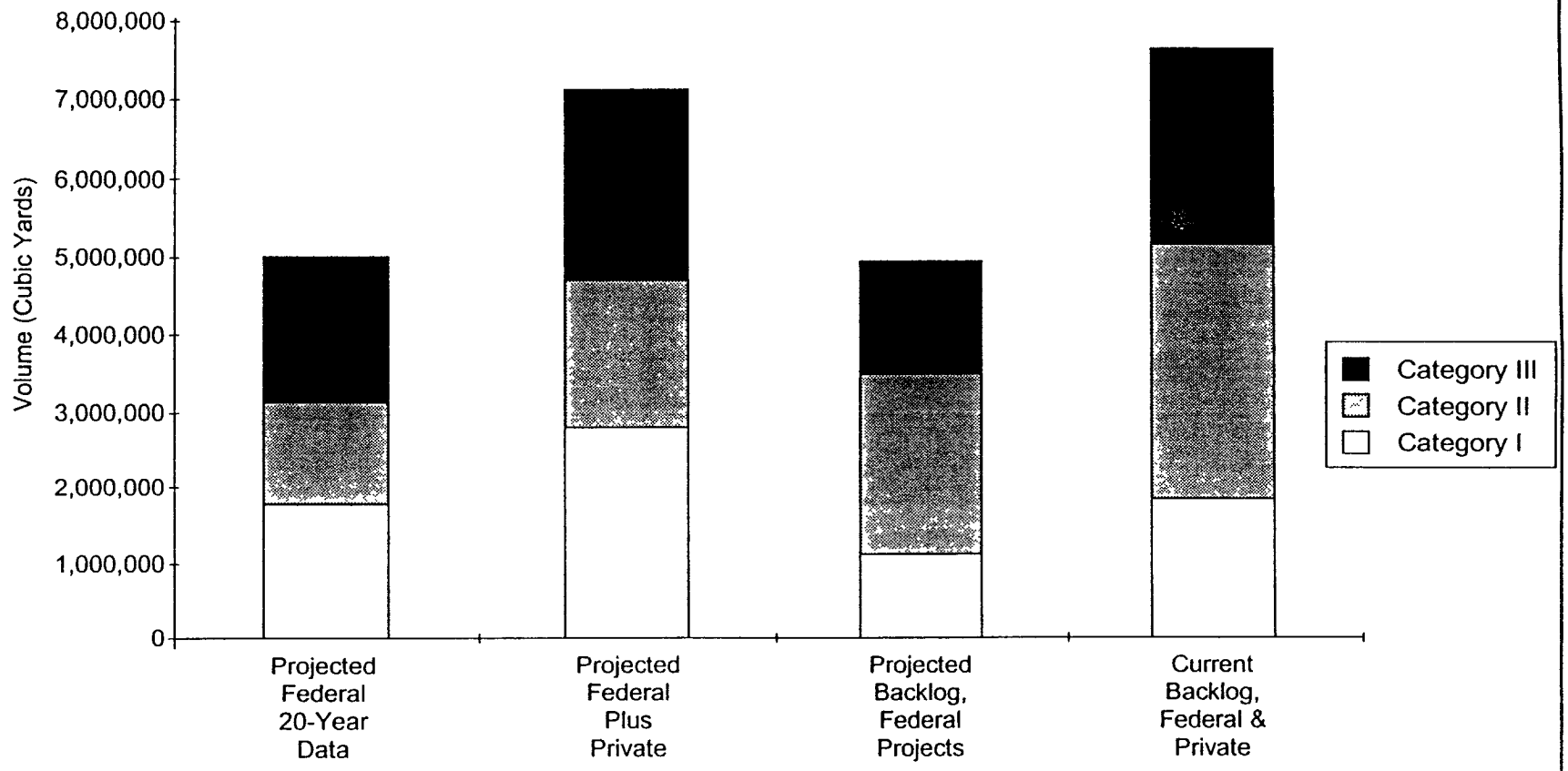
1.03.2 AMOUNTS OF MATERIALS TO BE DREDGED

The POS for the DMMP evaluated 20 years of dredging in NY Harbor and developed preliminary order of magnitude estimates of future dredging needs. Federal navigation projects and private projects together result in an estimated 4 to 6 MCY (3.1 to 4.6 MCM) of dredged materials each year (Figure 1.03-1).

The New Jersey and New York Joint Dredging Plan for the Port of New York and New Jersey (NJ/NY 1996) presents the following dredged material estimates:

- Short-term (September 1997 through 2000) maintenance dredging totals approximately 21 MCY.

- Long-term (2001 through 2025) maintenance dredging totals approximately 115 MCY (4-5 MCY per annum).



Source: USACE (1995).

Figure 1.03-1

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Comparison of Dredging Volumes per Year Using Projected Federal and Private Project Volumes and Current Backlog of Federal Projects

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- Long-term (2001 through 2025) capital dredging projects could approach 40 to 60 MCY, with higher estimates likely if currently authorized or anticipated channel deepening projects are conducted.

Nearshore areas typical of berthing facilities often have a higher percentage of Category II and III sediments than do the Federal Channel areas. These nearshore areas are more directly influenced by point and nonpoint sources of pollution, and sedimentation may occur at a faster rate due to the lower water velocities within the berthing areas. The POS estimated that between 1.8 and 2.8 MCY (1.4 and 2.1 MCM) of Category III material per year needed to be dredged and disposed of from the Harbor. Between 10 and 15 private projects and 13 Federal projects totaling between 4 and 6 MCY (3.1 and 4.6 MCM) have been delayed due to insufficient disposal capacity.

The dredging database of the Port Authority, MudOne, provides a summary of the total maintenance dredged material volume throughout the Port region (Table 1.03-1). This database comprises information provided by past permit holders and USACE. The database indicates that approximately 1,129,000 CY (863,230 CM) throughout the region are the responsibility of the Port Authority and 17,313,000 CY (13,237,520 CM) the responsibility of USACE, out of a total of 25,719,550 CY (19,665,170 CM) to be generated between 1997 and 2000.

In 1995 USACE and the Port Authority conducted an informal survey on future Port dredging needs. Based on responses to USACE's questionnaire, an estimated total volume of 24,847,600 CY (18,998,475 CM) will require dredging and disposal between 1996 and 2012 (Figure 1.03-2).

Table 1.03-1

Projected Total Maintenance and Channel Deepening Dredging Volumes (cubic yards) For 1997 to 2000 in the NY/NJ Harbor Region

Organization	1997	1998	1999	2000
Port Authority				
New Jersey	195,000	0	0	300,000
New York	209,000	145,000	175,000	105,000
Private and Local Government Agencies				
New Jersey	1,129,450	1,135,200	108,800	128,000
New York	2,603,000	690,000	757,000	726,100
USACE[a]				
New Jersey	1,491,000	2,350,000	345,000	0
New York	2,841,000	2,463,000	819,000	731,000
NY/NJ (Federal Navigation Channels)	586,000	5,170,000	0	517,000
Total				
New Jersey	2,815,450	3,485,200	453,800	428,000
New York	5,653,000	3,298,000	1,751,000	1,562,100
NY/NJ	586,000	5,170,000	0	517,000
Total	9,054,450	11,953,200	2,204,800	2,507,100

Source: MudOne, December 1996.

[a]Includes U.S. Navy Facilities.

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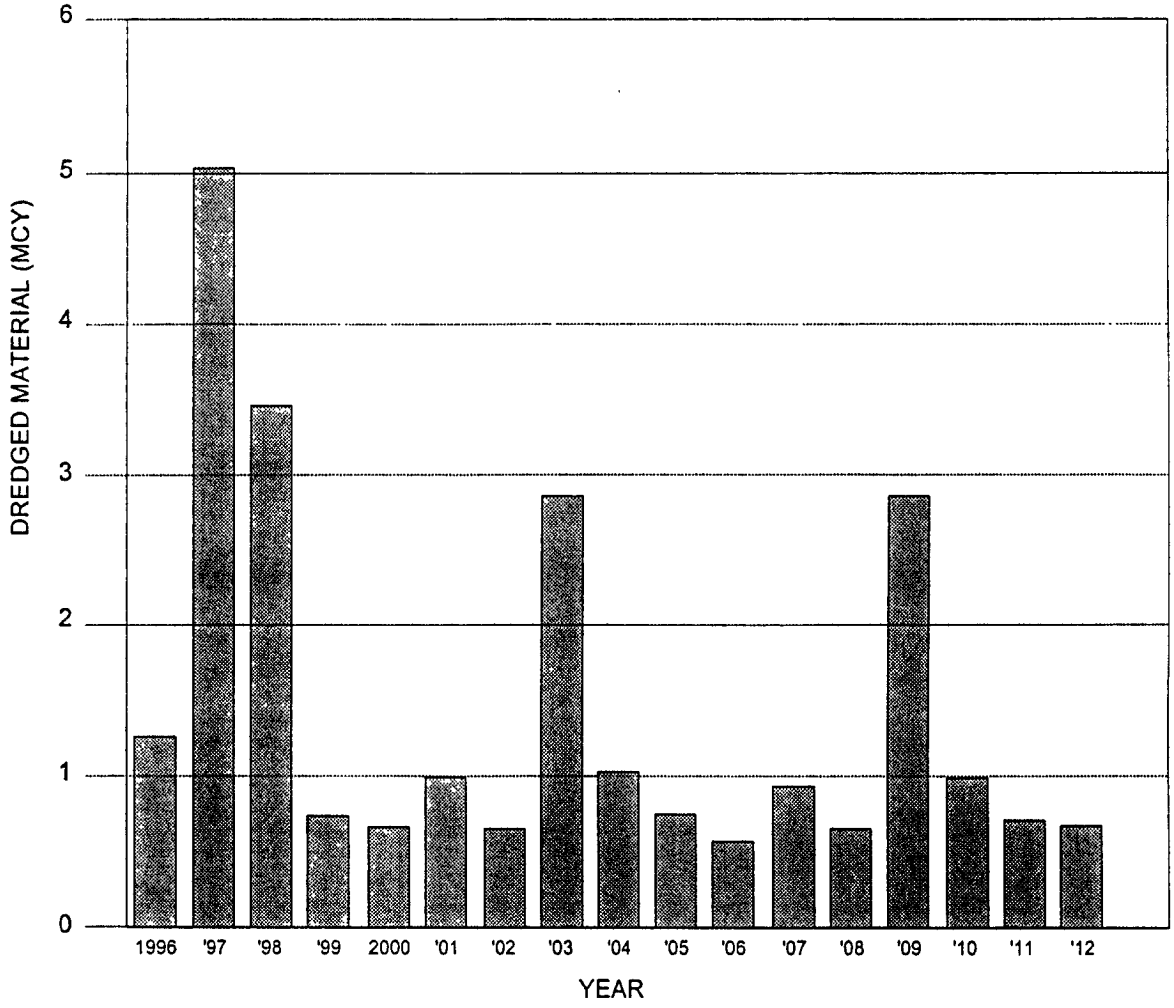

Total = 24,847,600 CY

Based on an informal U.S. Army Corps of Engineers Survey
(Some respondents indicated a need and desire to dredge but not amounts)

Figure 1.03-2
Anticipated Dredging Needs in New York-New Jersey Harbor Region

1.04 OBJECTIVES OF THE PROJECT

As stated in the preamble to the bistate plan titled "Joint Dredging Plan for the Port of New York and New Jersey" (NJ/NY 1996), "The continued operation and economic development of the Port facilities and private terminals located in New York Harbor is vital to the regional economy of New York State, New York City, and New Jersey. Additionally, and as importantly, the preservation, conservation, and restoration of the harbor's natural resources are critical to the quality of life in the metropolitan region." The preamble further states that recognizing these overall concerns, and in compliance with parameters developed by environmental groups and Federal agencies, the States of New Jersey and New York developed a plan to accomplish two major objectives vital to the maintenance of the region's navigational assets. The two components of the plan are to:

- Promote greater certainty and predictability in the dredging project review process and dredged material management.
- Facilitate effective long-term environmentally sound management strategies for addressing dredging and disposal needs for the region.

Specific objectives of the bistate dredged material management plan include:

- Maintaining and strengthening the economic vitality of the Port region
- Providing for a comprehensive and coordinated approach to the management of dredged material in the region
- Identifying immediate and short-term disposal requirements and initiating development of long-term disposal options
- Eliminating contaminants at their source
- Supporting continued research into feasibility of decontaminating sediments

The stated goal of the New York Harbor Dredged Material Management Plan: Phase I Report-Plan of Study (USACE-NYD 1995) "is to maintain the viability of the Port while protecting and improving the quality of the environment of the Harbor and adjacent waters."

Dredged material management studies evaluating NY/NJ Harbor disposal options recognize that no single solution will solve the complex problem facing the Port. Potential solutions to the existing dredging and material disposal problem have been broken down into two groups: short-term solutions covering the period September 1997

through the year 2000, and long-term solutions covering the period 2001 through 2025. The criteria for screening and selecting short-term sites include (USACE-NYD 1996):

- Capable of implementation in three years (end 1999)
- Little or no additional data needed
- Expeditious regulatory review is likely
- Environmentally acceptable
- Acceptable cost
- Minimal disposal capacity of one year (for Category II and III material)

One of the short-term options listed in both dredged material management plans for the disposal of dredged material deemed not suitable for ocean disposal is the development of a subaqueous CDF in Newark Bay (NBCDF). Previous studies conducted on aquatic CDFs indicate that the subaqueous CDF option, and the proposed NBCDF in particular, meet the following short-term disposal criteria: (1) A substantial Newark Bay environmental database exists, (2) the proposed project has minimal and short-duration environmental impacts, (3) permitting for the proposed project will require regulatory review, but can be completed within the project's proposed time frames, and (4) the CDFs can be constructed and be operational in a relatively short period of time. The projected capacity of the NBCDF can meet part of the short-term disposal requirements from the draw area for dredged material deemed not suitable for ocean disposal. The proportion of material that might be accommodated in the NBCDF would vary strongly depending upon the alternative selected (see Sections 2.03.3 and 2.03.4). The currently proposed action (Alternative 2) would provide space for approximately 65% of New Jersey's projected needs based on the above table. If Alternative 1 were undertaken only 40% of New Jersey's need would be met. The NBCDF must be viewed as one of several complementary solutions being investigated at this time.

The objective of the proposed project and alternatives evaluated is to provide a repository for dredged material deemed unsuitable for ocean disposal from a draw area defined as waters of the NY/NJ Harbor, contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull (Figure 1.04-1). The draw area was defined pursuant to discussions with representatives of New York and New Jersey to optimize the objectives of the Joint Dredging Plan.

The overall objective of the NBCDF EIS is to assess the potential impact of the construction, operation, and closure of the proposed NBCDF and its alternatives on Newark Bay and the New York/New Jersey Harbor. The evaluation of potential environmental impacts and a determination that any adverse environmental impact could be mitigated are required to obtain the necessary Federal and state approvals for the project.

1.05 CONNECTED, CUMULATIVE, AND SIMILAR ACTIONS

Dredging has been a necessary part of shipping in New York Harbor; thus, parts of the bottom habitat in the Harbor are disturbed by or recovering from dredging on an almost continuous basis. Some areas of the Harbor have been dredged numerous times in order to maintain adequate depths for ships. Dredging causes temporary disruptions of bottom habitat, a temporary increase in turbidity, and exposure of aquatic life to contaminants released during the dredging. Similar effects will occur at disposal sites for the dredged material, except that the exposed bottom habitat is covered rather than exposed.

Studies in New York Harbor and other coastal environments have shown that open-water estuarine habitats recover from dredging at a relatively rapid rate (USACE/Massport 1995). The rate of recovery will vary from site to site, but generally aquatic life returns to a dredged area in less than a year. Some aquatic life forms will recolonize dredged areas in a matter of weeks. The rate of recovery of dredged areas is an important factor in the assessment of cumulative effects of similar types of actions that cause habitat disruption. The timing of similar actions in relation to the dredging and filling activities of the proposed NBCDF must be related to the expected rate of recovery at each site in order to assess the cumulative effects of all actions. NBCDF utilization will cause habitat disruption for a period of time as dredged material is added to each disposal pit.

NY/NJ Harbor projects that are likely to occur during the construction, operation, and closure and that may directly and indirectly affect the proposed NBCDF include:

- Dredging and reprofiling of berthing facilities and shipping channels at various locations in the New Jersey portion of the Harbor.

- Remediation of hazardous waste sites in the Hackensack Meadowlands and other Newark Bay watershed areas, which may contribute contaminants to the waters of the Bay.

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2.0 ALTERNATIVES ANALYSIS

Since 1977 dredged material disposal alternatives evaluated for the Port of New York and New Jersey have focused on the containment of large volumes of dredged material unsuitable for ocean disposal. More recently, in 1993, the Port Authority of New York and New Jersey experienced difficulties in obtaining permits associated with disposal of sediments for Port Newark/Elizabeth dredging projects. Additionally, the costs for disposal of dredged material for recent Port Authority projects have been high. In response to these difficulties and concerns over the environmental impact of these activities, a task force for dredged material management was established by New Jersey Governor Christine Todd Whitman. The Governor's DMMT, chaired by Assemblyman Steven Corodemus, issued its final report in early 1995. The first recommendation of the DMMT was ". . . construction and utilization of subaqueous pits in Newark Bay for the disposal of contaminated sediments taken from the Port of New York and New Jersey" (DMMT 1995). Preliminary site recommendations, that have changed the estimated volumes, and estimated costs were given in the report. The project proposed by the Port Authority and described in Chapter 1 was developed from the DMMT's recommendations. Events that have occurred since the DMMT's recommendation that have changed the configuration and capacity of the Newark Bay CDF are described in Section 2.03-3.

2.01 CRITERIA FOR ALTERNATIVE SELECTION

As this project was deemed a major Federal action, an environmental impact statement (EIS) to evaluate the impacts of the proposed project and its feasible alternatives is required by the National Environmental Policy Act (NEPA). The proposed alternative for the disposal of sediments deemed unsuitable for ocean disposal must be evaluated in the context of other alternatives that may have different and/or lesser environmental impacts. The phrase "sediments deemed unsuitable for ocean disposal" most commonly refers to Category III sediments (see Chapter 1). However, changing circumstances result in sediments currently classified as Category II becoming eligible for disposal in the proposed facility.

Potential alternatives to the Port Authority's proposed project were evaluated in a three-phased screening process. The first phase considered potential alternative dredged material disposal strategies (Section 2.02). The second phase considered alternative locations for the proposed facility (Section 2.03). The third phase considered alternative construction methods (Section 2.04). The screening process considered the objectives identified in the Dredged Material Management Plan (USACE-NYD 1991) and used these objectives to develop the specifics required of feasible alternatives for the NBCDF. These criteria included:

- Must be suitable for receipt of dredged material within a short-term time frame, defined herein as by October 1997 (NJ/NY 1996).
- Must not involve disposal of unsuitable sediments in the ocean.
- Must have a capacity between one and 14 million cubic yards (MCY).
- Must be permittable, *defined as*:
  - No changes to existing regulations or laws required to obtain permits.,
  - The current permit process for local, state, Federal, and international laws and regulations can be accomplished within the timing required for this project.
- Must be constructable, *defined as*:
  - Uses existing technologies, no untested construction methods involved, no encumbrance on existing or proposed land uses.
  - Involves no access or utility restrictions (e.g., underground electric cables).
- Must be environmentally acceptable, *defined as*:
  - Does not result in substantial adverse impacts.
  - Results in impacts that balance or have a net beneficial effect.
  - Does not put additional stress on endangered or threatened species.

In the first phase of the screening process, alternatives were eliminated from further consideration if they did not achieve the same objectives as the applicant's preferred alternative and the DMMT's goals for short-term availability, constructability, minimum capacity, and nonocean disposal of Category III material. Feasible alternatives that met these objectives were selected for the second and third phases of the screening process, which involved the evaluation of environmental impacts associated with alternative locations and evaluation of alternate construction methods.

2.02 ALTERNATIVE DREDGED MATERIAL DISPOSAL STRATEGIES

A literature search revealed a number of alternatives described below that have either been employed in the past by the Port Authority of New York and New Jersey or by other ports in the United States. For reasons described below, certain of these alternatives were eliminated from further consideration. A summary of screening factors for the alternative dredged material disposal opportunities is presented in Table 2.02-1. The majority of the alternatives were eliminated because they cannot accommodate material that is unsuitable for ocean disposal in the short-term time frame.

2.02.1 DESCRIPTION OF ALTERNATIVE DISPOSAL STRATEGIES

Ocean Disposal at Shallow Ocean Sites. Ocean disposal involves transporting dredged material from a dredging site to open ocean water sites (USACE-NYD 1989). This alternative refers to designated sites on the continental shelf, including the existing MDS. The MDS is located approximately 6 miles (9.7 km) east of Sandy Hook, New Jersey, and has been used for disposal of dredged material since approximately 1914. The total volume of accumulated materials at the MDS is approaching the site's capacity of approximately 100 MCY (76 MCM).

Ocean disposal at shallow ocean sites is considered feasible for large volumes of dredged material, but is limited by a variety of factors: (1) a limited time frame for use of the currently available site in this region, (2) the limited capacity of the currently available site, (3) the extra cost required for capping and/or other management techniques required for some sediments, and the improbability that a new disposal site in the ocean will be designated in the near future. Shallow ocean dumping with capping is required for Category II material. In coordination with local, state, and Federal agencies, Category II dredged material would be disposed of at a designated buoy at the MDS and capped with a 3 ft (1 m) layer of clean material. Capping has been permitted for dredged material that does not meet the criteria for unrestricted ocean disposal. The need to handle sediments deemed unsuitable for ocean disposal which may include Category III eliminates this alternative.

On 24 July 1996 the Federal government announced a plan to close the MDS by September 1997. After that time only Category I material needed for specific remediation purposes can be deposited at the site. The volume of material that can be accommodated at the MDS in compliance with the required closure is given in EPA's Mud Dump Site Management and Monitoring Plan (issued in February 1997) as approximately 1 MCY. A more exact volume calculation will be included in their Supplemental Environmental Impact Statement on the Historic Area Restoration Site. The implications of the decision to close the MDS is that after the closure, there are even fewer facilities available for disposal of sediments presently accumulating in the Harbor, and the ability of the Port to achieve its role in the commerce of the region will be further impaired.

Table 2.02-1

Summary of Alternatives Screening Criteria

Alternative	Screening Criteria						Acceptable for Further Consideration?
	Permitability	Capacity	Timing	Constructibility	Unsuitable Ocean Disposal*	Environmental Acceptability	
Ocean Disposal at Shallow Ocean Sites (Mud Dump Site)	o	+	o	o	•	•	No
Deep Ocean Disposal	o	+	•	o	•	o	No
Ocean Spreading	•	+	o	o	•	o	No
Containerized Ocean Disposal	•	+	•	•	o	o	No
Disposal in Abandoned Interpier Basins	•	•	o	o	+	•	No
Incineration	o	o	•	o	o	•	No
Aquatic Containment Islands or Peninsulas	o	+	•	o	o	o	No
Subaqueous Borrow Pits in the Lower Harbor and the Bight Apex	•	+	•	+	+	•	No
Subaqueous Confined Disposal Facilities	+	+	+	+	+	+	Yes
Upland Disposal	•	+	•	o	o	o	No

* Must not involve disposal of unsuitable sediments in the ocean.
o Indicates not evaluated or not applicable.
+ Indicates alternative is viable in this selection criteria.
• Indicates primary elimination factor.

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Deep Ocean Disposal. Deep ocean disposal would involve the creation of an ocean disposal site beyond the continental shelf. Major problems are associated with thisalternative, including the economics of transporting dredged material long distances, potential environmental impacts to an undisturbed ocean site, and disposal dispersion considerations associated with a deepwater ocean site. Additionally, at least two years are necessary to identify a site, prepare an EIS, and permit the site, and this time frame does not meet the requirements of the short-term project. As a result, this alternative does not meet the objective of short-term availability and was dismissed from further consideration. Current regulations prohibit deep ocean disposal.

Ocean Spreading. The ocean spreading alternative was given initial consideration due to its potential to prolong the useful life of the MDS. The process of ocean spreading involves dispersive and nondispersive techniques for placing uncontaminated dredged material on already disturbed ocean bottom areas. This alternative was eliminated from further consideration because it cannot accommodate dredged material that is unsuitable for ocean disposal. Ocean spreading is currently prohibited.

Containerized Ocean Disposal. Containerized ocean disposal assumes that dredged material would be placed in sealed containers and disposed of in the ocean. To date, no sites have been identified for this method of disposal. Additionally, this method may be inconsistent with the London Dumping Convention, which eliminates it from further consideration. Current regulations do not permit containerized ocean disposal.

Disposal in Abandoned Interpier Basins. Disposal in abandoned interpier basins involves the placement of dredged material behind barriers, e.g., sheet piles, erected around and between abandoned piers. Because there are few interpier areas presently available for filling (River Terminal and Long Ship Canal), this alternative provides limited capacity, does not satisfy the volume criterion for the project, and may involve permanent loss of aquatic habitat although it may be viable for disposal of small volumes of dredged material. USACE has identified a number of environmental issues associated with disposal of dredged material at abandoned interpier sites. Most significantly, interpier basins provide valuable habitat for overwintering striped bass. Certain piers are listed on New Jersey's State Historic Preservation List. If fish habitat and/or cultural resources are to be maintained while still using an abandoned pier for dredged material disposal, capacities are reduced to the point that disposal in abandoned interpier sites is no longer feasible. Therefore this alternative was eliminated from further consideration because it does not provide much capacity and may involve permanent loss of aquatic habitat.

Incineration. Incineration is most effective when applied to fine-grained material with a high organic carbon and organic contaminant content. Incineration does not destroy metallic contaminants, and in some cases it produces dioxins. Ash, a byproduct of incineration, requires disposal.

There is limited access to incineration facilities, and properly equipped incinerators are not presently available in the NY/NJ area. The engineering, permits, and approvals needed to site a new incinerator could not be achieved in the short-term time frame. This alternative is eliminated from further consideration because incineration does not meet the short-term objective, is limited to small volumes of material, and involves significant environmental issues.

Aquatic Containment Islands or Peninsulas. Aquatic containment facilities involves a breakwater or diked area in open water into which dredged material is placed, ultimately creating a peninsula attached to land or a containment island separated from land (USACE-NYD 1995). Containment islands, have the potential to accommodate long-term dredging requirements. For instance, a 500-acre containment island could provide a capacity of approximately 28 to 150 MCY (21-115 MCM) of dredged material, depending on water depth and the type of dikes used. In addition, a containment island is engineered to isolate dredged material unsuitable for ocean disposal from the biosphere.

The current status of implementing an island involves siting efforts by USACE New York District (NYD) and the Waterways Experimental Station (WES), cost estimating by USACE-NYD, and cooperative planning efforts between the Port Authority, USACE-NYD, and state and local governments. An absolute minimum of three to four years would be required to site, permit, and construct an island. This lengthy time requirement eliminates a containment island from consideration as a short-term alternative.

Subaqueous Borrow Pits in the Lower Harbor and the Bight Apex. Subaqueous borrow pits or CDFs are depressions in the harbor or ocean floor, either preexisting or newly excavated, where disposal of dredged material unsuitable for unrestricted ocean disposal may be an option. Subaqueous pits may be capable of accepting large volumes of dredged material, depending on the size of the depression. Clean sediment could be used to cap and isolate the underlying contaminated dredged material. Existing excavated depressions located in the Lower New York Bay are the result of past sand and gravel mining operations. According to the "Final Supplemental Environmental Impact Statement: Use of Subaqueous Borrow Pits for the Disposal of Dredged Material From the Port of New York-New Jersey," prepared by USACE in January 1991, the Large East Bank Pit, located in the Lower Bay east of the Ambrose Channel off of Coney Island, was the most economically and environmentally suitable for disposal of dredged material. This site could provide disposal capacity for up to 6 MCY (4.6 MCM) of dredged material deemed unsuitable for ocean disposal. This and other sites were identified by the 1991 FEIS. The New York State Department of Environmental Conservation (NYSDEC) is currently evaluating potential impacts associated with the use of the existing pits, particularly the East Bank Pit. USACE currently has an application pending for the use of the Lower Bay pits before NYSDEC.

The Port Authority attempted to use the CAC pit (located west of the Chapel Hill Channel) in 1995 for disposal of contaminated dredged material that would have been

dredged from the Howland Hook Marine Terminal. Approximately half the material would have been enclosed in geotextile containers for disposal. The original proposal was to use the bagged material to cap unbagged sediments. This plan was later modified in favor of a plan to use the bagged material to create a berm adjacent to the eastern wall of the CAC Pit, behind which the unbagged material would be placed. The berm and material disposed behind it would then be capped by 3 ft (1 m) of sand.

The Port Authority later modified its application to use the CAC Pit in favor of an upland disposal option. The Port Authority's decision was made with the concurrence of the City of New York, the owner of the Howland Hook facility. The decision recognized the difficulties attendant in the permitting process and the desire of the Port Authority and the City of New York to dredge and reopen the facility at the earliest possible opportunity. At the time of the amended application, the Port Authority had not yet received a notice of complete application from NYSDEC, with one or more years anticipated as the time needed to complete the application.

Construction of new pits was also discussed in the 1991 Borrow Pit FSEIS. However, because of the added expense to create a pit, the use of existing pits was the preferred alternative. Accordingly, new pits were not pursued by USACE after the 1991 FSEIS. As part of a report on dredged material management alternatives, USACE-NYD is conducting a siting study in cooperation with WES to identify potential sites in the New York Harbor and Bight for new pits. The additional cost of new pits can be justified by a number of factors, such as siting to minimize adverse environmental impacts, special design to maximize containment efficiency, and proper planning for mitigation measures. Construction design and cost estimates will be part of this report. The use of existing borrow pits for the disposal of contaminated dredged material is considered an implementable alternative; however, siting and permitting for this alternative will take more than two years, which does not meet the time criterion for this project. Therefore, this alternative is eliminated from further consideration.

Subaqueous Confined Disposal Facilities in Newark Bay

As described previously, the New Jersey Governor's DMMT recommended construction of subaqueous CDFs in Newark Bay for the disposal of contaminated sediments. As described in Section 1.0, the Port Authority studied Newark Bay to determine the engineering and environmental feasibility of creating new pits for subaqueous disposal of dredged material. Studies included bathymetric measurements, geotechnical borings, chemical analysis of sediments at multiple locations and depths, biological sampling, and engineering analyses. Numerous public interest groups have reviewed the information, and the New Jersey DMMT and the Dredged Material Management Forum Containment Workgroup have reviewed the scientific findings.

Three areas west of the Federal Navigation Channel with a combined volume of over 3 MCY have been studied. A CDF in Newark Bay meets the objectives and is feasible

with respect to timing, constructability, capacity, permitability, and environmental acceptance. This alternative is further discussed in Section 2.02.

Upland Disposal

During the permit and approval process for each dredging project, upland disposal options are evaluated as the primary alternative to any "in-water disposal" option. The capacity available at permitted upland sites is insufficient to accommodate the existing need for dredged material disposal. Additional, new sites are required for this alternative to be viable. A number of sites for upland disposal facilities have been identified for dredged material deemed unsuitable for ocean disposal (see Appendix 2.02). However, all proposed projects are evaluated on a case-by-case basis and the length of time required to secure a suitable site, select a design engineer, perform wetlands delineations, conduct surface and groundwater studies and modeling, prepare the engineering design, and obtain the requisite permits for an upland disposal site is estimated to be approximately two years. This does not meet the required schedule, eliminating upland disposal as a viable alternative. The Orion site (discussed in greater detail in Appendix 2.01) is not considered a feasible alternative because the dredged material processing rate will not allow for disposal of sufficient contaminated sediment before its scheduled closure in October 1997. It is also noted that the expected processing rates for materials going to Orion have not been achieved.

In order for an upland New Jersey site to be considered as a viable disposal option for dredged material, the site must comply with permitting regulations regarding construction, operation and closure of upland CDFs, described in "Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters" (NJDEP 1996). The estimated time required to complete the permitting process for the New Jersey Pollutant Discharge Elimination System (NJPDES) regulations (N.J.A.C. 7:14A), Ground Water Quality Standards (GWQS; N.J.A.C. 7:9-6.), and the wetlands permitting process is one year (NJDEP, pers. commun., J. Peccholi, 31 July 1996). Contracting engineering studies, conducting the studies, and preparing the required documentation could take an additional year. Current New York State regulations exempt dredged material from solid wastes regulations under 6 NYCRR Part 360 when both excavation and disposal are permitted under the Federal WPCA and companion state statutes and regulations.

2.02.2 SCREENING OF ALTERNATIVES

The selection of feasible alternatives from among the alternatives evaluated in the Phase 1 literature search was based primarily on meeting the project objectives of capacity, permittability, timing, environmental acceptability, constructability, and the capability of sites to accommodate dredged material deemed unsuitable for ocean disposal. Table 2.02-1 summarizes the alternatives and their ratings with respect to each factor.

The alternative that best meets the project objectives is construction of a CDF such as that recommended by the DMMT. CDFs are suitable for dredged material deemed unsuitable for ocean disposal and provide a short-term solution for dredging requirements. The CDF alternative requires excavation of one or more pits, mechanical deposition of dredged sediment unsuitable for ocean disposal, and a cap to contain dredged material. The primary advantages associated with CDFs are:

- They have a long-term ability to isolate sediments from the water column, thereby limiting contaminant bioavailability and potential for bioaccumulation.
- They have minimal adverse impacts to aquatic resources and human health.
- They can be readily constructed or, as in the case of preexisting pits, are immediately available.
- They are a proven technology that has been used successfully in other areas of the United States and around the world.
- They are permittable under existing regulation and authority.
- They minimize waterborne and landside transportation.

Following the screening of disposal alternatives, the subaqueous CDF was selected as the most appropriate alternative dredged material disposal opportunity. Next, several alternative locations for a CDF within Newark Bay were evaluated.

2.03 ALTERNATIVE LOCATIONS WITHIN NEWARK BAY

Newark Bay has several characteristics conducive to the development of a CDF and this was recognized by the DMMT (DMMT 1995), which limited the search for a subaqueous CDF to the immediate Newark Bay Complex. The Bay has large shallow areas with depths and sediments that are appropriate for the construction of CDFs. These areas are close to existing channels thus avoiding the construction of lengthy access routes for construction and disposal barges. The Bay and adjacent waterways contain sediments that are unsuitable for ocean disposal, providing an abundant source of potential disposal material. The use of Newark Bay isolates contaminated sediments in an area already contaminated rather than transporting this material to an uncontaminated environment. Both the DMMT and the Port Authority support a Newark Bay location.

In addition, the New York-New Jersey Harbor Estuary Program's (HEP) Comprehensive Conservation and Management Plan (CCMP) which defines specific actions to cleanup, protect, restore, and enhance the Harbor/Bight ecosystem, calls for the practical integration of contaminant reduction (or isolation of bioavailable toxics) with dredging projects. A Newark Bay location contributes to the goal of contaminant reduction by removing contaminants known to be present in surficial sediments and replacing them with a clean cap. The sources of these contaminants are described in Chapter 3.

2.03.1 DESCRIPTION OF ALTERNATIVE LOCATIONS

Locations for subaqueous pits in Newark Bay were determined from data collected by the Port Authority and USACE. The evaluation of suitable locations included sites east and west of the Federal Navigation Channel in the vicinity of Port Newark, southwest Newark Bay north of Shooters Island, and north of the I-78 New Jersey Turnpike Bridge. These areas are shown in Figure 2.03-1 and are discussed below:

- *Northwest of Shooters Island.* Historically, this area had water depths in excess of 10 ft, although the present depths are generally less than 5 ft. The accumulation of sediment in this area is believed to be influenced by construction of a submerged dike (the U.S. Dike) along the northern limit of the North of Shooters Island Reach. The U.S. Dike was constructed to reduce sediment accumulations within the North of Shooters Island Reach. Construction of the U.S. Dike caused accelerated rates of deposition from the 1970s through present time (Moffat and Nichol 1996).

  Construction and operation of a CDF in this location would not be possible due to the extensive number of buried cables and pipelines.

- *Newark Bay North of the I-78 New Jersey Turnpike Bridge.* This area was eliminated for the following reasons: (1) a number of underground utilities cross Newark Bay north of the I-78 Bridge; (2) this area was selected as the discharge point for the Passaic River Flood Protection

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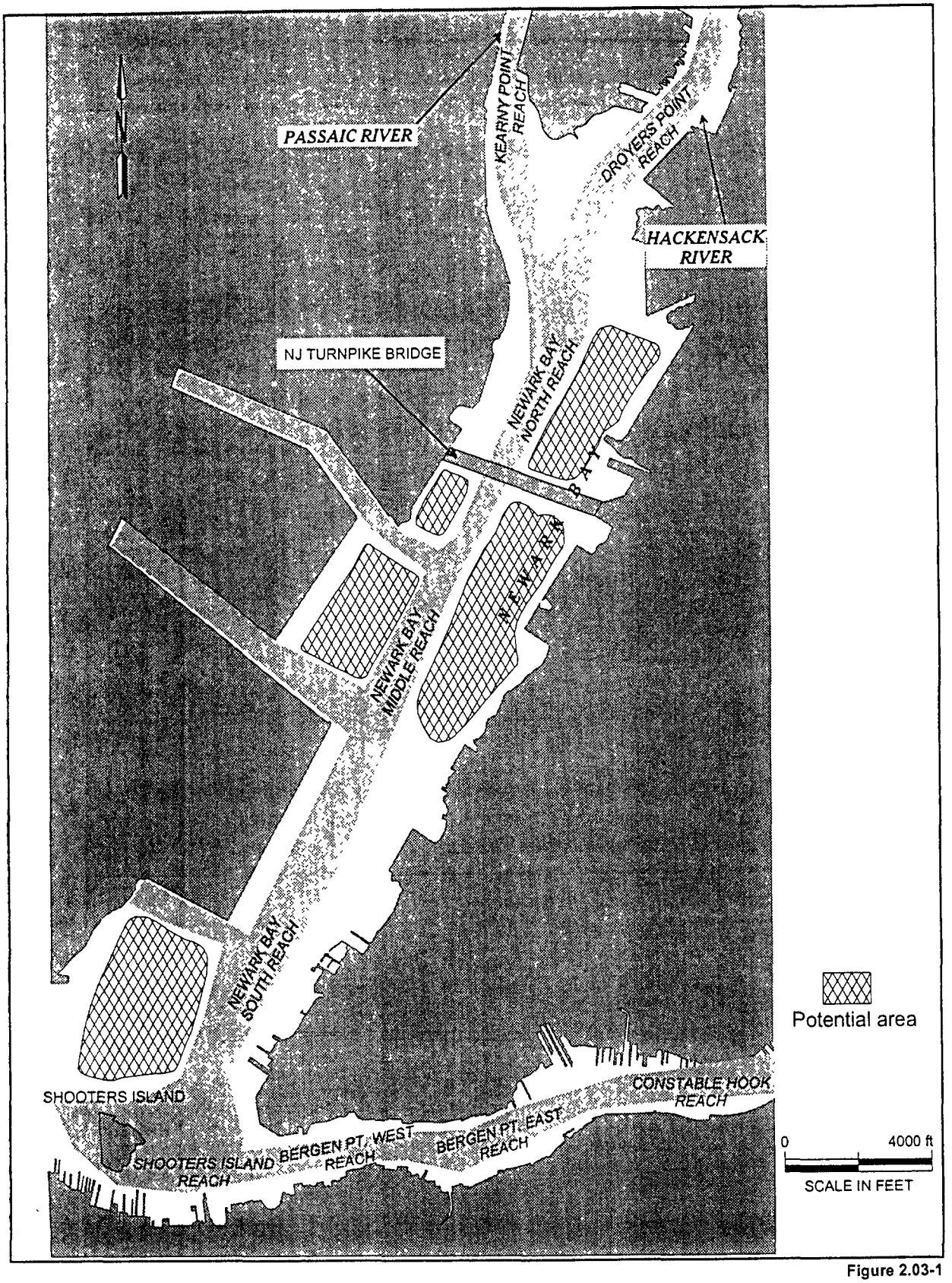

Figure 2.03-1

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Potential NBCDF Locations

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Project's Tunnel Outfall, and while the Flood Control Tunnel Project was recently put on hold by the sponsoring agency (USACE), this project could be reactivated; (3) the area available north of the I-78 bridge for a pit does not provide sufficient storage capacity; and (4) no subbottom sediment chemistry data are available for this area. This data gap would require additional field work that would delay progress on implementation of this critically needed project. For these reasons, this area was eliminated from additional evaluation.

- ***Newark Bay West of the Federal Navigation Channel Adjacent to Port Newark.*** This area is the location proposed by the Port Authority and evaluated by the DMMT. Originally, it was estimated to provide a capacity of 14 MCY. To confirm the site as a viable location, the Port Authority undertook an extensive sampling effort that included geotechnical and chemical analysis of sediments. The results of tests conducted to determine the acceptability of in situ surficial sediments for ocean disposal indicated the presence of contaminants that rendered large portions of the location unsuitable for ocean disposal. These data are presented in Section 3.04, Sediments. From the larger west side areas originally evaluated, three smaller areas with different toxicological characteristics have been identified as potentially feasible for construction of pits (Figure 2.03-2). These Areas 1S, 2S, and 2N are discussed in Section 2.03.3.

- ***Newark Bay East of the Federal Navigation Channel Opposite Port Newark.*** This alternative locates a CDF in Newark Bay east of the main Federal Navigation Channel in the vicinity of the City of Bayonne, New Jersey (Figure 2.03-2). This site, Area 3, could potentially create a 12.7-MCY capacity CDF, assuming that dredged sediments placed in the pit will bulk (i.e., increase in volume) by 20% Unlike the west-side location, detailed feasibility studies have not been conducted for this area, although some sampling of sediment chemistry was conducted in 1995. There are few site-specific geotechnical data, and sediments from Area 3 have not been tested for bioaccumulation potential in marine organisms to determine their suitability for ocean disposal. The time to complete the geotechnical and ocean disposal testing necessary to develop a construction design for an east-side CDF will require a six-month delay from the date specified for receiving dredged material in the CDF. Thus, this alternative does not meet the schedule required for the project.

2.03.2 ENVIRONMENTAL EFFECTS OF ALTERNATIVE LOCATIONS

A larger CDF could be constructed on the east side than on the west side because the depth of the contaminated surficial layer appears to be thinner on the east than on the west. The construction cost per cubic yard of dredged material disposal would be less

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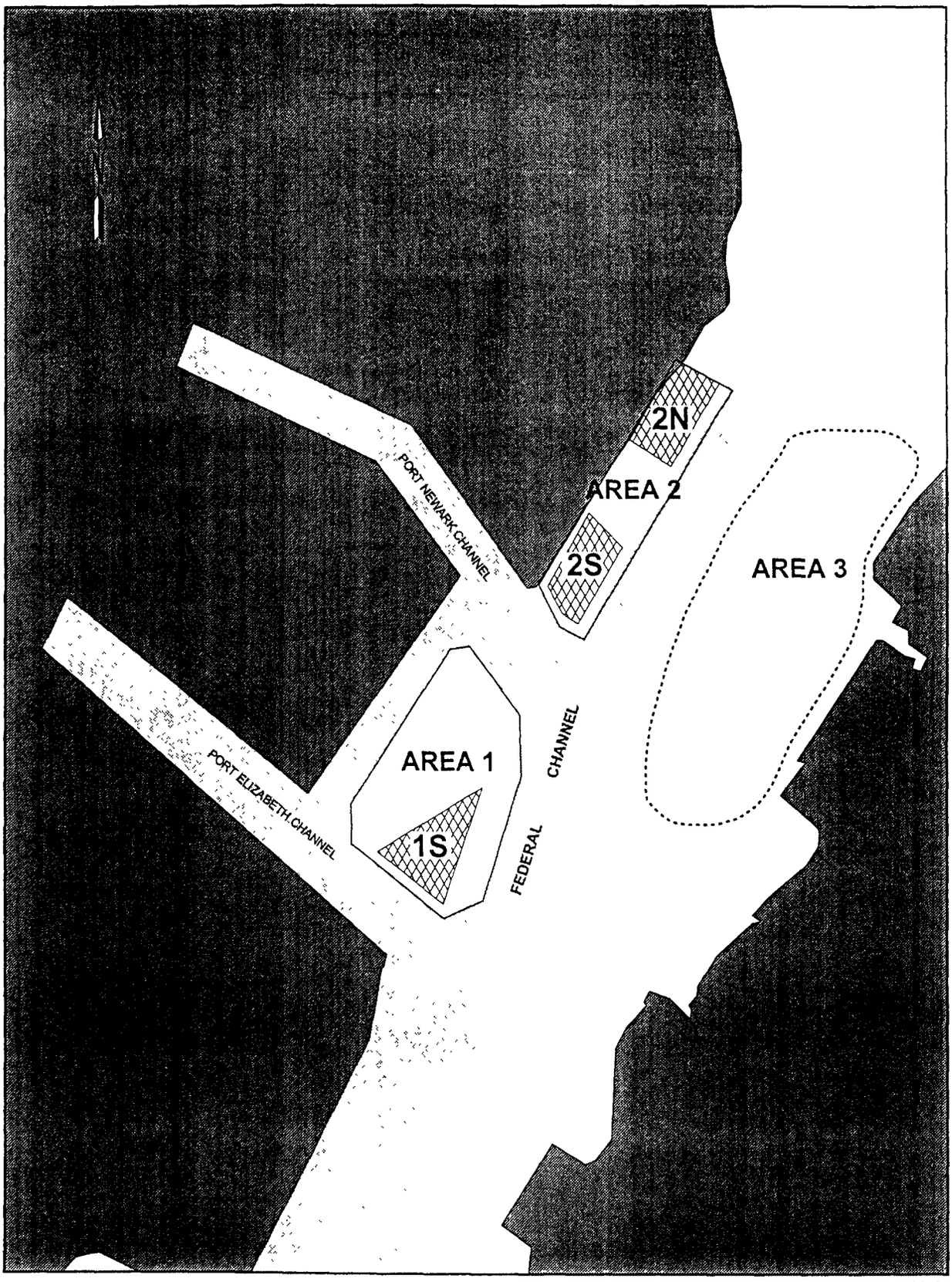

Figure 2.03-2
East and West Side Locations

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

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and larger volumes of contaminated sediments could be sequestered in the CDF. The benefit of sequestering large volumes of contaminants makes the Area 3 locationattractive from the perspective of long-term and cumulative impacts to the general environment.

In view of the potential value of the east-side location, the short-term impacts associated with construction and operation of an east-side location are compared to those of west-side alternatives. The screening-level assessment presented here compares effects that might be expected. Detailed impact assessment of a CDF located on the west side of Newark Bay is given in Chapter 4. Environmental effects that would differ because of differences in the **location** of the facilities are described below.

Among the CDF alternatives on the east or west side of the Federal Channel, no site-specific differences are likely to be associated with effect on physical oceanography, meteorology, fish, wildlife, benthos, wetlands, endangered or threatened species, critical habitats, flooding, hydrology or human health. However the differences in the potential size of projects in the different locations would result in differences in the **scale** of temporary impacts to fish, benthos, wildlife, water quality, and socioeconomics. For example, a larger CDF would cause temporary disruption to a larger area of the Bay's bottom habitat dislocating more fish and benthic organisms. With respect to the socioeconomics, a larger project would result in more jobs in the Newark Bay area during construction and operation.

Air Quality

Impacts on air quality are similar in nature at each site; however, the proximity of residential communities would result in more sensitive receptors on the east side compared to the west side. The east side would be greater in scale due to the longer construction schedule and greater number of barges entering the larger site.

Aesthetics

An east-side location, temporarily detracting from the Bay, would place the CDF closer to residences and parks, thus temporarily detracting from the visual quality of the Bay more than a facility located more distant from potential view sites. The pleasant visual quality of the east side as viewed from the New Jersey Turnpike Bridge would be temporarily disturbed by the presence of construction equipment. An east-side location would also have more significant visual impacts because of the longer time required to excavate and fill the larger pit. Bayonne residents would be subject to dredging and excavation operations for three to four years, compared to one to two years for smaller alternatives.

Cultural Resources

There are known shipwrecks in the east-side area. Impacts to cultural resources cannot be determined without additional studies of these wrecks and any others that may be

present. However, the presence of wrecks suggest that additional analyses of impacts to cultural resources would be required to assess the size and feasibility of the east side location.

Navigation

The east side is more removed from the Port Elizabeth/Port Newark berthing areas, resulting in less potential for traffic congestion in the channels near the ports. However, more vessels would be required to construct and deliver dredged materials to the larger site. Consultation with the Coast Guard and Harbor Pilots Association would be needed. Overall projected effects to navigation would be small.

Land Use

A west-side location is more consistent with the existing land use characteristics than an east-side location. The east side is dominated by residential areas and recreational facilities. The west side is dominated by shipping and transportation facilities.

Noise

Noise associated with construction and operation would have a greater potential impact on the residential community on the east shore and would not be noticeably different from the existing uses on the west-side. The City of Bayonne has noise level restrictions that would limit the hours of construction and operation of an east-side CDF, potentially extending the construction schedule.

In summary, with the exceptions of effects associated with the proximity of an east-side location to residential areas and effects related to differences in the scale of the alternatives, potential environmental impacts associated with east and west locations are similar. The east side alternative may not meet the project criteria of availability by October 1997.

2.03.3 ALTERNATIVE CDFs

The CDF project initially recommended by the New Jersey Governor's task force and described in a public notice on 31 May 1995 was located on the west side of the Federal Navigation Channel. The project included two pits covering 160 acres (0.65 km^2) and had a capacity of approximately 14 MCY (10.7 MCM). As originally conceived, the project called for disposal of surficial contaminated sediments in a CDF, with the balance of the dredged material being disposed of at the MDS, or to be used for beneficial purposes. The Port Authority initiated a feasibility evaluation that included analyses of sediment chemistry. The resulting data suggested that large portions of the areas proposed for the pits were contaminated and would not qualify for ocean disposal. The size of the project was reduced to three smaller pits with an estimated capacity of 3 MCY (2.3 MCM).

An addendum to the public notice was issued and additional geotechnical and environmental sampling was conducted in the smaller areas. Results of the toxicity and bioaccumulation testing to evaluate suitability for ocean disposal showed that surface sediments from two of the three smaller areas are not acceptable for ocean disposal. Because sediments from sites 2S and 2N failed ocean disposal criteria, only Area 1S can be developed in accordance with the original plan. As described in Chapter 1, a CDF in Area 1S would have a capacity of about 1.55 MCY (1.1 MCM). Approximately 579,000 CY (442,703 CM) of Category II material on the surface of Area 1S would be transported to the MDS. The balance could be used as capping material at the MDS or for other beneficial purposes.

As described in Section 2.02.1, the Federal Government announced the closure of the MDS to Category II material by September 1997. After that time only Category I material needed for specific remediation purposes can be deposited at the MDS. At this time the volume of material that can be accommodated at the MDS and the specifications for material that can be used for capping are under review by USEPA. The final design of the CDF cannot be completed until the feasibility of using the MDS for disposal of in situ sediments is known.

Given the presence of sediments that are unsuitable for ocean disposal in Area 2S and 2N, the imminent closure of the MDS, and uncertainties associated with the suitability of all Category I-type materials for remediation at the MDS, the configuration of alternatives discussed in this FEIS has included several alternatives that do not meet the original project objectives. These alternatives (Table 2.03-1) have been included to allow for flexibility in modifying or expanding the project in the event that circumstances change (as is the case for Area 3).

Table 2.03-1

Summary of Newark Bay CDF Alternatives

Alternative	Description	Capacity
(1) Area 1S only	Category I & II to MDS	1.55 MCY
(2) Area 1S, then open 2S & 2N	Category III to 1S	2.41 MCY
(3) Area 3*	Category I and II to MDS	≈16.10 MCY
(4) Area 3, then 1S, 2S & 2N open	Category II & III to Pit 3	19.19 MCY
(5) No CDF	No Action	0 MCY

*Area 3 sediments, have not been tested for ocean disposal. It is assumed that surface sediments would be acceptable for ocean disposal.

Alternative 1, Area 1S

This alternative proposes to create one CDF in Area 1S on the west side of Newark Bay. Area 1S has a surface area of 25 acres (0.10 km^2) and is located west of Newark Bay

Middle Reach Channel, north of the mouth of Port Elizabeth Channel, south of the mouth of Port Newark Channel, and east of the Pier-Head Channel (Figure 2.03-2). The surficial sediments of Area 1S are estimated at 579,000 CY (442,700 CM) (Table 1.02-1). This Category II material would be transported to the MDS and would be capped. The remainder of the material dredged from Area 1S (1.41 MCY [1.07 MCM]) is suitable for unrestricted ocean disposal and may also be suitable as capping material. The storage capacity of Area 1S is 1.55 MCY (1.1 MCM).

Alternative 2, Areas 1S, 2S, and 2N

This alternative is also on the west side of Newark Bay and is composed of Areas 1S, 2S, and 2N. Area 2N with a surface area of 9.8 acres (0.04 km^2) is located north of Area 2S. Area 2S has a surface area or 20.9 acres (0.08 km^2) located between Areas 1S and 2N. Area 2S and Areas 2N are both west of Newark Bay North Reach Channel and north of Port Newark Channel.

The surficial materials from Area 1S would be transported to the MDS and capped. The remainder of dredged materials from Area 1S is suitable for ocean disposal and may also be suitable as capping material. The upper layer from both Areas 2S and 2N has not passed ocean disposal testing criteria and could be deposited in Area 1S or disposed of at a state approved upland disposal site. Surficial material from Area 2S are estimated to be 485,000 CY (370,830 CM). Surficial materials from Area 2N are estimated to be 200,000 CY (152,920 CM). Combined, the excavation of the three locations (Areas 1S, 2N and 2S) creates an estimated capacity of 2.41 MCY (1.84 MCM) if surficial sediments from Areas 2S and 2N are deposited in Area 1S and 3.09 MCY (2.29 MCM) if surficial sediments are disposed of at a state approved upland disposal site.

Alternative 3, Area 3

This alternative was described in Section 2.03.1. It would place a large-volume (16 MCY) capacity CDF on the east side of the Navigation Channel. Sediments in this area have not been tested for ocean disposal but the available data indicate that sediments in this area may be Category I or II.

If additional subaqueous CDFs are needed, the east side location (Area 3) warrants further consideration. Existing, although limited, data suggest that the east side has less contaminated materials and it may be feasible to build a larger-volume CDF than can be accommodated on the west side. There are two layers of sediments in Newark Bay: a deep layer of preindustrial, undisturbed, consolidated materials and a surficial layer of disturbed or recently deposited material. Typically contaminants are found in the surficial layer. Data collected by the Port Authority in 1995 indicate that the surficial layer of sediments is thinner on the east side than on the west side. The surficial layer on the east side is between 2 and 8 ft (0.6 and 2.4 m) thick. The west shore has unconsolidated sediments and contaminants as deep as 25 ft (7.6 m) (see Figures 1.02-3 and 1.02-4).

Data collected in 1995 and 1996 by the Port Authority indicate that the near surface layers in Area 3 have lower concentrations of metals and dioxin (2,3,7,8-TCDD) than samples collected from the near surface layer of Areas 1 and 2 (Table 2.03-2). These data also show that there are differences in the concentrations of metals in the top 2 ft (0.6 m) compared to sediments lower than 2 ft (0.06 m) deep in Area 3. Deeper sediment have the lowest concentrations of chemicals. In 1995 amphipods were exposed to sediments from the east side of Newark Bay in controlled toxicity tests (Table 2.03-3). Sediments from the southern portion of Area 3 were found to have significant amphipod mortality; however, sediments tested from the northern portion did not cause significant mortality.

The 1995 and 1996 Port Authority data suggest that Area 3 may have a thinner layer of less contaminated sediments than the areas on the west side. Additional sampling is needed to confirm this preliminary finding and to delineate the actual size of the relatively uncontaminated area. Data collected by NOAA show significant toxicity and high concentrations of dioxin in surface grab samples collected from sites in deeper water adjacent to Area 3 (Long et al. 1993).

Assuming a small volume of contaminated sediments, a large CDF in Area 3 could be constructed by disposing of contaminated sediments in the new facility itself. This could be accomplished by excavating a portion of the pit along the northern edge, presumed to contain the cleanest sediments, to create a cell. If the surface sediments from this cell were clean they could be disposed of in the ocean or used beneficially. Contaminated surface sediments from southern cells of Area 3 could be placed in this northern cell. The excavated material below 2 ft (0.6 m) could be transported offshore to the MDS to be used as a cap or for some similar beneficial purpose. If constructed in this manner a CDF with a volume of as much as 12 MCY (9 MCM) could be constructed in Area 3.

A large-capacity, Area 3 CDF provides the opportunity for dredged material management practices that are not readily available from other alternative CDF locations in Newark Bay. These practices include advance maintenance dredging and contaminant reduction. Advance maintenance is the practice of channel overdredging or constructing sediment traps that collect material before it settles in channels or berths. Contaminant reduction refers to improvement of water quality and sediment conditions so that future dredge projects involve "clean material." As described in Chapter 3, surficial sediments are contaminated throughout large portions of Newark Bay and adjacent water bodies. A large-volume CDF would allow disposal of more of the contaminated sediments from channels and berthing areas, sequestering contaminants away from biota.

Alternative 4, Areas 1, 2, And 3

This alternative is a combination of Alternatives 2 and 3. In this alternative, all surficial volumes from Areas 1S, 2S, and 2N will be placed in Area 3 (east side of channel site), and only Category I material excavated from Areas 1S, 2S, 2N and east side or Areas

Table 2.03-2

Sediment Chemistry Data for Newark Bay

CDF Area	Sample Date	Layer Thickness	Average Concentrations									
			As mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Pb mg/kg	Hg mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg	2,3,7,8- TCDD pg/kg
1S	1995	16 ft	20.9	0.05	49.1	64.5	94.8	1.75	15.81	0.00	116	
1S	1996	16 ft	8.6	0.54	80.3	49.3	115.0	0.90	15.70	0.41	252	8.6
2S	1995	19 ft	33.9	0.00	87.7	121.6	127.6	1.65	25.22	0.32	194	
2S	1996	16 ft	10.4	0.09	43.4	50.8	58.8	1.30	16.70	0.34	107	11.4
2N	1995	12 ft	15.6	2.03	175.4	112.8	171.6	2.27	24.77	0.80	220	
2N	1996	14 ft	17.4	0.43	117.0	96.6	112.0	2.80	21.90	1.00	192	99.6
3	1995	2 ft	11.1	0.18	60.0	37.9	36.2	0.63	14.69	0.00	86	2.3
3	1995	>2 ft	6.9	0.00	15.2	7.8	0.0	0.03	10.55	0.00	41	

Source: Port Authority.

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Table 2.03-3

Amphipod Toxicity Test Results for the East Side of Newark Bay

Station and Location in Relation to Port Newark Channel	Species	Control Survival (%)	Reference Survival (%)	Test Survival (%)	Significant
3-037 Surface South	*E. estuarius*	100	100	58	Y
	A. abdita	99	92	36	Y
3-037 South	*E. estuarius*	100	100	72	Y
	A. abdita	99	92	37	Y
3-043 Surface Opposite	*E. estuarius*	100	100	84	N
	A. abdita	99	92	81	N
3-043 Surface Opposite	*E. estuarius*	100	100	91	N
	A. abdita	99	92	98	N
3-048 Surface North	*E. estuarius*	100	100	94	N
	A. abdita	99	92	96	N
3-048 North	*E. estuarius*	100	100	89	N
	A. abdita	99	92	94	N

Y = yes
N = no

Source: Port Authority, 4 October 1995.

Species Tested

Ampelisca abdita
Edotea estuarius

1S, 2S and 2N only would be placed at the MDS. The volume provided by this alternative is approximately 14.6 MCY (11.2 MCM).

Alternative 5

The no action alternative is not acceptable in view of the need to provide short-term disposal opportunities for contaminated dredged materials and the goals set forth in the CCMP for contaminated sediment reduction and long-term water quality improvements.

2.03.4 COMPARISON OF ALTERNATIVES

It is possible to compare the alternatives with respect to the objectives of the proposed project. All four of the alternatives would help to maintain and strengthen the economy of the Port region by providing a cost-effective disposal alternative for sediments that are unsuitable for ocean disposal.

Alternative 1, construction of a CDF in Area 1, can be permitted, constructed, and ready to receive dredged material by October 1997. Construction and operation can be accomplished without substantial adverse impact (see Chapter 4) and would have a small net beneficial effect by sequestering 1.55 MCY (1.1 MCM) of contaminated sediments from within the Harbor. Alternative 1 requires that Category II material be placed at the MDS and capped.

Alternative 2 makes more capacity available than Alternative 1 by placing the contaminated sediments from the surface of Areas 2N and 2S in Area 1S or at a state approved disposal site and operating all three areas as CDFs. It may not be possible to construct all three CDF areas by October 1997.

Alternatives 3 and 4 would have the advantage of being able to accommodate large volumes of material. This would contribute more significantly to the goal of improving the environmental quality of Newark Bay by sequestering larger volumes of contaminated sediments. It would provide a cost- effective disposal option for large volumes of sediments, which may encourage the remediation of contaminated sediments. However, although these provide the greatest capacity they could not be completed until at least 1998. The size and magnitude of these alternatives warrant further additional study. The capital investment to construct these larger facilities would be substantial and would likely require new legislation, appropriation, and/or bonding to provide the needed funding.

In light of comments received in response to the NBCDF DEIS, and in accordance with Title 40 of the Code of Federal Regulation (CFR) Part 1502.14(e), Alternative 2 has been selected as the preferred alternative. This alternative was selected because it meets all the criteria developed in Section 2.01 and provides maximum capacity within the time frame set by the criteria. (NOTE: Also see reply comment F1-1.)

2.04 ALTERNATIVE METHODS OF CONSTRUCTION

The conceptual construction sequence presented in Section 1.02 identified applicable methods of construction. Section 5.05 identifies proposed equipment and techniques. This section contains discussions of alternative dredge methods, transport and placement as well as other issues.

2.04.1 ALTERNATIVE DREDGING METHODS

Dredging is accomplished using either hydraulic or mechanical means, or a combination of the two methods. The following sections provide descriptions of these dredging methods, and their advantages and disadvantages.

2.04.1.1 Hydraulic Dredging. Hydraulic dredging involves removing sediment from the bottom and transporting it to the water surface as a water-sediment mixture. A suction hydraulic dredge is analogous to a vacuum cleaner, except that water rather than air is the fluid medium. A dredge pump can be located on the dredge at the water line or submerged on the dredge ladder. In cases where bottom sediment does not "flow to the suction pipe" and cannot be picked up by the suction process alone, a cutterhead hydraulic dredge is used. The cutterhead is typically a bowl shaped series of blades, which rotate in front of the suction pipe. The cutterhead mechanically cuts the sediment so that it can be picked up by the suction pipe. Cutterhead suction hydraulic dredges can work in hard soils and even weathered rock, but with significantly reduced production rates. In weathered rock or sand sediment with blow counts greater than 50 or stiff clay with blow counts in the vicinity of 30, an hydraulic bucket wheel dredge may be a preferred option.

Once the material has been excavated and transported to the surface, it can be transported to the disposal site either through a pipeline or by hopper barge. The hydraulic dredging process adds water to the in-situ sediment at an approximate ratio of 9-10 parts water to 1 part in-situ sediment volume. Thus when a hopper barge is used to transport the sediment mixture to the disposal site, a large percentage of the hopper capacity is taken up by water rather than sediment. The preferred method of slurry transport from the dredge to the disposal site is through a pipeline. The dredged material-water mixture is pumped, in a continuous process, from the bottom directly to the disposal site. Depending upon the size and power of the dredge, the sediment characteristics, and the distance from the dredge to the disposal site, booster pumps may be required in the discharge line.

A hopper dredge is a self propelled hydraulic dredge that holds the dredged material mixture in its hold (hopper) and physically transports the material to the disposal area. At the disposal site, the dredged material is dropped through the bottom of the vessel through hinged doors, through a split hull, or pumped out of the hopper through a pipeline. As all production ceases while the dredge moves to the disposal site, discharges its load, and travels back to the dredging location; and as the dredge is required to turn

at the end of each dredge cut, it is not efficient on projects with short dredging cuts and long distances to the disposal areas. In addition, a hopper dredge is less efficient in consolidated materials or fine grained unconsolidated materials.

2.04.1.2 Mechanical Dredging. Mechanical dredging involves removing sediment from the bottom using equipment that is similar to machinery used on land, particularly for mining operations. Mechanical dredges use some form of bucket to remove material from the bottom and lift it to the surface. The bucket used to remove the sediment is connected to the dredge by one of several methods; clamshell grabber dredge buckets are connected by a wire rope, dipper or marine excavator dredge buckets are connected structurally, and ladder dredges employ a combination of chain and structural connections to attach their buckets.

For small jobs located in shallow water, hydraulically operated shovels and backhoes mounted on a barge, or a clamshell bucket dredge, are capable of performing the work. For larger jobs in unconsolidated sediment, particularly in deeper water, higher-capacity, cable operated buckets are used. In consolidated sediment, structurally connected mechanical dredges, such as dipper dredges or hydraulic marine excavator dredges, are used. These structurally connected dredges are capable of developing the cutting force required to remove consolidated sediment.

A drawback to using a traditional clamshell bucket is that some portion of the original load may be washed away before the bucket finally breaks the water surface. If the bucket is not properly closed, the dredge material is very fine and unconsolidated, and the dredging depth is great, it is possible that part of the load may be washed from the bucket prior to breaking the surface. For that reason, specialized buckets have been developed in recent years to minimize spills and losses during lifting. Such equipment, when properly fabricated and maintained, reduces but does not entirely eliminate, material losses and the accompanying dispersion of sediments. The sealed clamshell bucket or environmental bucket is proposed for use in the construction of the NBCDF. As with any mechanical dredge, closed bucket dredges are subject to loss of material if debris blocks the bucket from closing.

2.04.2 DREDGED MATERIAL TRANSPORT/PLACEMENT OPTIONS

2.04.2.1 Dredged Material Transport to the Disposal Site. The dredged material would be excavated using hydraulic or mechanical equipment, or a combination of the two types of equipment. The sediment would be placed in a barge and then transported to the disposal site by a tug. The most common type of barge used in the New York/New Jersey Harbor is a split-hull scow. The split-hull scow barge is an efficient delivery method, as when the scow opens, the dredged material drops quickly into the disposal site as a fairly cohesive mass.

2.04.2.2 Dredged Material Placement at the CDF. Split-hull scows would be used for disposal/placement of dredged materials. Barges with fixed bottoms are used also by the

dredging industry, particularly when the dredged material is off-loaded at a dock for transport to upland locations. If this type of barge were used for placement of dredged material, barge-mounted mechanical dredges would be required to transfer the dredged material from the barge to the CDF. Double handling of dredged material results in an increase in disposal costs. However, either type of barge could be used for placement of dredged material into the CDF.

If disposed sediment accumulations prevent scow access to the disposal site, alternate methods, such as hydraulic pumpout, can be used to transfer dredged material from scows to the CDF, as discussed in Section 5.05.

There is a potential for debris, including rebar, concrete rubble, and logs, to be found in material dredged from the NY/NJ Harbor. Debris would be a particular problem for disposal operations that require hydraulic pumping into the facility, such as when closure is imminent. Various methods may be employed to deal with this possibility. One option is for the disposal site owner/operator to require users to screen material prior to transport to the disposal site. Alternatively, the owner/operator may elect to have a screening operation as part of the disposal process. This would require a clamshell dredge to remove the dredged material from the barge and drop it over a screening device mounted on another barge prior to pumping. In either case, the cost of disposal would increase.

For disposal sites requiring caps (i.e., subaqueous CDF), the capping material could be placed using barge pumpout equipment similar to that used to place upper layers of dredged material. Hydraulic dredges could also be used to spread the layer if a suitable borrow site(s) is available within economical pumping distance from the CDF.

2.05 CRITERIA FOR USE OF NBCDF

The owner/operator of the NBCDF will be required to identify a program that selects from among potential dredging projects, those that are acceptable for placement in the NBCDF. The Applicant's selection criteria may include the following:

- The dredging project has demonstrated that it will meet the requirements for all state, Federal, and local permits.
- Upland disposal is not an economically viable option.
- The dredged material is not suitable for ocean disposal.
- The dredged materials meet the operator's best management plan.
- The dredging site is within the draw area for the NBCDF.
- The dredging project provides regional economic and/or ecological benefit.
- A market-driven price can be reasonably negotiated for the owner/operator to recover at a minimum development and operation costs.

2.06 NO ACTION

Under the No Action alternative CDFs would not be constructed. The port would not have enough capacity in the short-term for disposal of contaminated dredged materials and would not be able to maintain sufficient channel depths for commercial ship traffic. Siltation in berths and channels will continue. If the harbor cannot be dredged, the economy and environment of the metropolitan region will be negatively impacted.

At present, depths in channels and berthing areas are not sufficient to allow the safe and efficient passage of fully loaded container and liquid bulk vessels calling on the Port. Tankers must lighter in anchorages and/or enter channels only during high tides. Anchorages become congested with queues of vessels (USACE 1994). Container ships calling on some marine terminals must be loaded to less than design capacity and new, deep draft vessels cannot be accommodated (USACE-NYD 1986 and 1996). These practices are inefficient, costly, and present unnecessary environmental risks.

The Port of NY/NJ is a vital element in the economy of the region. If a dredged materials disposal facility is not available within the year, commerce will continue to leave the area for ports capable of providing better service. If sedimentation reduces the channels to 30 ft (9 m), 90% of the containerized cargo volume would be diverted (Port Authority 1996). The economic consequences of preventing maritime operators from maintaining their berths at authorized depths include decreases in total sales, wages, and employment. The Port Authority (1996) estimates that the region would lose about $5 billion in total sales if the Harbor silts up to 35 ft (10.7 m) in the year 2000. Regional consumers would face higher prices and many firms would experience increased costs of doing business. Transportation costs will increase as goods are moved into and through the region.

The need to transport diverted marine cargo into the region will be met by increased use of roadway vehicles and vehicle miles of travel (VMT) (Port Authority 1996). As traffic increases, congestion will increase, travel times for individuals commuting to their job sites will increase, and roadway maintenance costs for state and local governments will increase. As VMT increases, emissions will increase and pollution from mobile sources will increase. The metropolitan region is currently classified as a nonattainment area. Increased emissions will not allow the states to achieve the goals required by their Implementation Plans to attain the National Ambient Air Quality Standards (NAAQs).

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2.07 MITIGATION

Mitigation is an action that is performed to offset adverse impacts associated with performing a particular activity. Detailed descriptions of potential impacts and mitigation measures are provided in Chapter 4. This section discusses the differences in mitigation measures that are attributed to differences in the alternatives.

As described in Chapter 4, most potential long term impacts would be avoided through careful engineering design. All of the alternative CDFs would sequester contaminants safely and will restore the aquatic habitat to its existing condition with the exception that clean sediments will be used in place of the of the existing contaminated surface layer. The design elements of all of the alternative CDFs are also the same. For example, to protect groundwater from contamination, the proposed design includes a 10-ft (3.0 m) layer of clay along the bottom. This layer will prevent contaminants and solids from entering ground water aquifers.

The effects of CDFs on navigation are small and different depending upon the location of the facility. Alternatives involving the west shore may temporarily affect navigation in and out of the Port Newark and Elizabeth channels, which in turn will impact either the efficiency of commercial navigation or dredging operations. This impact can be minimized by careful scheduling of the traffic into and out of the CDF areas during construction and operation. Scheduling can mitigate against the impacts from the obstructions. Navigation is discussed in greater detail in Section 3.18.

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3.0. AFFECTED ENVIRONMENT

A substantial literature base is available describing the physical, chemical, and biological components of Newark Bay. The information, summarized in the following sections.

3.01 GENERAL ENVIRONMENT

Newark Bay is part of the NY/NJ Harbor Estuary, or alternatively the Hudson-Raritan Estuary. The Bay is on the western side of the Harbor complex and is connected to Upper New York Bay by the Kill Van Kull and to Raritan Bay by the Arthur Kill. The Kill Van Kull is located along the north side of Staten Island and the Arthur Kill extends along the western side of Staten Island, with both waterways forming the boundary between the States of New York and New Jersey (Figure 3.01-1). Newark Bay, located completely within the State of New Jersey, has a northeast-southwest orientation, and is formed by the Kill Van Kull to the south, the confluence of the Passaic and Hackensack rivers to the north, the City of Bayonne to the east, and the cities of Elizabeth and Newark on the west. The Union-Essex Counties and Hudson County line extends down the middle of the Bay; the Union County and Essex County line roughly corresponds to the Elizabeth Channel, which separates Port Elizabeth from Port Newark.

Newark Bay and its shoreline have been modified extensively by dredging, filling, and commercial operations since the mid-1800s (Crawford et al. 1994). The Bayonne, or eastern side of Newark Bay is characterized by varied industrial complexes near the Hackensack River and the Kill Van Kull. Residential areas, school campus, parks, and light industry are present over most of the remainder of the shoreline. The Bay's western shore is dominated by the extensive containership facilities of the Elizabeth Marine Terminal and Port Newark. Two Federal navigation channels - Port Newark Channel and Elizabeth Channel - permit ship access to the inner facilities of Ports Elizabeth and Newark. Small isolated wetland areas are present on the western shore of the Bay north and south of Ports Newark and Elizabeth.

Newark Bay is rectangular, approximately 5.5 miles (8.9 km) long and varying in width from 0.6 to 1.2 miles (1.0 to 2.0 km), with the widest section of the Bay opposite Port Newark, and the narrowest section opposite Port Elizabeth. Two bridges span Newark Bay: the New Jersey Turnpike-Newark Bay Bridge, and a Conrail railroad bridge cross the Bay on the northern side of Port Newark.

The surface area of Newark Bay is approximately 5.5 square miles (14.2 km^2). With the exception of the maintained shipping channels, turning basins, and docking facilities, Newark Bay is very shallow, with extensive shallow areas throughout the eastern half. Newark Bay is divided longitudinally into four reaches (NOAA 1983): (1) South Reach, the southern section of the Bay corresponding to the area between the Arthur Kill/Kill Van Kull to the south to South Elizabeth Channel to the north (South Elizabeth Channel

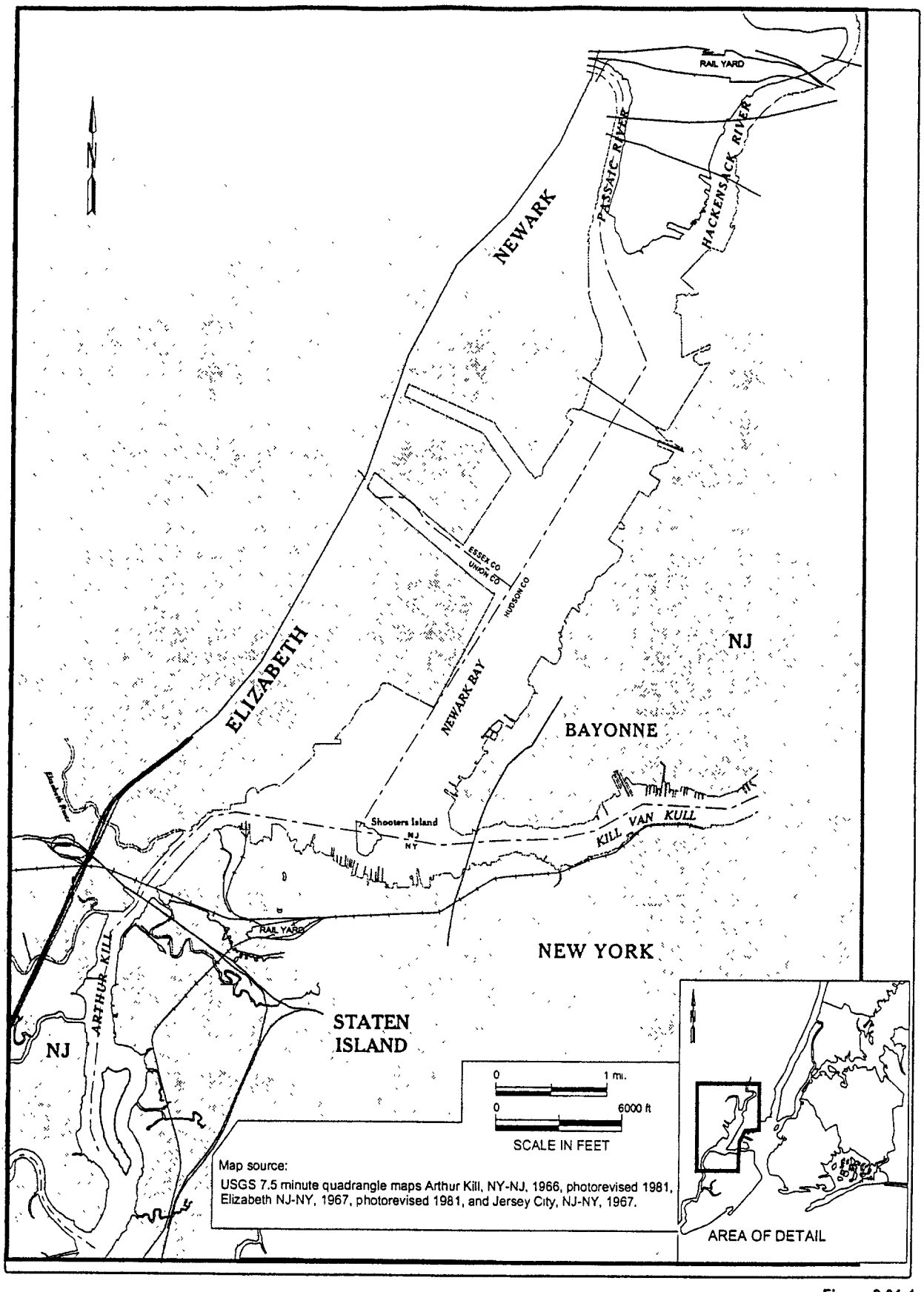

Figure 3.01-1
Newark Bay Area Project Location

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is the south access channel to Port Elizabeth); (2) Middle Reach, the Bay area in front of Ports Elizabeth and Newark (location of the proposed NBCDF) extending from South Elizabeth Channel north to Port Newark Channel; (3) North Reach, extending from Port Newark Channel to a point approximately 3000 ft (915 m) north of the Conrail railroad bridge; and (4) the northern area, consisting of the Kearny Point Reach, which corresponds to the area around the mouth of the Passaic River, and the Droyers Point Reach, which corresponds to the area around the mouth of the Hackensack River (Figure 3.01-2).

The South Reach is characterized by an extensive shallow area to the west of the navigation channel and north of the Arthur Kill and, because the navigation channel is close to the Bayonne shore, relatively limited shallows and a few piers along the eastern shore. Water depth in the east and west shallows areas range from 1 to 8 ft (0.3 to 2.4 m) at mean low water (MLW). In the Middle Reach, the Port Elizabeth pierhead extends to the navigation channel, with water depth maintained at approximately 35 ft (10.7 m) by dredging. A narrow ship channel is maintained at the Port Newark pierhead. The large shallow area between the Port Newark pierhead channel and the navigation channel (where water depth ranges from 1 to 5 ft [0.3 to 1.5 m] MLW) corresponds to Area 1 for consideration in developing CDF site 1S. The eastern side of Newark Bay included in the Middle and North Reaches is an extensive shallows area with water depths ranging from 1 to 11 ft (0.3 to 3.4 m) MLW. The Federal Navigation Channel, located along the western side of the Bay in the North Reach, results in limited shallows along the Newark shore in this area. Area 2, the second area under consideration for NBCDF development, is located due east of Port Newark, which is located north of the Port Newark Channel. In the extreme northern end of Newark Bay, the navigation channel is approximately 300 ft (91 m) wide, with depths of 6.5 ft (2.0 m) recorded in the Passaic River and 18 ft (5.5 m) in the Hackensack River. The area around the Kearny Point and Droyers Point Channels is very shallow, ranging in depth from 1 to 4 ft (0.3 to 1.3 m) MLW.

The total bottom area of Newark Bay is approximately 4082.5 acres (16.5 km^2), calculated from National Oceanic Atmospheric Administration (NOAA) navigation charts 12333 and 12337 using surface planimetry techniques. Bottom area estimates obtained using planimetry techniques, a two-dimensional method, does not take into account bottom area associated with steep slopes, which would result in an underestimation of actual exposed bottom area, especially for the channel area.

The mean tidal range in the Bay is 2.8 ft (0.9 m), with the mean tidal range at the northern end of the Bay (Kearny Point) 2.85 ft (0.87 m), and 2.77 ft (0.84 m) at the southern end of the Bay off Port Elizabeth. Maximum flood and ebb tidal currents are 1.2 ft/sec (0.4 m/sec). The Hackensack River, which enters Newark Bay at its northeast corner, has a drainage basin area of approximately 113 square miles (293 km^2) and an annual mean discharge of 95.8 cfs (2.7 m^3/sec) (Bauersfeld et al. 1994). The range in annual mean discharge is from 0.4 cfs (0.01 m^3/sec) recorded in 1981 to 263 cfs (7.5 m^3/sec) recorded in 1928. The Passaic River, which enters Newark Bay directly to the

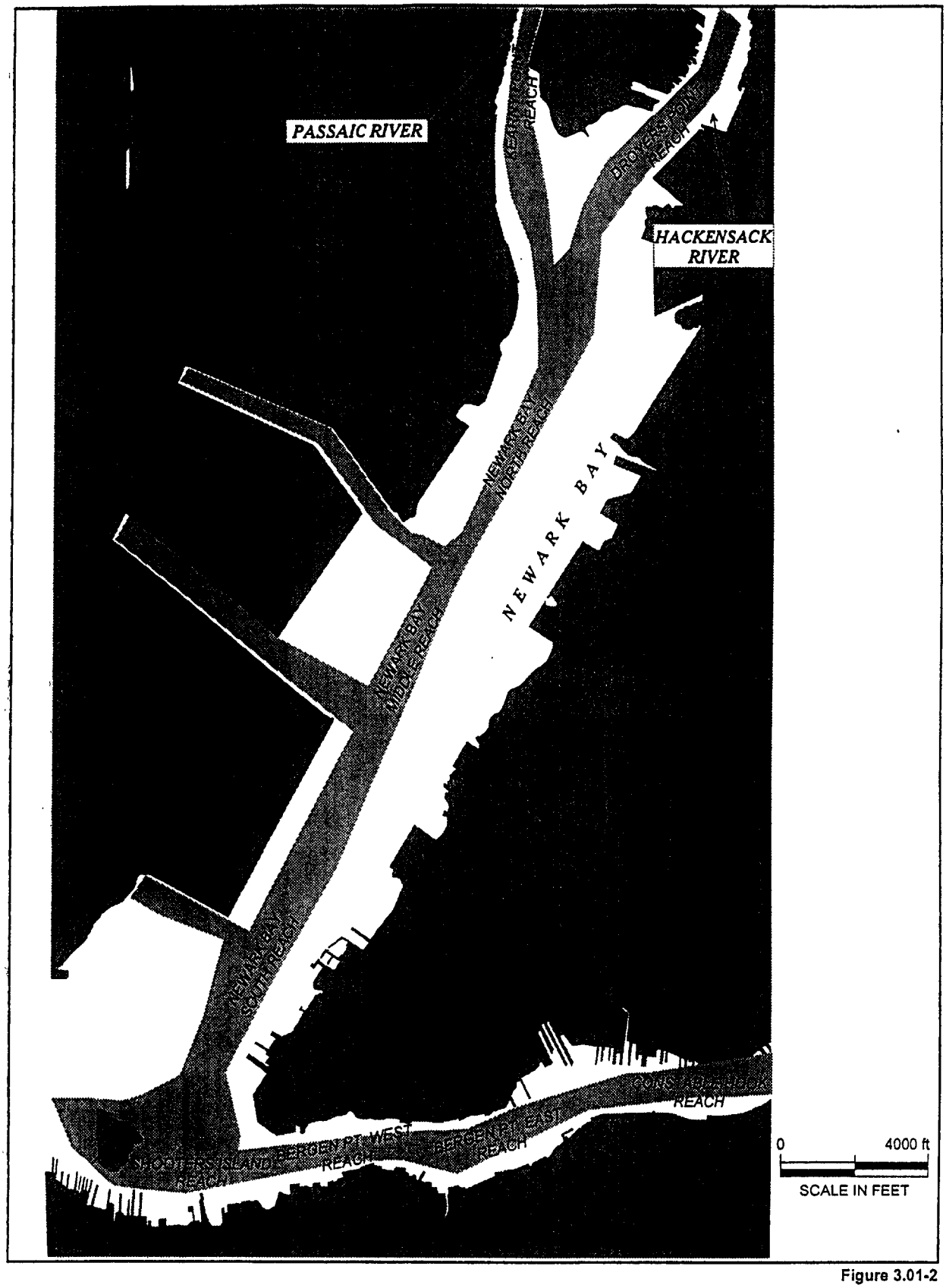

Figure 3.01-2

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Reaches in Newark Bay

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west of the Hackensack River on the northwest corner, has a drainage basin area of approximately 100 square miles (260 km^2) and an annual mean discharge of 173 cfs (4.9 m^3/sec) (USGS 1994). The highest recorded Passaic River annual mean flow was 305 cfs (8.6 m^3/sec) recorded in 1984, and the lowest recorded annual mean flow was 68 cfs (1.9 m^3/sec) recorded in 1965.

Geologically, the Newark Bay Drainage Basin is contiguous with the Atlantic Coastal Plain, with three general underlying stratigraphic units (USACE 1987a,b; NOAA 1994):

- ***Recent estuarine sediments***: Recent sediments are typically black organic muds, black sandy muds, or black muddy sands representing geologically recent estuarine sedimentation.

- ***Pleistocene glacial sediments or Cretaceous nearshore sediments***: Pleistocene (ice age) sediments are typically gray sands, gray gravelly sands, or gray sandy gravels that represent glacio-fluvial conditions. Pleistocene lacustrine sediments are typically red or red-brown clays. The underlying Cretaceous sediments, if present, are typically gray or green marine sands, red clays, gray clays, red gravelly sands, or brown muddy sands that represent nearshore marine sedimentation of several million years ago.

- ***Bedrock***: These are red shales, red sandstones, and diabase of Triassic-Jurassic age and serpentine of Pre-Cambrian age.

The present Bay sediments are predominantly fine grained. The sediment facies patterns reflect river input of sediment at the north end and exchange with the Upper Bay of New York Harbor and the Lower Bay at its southern end. Sand is the dominant sediment component at the northern end of the Bay in the vicinity of the Passaic and Hackensack rivers, and the central part of the bay is underlain with sandy-clayey-silts that grade southward to clayey-silty-sand and sandy-clayey-silts at the junction of the Arthur Kill to the south and the Kill Van Kull to the east. The coarser sediments found at the southern end of Newark Bay reflect scouring due to tidal currents at the junction of the three water bodies.

3.02 PHYSICAL OCEANOGRAPHY

The project site is located within Newark Bay at latitude 40°41'N, and longitude 74°8' W, as shown in Figure 3.02-1. The site is adjacent to the Port Newark and Port Elizabeth Marine Terminals and is approximately 3 miles (4.8 km) south of Newark, New Jersey, and 6 miles (9.7 km) west of Manhattan. Site conditions pertinent to project design include bathymetry and topography, wind conditions, water levels, wave conditions, and currents. A discussion of each of these factors is presented in the following paragraphs.

3.02.1 BATHYMETRY AND TOPOGRAPHY

Newark Bay is relatively wide compared to the Arthur Kill, the Kill Van Kull, the Passaic River, and the Hackensack River. Several Federally maintained channels exist within Newark Bay: (1) Newark Bay South Reach, (2) South Elizabeth Channel, (3) Newark Bay Middle Reach, (4) Newark Bay North Reach, (5) Port Elizabeth Channel, (6) Port Elizabeth Pierhead Reach, (7) Port Elizabeth Inshore Reach, (8) Port Elizabeth Branch Reach, (9) Port Newark Pierhead Reach, (10) Port Newark Inshore Reach, and (11) Port Newark Branch Reach. The Federal channels within Newark Bay provide access to very active port facilities at the Port Newark and Port Elizabeth Marine Terminals. The marine terminals at Port Newark and Port Elizabeth are located on the western side of the waterway, where the channels and Harbor basins are relatively deep. The channels and berthing areas are maintained at designated depths by dredging. The eastern side of the Bay consists of shallow areas with water depths ranging from 0.5 to 10 ft (0.2-3.0 m). The Federally maintained channels have authorized widths ranging from 400 to 600 ft (122 to 183 m) and water depths ranging from -35 to -40 ft (-10.7 to -12.2 m) MLW.

The shallow area where NBCDF Area 1S is proposed to be constructed lies north of the Port Elizabeth Channel, south of the Port Newark Channel, east of the Port Newark Pierhead channel,and west of the Newark Bay Middle Reach and Newark Bay North Reach; it is characterized by low water depths, ranging from 0.5 to 5 ft (0.2 to 1.5 m). The shallow area where NBCDF Areas 2S and 2N are proposed to be constructed is north of the Port Newark Channel and west of the Newark Bay North Reach. Low water depths range from 1 to 5 ft (0.3 to 1.5 m) MLW.

3.02.2 WATER LEVELS

3.02.2.1 Astronomical Tides. Normal water level variations in Newark Bay are generally dominated by astronomical tides, although wind effects can be influential. Astronomical tides in the vicinity of Newark Bay are semidiurnal, with a mean tide range of 5.1 ft (1.6 m) and a spring tide range of 6.1 ft (NOAA 1996). The mean tide level is 2.5 ft (0.8 m) water MLW. Tidal datum characteristics are presented in Table 3.02-1.

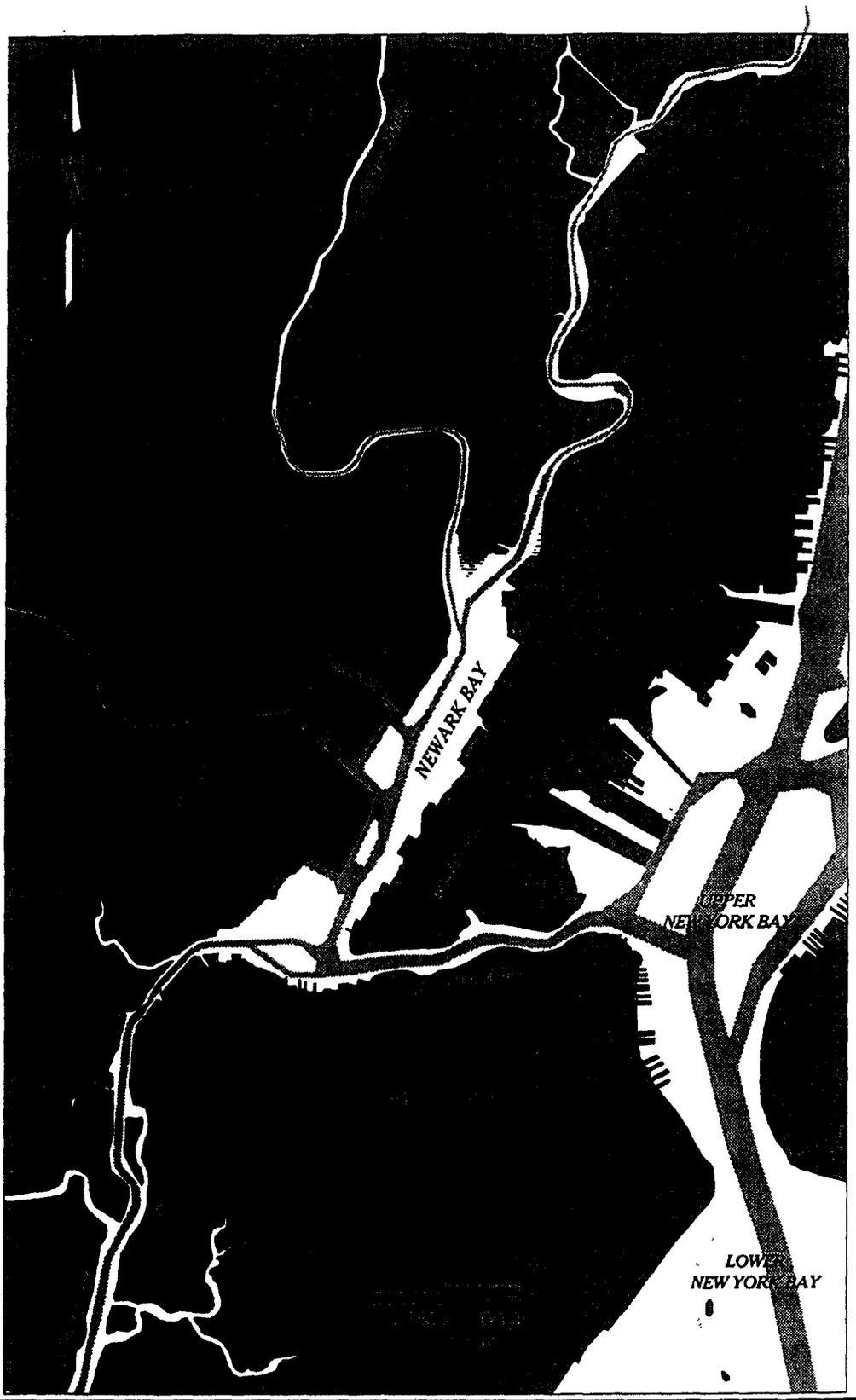

Figure 3.02-1
Newark Bay Area

TABLE 3.02-1

Astronomical Tidal Datum Characteristics of Newark Bay

Tidal Datum	Feet	Meters
Mean Spring High Water (MSHW)	5.9	1.80
Mean Higher High Water (MHHW)	5.5	1.68
Mean High Water (MHW)	4.9	1.49
Mean Tide Level (MTL)	2.5	0.76
Mean Low Water (MLW)	0.0	0.00
Mean Lower Low Water (MLLW)	-0.2	-0.06

3.02.2.2 Storm Surge. Extremes in project site water levels that influence CDF design are dominated by storm effects (i.e., storm surge and wave setup) in combination with astronomical tide. Storm surge is a temporary rise in water level generated either by large-scale extratropical storms, known as northeasters, or by hurricanes. The rise in water level results from wind shear forces, the low pressure of the storm disturbance which allows sea level to increase locally, and the Coriolis force. Wave setup describes the rise in water level due to wave breaking. Specifically, a change in momentum that attends the breaking of waves propagating toward shore results in a surf zone force that raises water levels at the shoreline. The maximum total water level (maximum stage) is typically used to define the return period of an extreme storm event. Storm tides for Newark Bay were taken from The New York City Flood Insurance Study (1981). Storm tide elevations range from 5.9 ft (1.8 m) National Geodetic Vertical Datum (NGVD) for a two-year storm to 8.7 ft (2.7 m) NGVD for a 100-year storm. Water level elevations vs frequency of occurrence are shown in Figure 3.02-2.

3.02.3 WIND CONDITIONS

Wind data were obtained for La Guardia International Airport, approximately 15 miles (24 km) from the project site, for the period 1947 through 1979 (Table 3.02-2). Wind data are fastest mile values that correspond to the highest recorded wind speed with a duration sufficient to travel 1 mile (1.6 km) during a 24-hr recording period. Yearly extremes, obtained from NOAA (1982) (Table 3.02-2a), show that the maximum wind speed recorded at LaGuardia was 73 miles per hour (mph) (117.5 km/hr) and had a northeast direction. Design wind speed per return period for the project site, based on the LaGuardia data, are shown in Table 3.02-2b. The 25-year return wind speed for the "All Directions" was 73 mph (117.5 km/hr) (Table 3.02-2b).

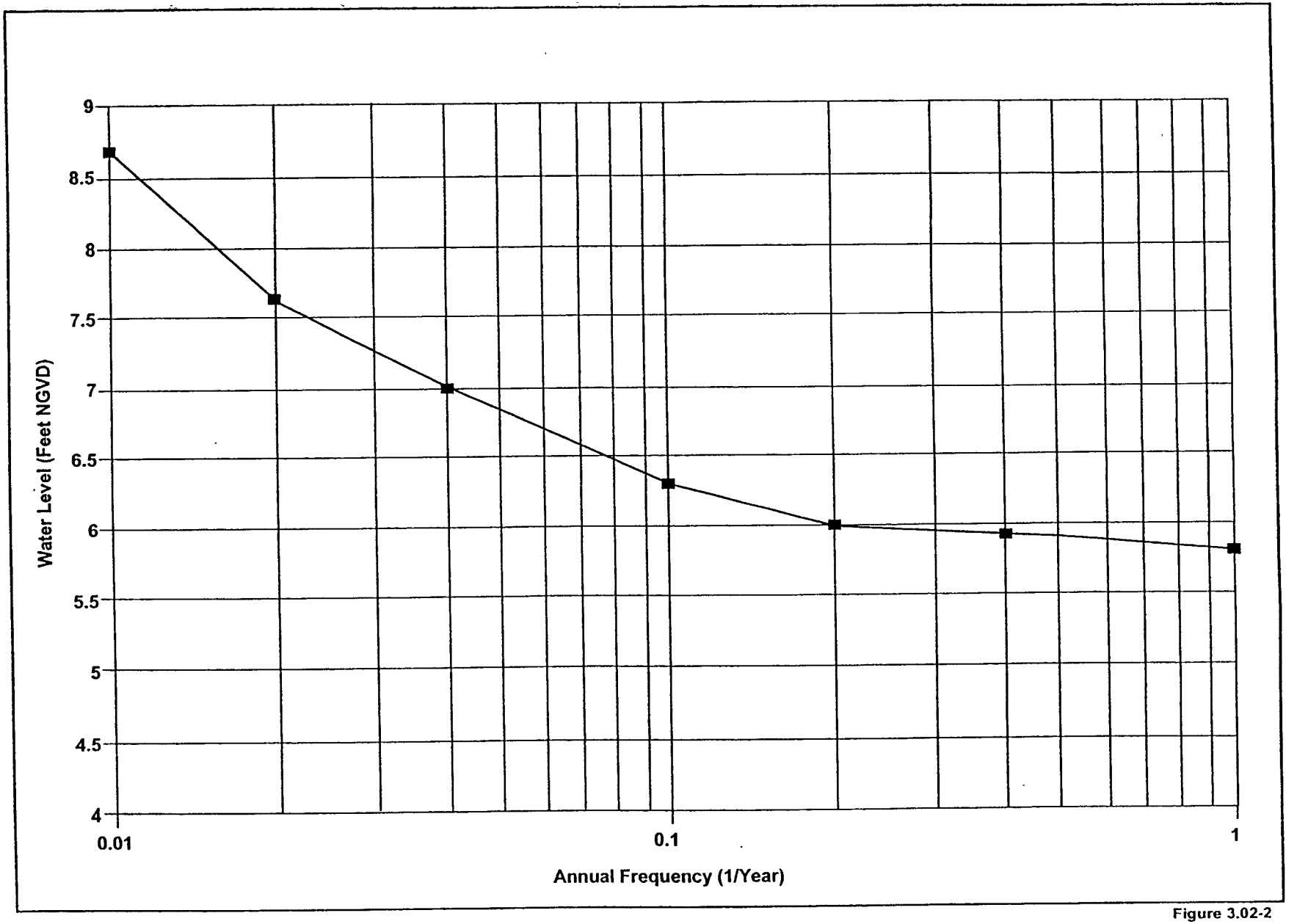

Figure 3.02-2

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Newark Bay Confined Disposal Facility

Water Level Elevation vs Frequency in Newark Bay

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Table 3.02-2

Wind Conditions: New York-New Jersey Harbor Area

a. Yearly Extreme Wind Speed Recorded at La Guardia Airport

Year	All Directions Speed (mph)	All Directions Direction	North	Northeast	East	Maximum from NE quadrant
1947	55	SW	41	49	46	49
1948	58	NE	33	58	30	58
1949	49	NW	43	41	23	43
1950	60	SE	39	33	35	39
1951	52	NW	43	38	38	43
1952	52	E	37	37	52	52
1953	60	N	60	33	46	60
1954	58	SE	44	44	23	44
1955	49	W	49	37	49	49
1956	56	N	56	47	47	56
1957	49	NW	39	37	22	39
1958	60	NE	38	60	32	60
1959	55	NW	38	42	24	42
1960	61	NE	33	61	29	61
1961	52	NE	44	52	27	52
1962	59	NW	33	61	38	61
1963	65	W	37	52	33	52
1964	65	NW	31	63	20	63
1965	40	S	37	34	18	37
1966	56	W	26	43	26	43
1967	53	NW	40	44	31	44
1968	73	NE	40	73	37	73
1969	57	N	57	48	25	57
1970	51	E	31	39	51	51
1971	61	NE	32	61	40	61
1972	62	NE	37	62	24	62
1973	44	NE	32	44	26	44
1974	60	NE	30	60	25	60
1975	49	W	37	34	36	37
1976	57	NE	19	57	23	57
1977	59	NE	27	59	31	56
1978	47	W	28	42	29	42
1979	57	S	34	37	46	46

b. Wind Speed Return Periods

Return Period (Year)	Wind Speed (mph) All Directions	North	Northeast	East
2	55	42	51	36
5	62	45	55	40
10	67	50	61	46
25	73	56	68	53
50	78	60	74	59
100	82	64	80	64

Wind speed and direction data for Newark Airport, adjacent to the Port Newark and Port Elizabeth terminals and less than 2 miles (3.2 km) from the project site, were obtained from NOAA and are presented in Figure 3.02-3. For the project site, predominating winds are from the southwest. These southerwesterly winds are prevalent during the summer and fall and occur about 11.8% of the time. Northwesterly winds are prevalent during the winter and spring and occur about 10.9% of the time. Annual average wind speed is 10.2 mph (16.4 km/hr); calm winds occur about 2.9% of the time.

3.02.4 WAVE CONDITIONS

The NBCDF site is exposed to wind-generated waves from the northeast and southeast quadrants. The longest fetch to which the site is exposed is to the northeast and the largest waves approach from that direction. In accordance with procedures recommended by the USACE (USACE 1984), a radially averaged fetch distance of 2.5 miles (4.0 km) was computed for the northeast direction. Wave conditions were hindcast along this fetch direction for the design winds presented in Table 3.02-2a,b (adjusted appropriately for duration) and the water levels presented in Figure 3.02-2. Wave hindcast results are presented in Figure 3.02-4a for offshore significant wave height (H_s) and Figure 3.02-4b for peak wave period (T_p).

A sea state is normally composed of a spectrum of waves with varying heights and periods that may range from relatively long waves to short ripples. In order to summarize the spectral characteristics of a sea state it is customary to represent that wave spectrum in terms of a distribution of wave energy over a range of wave periods. Having made this distribution, known as a wave spectrum, it is convenient to represent that wave spectrum by a single representative wave height and period. The wave conditions reported in Figures 3.02-4a and 3.02-4b are H_s and T_p, respectively. H_s is defined as the average of the highest one-third of the waves in the spectrum. Depending on the duration of the storm condition represented by the wave spectrum, maximum wave heights may be as high as 1.8 to 2 times the significant wave height. T_p, is the wave period that corresponds to the maximum wave energy level in the wave spectrum. The highest waves are estimated for the northeast fetch direction. The 25-year return period waves for this direction have an H_s value of 4.0 ft (11.2 m) and a T_p value of 3.2 sec.

The wave heights described above represent deepwater conditions some distance offshore of the proposed NBCDF, which is, however, located in relatively shallow water. The specific water depths at the project are located in MLW water depths of about 1 to 5 ft (0.3 to 1.5 m). Figure 3.02-4c shows plots for nearshore significant and maximum wave heights. Figure 3.02-4c indicates that nearshore significant wave heights from the northeast range from about 3.4 ft (1.0 m) for a two-year storm to about 4.5 ft for a 100-year storm. Figure 3.02-4c also indicates that maximum depth limited or breaking waves from the northeast range from 4.9 ft (1.5 m) for a two-year storm to 6.6 ft (2.0 m) for a 100-year storm.

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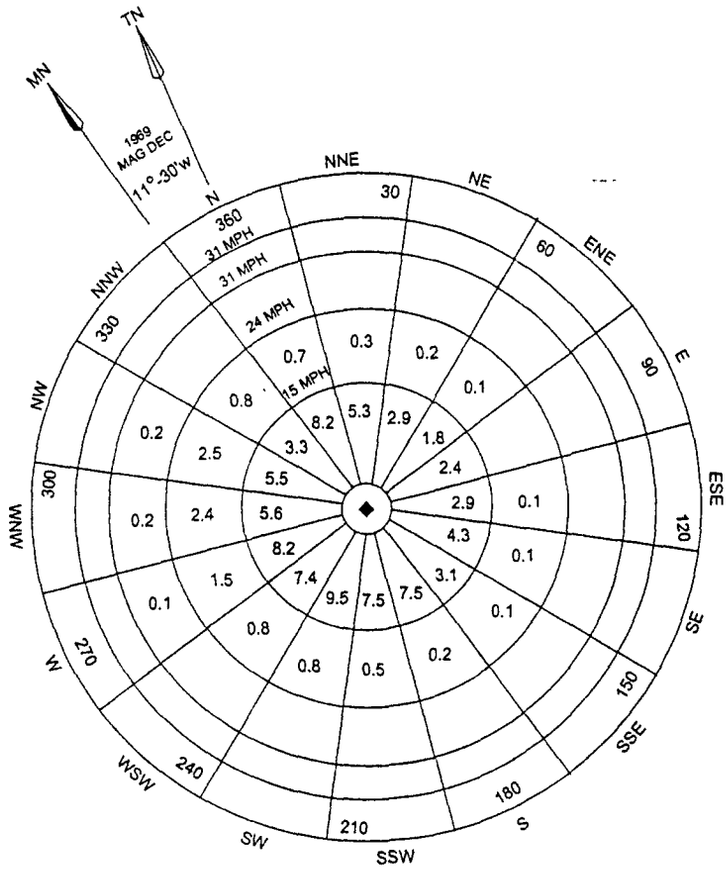

◆ = Calms 0-1 MPH 2.9%

Period: 1972-1976, All Weather
15 MPH (13 Knots) Crosswind Coverage All R/W's 98.8%
% of VFR Weather 90.0
% of IFR Weather 10.0

Source: U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Figure 3.02-3
Wind Rose Diagram for Newark Airport

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

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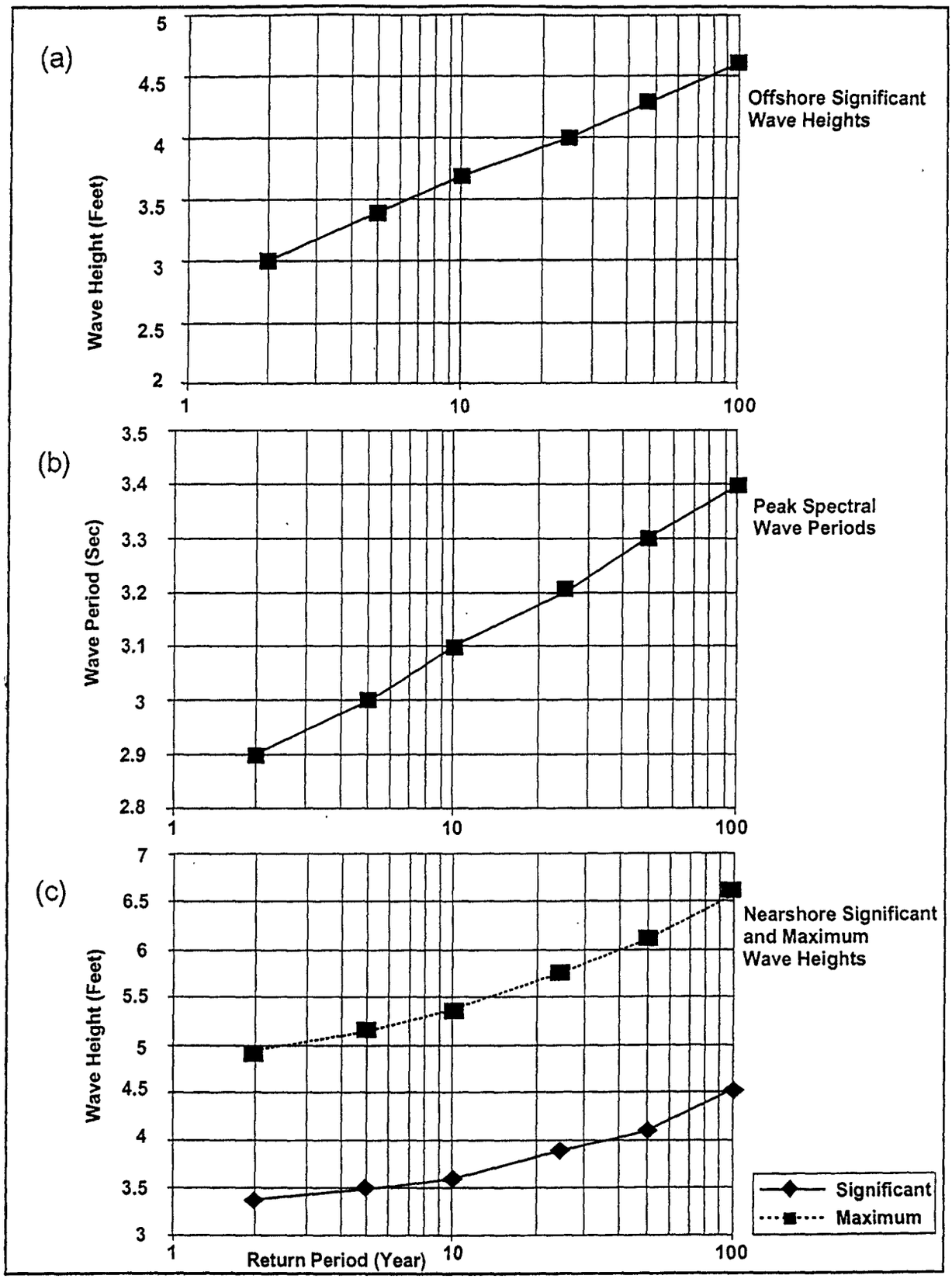

Figure 3.02-4

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Newark Bay Wave Data Hindcast From Northeasterly Winds

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USACE-0009252

The site is also exposed to vessel-generated waves associated with tug, barge, and deep-draft traffic. Computations prepared for a range of vessel sizes, speeds, and distances to sailing line indicate that the site may be exposed to waves having heights on the order of 3 to 4 ft (0.9 to 1.2 m).

3.02.5 CURRENTS

3.02.5.1 Tidal Currents. Tidal current charts for New York Harbor are published by the U.S. Department of Commerce Coast and Geodetic Survey. According to these charts, maximum ebb tidal current velocity is 1.6 knots (2.7 fps [0.8 m/sec]), directed toward the southwest near Port Elizabeth, 4 hrs after high water is recorded at the Battery at the southern tip of Manhattan; maximum flood tidal current velocity is 1.8 knots (3.0 fps [0.9 m/sec]), directed toward the northeast near the mouth of the Hackensack River, 4 hrs after low water is recorded at the Battery. Peak tidal currents within Newark Bay vary according to reach and are summarized in Figures 3.02-5 through 3.02-8. The Newark Bay tidal current values presented in the figures were estimated from the USACE Waterways Experiment Station (WES) Harbor Apex Model (HAM) and the Passaic River Numerical Model. HAM results are presented in Figures 3.02-5 and Passaic River model results are presented in Figure 3.02-6 for peak flood and peak ebb, respectively. Figures 3.02-07 and 3.02-8 present velocity over time curves for existing conditions at four locations: Area 1S, Area 2S, Area 2N, and Newark Bay Middle Reach Channel, respectively. The figures show that maximum velocities in the vicinity of the project are on the order of 0.8 fps (0.24 m/sec).

3.02.5.2 Density Currents. Suszkowski (1978) studied the hydrodynamics, salinity, sediment transport, and sedimentation in Newark Bay. This study, which relied primarily on field measurements, advanced the argument that Newark Bay is subject to density-driven flows that result in a "turbidity maximum" in the vicinity of Port Newark. Suszkowski argued that this turbidity maximum contributes to the sedimentation problems in the Harbor and channel areas. He also concluded that the Kill Van Kull and Arthur Kill (and the Hudson River) were the major source of sediments to Newark Bay, although the Passaic River also contributes. The Hackensack River, according to Suszkowski, may be a sediment sink. Suszkowski's study has been used to develop the sedimentation reduction schemes presented in this study. With respect to Suszkowski's conclusions regarding the turbidity maximum, it should be noted that previous physical model studies and velocity measurements have not revealed the presence of stratification in Newark Bay (Simmons and Bobb 1965) to the same extent as seen by Suszkowski. Simmons and Bobb (1965) classified Newark Bay as a partially mixed estuary. Consistent with the behavior of partially mixed estuaries, one might expect a flood predominance of bottom currents and an ebb predominance of surface currents under normal conditions. A review of Suszkowski's data collected in 1976 and 1977 (Figures 3.02-9 and 3.02-10) indicates that relatively high bottom concentrations of suspended sediments (i.e., 30-50 mg/l) occurred during a one-year evaluation period. These high concentrations, attributed to runoff events in the Passaic River, occurred at stations 7, 8, 9, and 10 (Figure 3.02-10), extending from an area opposite Port Newark northward to the Passaic River. The

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3.19 LAND USE

The study area encompasses both the eastern and western shores of Newark Bay, covering waterfront areas of Essex, Union, and Hudson counties. Three municipalities are located in the area: the City of Bayonne, located along the eastern shore of Newark Bay, and the City of Newark and the City of Elizabeth, both located along the western shore.

The waterfront areas of Newark Bay are characterized by industrial, commercial, and residential areas. Newark Bay itself is part of the 31-mile (50-km) Federal navigation area known as the New York and New Jersey Channels. The present land use of the area reflects the nonpassenger ship use of the channel. The western shoreline is dominated by Port Newark and Port Elizabeth, the leading containerized cargo and shipping marine terminals on the Atlantic coast. Transportation facilities and corridors, including Newark International Airport, the New Jersey Turnpike, and railroad right-of-ways encompass most of the remaining area.

The eastern shoreline of Newark Bay is predominantly residential, with public parks and community facilities located in the City of Bayonne. Residential areas include single-, double-, and multifamily housing units. Community facilities include county and city parks, as well as a high school, stadium, and playing fields.

A more detailed description of the existing land use and zoning in the study area is provided below.

City of Newark

The City of Newark is located in the southeast corner of Essex County, immediately north of the City of Elizabeth. The City of Newark, the Essex County Seat, is New Jersey's most populous city, with 275,000 residents. The 24-square-mile (38.6-km^2) city is located along the west banks of Newark Bay and the tidal Passaic River. Newark is an industrial and transportation hub of the state, with highways, railroads, bridges, a major airport, and seaport facilities in the southeastern part of the city. Multistory buildings in the downtown area form the commercial hub of the city. Heavy industries are mostly concentrated in the low-lying southeastern part of the city and along the Passaic River. The more elevated northern, western, and southern sections include a mix of urban residences, commercial development, institutions, parks, and light industry.

City of Elizabeth

The City of Elizabeth is located in the northeast corner of Union County, New Jersey, just south of the City of Newark. Approximately 12 square miles (31.1 km^2) in size, Elizabeth is the county seat of Union County and contains one of the heaviest concentrations of industrial land uses in this otherwise suburban county. Major transportation facilities and corridors include; Newark International Airport, the New

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Jersey Turnpike, and Port Newark/Elizabeth marine terminals which occupy large areas of the city.

Situated at the confluence of the Arthur Kill, Kill Van Kull and Newark Bay, the industrial land use of Elizabeth developed around the waterfront. Residential and commercial/retail areas are limited to the interior portions of the city. Approximately 45% of the City of Elizabeth is zoned for industrial activities. With the exception of the Waterfront Redevelopment Area, south of the proposed project area, the entire Elizabeth waterfront is zoned for heavy and medium industrial use. This area is characterized by densely developed industrial activities, including oil storage, manufacturing, metal fabrication, warehousing/distribution facilities, and the Port Newark/Elizabeth marine terminal. This 2100-acre (8.5-km^2) steamship terminal occupies most of the western shoreline of Newark Bay and the northern shoreline of Elizabeth. Industrial activities at the terminal include container storage and handling, liquid and solid bulk storage, warehouse and distribution buildings, and an on-dock rail terminal. Railroad right-of-ways, truck routes and highways, and Newark International Airport occupy most of the remaining land within the study area.

City of Bayonne

The City of Bayonne is located in the southernmost portion of Hudson County, New Jersey, located immediately south of Jersey City. Approximately 5 square miles (13.0 km^2) in size, Bayonne is situated on a peninsula, bounded by Newark Bay to the west, Upper New York Bay to the east, and the Kill Van Kull to the south. The Bayonne Bridge, located at Bergen Point, provides a connection to Staten Island to the south, while the New Jersey Turnpike Extension and Newark Bay Bridge provide a connection to Newark and Elizabeth to the west.

Land use in Bayonne is a combination of residential, commercial, and industrial districts, typical of urban municipalities. Mixed-use, commercial, and residential areas are located primarily along the north-south corridors and western shore of Bayonne, while industrial districts are located along the Upper New York Bay and Newark Bay/Kill Van Kull waterfront. Industrial land uses include heavy manufacturing such as petrochemical and metals industries, light manufacturing firms such as food processing and light assembly, and distribution and warehousing firms.

Four industrial districts are identified within Bayonne - the Port Jersey, Constable Hook, Bergen Point, and 53rd Street areas. Located on the eastern shore of Bayonne and approximately 727 acres (3.0 km^2) in size, Constable Hook, is the largest and most heavily concentrated industrial district. Port Jersey, located along the Jersey City/Bayonne border, is approximately 400 acres (1.5 km^2) (approximately 160 acres [0.65 km^2] in Bayonne) and consists of a container port, the PA Auto Marine Terminal, and the Global Marine Terminal. The Bergen Point and the 53rd Street districts are both located within the project study area, along the eastern shore of Newark Bay. The 53rd Street district, located in the northwest corner of Bayonne, south of the Newark Bay

Bridge, is the smallest of the four industrial districts, covering approximately 19 acres (0.1 km^2). Access to this district is poor, passing through established residential areas. Commercial and industrial development is limited. The Bergen Point district is located at the southern end of the study area, at the tip of the peninsula between Newark Bay and the Kill Van Kull. Development in the district includes basic metal and chemical manufacturing and light industrial firms.

Except for the Bergen Point and 53rd Street industrial districts, land use along the eastern shoreline of the project study area is primarily residential and public. Residential areas include single-, double-, and multi-family housing. The predominant residential land use within the study area is the double-family detached house on relatively small lots (usually 25 x 100 ft [7.6 x 30.5 m]). Some single-family housing is located to the south of Bayonne Park, while some multifamily housing, including mid- and high-rise apartments, is located north of Bayonne Park along the eastern shoreline of Newark Bay.

Community facilities located along this shoreline include Bayonne Park, City Park, Veterans Park, and Bayonne High School. Located between West 37th and West 48th Street, Bayonne Park is bordered by Newark Bay to the west and John F. Kennedy Boulevard to the east. Maintained by Hudson County, Bayonne Park is approximately 98 acres and is the largest park facility located within the city limits. The park includes sitting areas, walking paths, and open areas. Veterans Park and Bayonne High School are located south of Bayonne Park. Approximately 11 acres (0.04 km^2), Veterans Park includes a football stadium, a baseball diamond, and sitting areas. City park, located at West 16th Street and Avenue A, is bordered by Newark Bay to the west and is approximately 20 acres (0.1 km^2). Facilities include sitting and picnic areas, a playground, basketball and tennis courts, playing fields, and an amphitheater. All three parks offer waterfront walkways and access to the Newark Bay waterfront. The City of Bayonne Comprehensive Master Plan recognizes the opportunity of linking these park areas with a waterfront pathway network.

Newark Bay

Newark Bay has several submerged cable and pipeline crossings (Table 3.19-1 and Figure 3.19-1). None of these transverse the areas identified in the alternatives described in Section 2.03.3, including Areas 1, 2S, 2N, and 3. All are north of or clustered in the southern portion of the bay.

Table 3.19-1

Submerged Utilities in Newark Bay

Permit Number (Used as Map Designator)	Descripton of Utility
3353	U.S. Coast Guard - Standard light tower on a riprap foundation with associated submarine cable.
4019	The Central Railroad Company of New Jersey - Seven submarine cables between cables between Bayonne, NJ, and Elizabeth, NJ, located at the Jersey Central Railroad Bridged (removed)
4318	Exxon Company U.S.A. (Esso Standard Oil Co.) - Two 8-in.- and one 12-in.-diameter pipes between Staten Island, NY, and Bayonne, NJ
4345	The Tide-Water Pipe Co., Ltd. - Two 8-in.-diameter pipes between Staten Island, NY, and Bayonne, NJ.
4739	Port Authority of NY/NJ - Twenty-four-inch water pipeline between Doremus Ave. and Export St.
4888	Texas Eastern Transmission Corp. - Twelve-inch pipeline between Bayonne, NJ, and Howland Hook (Staten Island), NY.
6364	Public Service Electric and Gas Co. - Two 8.6-in. pipes installed adjacent to (south of) the Lehigh Valley and Pennsylvania Railroad Bridge between Newark, NJ, and Bayonne, NJ.
8739	Amerada Hess Corp. - Fourteen-inch submarine pipeline between Newark, NJ, and Bayonne, NJ.
13809	Hudson County Utilities Authority - Seventy-two-inch sanitary sewer between Jersey City, NJ, and Bayonne, NJ.
14649	Public Service Electric and Gas Co. - Twelve-inch natural gas pipeline between Elizabeth, NJ, and Bayonne, NJ.
16450	Town of Kearny - Thirty-inch diameter sanitary sewer between Kearny, NJ, and Newark, NJ.

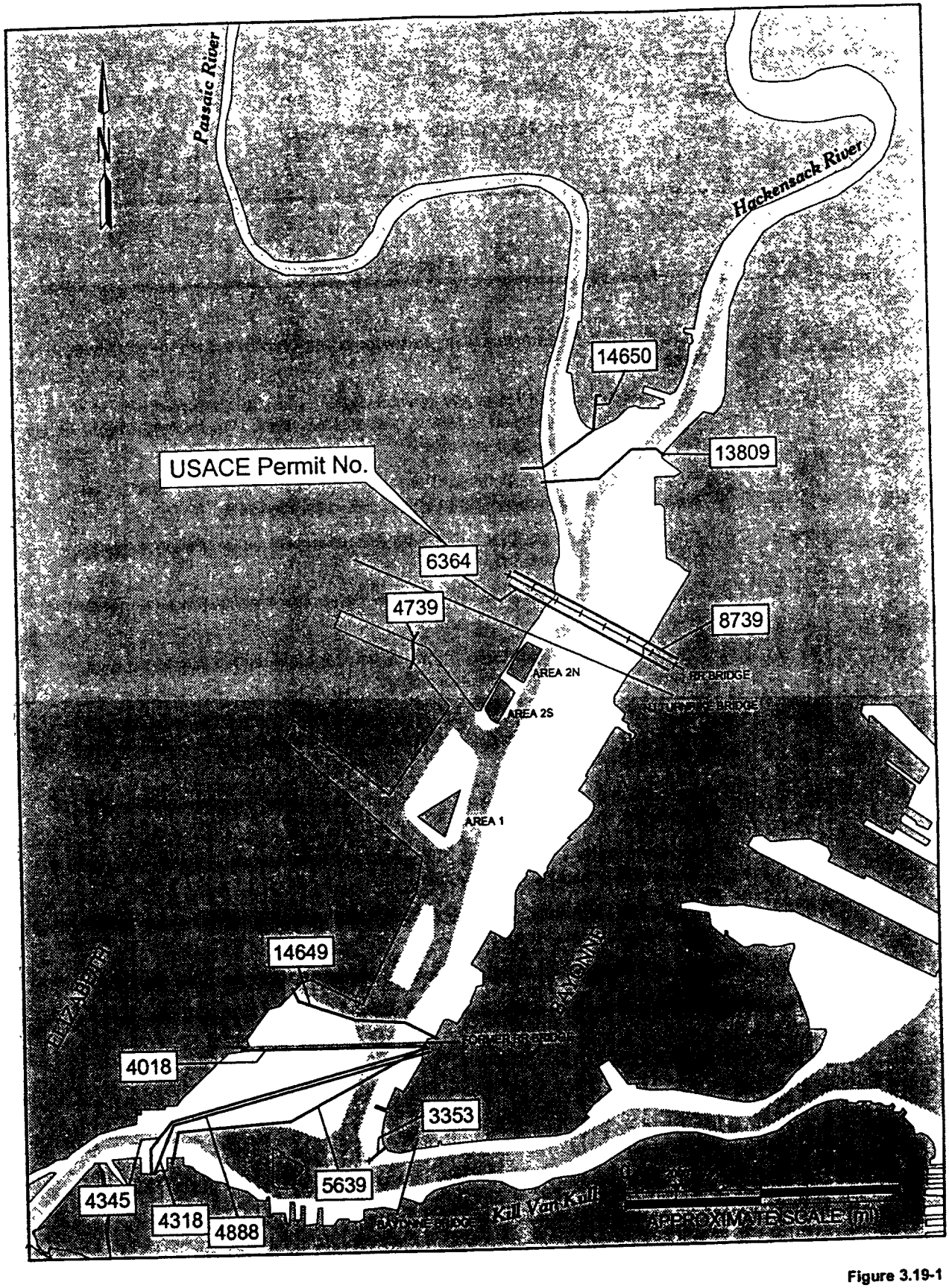

Figure 3.19-1
Submerged Cable and Pipeline Crossings

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

3.20 NOISE

Noise in the project study area originates from a variety of sources, including commercial vehicles, industrial machinery, and steamship operation. The proposed NBCDF sites are bordered to the west by the Port Newark/Elizabeth marine terminals and heavy industrial areas. Noise levels from these sources varies with the level of use (i.e., time of day) and type of machinery operated (e.g., cranes, derricks, loading equipment). The open water of Newark Bay and the Federal Navigation Channel are east of the proposed NBCDF sites, while the New Jersey Turnpike Extension and Newark Bay Railroad Lift Bridge are to the north. Primary sources of noise from these areas are boating/shipping activity, highway traffic, and railroad traffic. Commercial airplanes using Newark International Airport, located approximately 1.5 miles (2.5 km) west of the proposed NBCDF development area, also contribute to noise levels in the study area.

Noise levels are generally expressed as a single value of broadband noise using a frequency weighting that simulates human perception. Noise criteria or permissible sound levels are usually specified in the units of A-weighted noise or decibels A (dBA).

Noise control ordinances exist for all three local municipalities in the study area. These ordinances often designate maximum permissible sound levels from sources to receiving properties/receptors or time of day restrictions on construction activities near residential or sensitive noise receptor areas. Potential noise-sensitive receptors include schools, churches, residences, libraries, parks, recreational areas, hospitals, senior citizen homes, and rehabilitation centers. No noise-sensitive receptors were identified in the vicinity (less than 1000 ft [300 m]) of the proposed NBCDF sites. Bayonne Park, Veterans Park, Hudson County Park, and the Bayonne High School, situated along the Bayonne waterfront area, are the noise-sensitive receptors nearest the proposed NBCDF site. The City of Bayonne and the City of Elizabeth both prohibit construction or repair activities during nighttime hours, i.e., no construction or repair activities between the hours of 8:00 p.m. and 7:00 a.m. and 9:00 p.m. and 7:00 a.m. weekdays, respectively. The City of Newark has adopted maximum permissible sound levels according to the source of the sound and the sound receptor category (e.g., residential, industrial). The following table lists the maximum permissible sound levels in the City of Newark by receiving property type or category:

	Receiving Property Category				
Sound Source Property Category	Residential 7 a.m.-10 p.m.	Residential 10 p.m.-7 a.m.	Commercial All Times	Industrial All Times	Hospital Quiet Zone All Times
Residential	55 dBA	50 dBA	65 dBA	75 dBA	50 dBA
Commercial	65 dBA	50 dBA	65 dBA	75 dBA	50 dBA
Industrial	65 dBA	50 dBA	65 dBA	75 dBA	50 dBA

Source: Noise Control Ordinance of the City of Newark, 17:3A

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4.0 ENVIRONMENTAL IMPACTS OF CONSTRUCTION AND DISPOSAL OPERATIONS INTO THE CDF

The primary objective of the NBCDF is to provide an environmentally acceptable disposal method for dredged material removed from selected locations in the New York Harbor. The need for this special disposal facility is brought about by the presence of chemical contaminants in the sediments, which results in material deemed unacceptable for ocean disposal.

The NBCDF is a project primarily related to dredging and dredged material disposal, but it has the secondary benefit of reducing contaminant levels in the Bay. This assessment focuses on the potential impact of dredging and dredged material disposal, including the potential for contaminant release and organism exposure, as would be done in the evaluation of any dredging and disposal operation. The method of disposal is given special attention because it is a relatively new approach that has not been applied in the Port of New York and New Jersey.

The burial of contaminated sediments has the potential to remove some of the widespread contamination from contact with aquatic life. However, the quantities of contaminated material to be buried in the NBCDF would represent a very small portion of the total residual contamination present in the Harbor. In addition, all of the potential sources of contamination have not been remediated; thus, additional contamination could occur in areas dredged during this project. The relationship of this dredging project to the long-term management of contaminants is discussed, but this is a secondary aspect of this assessment.

The spatial and temporal boundaries for this assessment are based on the unique features of the project. The spatial boundary for the assessment of the disposal facility will be Newark Bay because all reasonable CDF alternatives are wholly within the Bay.

The temporal boundaries for the assessment will be a short-term and a long-term time frame. The objective of the project is to dispose of dredged material that cannot go to the ocean disposal site and then return the disposal area to its original bottom contours, with the expectation that the area will recover and become usable as aquatic habitat. There will be no structure remaining or an ongoing, long-term activity at the disposal site after it is filled and capped. The most likely sequence for implementing the CDF is to construct the pit(s) and begin filling as soon as it is available. The short-term time frame for this assessment will be the construction, filling, and capping of the facility taken as a discrete, continuous impact. The long-term time frame will begin when capping is completed and activity ceases at the site. At this point in time a long-term monitoring program will begin. A major component of this assessment will be an evaluation of the adequacy of the proposed monitoring plan, including the duration of the monitoring.

This section presents a discussion of impact for each major environmental issue. This is followed by the cumulative assessment, which includes indirect effects.

4.01 GENERAL ENVIRONMENT

The environmental baseline for this assessment is the existing conditions in Newark Bay, which incorporates all the previous man-induced changes to the physical, chemical, and biological characteristics of the Bay. Many of the past changes, such as bulkheading and filling of the shoreline of the Bay, can be considered permanent. In addition to changes to the Bay, the upstream watersheds have been highly developed, which has changed freshwater flow regimes and contributed many types of contaminants. The Arthur Kill and Kill Van Kull, Newark Bay's connecting waters to the south, have been highly modified for waterborne commerce and other industrial activities. These changes adversely affected aquatic life, but due to a lack of historical information, the aquatic resources prior to these changes are not well known.

Water quality has been limiting to aquatic life in much of Newark Bay and its connecting waters throughout this century. Recent improvements in water quality, particularly dissolved oxygen (DO), have made these waters suitable for aquatic life and the diversity of fish species collected over the past 20 years reflects the improved conditions. The existing conditions in Newark Bay can be characterized as recent improvements for aquatic life within a context of permanent physical changes and residual chemical contamination.

4.02 PHYSICAL OCEANOGRAPHY

4.02.1 TIDAL HYDRODYNAMICS AND SEDIMENTATION

Tidal hydrodynamics and sedimentation models have been developed for the NBCDF and its environs. The purpose of this modeling effort was to assess the impacts of dredging and disposal operations on area hydrodynamics, erosion of the proposed cap, and area sedimentation. The following sections present a brief description of the model development, calibration/verification and model results. A detailed description of the model is presented in Appendix 4.02.

4.02.1.1 Simulation Models. The TABS-2 numerical modeling system of the USACE-Waterways Experiment Station (WES) used in this study includes hydrodynamic (RMA-2), constituent transport (RMA-4), and sedimentation (STUDH) models (Thomas et al. 1985). The TABS-2 system consists of pre- and postprocessor utility codes and three finite-element, two-dimensional, depth-averaged computational programs. The three basic components of the modeling system are as follows: (1) a two-dimensional model for free surface flow (RMA-2), (2) a two-dimensional, finite-element program for water quality (RMA-4), and (3) sediment transport in unsteady two-dimensional flows, horizontal plan (STUDH). All models are solved by the finite-element method using Galerkin-weighted residuals. The finite-element method provides a means of obtaining an approximate solution to a system of governing equations by dividing the area of interest into smaller subareas called elements. Time-varying partial differential equations are transformed into finite-element form and then solved in a global matrix system for the modeled area of interest. The solution is smooth across each element and continuous over the computational area. Both sand and clay transport can be modeled separately.

4.02.1.2 Model Calibration. The USACE Waterways Experiment Station (WES) has calibrated and verified the finite-element model with field measurements in order to assure accurate representation of tidal flows within a modeled estuarine system. The calibrated and verified model has been used to evaluate the impacts of proposed changes on the system. Calibration is an iterative process that involves adjusting model parameters so that model predictions match field observations reasonably well.

Hydrodynamic model calibration is best achieved by means of a set of simultaneous measurements both along the model boundaries and throughout the estuarine system. Boundary conditions important to the present study include tidal elevation, flow velocities, and freshwater discharge. For a given set of boundary conditions, the model is calibrated to reproduce tidal elevations and tidal velocities within the estuary by choosing appropriate controlling parameters. The hydrodynamic model was calibrated against field measurements using the Troy Dam discharge at the northern model boundary in the Hudson River, freshwater discharge from the Passaic and Hackensack Rivers, and recorded time-varying tidal elevation and velocities at the other model boundaries.

4.02.1.3 Impacts of Dredging and Disposal Operations. The calibrated and verified model was used to evaluate the impacts of dredging and disposal operations associated with the project. Impacts on erosion and sedimentation were assessed using the sedimentation model (STUDH) combined with the hydrodynamic model (RMA 2).

Hydrodynamics

Section 3.02 presents existing bathymetry along with peak flood and ebb flow velocity contour plots in the vicinity of the proposed NBCDF under normal conditions (see Figures 3.02-7 through 3.02-15). Maximum current velocities range from 0.3 to 2.0 ft/sec (0.1 to 0.6 m/sec) within Newark Bay and 0.3 to 1.0 ft/sec (0.1 to 0.3 m/sec) in the vicinity of the proposed NBCDF sites.

Numerical modeling was performed for normal conditions to predict potential changes to maximum velocities due to the presence of the Area 1S CDFs. The analysis showed that velocities within the CDF would be decreased compared to existing conditions due to the greater water depth. Velocities within the channel, however, would not be significantly affected by the presence of the CDF. Figure 4.02-1 shows the revised bathymetric conditions represented in the model that includes the CDFs. Figures 4.02-2 and 4.02-3 show the peak flood and ebb velocity vector plot, respectively. Figures 4.02-4 and 4.02-5 present velocity time histories for Area 1S and the Newark Bay Middle Channel (channel nearly perpendicular to Elizabeth Channel), respectively. Overall, the velocities within the CDFs are decreased compared to existing conditions, as would be expected, but velocities within the Newark Bay channels are not affected by the presence of the CDFs.

Upon completion of the project, the new bathymetry would match the existing bathymetry. Hydrodynamic flow conditions would be similar to the previously described results presented in Section 3.02.

Results from the hydrodynamic modeling were used to evaluate sediment transport for several different potential conditions that could affect the project:

- Sedimentation of fine-grained material within the excavated CDFs
- Sedimentation of fine-grained material in the NBCDF project area following completion of the cap
- Erosion of noncohesive cap material for a 100-year return period flood event following completion of the cap
- Erosion of noncohesive cap material for average tide and normal wave conditions in the NBCDF project area following completion of the cap

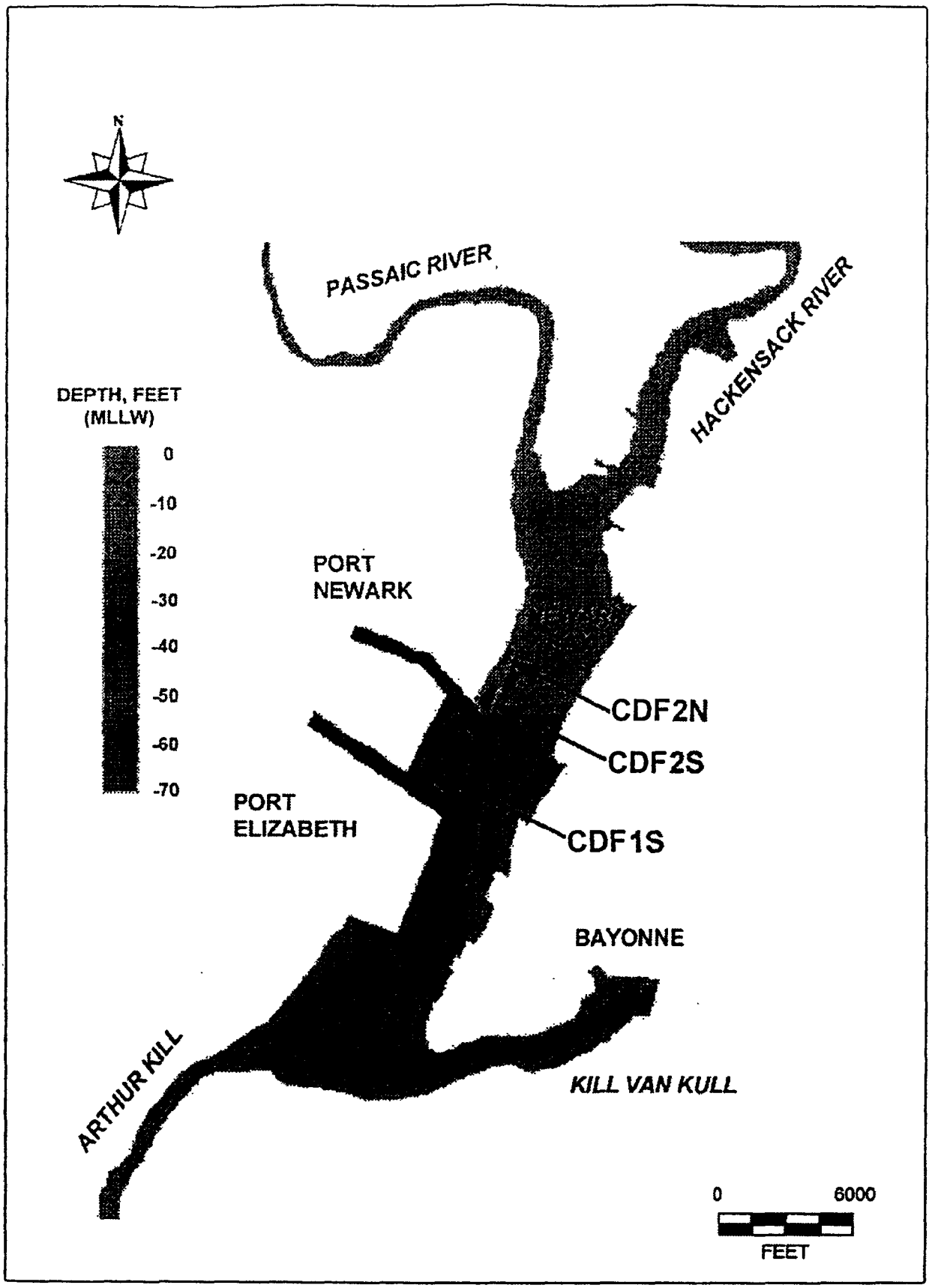

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Figure 4.02-1
Bathymetry Contour Map for Hydrodynamic Modeling of Dredged CDFs 1S, 2S, and 2N

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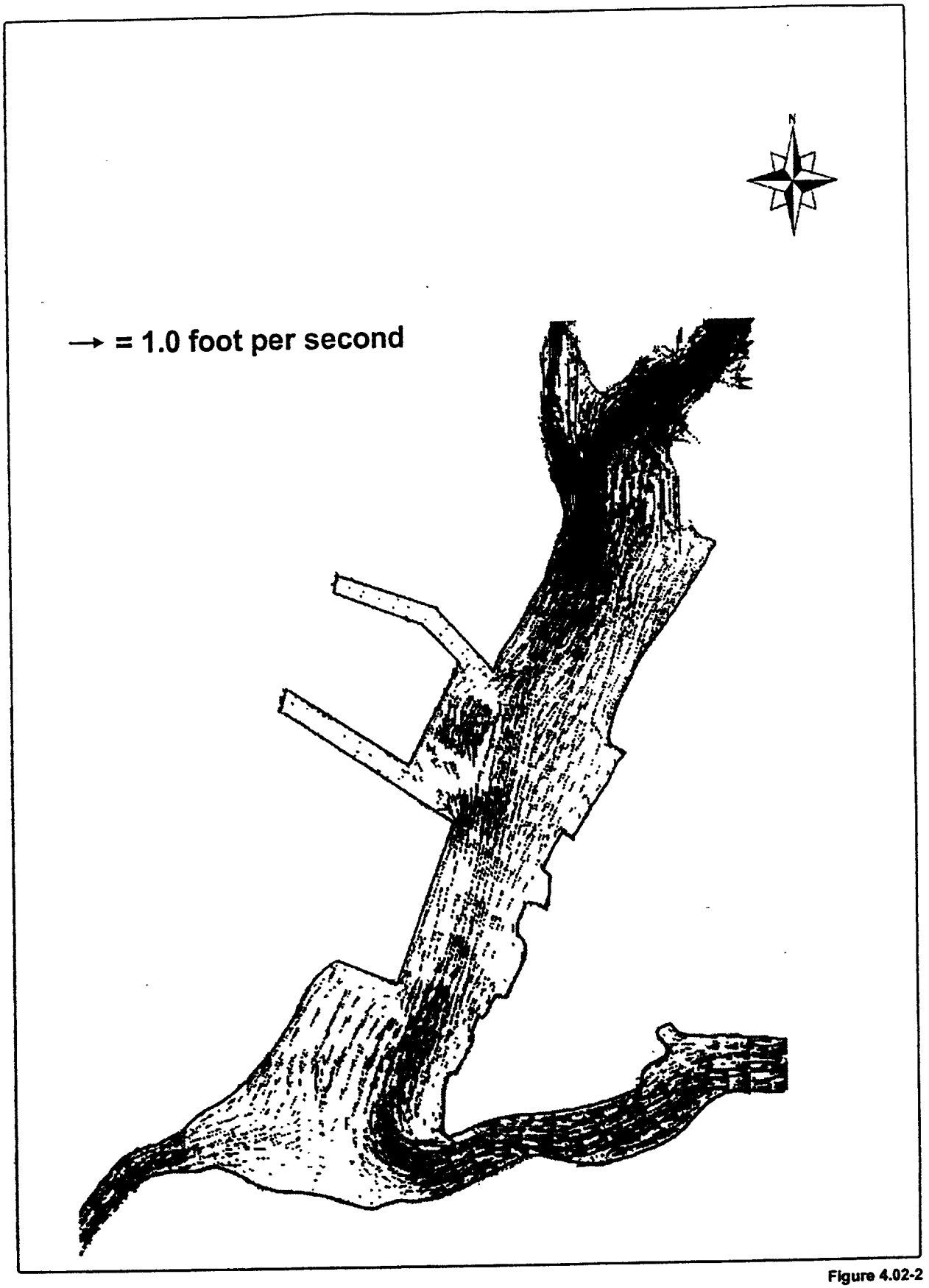

Figure 4.02-2
Peak Flood Tidal Currents in Newark Bay

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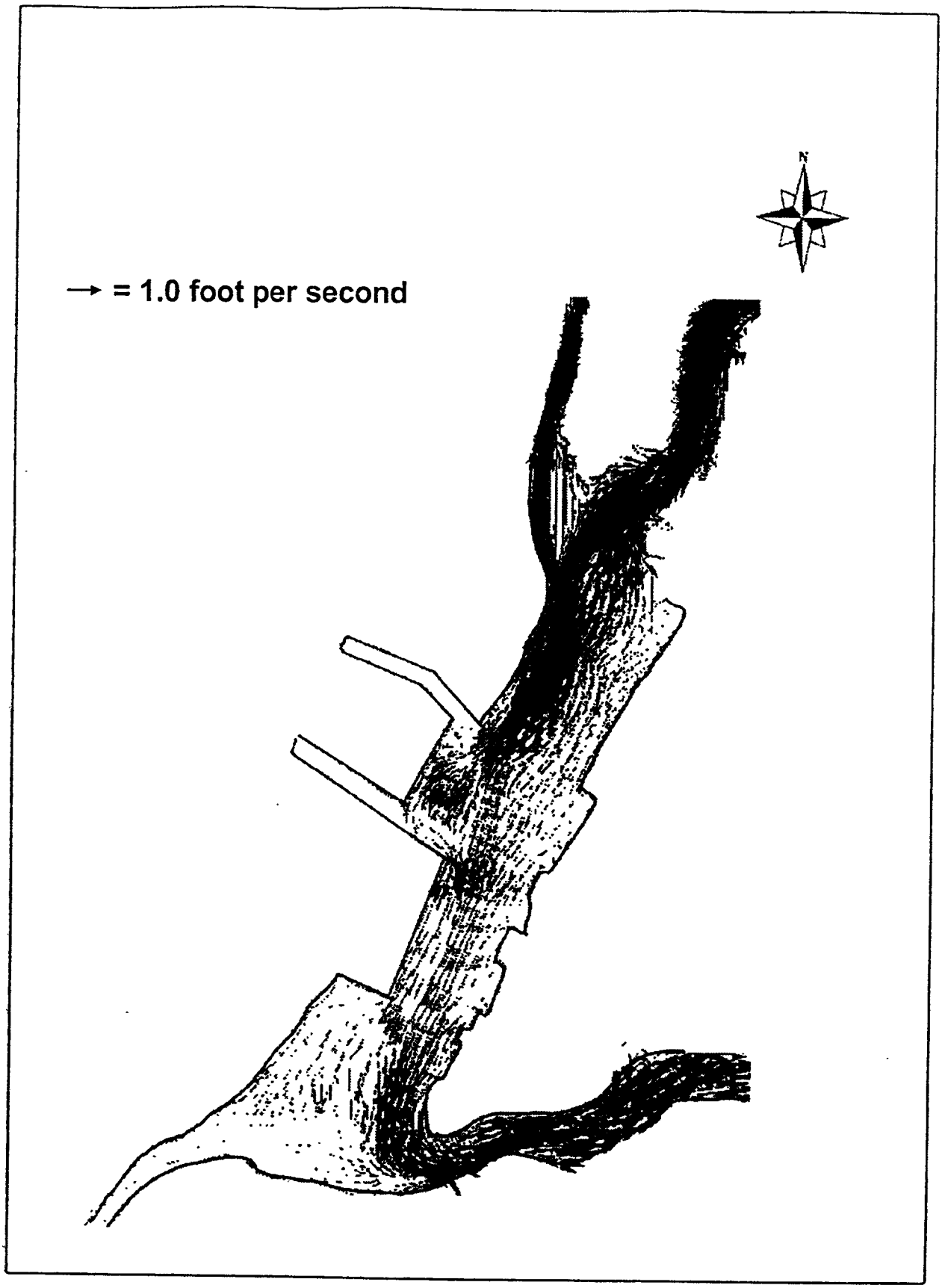

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Figure 4.02-3
Peak Ebb Tidal Currents
in Newark Bay

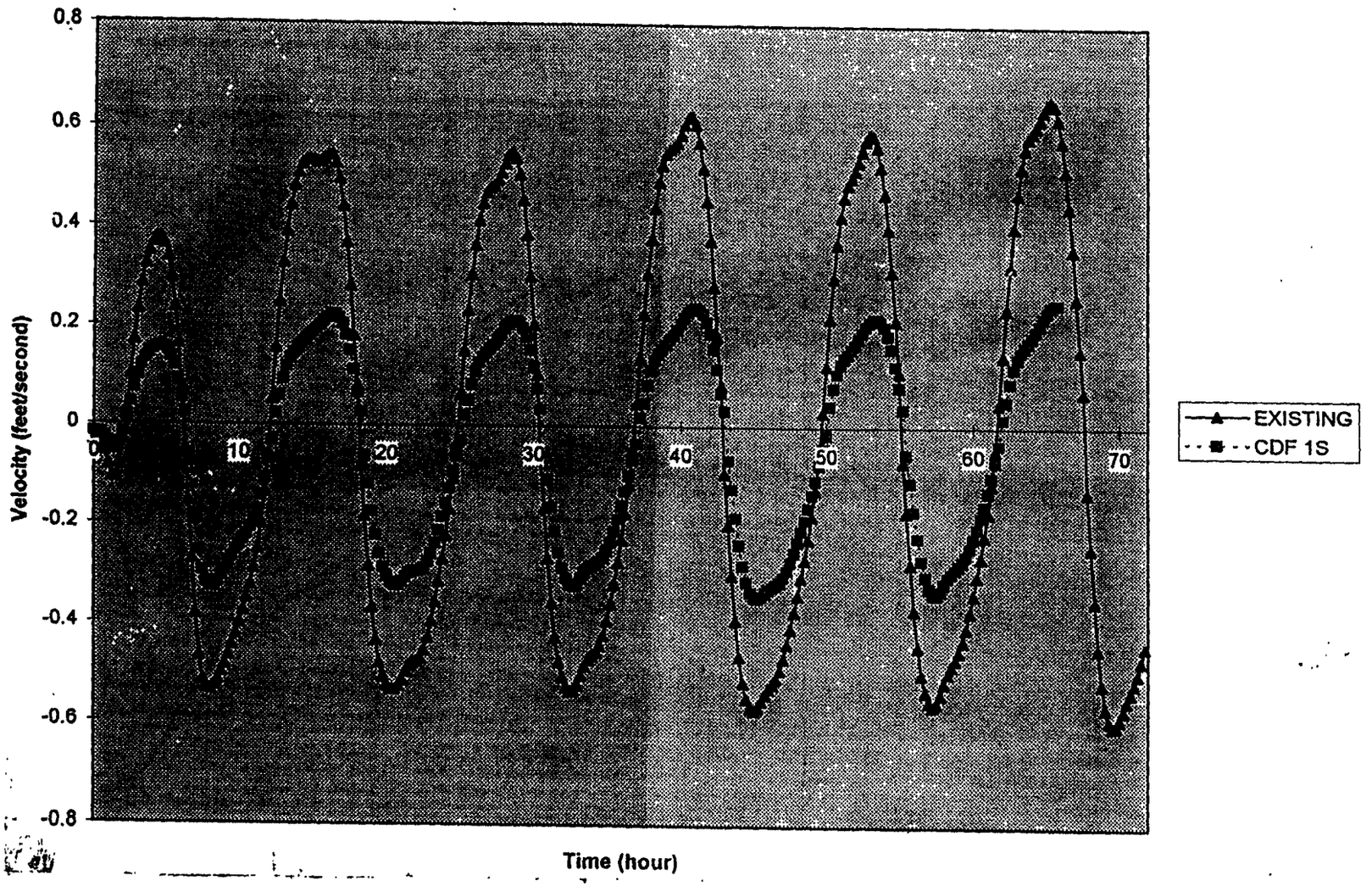

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Figure 4.02-4
Velocity vs Time in Area of Pit 1S CDF
Existing Conditions and Constructed CDF 1S

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USACE-0009280

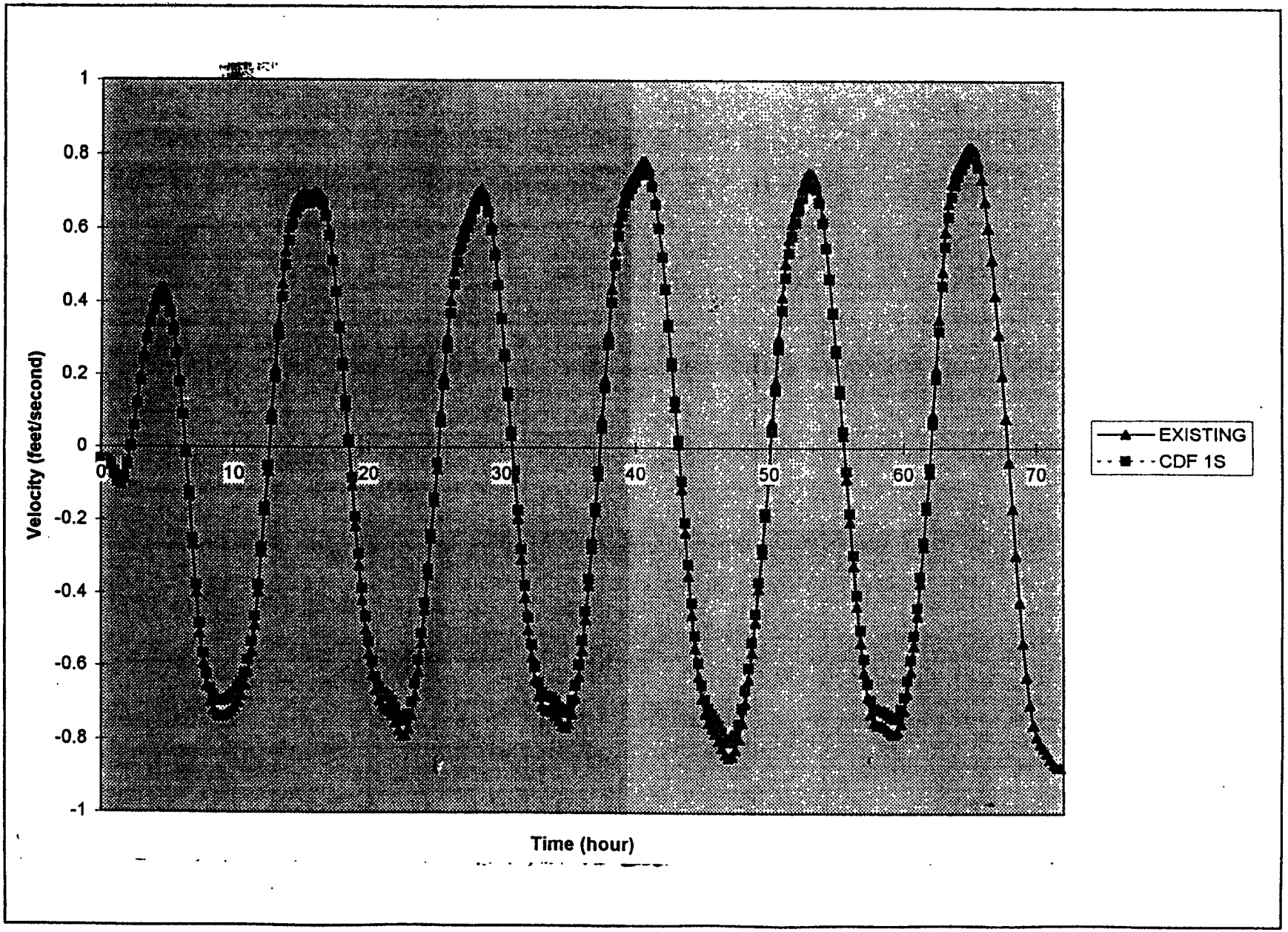

Figure 4.02-5

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Velocity vs Time in Newark Bay Middle Reach Channel
Existing Conditions and With Constructed CDF 1S

USACE0007297

USACE-0009281

- Erosion of noncohesive cap material for average tide and extreme wave conditions following completion of the cap

Sections 4.04 and 5.04 of this report details and results of this modeling effort.

4.03 METEOROLOGY

The proposed NBCDF alternatives will not affect meteorological conditions in the vicinity of Newark Bay. The project, when completed, would maintain the same physical configuration as the existing condition because the final elevation of the cap(s) would be placed at the existing bottom elevation.

4.04 SEDIMENTS

4.04.1 SEDIMENTATION ANALYSIS

Results from the hydrodynamic modeling described in Section 4.02 were used to evaluate sediment transport for several different potential conditions that could affect the project. Conditions that were evaluated and included in this section consisted of an assessment of (1) sedimentation of fine-grained material within the excavated pits, and (2) sedimentation of fine-grained material in the NBCDF project area following completion of the cap.

The hydrodynamic results from RMA-2 were used in the numerical sediment transport code STUDH as input information to solve the depth-integrated convection-diffusion equation for a single sediment constituent. Sediment transport modeling results provide an average sedimentation (erosion or deposition) approximation across each computational element. It should be noted, however, that the code does not compute a new flow field even though bottom bathymetry may change as a result of sediment transport. Therefore, model simulation duration should be short so that the flow pattern will not be modified drastically. In the present case, depth changes are minor so that flow field modifications are not a concern.

Sediment transport was modeled separately for cohesive sediments (clay) and noncohesive sediments (sand) because two bed types cannot be contained within the same model run. The simulations of sedimentation entailed cohesive sediment only because suspended solids within the area are mostly fine-grained. In addition, the predominant grain size in the mid-section of Newark Bay is in the clay to fine silt range (Suszkowski 1978). Physical parameters used in modeling are presented in Tables 4.04-1 and 4.04-2 for cohesive sediments (clay) and noncohesive sediments (sand), respectively.

Table 4.04-1

Cohesive Sedimentation Parameters

Model Parameters	Units	Values
Crank-Nicholson THETA		0.66
Critical shear stress (deposition)	N/m**2	0.06
Critical shear stress (erosion)	N/m**2	0.16
Dry density of freshly deposited	kg/m**3	334
Particle specific gravity		2.65
Erosion rate constant	kg/m**2/sec	0.00002
Effective diffusion	m**2/sec	25
Inflow concentration	kg/m**3	variable
Settling velocity	m/sec	0.0001
Initial concentration	kg/m**3	variable

Table 4.04-2

Noncohesive Sedimentation Parameters

Model Parameters	Units	Values
Crank-Nicholson THETA		0.66
Particle shape factor		0.7
Length factor (deposition)		0.5
Length factor (erosion)		10
Particle specific gravity		2.65
Median grain size	mm	0.1 to 0.3
Effective diffusion	m**2/sec	50
Inflow concentration	kg/m**3	0.005
Settling velocity	m/sec	0.01
Manning's n		0.025

4.04.2 CONSTRUCTED CDFs

Model runs were made to evaluate sedimentation rates that could occur following construction of the NBCDFs. The purpose of the analysis was to estimate the sedimentation that might occur during filling operations and to determine whether sedimentation would materially reduce the volume of the pits for dredged material. The model was used to simulate Area 1S as excavated prior to disposal of dredged sediments. Figure 4.04-1 shows a contour plot of sedimentation rates in Newark Bay, including the NBCDF area. Figure 4.04-1 indicates a sedimentation rate of approximately 6 to 12 in. (15.2 to 30.5 cm) per year. These rates are greater than the sedimentation rate found by Bopp et al. (1991) as described in Section 3.04. Figure 4.04-2 shows baywide sedimentation rates with the pit in place at Site 1S. The sedimentation rates are the same with or without a CDF at Area 1S. The proposed length of time required to complete NBCDF filling is from one to three years. Accordingly, while sedimentation is anticipated, the total sediment volume would have a negligible effect on reducing pit capacity (about 1-2%).

Modeling was also performed to evaluate changes in suspended sediment concentrations within Newark Bay due to dredging and disposal operations at the NBCDF. Figure 4.04-3 shows baywide suspended sediment concentrations. There were no changes in concentrations when the NBCDF was added to the suspended sediments model. This is to be expected because there is no mechanism by which a significant amount of suspended material could be removed from the water column.

After the project is completed, sedimentation of fine-grained material would continue in the Bay and would cover the cap. Eventually, the sediments covering the NBCDF would revert back to the existing fine-grained silt and clay substrate type.

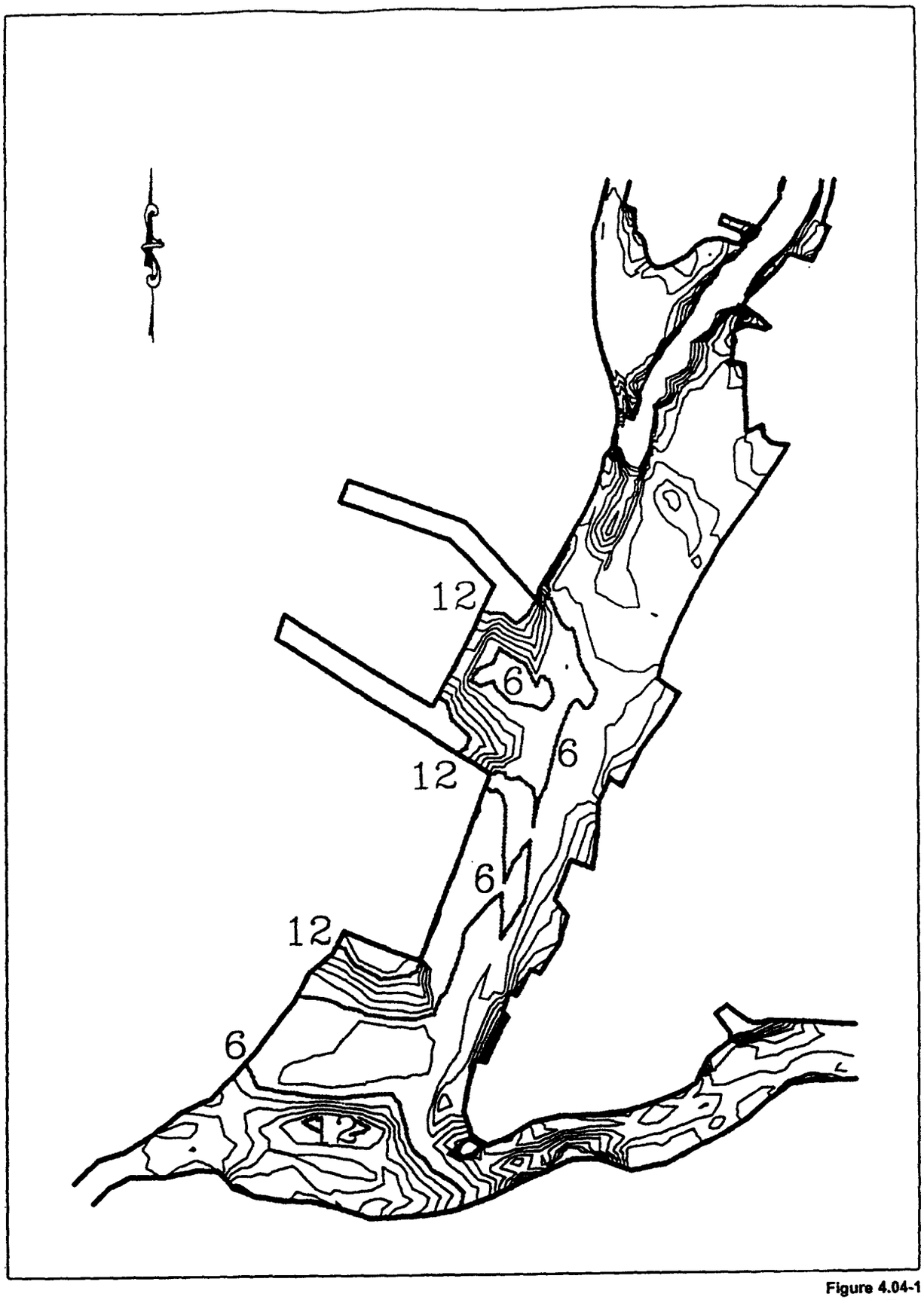

Figure 4.04-1

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Sedimentation Rates Without Pit in Newark Bay (in./year) - Cohesive Sediments

USACE0007302

USACE-0009286

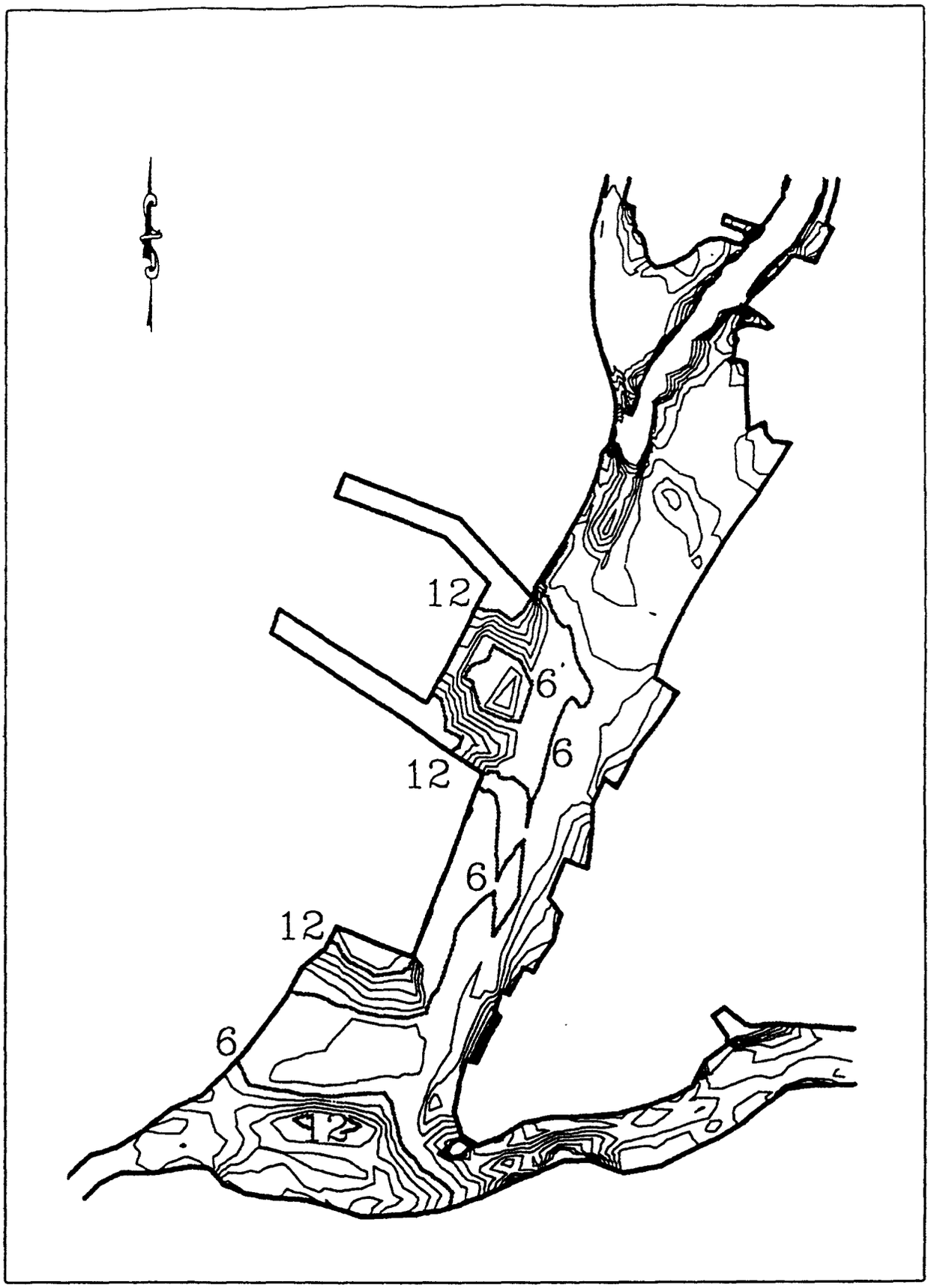

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Figure 4.04-2
Sedimentation Rates With Pit in Newark Bay
(in./year) - Cohesive Sediments

USACE0007303

USACE-0009287

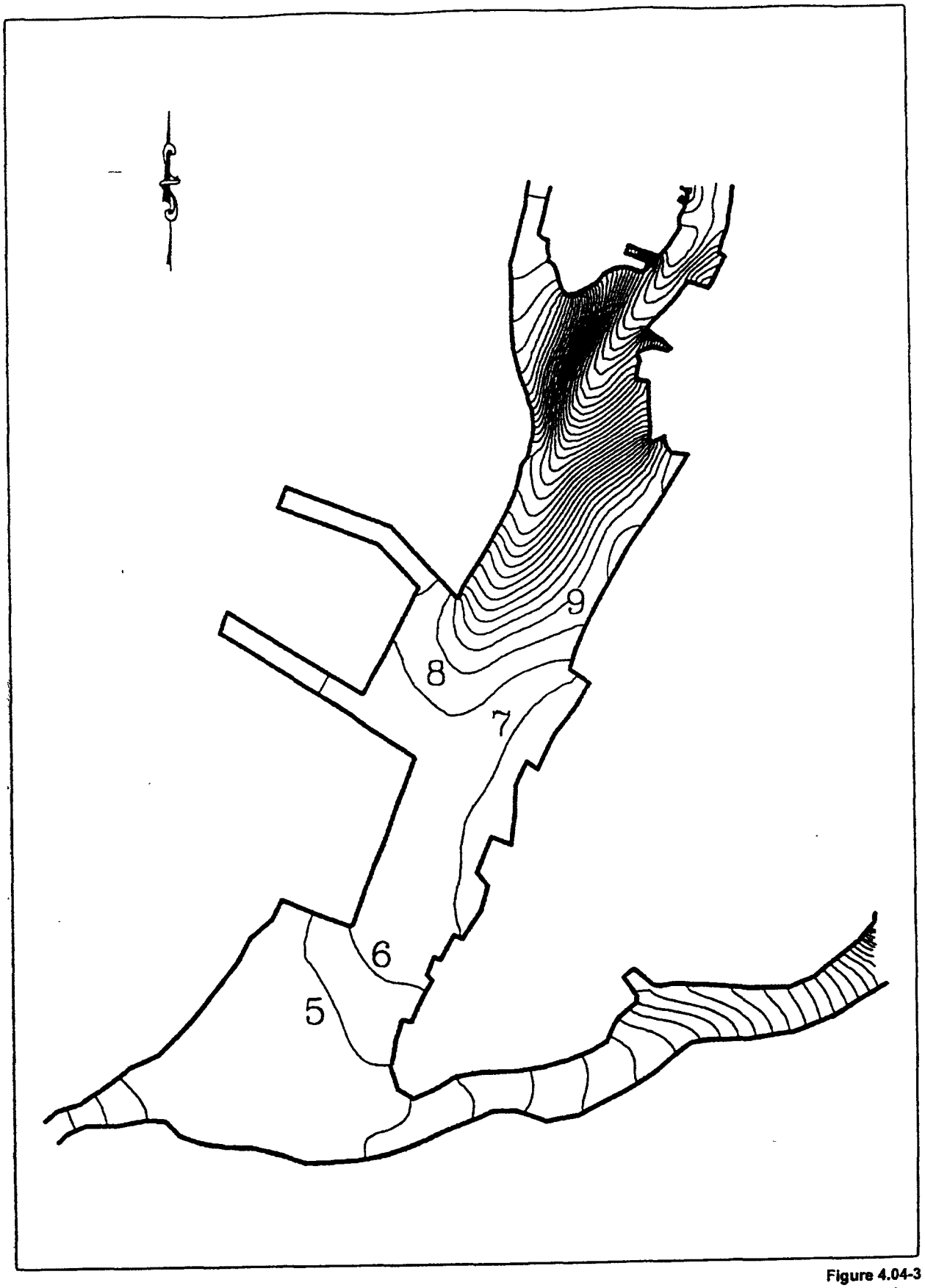

Figure 4.04-3
Suspended Sedimentation Concentrations (mg/l)

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USACE0007304

USACE-0009288

Design of the cap, including required thickness and material, is discussed in Section 5.04. The design criteria included cap integrity with regard to physical and chemical isolation, bioturbation, consolidation, wave- and current-induced erosion, and construction tolerance. Section 5.04 includes an evaluation of cap stability under different conditions, including a 100-year flood event.

4.05 WATER QUALITY

The potential impacts of the NBCDF on Newark Bay water quality are assessed in terms of the short-term (construction, disposal and capping operations) and the long-term (post-capping) periods. Construction and operation of the NBCDF will not affect overall sedimentation patterns and rates or concentrations of total suspended solids (TSS) throughout Newark Bay (Figures 4.04-1 and 4.04-2). However, localized effects will occur in the NBCDF area including a decrease in current velocities causing increased sedimentation. This will result in a decrease in local TSS concentrations. Studies of subaqueous borrow pits within New York Harbor show low DO concentrations within the pits (Bokuniewicz et al. 1986). The disposed sediment will be in a chemically reduced state within the pits so that particle-bound metals (i.e., copper, zinc, cadmium, mercury and lead) are unlikely to migrate. The partitioning of organic contaminants is largely controlled by the organic carbon content of the sediment. As changes in the organic carbon content of the sediments are expected to be minimal, there will be little migration of organic contaminants during disposal.

The effects of the disposal operation on nutrients and DO in the water column surrounding subaqueous borrow pits evaluated as potential CDFs located in lower New York Harbor were reported to be negligible (Bokuniewicz et al. 1986). Therefore, there should be only a negligible short-term impact of the NBCDF on nutrient and DO concentrations in Newark Bay.

The sediment transport modeling indicated that the NBCDF cap will be stable, thus no scour of disposed sediments is anticipated. The pathways for release of contaminants through bioturbation and/or gas bubbles penetrating the cap are expected to produce only minimal releases. The settlement of the cap in the first two years after placement depends on several factors such as the porosity and specific weight (bulk density) of disposed sediments, time span to fill the pit, number and size of blocks of disposed sediment, initial and final porosity of the cap material, and the thickness of the cap. Because these factors cannot be quantified at this time, it is not possible to estimate the settlement of the cap in the first two years after placement. The settlement of the cap may exceed the thickness of the cap and, if the porosities of the dredged material in the CDF and the cap are similar, pore water from the dredged material will be expelled through the cap during this time. The depth of dredged material in the CDFs is approximately 67 ft (20.4 m) and a 3-ft (1.0-m) thick cap is planned. The volume of pore water within the dredged material that will be expelled by compaction is probably a relatively low percentage of the total initial pore water.

If the cap settles and the pit area is depressed below the surrounding bottom of the Bay, deposition of ambient sediment will be fostered to fill in this depression and eventually an equilibrium will be reached. The layer of natural sediment overlying the cap provides an additional buffer to retain pore water from the dredged material.

The flux of contaminants associated with potentially expelled pore water depends primarily on the contaminant concentrations within the dredged material, contaminant partitioning coefficients, and the overlying Newark Bay water concentrations. Because the contaminant concentrations of the dredged material to be disposed of are unknown, it is not possible to estimate the flux of contaminants associated with potentially expelled pore water. Nevertheless, any flux would probably be minimal in relation to the mass of contaminants sequestered because the contaminants have a high affinity for the dredged sediment and therefore will generally remain immobile below the cap. The monitoring of the cap (Section 5.07) will provide a means to assure that contaminants are not substantially released to the overlying Bay.

The net long-term impact of the NBCDF on water quality depends on whether (or not) contaminated sediments only from Newark Bay (e.g., Port Elizabeth, Port Newark channels) are dredged and disposed of in the pits. If contaminated sediments from Newark Bay are disposed of in the CDFs, there would probably be a reduction in contaminant levels in the dredged area because dredging to project depths with an allowable overdepth would remove sufficient amounts of sediment to expose relatively cleaner material. If dredged sediments are not solely from Newark Bay, changes in surficial sediment contaminant levels would be confined to capped CDF areas and dredged areas in the Bay. As the capping material will be uncontaminated, there will be at least a slight reduction in contaminant concentrations at Areas 1S, 2S, and 2N. Reductions in contaminant levels of Newark Bay sediments would have a beneficial impact on long-term water quality. Such changes are difficult to quantify, but are likely to be very small. The natural sedimentation over the cap will tend to minimize these changes with time. In summary, the project will not have significant short- or long-term adverse impact on water quality.

4.06 FISH AND SHELLFISH

4.06.1 HABITAT DISTURBANCE

Dredging to create the NBCDF would temporarily disturb approximately 56 acres (0.23 km^2) of shallow-water habitat in Newark Bay, including the connecting channels from the existing shipping channels to the disposal pits. There would be a removal of all substrate material from this area, with disposal in the ocean, an adjacent CDF or used beneficially. The benthic organisms in this area would be lost and the habitat would be unavailable as a feeding area for fishes. The duration of this impact would be for the length of the CDF operation.

The temporary habitat loss represents approximately 1.4% of the bottom area of Newark Bay and approximately 2.0% of the shoal habitat in the Bay. The fish and invertebrate studies summarized in Chapter 3.0 show that there were no major differences among the shoal areas sampled in the Bay. In addition, many of the species that use the shoal areas are also abundant in the channel areas. There is extensive habitat for fish and shellfish in Newark Bay that could be utilized while the CDF is under construction and in operation.

The sampling data from Newark Bay and a review of agency files shows that there are no endangered or threatened species of aquatic life reported in Newark Bay. In addition, the species of fish and shellfish that are abundant and ecologically important in Newark Bay are widespread and abundant in New York Harbor and nearby coastal waters and estuaries. The areas considered for CDF development in Newark Bay do not represent critical habitat for any of these species.

An important element in the development of the CDF for dredged material disposal was the potential for recovery of the CDF site as functional habitat for aquatic life. Following placement of the cap, natural sedimentation would produce a fine-grained mud substrate identical to the surrounding undisturbed shoal area. The large area of nearby undisturbed habitat would be a source of organisms to recolonize the CDF. The organisms that live burrowed in the substrate, while lacking mobility, may have early life stages that are carried by tidal currents to new areas. There organisms are also moved about when scour takes place through high current velocities and wave action associated with storms. Mobile organisms such as fish and shellfish would move into the area as soon as there is a natural substrate and food resources.

A study conducted in New York Harbor at the Passenger Ship Terminal (PST) showed that the recolonization of a dredged area is very rapid, with productive habitat conditions reestablished in a matter of months (Parish and Weiner, Inc. 1989). The PST is dredged annually to provide adequate depth for berthing large cruise ships. An interpier basin at the PST was sampled for fish and invertebrates just prior to dredging in April and sampled again the following fall and winter. There was no substantial difference in the

abundance of fish and epibenthos between these two surveys even though approximately 5 ft (1.5 m) of sediment had been removed after the first survey. Interpier basins in the Harbor have been found to be important habitat for fish and invertebrates despite the fact they have been subjected to repeated disturbances through dredging. The shoal areas disturbed for the CDF in Newark Bay should recover to useful habitat after several months and be fully recovered in approximately one year. The compaction of the dredged material within the pits would cause the cap to settle approximately 3.5 ft (1.1 m) in the first two years. This settlement will create a depression in the area of each CDF. Sedimentation in the depression may be somewhat greater than in surrounding shoal areas, but the habitat formed would be attractive to aquatic life and a normal complement of organisms would use the area. Their use of the area would continue as the depression fills with sediment, and reaches equilibrium with the surrounding shoals.

4.06.2 EXPOSURE TO CONTAMINANTS

A major factor in the potential exposure of aquatic life to contaminants released during the construction and operation of the CDF is the movement and migratory patterns of the organisms. Many fish and some invertebrates cover broad areas in their search for food and often larger areas associated with their reproductive cycles. The fish community in the New York Harbor/Newark Bay complex can be characterized as transient in that very few species remain in an area as small as Newark Bay throughout their life cycle. Most species, in fact, move into and out of Newark Bay seasonally or over shorter intervals of time.

Invertebrates generally cover relatively small distances compared to fish, but the epibenthos (those invertebrates which move over the bay bottom) can cover substantial distances daily and seasonally. Crabs and a variety of small crustaceans (shrimps) can crawl, swim, or be carried by tidal flows as they respond to a variety of environmental cues. Benthic organisms that live burrowed in the substrate (infauna), in contrast, do not make regular movements, which makes them particularly susceptible to dredging effects and contaminant exposure.

All aquatic organisms present in Newark Bay for all or part of their life cycle are exposed to the widespread, residual chemical contamination present in the water column and sediments. The construction and operation of a CDF constitutes a new source of potential exposure. The following discussion focuses on a CDF, with the existing residual contaminants considered as background conditions. Section 4.24 addresses cumulative effects, including the interactions of the NBCDF and the existing residual contaminants in the Newark Bay system.

Table 4.06-1 lists the fish species commonly found in Newark Bay and provides a description of their movement/migration patterns. This list contains the most common species based on Newark Bay fish sampling studies, summarized in Section 3.06. The movement patterns are based on the known life histories of these species. All the species

Table 4.06-1

Common Fish Species in Newark Bay and Their Movement/Migration Patterns

Species	Movement/Migration Patterns
Striped bass	Juveniles on shoals and in channels from April through Novemeber. Juveniles move off shoals in winter, concentrate in channels. Bass may move out of Bay during very cold weather. Juveniles move around while feeding.
Winter flounder	Present in Bay during cool water temperature conditions; move out of Bay and shore during summer.
Summer flounder	Move into Bay during summer months and offshore during winter.
Bay anchovy	Pelagic in Bay during summer and early fall, reproduces in open water of Bay; migrate back to ocean in fall.
American shad	Adults run upstream in spring, but runs in Passaic and Hackensack Rivers are minimal; if any at all. Young are present in fall from spawning elsewhere, young migrate to ocean before winter.
Bluefish	Juveniles move into Bay from offshore spawning; are present in summer and fall; migrate back to ocean in fall.
Alewife	Adults migrate up rivers to spawn in spring, but little or no runs in Bay tributaries; juveniles occur in fall prior to migrating to ocean.
Atlantic silverside	Common in Bay during summer and early fall, move offshore in winter.
White perch	Prefers low salinity water upstream of Bay, common in Bay during winter and when freshwater runoff produces low salinity conditions.
Atlantic tomcod	An estuarine species common in Bay and Hudson River. Also a winter spawner in low salinity water, early juveniles carried downstream into higher salinity areas. Spawning population in Newark Bay tributaries is probably small.

listed can be expected to move through the Bay, but not have lifelong residence in the Bay. The grubby and killifish are exceptions in that they live out their lives in a relatively small area. Killifish were not collected in the recent fish sampling program, but are known to be residents of the Bay. The sampling program was conducted in open-water areas and the killifish prefers shallow shoreline areas and tidal creeks. This limited distribution will limit this species' exposure to contaminants released at the NBCDF, which will be an open-water site. Grubby are found exclusively in the channels, which would limit their exposure to the CDF.

The movements and migrations of the majority of fish species using the Bay are related to migrations of adults to spawning grounds, the migration of juvenile fish away from spawning grounds, responses to temperature and salinity changes, onshore/offshore movements for access to seasonal habitat areas, and general dispersal patterns by species that are pelagic or follow watermass movements. The actual exposure of individuals to the NBCDF will depend on how the sequence of activities at the project site corresponds to the movement/migration patterns of the various species.

The recent sampling conducted in Newark Bay (Section 3.06) shows that there is very little use of shoal habitat by fishes during the winter months. Shoal areas are used heavily from April through October. The channel areas are used heavily by a few species in the winter, but overall use of the Bay by fishes is very low from December through March. Striped bass and white perch were abundant during the writer months. This general pattern of use is reflected in the species movements described in Table 3.06-13. The species that occur from April through late fall have movement patterns that would permit exposures to the NBCDF ranging from weeks to the entire period from spring through fall.

However, the exposure of individuals to dredging and disposal operations will be primarily a chance encounter as the various species move about the Bay. The majority of individuals can be expected to use the Bay without encountering the activities at the CDF because the work area represents a very small area of the Bay. Some species may take advantage of the bottom disturbance to feed on organisms exposed by the initial dredging at the CDF, but generally fish can be expected to avoid the disturbance in the vicinity of the CDF. The activities at the CDF would not produce conditions that would attract fish and shellfish for extended periods of time. As long as the species undertake their normal movement and migration patterns, their exposure to elevated levels of contaminants would be of short duration. This level of exposure should not be any greater than their exposure to residual chemical contaminants on a day-to-day basis in Newark Bay.

Initial dredging for the CDF would occur in areas with low levels of contamination. The underlying sediments are clean, and thus the construction of the pits to their selected depth would not cause an increase in contaminant levels in the vicinity of the CDF. The dredged material brought to the site for disposal would be contaminated at relatively high

levels; however, the contamination levels would be similar to average background levels in the Bay. The placement of this material in the pits has the potential to release a small quantity of the contaminants to the surrounding water.

The food habits of fish and shellfish are a factor in the potential exposure to and uptake of contaminants. Bottom-feeding fish and shellfish have the potential to accumulate more contaminants than species that feed in the water column because concentrations of contaminants are greater in the sediments than in the overlying water. Benthic organisms, through their feeding, concentrate the contaminants, creating a source of contamination for fish that feed on them. Most of the fish and crabs found in Newark Bay feed on the bottom. This is a common feeding location for juvenile fish of many species and some adults. Striped bass, for example, feed on benthic organisms as juveniles, but switch to a diet of fish as they grow larger, whereas Atlantic tomcod feed on bottom organisms throughout their life.

The fish and shellfish using Newark Bay for habitat would be exposed to varying concentrations of contaminants as they move about the Bay feeding in different areas. The CDF, while it is receiving dredged material for disposal, would be an area of relatively high contaminant concentration, but the sediments would have been thoroughly mixed in the process of dredging and mixed again in the dumping of the material into the pits. Any remaining organisms that might serve as food for fish or shellfish would be buried in the dredged material. The constant addition of new dredged material would not allow the site to be recolonized before new material is added. In addition, the ongoing activity at the CDF during construction and operation would be beneficial in that the continual disturbance would render the site(s) unattractive to fish and shellfish for feeding.

Capping of the CDF would isolate the contaminated sediments preventing exposure to aquatic life. Sedimentation on top of the cap would establish a substrate that is suitable for recolonization by benthic invertebrates and the site would return to its former function as a feeding area for juvenile fish and shellfish. The formation of this new sediment substrate would result in the deposition of contaminants from upstream sources. After this area stabilizes the contaminant levels are likely to return to average levels in the Bay unless upstream sources are remediated.

4.07 WILDLIFE

4.07.1 DUCKS

Ducks area seasonal visitors to Newark Bay, with the period of residence generally limited to migratory feeding stops. Feeding by diving and puddle ducks is confined to the extensive shallow areas of the Bay, with the primary feeding areas located along the Bayonne shore area, north of the two Bay bridges, around the mouths of the Passaic and Hackensack rivers, and in the southwest corner of the Bay near Elizabeth Port. Breeding in the Bay is limited due to the small amount of preferred vegetated shoreline habitat.

Impacts to duck populations related to the development of the NBCDF would be minimal. The proposed NBCDF area can be used by ducks for feeding; however, the area is not a preferred feeding area due to the extensive amount of commercial activity associated with Ports Elizabeth and Newark. The temporary loss of the area resulting from the development of the NBCDF would have minimal impact on duck populations as the area represents only a small percentage of the available duck feeding area of Newark Bay. The development of the NBCDF has the potential to minimally benefit duck populations through the reduction of contaminated sediments.

4.07.2 NORTHERN DIAMONDBACK TERRAPINS

The project impact on northern diamondback terrapins is expected to be minimal because the species is an area transient. Terrapins may move through the CDF area during migrations; however, their presence has not been documented.

Northern diamondback terrapins may be attracted to dredging operations by the prey organisms stirred up; however, the NBCDF area is relatively small and is located in an area where transient turtles are not expected to travel.

Terrapins nest in sandy substrate above the high tide. Because of minimal quality and quantity of nesting habitat in nearby shoreline areas it is unlikely terrapins would nest near the CDF site. In any case, marginally suitable nest sites would not be disturbed by the CDF project because all activities are confined to open water. Hatchling terrapins could be impacted by mechanical operations if they moved through the project area during dredging or filling. This is unlikely to occur because of the lack of suitable nest sites near the project area.

4.07.3 GULLS, TERNS, AND CORMORANTS

The project impact on gulls, terns, and cormorants is expected to be minimal because these species use open water throughout the Bay. During the short term, these species will be displaced from the project area by dredging and filling operations.

The project area over the long-term would revert back to shoal habitat, attracting the same species that were found prior to the project. This would occur within a few months after the CDF is capped with clean dredged material and natural sedimentation and recolonization by benthic organisms occurs.

4.07.4 RAPTORS (EXCLUDING THE PEREGRINE FALCON), SHOREBIRDS, RAILS, AMERICAN COOT, GREAT BLUE HERON, AND GREEN-BACKED HERON

The occurrence of raptors, shorebirds, rails, coots, and herons in the CDF project area is considered unlikely because the area contains, at best, only marginal habitat for these species. The only short-term impact on these species is the potential for migrating birds to collide with tall equipment, such as cranes, and the possibility that some raptors, such as osprey or American kestrels would land on tall equipment and could become contaminated with petroleum lubricants, oils and greases. These are both considered unlikely occurrences.

4.07.5 MARINE MAMMALS

The occurrence of marine mammals, other than an occasional harbor seal or harbor porpoise, is not expected due to the long, narrow channels and remoteness of the Bay from the marine waters. The potential, though remote, for transient marine mammals to be affected by the project would be limited to the short-term dredge and fill operation. Mechanical injury or burial is unlikely because of the small area and slow movement of equipment. Collisions between tugs and marine mammals are unlikely to occur because marine mammals are strong and fast moving.

4.07.6 MARINE TURTLES

Juvenile marine turtles may be late spring to fall visitors to the Newark Bay area (Schoelkopf, pers. commun., 1996). Marine turtles can be entrained and killed during dredging operations (Schoelkopf and Stetzar 1995). Marine turtles attracted to dredging operations by food may be struck by boats or propellers (Schoelkopf, pers. commun., 1996).

There are no long-term impacts expected as the project area reverts back to its original condition. One minimal positive impact of the project would be a reduction in the

contamination of the food source (blue crabs and molluscs) in Newark Bay and New York Harbor.

4.08 BENTHOS

Development of the NBCDF will involve dredging existing sediments to create the disposal pits, depositing dredged material in the pit, and capping the completed pit with clean dredged material. The elevation of the completed pit would approximate the existing bottom contours and thereby maintain current water depths and hydrographic conditions. In addition, it is proposed that the disposal pits would be open for a short period of time.

Direct impacts to the benthic community from development of the NBCDF could include the permanent or temporary loss, or permanent alteration of aquatic habitat in the footprint of the CDF. Temporary loss of benthic habitat is a less serious impact than a permanent loss because it minimizes the impact to aquatic habitat function, i.e., bottom-feeding predators would suffer a temporary loss of prey until the area is repopulated after the completion of activities at the site.

The initial NBCDF dredging activities would result in the elimination of the organisms that occupy the construction area, and benthos in the immediate vicinity of the CDF would be influenced by stress gradients (McCall 1977), including sedimentation of suspended dredged material, scouring, and periodic disturbances (e.g., dredging activities, boat traffic). Benthic studies conducted in Newark Bay have determined that the benthic community has low overall species diversity, with polychaete worms dominating. No difference was found in the composition of the benthic community between the shallow-water habitat, characteristic of the proposed NBCDF sites, and deeper-water locations in maintained navigation channels. The overall similarity of the Newark Bay benthos provides a vast reservoir of individuals to recolonize the disturbed area. In addition, studies conducted before and after maintenance dredging activities indicate that repopulation is rapid, with no long-term observable alteration in species composition or seasonal abundance patterns.

Dredging at the NBCDF sites would utilize environmentally acceptable equipment and techniques, which would minimize potential impacts on the benthos in the immediate vicinity of the NBCDF sites. The shallow nature of the proposed CDF sites would minimize impacts on the benthos because the pits would act as a natural berm and vessels would be restricted to the Navigation Channel or in the pits. Life cycle activity of benthic infauna is generally limited to the top few centimeters of the bottom sediments (Carreker 1967). Given the limited sediment activity depth of the benthic organisms that would colonize a completed CDF cap, the potential for bioaccumulation of contaminants from the buried dredged material is negligible, and therefore upper trophic level bioavailability would be negligible.

Because the CDF development options result in the final CDF site elevation approximating the current site elevation and not exceeding the high water elevation, there will be no permanent loss of benthic habitat or associated functions. In fact, depending on

the capping material used, potential enhancement of the benthic community - changes in organism abundance and diversity - are possible. In addition, the NBCDF development areas constitute a relatively small percentage of the shallow-water habitat in Newark Bay which indicates minimal impact on the Newark Bay benthic community and on benthic predators that are mobile and thus capable of feeding in undisturbed areas for the short duration that the NBCDF is in operation.

4.09 HAZARDOUS WASTE SITE(S)

To assist in the identification of hazardous waste sites near the proposed NBCDF, LMS obtained a report from Environmental Risk Information & Imaging Services (ERIIS), a company specializing in the performance of database searches for location of current or potential hazardous waste sites. A search for listed hazardous waste sites and potential hazardous waste sites was performed by ERIIS for an area encompassing a 5-mile (8-km) radius around the proposed NBCDF. The following databases were searched as part of the service provided by ERIIS:

- ***National Priorities List (NPL).*** Also known as the Superfund List, this database is an EPA listing of uncontrolled or abandoned hazardous waste sites.

- ***Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS).*** A comprehensive listing of known or suspected uncontrolled or abandoned hazardous waste sites. These sites have either been investigated or are currently under investigation by EPA for the release, or threatened release, of hazardous substances.

- ***Toxic Release Inventory (TRI) System of 1992.*** The TRI report contains information concerning the industrial release and/or transfer of toxic chemicals as reportable under Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III).

- ***New York Inactive Hazardous Waste Disposal Sites (NYHWS).*** Contains summary information pertaining to those facilities that are deemed potentially hazardous to the public health and welfare by the New York State Department of Environmental Conservation (NYSDEC).

- ***New Jersey Known Contaminated Sites List (NJHWS).*** A comprehensive report of approximately 6000 sites in the State of New Jersey where contamination of soil or groundwater has been confirmed and where cleanup efforts have either begun or are pending.

Other databases were also searched but the ones cited above are the most pertinent for the objectives of this FEIS. The following table summarizes the number of sites found within each of the above databases that were close to Newark Bay, Passaic River, Hackensack River, Kill van Kull and the Arthur Kill:

Database Searched	Number of Sites Found Along Newark Bay, Passaic and Hackensack Rivers, Kill van Kull and Arthur Kill
NPL	5
CERCLIS	10
TRI	3
NYHWS	0
NJHWS	14

Table 4.09-1 provides descriptions, threats and contaminants, response action status,and environmental progress for the five NPL sites within a 5-mile (8-km) radius of the proposed NBCDF; Figure 4.09-1 shows their locations.

Table 4.09-2 summarizes the locations of the 10 CERCLIS and 14 NJHWS sites and Figures 4.09-2 and 4.09-3, respectively, show their locations. These data bases do not provide specific information on types of contaminants present and potential for migration to water bodies.

The TRI database search resulted in 65 sites with reported releases within the 5-mile (8-km) radius as of 31 December 1992. However, of these 65 sites only three reported releases to water, and only these are summarized in the following table.

Facility Address EPA #	Distance From Site Discharge Location	Chemicals Released to Water	Quantity (lbs)
Goody Products, Inc.	4.5 miles	Nickel compounds:	5
999 Newark Tpke.	Passaic River	Glycol ethers:	17,334
Kearny, NJ 07032			
NJD001340876			
Allied-Signal, Inc.	2.4 miles	Dichlorodifluoromethane:	7
10 North Ave E	Elizabeth River	Dichlormethane:	36
Elizabeth, NJ 07201		Acetone:	30
NJD002451490		Trichloroethylene:	66
		1,1,1-Trichloroethane:	153
		Dichlorotetrafluoroethane:	5
		Trichlorofluoromethane:	782
Rona, Inc.	2.6 miles	Ammonium nitrate:	240,000
4 Hook Rd.	Kill Van Kull		
Bayonne, NJ 07002			
NJD080619067			

Table 4.09-1 (Page 1 of 3)

Description of National Priorities List (NPL) Sites within 5 miles Radius of Proposed Project Site

Site Name:	Syncon Resins
Address:	77 Jacobus Ave
	Kearny, NJ 07032-4512
EPA ID Number:	NJD064263817
Map ID #:	38
Distance from Project Site:	3.71 Miles
Site Description:	The site encompasses approximately 15 acres and is located on the peninsula formed by the Passaic and Hackensack River. In addition to the buildings on site there were two unlined lagoons, numerous large bulk storage tanks, underground storage tanks and at least two chemical reactor buildings. The site also contained approximately 12,800 55-gallon drums, some of which had rusted spilling their contents onto the soil. The Syncon Resins facility produced Alkyd resin carriers for pigments, paints and varnish products. In the production process excess xylene or toluene was separated from wastewater and reused. Remaining wastewater was pumped to an unlined lagoon to evaporate or percolate into the soil. Soil investigations of the site have found that there is extensive contamination of the groundwater and soil.
Threats and Contaminants:	Groundwater is contaminated with VOCs including toluene, xylene, TCE and heavy metals such as lead and nickel. Contaminants in the sediments include heavy metals, VOCs and PCBs. Soil is contaminated with the pesticides DDT and Aldrin as well as heavy metals, VOC and PCBs. Potential health threats exist through direct contact, inhalation of contaminated dust and accidental ingestion of soils. The site is situated within a coastal wetland area which could be at risk from contaminant runoff.
Response Action Status:	Between late 1982 and early 1984 the State removed all of the exposed 55 gallon drums, cleaned up the lab area and stored the materials found on site. In early 1990 the site was fenced to provide additional security. The following remedies for site cleanup were performed: in 1986 the contents of the storage tanks and vessels were removed for offsite disposal; decontamination of buildings and tank structures; excavation of lagoon liquids, sediments and contaminated surface soil with disposal off site; installation of a cover over the site that allows natural flushing of underlying soil and groundwater contaminents, collection and treatment of contaminated water from the shallow aquifer with discharge to the Passaic River. The State and EPA are evaluating the need for further studies to identify the most appropriate methods to increase the effectiveness of the flushing program.
Environmental Progress:	EPA has determined that the site is safe to the surrounding community and the environment but is still evaluating methods that will make natural flushing of soil and groundwater more effective.
Site Name:	Diamond Alkali Co
Address:	80 Lister Ave
	Newark, NJ 07105-4524
EPA ID Number:	NJD980528996
Map ID #:	63
Distance from Project Site:	3.78 Miles
Site Description:	The Diamond Alkali co. owned and operated a pesticides manufacturing facility at 80 Lister Ave in Newark adjacent to the Passaic River. The property has been used for manufacturing by numerous companies for more than 100 yrs. The mid 1940s marked the beginning of the manufacturing operations related to the current site conditions including the production of DDT and phenoxy herbicides. The Diamond Alkali Co. later known as Diamond Shamrock acquired the property in 1951 and produced various chemicals and pesticides until 1969 when the company ceased operations. Subsequent owners used the property until 1983 when sampling at the site revealed high levels of Dioxin. Municipal water is drawn from the Wanaque Reservoir, roughly 35 miles from the site.

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Table 4.09-1 (Page 2 of 3)

Description of National Priorities List (NPL) Sites within 5 miles Radius of Proposed Project Site

Threats and Contaminants:	Dioxin, pesticides and other hazardous substances have been found in the soil at 80 Lister Ave and to a lesser extent at 120 Lister Ave. Other properties in the area were also contaminated by Dioxin but cleanup work has been completed. At these properties the Dioxin contaminated soil and debris resulting from the cleanup work is now stored in containers at 120 Lister Ave. Dioxin has also been found in sediment samples taken from the Passaic River and from nearby waterways.
Response Action Status:	Exposed soils on the property were covered with geofabric to prevent potential migration of contamination at other properties. Dioxin contaminated soils and debris were removed by excavation, vacuuming and other means and were transferred to 120 Lister Ave for storage. In 1987 EPA selected an interim remedy for the 80 and 120 Lister Ave. properties that relies on construction of a slurry wall around the properties, installation of a cap over the properties and pumping and treating the groundwater to reduce the migration of contamination.
Environmental Progress:	Securing the property and covering the contaminated soils at 80 Lister Ave. reduced the potential for off site migration and on site contact. The cleanup work that removed contaminated soil and debris from other properties in the area reduced the potential for contact with contaminated materials on those properties.
Site Name:	White Chemical Corp.
Address:	660 Frelinghuysen Ave
	Newark, NJ 07114-1324
EPA ID Number:	NJD980755623
Map ID #:	100
Distance from Project Site:	3.81 Miles
Site Description:	The White Chemical Corp. site is a 4.4 acre inactive facility that formerly manufactured acid chlorides and flame retardant compounds. WCC operated the facility from 1983 until July 1990 when it ceased most operations. During its operational years WCC was issued numerous violation of RCRA by NJDEP. Initially, EPA found over 10,000 55-Gal drums and other containers of hazardous substances precariously stacked or in other ways improperly stored. Throughout the site, drums and other containers were found in various stages of deterioration, fuming or leaking their contents onto the soil.
Threats and Contaminants:	Site circumstances suggested that the previously unstable situation could have led to a catastrophic release of hazardous material that would likely have affected the surrounding community.
Response Action Status:	In early 1993 the potentially responsible parties completed all cleanup activities associated with surface contamination including removing 7,787 drums of hazardous substances, 4,497 empty drums, the contents of 191 tanks and wells, 58 gas cylinders and 14,806 laboratory containers.
Environmental Progress:	Removal of surface contamination has reduced the risk to people and the environment while further studies to determine final cleanup remedies for the remainder of the site are being planned.
Site Name:	PJP Landfill
Address:	400 Sip Ave
	Jersey City, NJ 07306-6729
EPA ID Number:	NJD980505648
Map ID #:	56
Distance from Project Site:	4.276 Miles
Site Description:	The PJP landfill covers 87 acres in Jersey City. The site may have been used as early as 1968 to dispose of an unknown quantity of chemical & industrial wastes. The site is bordered by the Hackensack River on the West. The river is used for boating and for commercial shipping.

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Table 4.09-1 (Page 3 of 3)

Description of National Priorities List (NPL) Sites within 5 miles Radius of Proposed Project Site

Threats and Contaminants:	The shallow water in the vicinity of the site is contaminated with the heavy metal chromium, phenols, various pesticides & volatile organic chemicals (VOCs). The leachate from the site is contaminated with VOCs including benzene & chlorobenzene & the heavy metal lead. The deeper groundwater has not been significantly impacted by the landfill.
Response Action Status:	Interim cleanup actions involving major excavation work & capping were conducted by the state in early 1986 to extinguish landfill fires. In addition, a gas venting system was installed to prevent the buildup of gases under the landfill surface entire site. All phases of the site investigation, which included field sampling of groundwater, sediment , soil & surface water from the Hackensack River have been completed. A plan for the final remedy is being proposed.
Environmental Progress:	Initial actions to extinguish underground fires at the site & the installation of a gas venting system have reduced the potential for exposure to hazardous contaminants at the site.
Site Name:	Chemical Control
Address:	23 South Front Street
	Elizabeth, NJ 07202-3007
EPA ID Number:	NJD000607481
Map ID #:	8
Distance from Project Site:	4.32 Miles
Site Description:	The Chemical Control site consists of a 2 acre parcel of land adjacent to the Elizabeth River. The site was formerly a marsh, is flat and barely above sea level. The surrounding area is mostly industrial. From 1970 to 1978 Chemical Control operated the site as a hazardous waste storage, treatment and disposal facility accepting various types of chemicals including acids, arsenic bases, cyanides, flammable solvents, polychlorinated biphenyls, compressed gases, biological agents and pesticides. Chemical Control was cited for discharge and waste storage violations in 1979. The state of NJ initiated a site cleanup that included bulk solids and liquids drums at and below the soil surface, gas cylinders, infectious wastes, radioactive wastes, highly explosive liquids, debris, tanks and 3-ft of soil that was excavated. Soil areas were replaced with a 3-ft gravel cover. An explosion and fire in 1980 interrupted the site cleanup and created additional cleanup needs by destroying the site and reportedly launching drums of burning waste in the air. Contaminated runoff from firefighting efforts entered the Elizabeth River. After the fire and explosion cleanup was accelerated and was completed in 1981.
Threats and Contaminants:	The sediments of the Elizabeth River and the on site soils were contaminated with volatile organic compounds, pesticides, acid and base neutral extractables and metals. The subsurface soil was contaminated with VOCs. Eating contaminated fish, shellfish, crabs and other marine organisms, and direct contact with sediments in Elizabeth River was a potential health threat. Other industrial pollution sources in the area probably contributed to contamination of the Elizabeth River.
Response Action Status:	The EPA performed immediate actions at the site to ensure public and environmental safety which involved decontamination of box trailers and containment and removal of gas cylinders. EPA reconstructed storm sewer catch basins and grates, constructed curbing to prevent runoff of contaminated sediments.
Environmental Progress:	EPA has performed numerous immediate actions and eliminated the source of contamination at the site which have reduced the potential for exposure to hazardous materials. The EPA is presently overseeing maintenance activities and has determined that the site is safe.

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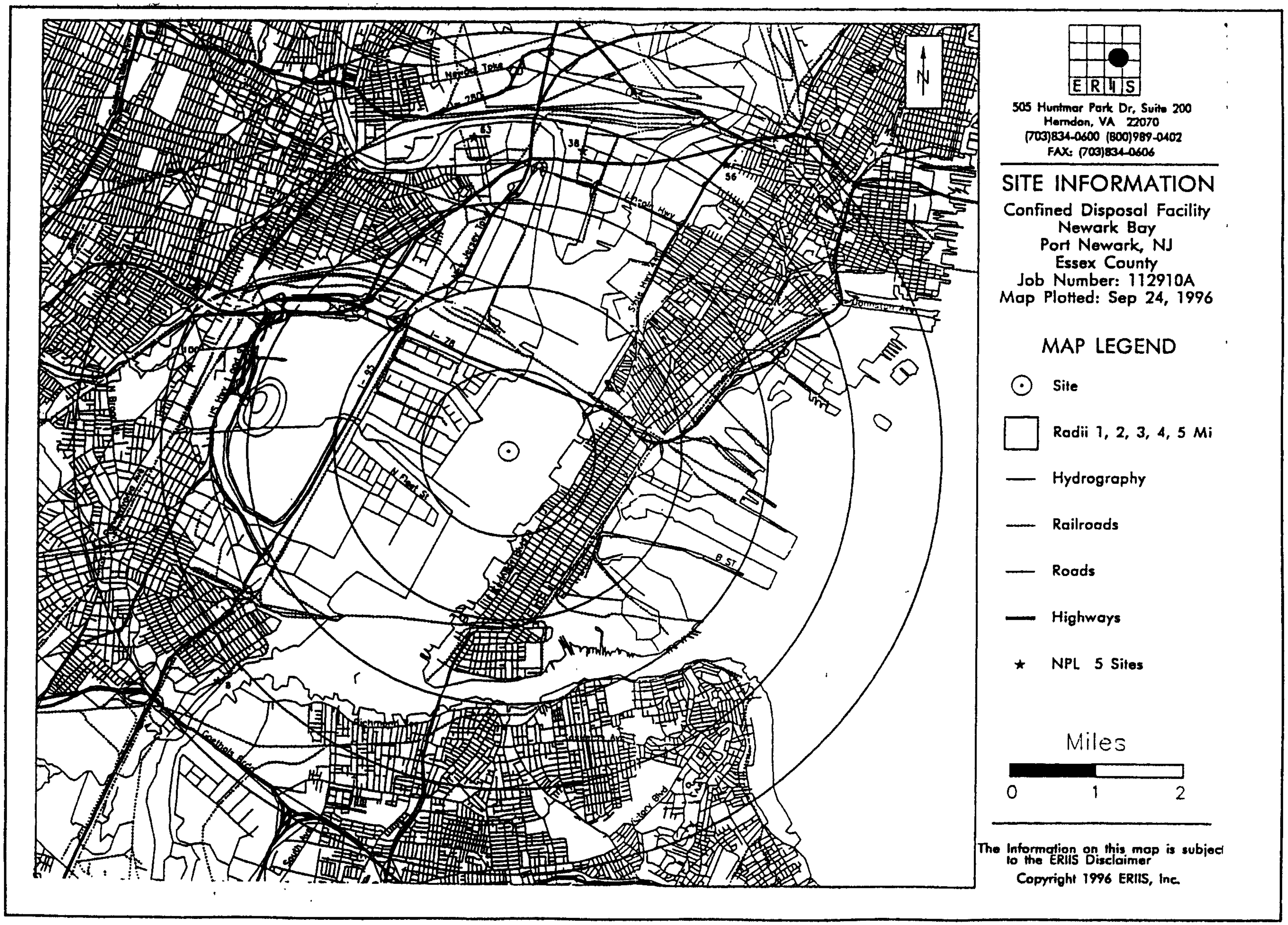

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Figure 4.09-1
National Priorities List Sites in Vicinity of Project Area

Table 4.09-2 (Page 1 of 4)

Summary of CERCLIS and HWS Facilities Within 5-mile Radius of Proposed Project

Facility Address EPA #	Distance from Site Map ID Number	Description	
CERCLIS Database			
Roosevelt Drive-in Route 440 Jersey City, NJ 07305 NJD030250484	2.5 miles Map # 328	Discovered: Inspected:	12/1/80 08/01/82
Standard Tank Cleaning Corp 1 Ingham Ave Bayonne, NJ 07002 NJD068292648	2.58 miles Map # 422	Removal Action: Inspected:	12/12/94 09/25/90
Pitt-Consol Chemical Co. 191 Doremus Ave Newark, NJ 07105 NJD004948188	2.96 miles Map # 289	Discovery: Inspected:	06/01/81 03/31/85
AT&T Technologies 100 Central Ave Kearny, NJ 07032 NJD002139053	3.8 miles Map # 168	Discovery: Prelim. Assess:	11/1/91 09/29/92
American Chrome & Chemicals 155 Front St Elizabeth, NJ 07206 NJD000764910	3.8 miles Map # 113	Discovery: Prelim. Assess:	01/29/92 09/24/92
Perk Chem Co. Inc. 217 S 1st St Elizabeth, NJ 07206 NJD002200046	4.31 miles Map # 229	Discovery: Prelim. Assess: Inspected:	06/01/79 05/22/89 03/28/91

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USACE0007324

USACE-0009308

Table 4.09-2 (Page 2 of 4)

Summary of CERCLIS and HWS Facilities Within 5-mile Radius of Proposed Project

Facility Address EPA #	Distance from Site Map ID Number	Description	
CERCLIS Database (*Continued*)			
St. Paul Ave. Trailer Site Duffield Ave & St Paul Ave Jersey City, NJ 07305 NJ0001039676	4.8 miles Map # 38	Removal Action:	05/01/95
Borne Chemical Co. 632 S Front St. Elizabeth, NJ 07202 NJD002167237	4.89 miles Map # 200	Discovery: Site Inspection:	06/01/80 08/24/81
Standard T Chemical 2600 Richmond Terrace Staten Island, NY 10303 NYD001601327	3.39 miles Map # 129	Discovery: Prelim. Assess.:	08/24/90 09/25/91
Berman Enterprises 2945 Richmond Terrace Staten Island, NY 10303 NYD986936953	3.63 miles Map # 640	No information provided	
NJHWS Database			
Darling Delaware Company Inc. 825 Wilson Ave Newark City, NJ NJD986602316	2.025 miles Map # 2261		
Hudson County Chromate 125 60 Kellogg St Jersey City, NJ 07305 NJL000001255	2.34 miles Map # 2903		

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USACE-0009309

Table 4.09-2 (Page 3 of 4)

Summary of CERCLIS and HWS Facilities Within 5-mile Radius of Proposed Project

Facility Address EPA #	Distance from Site Map ID Number	Description
NJHWS Database (*Continued*)		
Quantun Chemical Corp. USI Div 300 Doremus Ave Newark City, NJ NJL600163513	2.7 miles Map # 2360	
NJ Bell Telephone Newark City 268 Doremus Ave Newark City, NJ NJL840001556	2.77 miles Map # 2341	
Jersey City, NJ 07305 NJL800003683	2.93 miles Map # 2805	
Blue Circle Atlantic Incorporated 194 to 200 Doremus St. Newark City, NJ	2.95 miles Map # 2231	
Rollins Leasing Corp. Br 207 299 Roanoke Ave Newark City, NJ NJD067519025	3.06 miles Map # 2363	
Avon Drum Company 185 Foundry St. Newark City, NJ NJD000000000	2.98 miles Map # 2224	
Industrial Petrochemicals Inc. 128 Doremus Ave Newark City, NJ	3.108 miles Map # 2304	

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Summary of CERCLIS and HWS Facilities Within 5-mile Radius of Proposed Project

Facility Address EPA #	Distance from Site Map ID Number	Description
Getty Refining & Marketing Corp. 86 Doremus Ave Newark City, NJ	3.213 miles Map # 2289	
Hudson County Public Safety & Health Building 549 Duncan Ave Jersey City, NJ 07306	3.89 miles Map # 2877	
Entin Associates 265 Broadway Jersey City, NJ 07306 NJL800011660	4.517 miles Map # 2849	
West End Gas Works Saint Pauls & Duffield Ave Jersey City, NJ 07306 NJD981084817	4.82 miles Map # 3047	
Hudson County Chromate 86 123 Duffield Ave Jersey City, NJ 07306 NJL000071266	4.96 miles Map # 2952	

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The previously summarized NPL, HWS, and CERCLIS sites as well as the TRI sites represent areas with the potential for contributing toxic contaminants to Newark Bay or waters contiguous to the Bay. There are other sources of contamination to Newark Bay, including deposition from the air and rain, upstream sources in the Passaic, Hackensack and Elizabeth rivers as well as existing contaminated sediments of Newark Bay.

It is not anticipated that these sites or any other unidentified sites will have a particular impact on the proposed NBCDF. Contamination in Newark Bay comes from numerous sources, all of which contribute to sediment contamination. After the proposed NBCDF is closed it can be anticipated that clean cap material would eventually equilibrate to contaminant concentrations similar to those in the surrounding sediments.

However, it is possible that some catastrophic event could result in the discharge of contaminants, a portion of which would deposit at the proposed CDF site. Such an event could result in contamination of sediments during construction, operation, or closure that could require remediation. However, the chances of such an event are small and because most of the identified sites are several miles from the proposed NBCDF area, released contaminants would be subject to substantial dilution before impacting the proposed CDF area.

4.10 WETLANDS

No impacts on defined jurisdictional wetlands are anticipated as a result of NBCDF construction, dredging to fill the CDFs (so long as all dredging takes place in defined navigational channels and/or berthing areas), or CDF capping so long as proper dredging and sedimentation control procedures (see Section 5.08; Mitigation Measures) are employed and followed.

Secondary impacts that could occur as a result of Newark Bay Complex dredging and NBCDF construction activity may include temporary displacement of wetland-oriented wildlife, short-term increased sedimentation, and temporary smothering of benthic organisms and loss of fish habitat as a result of sedimentation. Potential fisheries impacts are discussed in Section 4.06 and impacts on benthos are discussed in Section 4.08. Waterfowl that currently use the shallow area north of the Elizabeth Channel as a feeding site will be temporarily displaced until the project is completed and benthic macroinvertebrate populations reestablish themselves. Adequate alternate habitat for foraging currently exists in the vicinity of Shooters Island and the Hudson County and Bayonne City parks to accommodate any displaced waterfowl or shorebirds. Due to the amount of existing boat traffic and development in the area, the noise and human presence associated with the dredging and fill operations is not expected to be a factor in the displacement of waterfowl. Increased sedimentation and smothering of benthic organisms may occur if materials suspended by the dredge and disposal operations are transported out of the work area and are deposited in low-velocity areas. Deposition of project-generated sediments is not expected to be significant due to the proposed mitigative measures (outlined in Section 5.08) and the currents in the navigation channel located east of the work area that would transport any sediments away from the tidal flats east of the channel.

4.11 ENDANGERED AND THREATENED SPECIES

4.11.1 LEAST TERN

Least terns may feed on bay anchovy and other small surface fish in the NBCDF area (see Section 3.06). The potential impact to least terns is minimal because dredging and disposal activities would drive schools of small fish from the project area to other areas where terns could continue to forage. The project area has not been identified as a significant or high-use area for least terns, further reducing any potential impacts caused by the proposed projects.

4.11.2 PEREGRINE FALCON

The project could have adverse impacts on falcons during the construction phase. Several New York City area falcons have been injured or killed after perching on the tops of cranes or areas with exposed petroleum lubricants. Birds can ingest oil and grease indirectly when eating prey contaminated by the perch or their own contaminated feet. Falcons can also become coated with oils and grease, resulting in the loss of flight ability. This impact can be mitigated by employing bird-exclusion devices where falcons and other birds may perch. Collisions with dredging equipment are not likely to occur because of the peregrine's flight ability and the slow speed at which heavy equipment moves. The overall project effect on peregrine falcon, will be minimal.

Project operation (long-term impact) is not expected to have any detrimental impact on the peregrine falcon because the project is over 2 miles (3.2 km) from existing nest boxes and because the area will be left as natural habitat. Positive impacts on the peregrine falcon will result from slight reductions in contamination of potential prey species feeding on benthic invertebrates in the CDF area. Capping with clean material may reduce overall average pollution concentrations in prey species.

4.12 CRITICAL HABITATS AND MARINE SANCTUARIES

4.12.1 HARBOR HERONS COMPLEX

The Harbor Herons Complex located on Shooters Island (the nearest rookery, over 2 miles [3.2 km) south of the project area) would not be impacted by the proposed CDF project because of distance from the proposed project area. Wading birds originating from this rookery forage to the south and north. To the north, most wading birds utilize foraging areas in the Hackensack River marshes and shallows. These areas are over 4 miles (6.4 km) north of the project. To the south, foraging areas are over 1 mile (1.6 km) from the project area. The project area does not contain suitable habitat for wading birds. No wading birds were observed using the adjacent shoreline of Newark Bay as a foraging area.

4.12.2 FISH SPAWNING, NURSERY, AND FEEDING AREAS

The Newark Bay shoals area is used by a variety of fish for spawning, nursery, and feeding areas. The project will result in the temporary loss of approximately 56 acres (0.23 km^2) of contaminated shallow-water habitat. Newark Bay contains over 2800 acres (11.3 km^2) of similar habitat; therefore these species will continue to utilize available habitat in the Project vicinity and throughout Newark Bay and the NY/NJ Harbor Estuary. The short-term loss will not be a significant impact because of the amount of other similar habitat nearby.

4.12.3 ESTUARINE SHELLFISH BEDS AND PRODUCTIVE SUBTIDAL SHOAL AREAS

The proposed project would result in the temporary loss of up to 56 acres (0.23 km^2) of potential estuarine shellfish beds and productive subtidal shoal areas. The area temporarily lost represents 2% of the potential estuarine shellfish beds and productive subtidal shoal areas in Newark Bay. The short-term loss would not be a significant impact because of the amount of other similar habitat nearby.

The project over the long term would result in a minor positive impact for these habitats because contaminants available to the biota are reduced in the project area and in channel areas of the NY/NJ Harbor area.

4.13 AESTHETICS

No potential visual impacts were identified from the proposed project. The viewsheds surrounding the proposed NBCDF sites and Newark Bay will be maintained, with no change or impact to visual resources identified in the study area.

Visual resources viewed from the Bayonne waterfront, including the Newark Bay Bridge and Port Newark/Elizabeth marine terminals, will remain. Dredging activities associated with the proposed project, including crane operation, drilling, or dipper dredge operations, will maintain the industrial nature and backdrop of the existing viewscape. Machinery heights, including cranes, or drill rigs, will not exceed existing container cranes or steamship heights that currently dominate the western skyline.

The marine terminals at Port Elizabeth and Port Newark provide the closest viewshed of the immediate project area. However, views of Newark Bay and the project area from the terminal are often obstructed by container handling/storage operations and berthed steamships. Additional barge traffic and dredge operations associated with the proposed project will not impact the already restricted views from marine terminal piers. Viewers in this area are limited to longshoremen, steamship crews, and other marine terminal employees.

When the CDF has been capped at the end of the disposal operation, all equipment will be removed and views across the Bay will not be altered from existing conditions.

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4.14 CULTURAL RESOURCES/SECTION 106 COMPLIANCE

There are no previously reported archaeological sites, ship wrecks, or historic properties within the proposed NBCDF. Examination of historical maps indicates that, at least from the mid-19th century to the present, the proposed NBCDF location has been submerged. No development is shown within the area although development has occurred to the west.

Cultural resource investigations conducted in the Newark Bay area to the south of the proposed NBCDF areas have suggested the possibility that prehistoric cultural resources from the Paleo and/or Archaic periods may be located in undisturbed, shallow areas of the bay (Kardas and Larrabee 1976, 1980, 1985). Kardas and Larrabee's research indicates that Newark Bay shorelines have changed considerably since prehistoric times, and that previous shorelines may exist as deeply buried strata under water. Such shorelines may have been occupied by prehistoric populations. If cultural resources were located in the construction area, the project could have adverse impacts on any existing cultural resources during the construction period, although project operation (long-term) would not have adverse effects.

In order to analyze the prehistoric environment of an underwater project, it is common to examine the area's stratigraphy, as reflected in the data provided by subbottom cores. To comply with the request of NJHPO to complete a cultural resource investigation of the area, core logs and photographs of cores collected from the NBCDF area were reviewed and evaluated for evidence of cultural resources. No anthropomorphic material was observed (see Section 3.14). Examination of these materials constitutes an investigation pursuant to the requirements of 33 CFR, Part 325, Appendix C, paragraph 5.

If any anthropomorphic material is uncovered during construction of the NBCDF, work will immediately stop, and the National Park Service and NJHPO will be notified. Work will not be allowed to proceed until all data recovery stipulated by these agencies is completed.

4.15 AIR QUALITY

It is not expected that any of the activities associated with the development and operation of the proposed NBCDF will cause a contravention of applicable air quality standards or a measurable departure from existing conditions at the identified sensitive receptors. Any odors associated with dredging and disposal operations would probably be dissipated by the prevailing winds prior to reaching the receptors on the east side of Newark Bay. The proper maintenance of dredging and transportation equipment during the NBCDF development and operation phases will assist in reducing any localized air quality impacts.

4.16 FLOODPLAIN VALUES HYDROLOGY

The potential for impact of the NBCDF on floodplain values and hydrology is limited to the construction phase only because the bottom of Newark Bay will be restored to its pre-construction elevations. During construction, the areas would be dredged sequentially. A channel would be constructed from the current navigation channels and then widened and deepened for the CDF beyond this entrance channel. The entrances would be approximately 300 ft (91 m) wide at the top and 200 ft (61 m) wide at the bottom to allow for maneuvering of construction equipment.

The areas of the three CDFs in relation to the surface area of Newark Bay (4082.5 acres, 16.5 km^2) are:

	Surface Area		
CDF Area	Acres	km^2	Percent of Newark Bay (%)
1S	26.0	0.11	0.67
2S	20.9	0.08	0.51
2N	9.8	0.04	0.24
Total	56.7	0.23	1.34

If all three areas were open simultaneously, the deepened portion of Newark Bay is limited to a little more than 1% of the total area. The effect on hydrodynamics of the Bay would be localized changes in velocity near the preconstruction sediment-water interface (see Section 4.02). The streamlines of flow will veer only slightly downward into the top of the pits, and the deeper portion of the pits will have virtually stagnant water (Bokuniewicz et al. 1986). Therefore, the flow-through volume of the Bay remains virtually unchanged by pit construction. Tidal elevations are also expected to remain unchanged because of the limited localized change in velocity. Wave action imparted by high tides in the Harbor such as hurricane surges would not be changed by the NBCDF.

The movement of salinity from the Bay into the Passaic and Hackensack rivers will not be affected by the project. The hydrology of these rivers is also unchanged by the project, which is situated downstream of the mouths of these rivers. Because the tidal elevations of Newark Bay will not be altered, the floodplain would also be unaffected by the NBCDF.

Dredged sediments would not be deposited in the Bay other than in the CDF; thus, there would not be a decrease in the cross-sectional area for conveyance of water. The project would not have a short- or long-term adverse impact on hydrology and floodplain values.

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4.17 HUMAN HEALTH

4.17.1 DREDGING FOR CONSTRUCTION OF CDF

The potential for resuspension and movement of fine-grained sediments during dredging operations at the proposed NBCDF would not significantly increase the ecological and human exposure above existing Newark Bay levels. Best management practices during dredging and subsequent disposal in the CDFs would further ensure that suspended materials could be prevented from redistributing toward lower New York Harbor and Raritan Bay, decreasing the exposure of benthic organisms to dioxin and other contaminants (e.g., PCBs) in these areas.

4.17.2 DISPOSAL

Alternative 1 has a maximum storage volume of approximately 1.5 MCY (1.2 MCM) and Alternative 2 has a maximum storage volume of 0.41 MCY (1.8 MCM). Because these volumes are similar in scale, both alternatives are discussed together. Both alternatives would improve water quality and isolate contaminated surficial sediments from biota. However, the vastness of the remaining contaminated acreage would result in a redistribution of the surficial contaminants and an equilibration of contaminant levels over time among the areas dredged for this project.

The removal of contaminated surficial sediments from availability to the biota of Newark Bay would result in short-term changes in the accumulation of contaminants in the benthic fauna. However, unless the major sources of dioxin and PCBs are contained, there would not be any changes in the human health risks associated with the consumption of fish and crustaceans from this ecosystem as a result of these alternatives.

The sediments that would be sequestered in the pits are fine-grained (high TOC, high contaminants) that could be resuspended by activities in the estuary and settle in any depositional areas. These sediments would be ingested by burrowing, deposit, and filter-feeding benthic organisms; contaminants such as dioxin and PCBs accumulate in their tissues as well as in the tissues of the animals that consume them.

The following factors would also lead to a reduction in the contaminated materials that will be bioavailable as a result of Alternatives 1 and 2.

- The Federal navigation channels and berthing areas located within the draw area that would be dredged have sediments that are more likely to resuspend in the estuary because of vessel "prop-wash" in shallow channels and berths.

- For a short period after dredging is finished, sediments at the bottom of the berths would not be contaminated.

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- After the pits are filled, the clean dredged material used for capping would create areas that benthic organisms can colonize that are relatively free of contamination.

- As dredging for pit construction proceeds down to levels where uncontaminated material is present some of this (Category I) material would resuspend, settle in depositional areas, and mix with contaminated sediments.

The reduction in available contaminants in these areas (surface of CDFs, navigation channels, and berths) would decrease the body burden of animals at lower trophic levels that live in these habitats. The animals that forage on the benthos from these "cleaned areas" would also be expected to accumulate lower concentrations of contaminants in their tissues. However; in order for fish and crustaceans to be considered safe for human consumption, the tissue levels of dioxin and PCBs must be reduced by factors from 2 to 50 times their present concentrations (depending on the species). This would require the concentration of dioxin in the surficial fine-grained sediments to fall well below 100 pptr in all depositional areas in the ecosystem.

Most food source species have spent at least 2-3 years in this ecosystem before they would be used for food by humans. During this time it is doubtful, in light of the above discussion, that they would not have accumulated enough dioxin to warrant a consumption ban or advisory. The removal of dioxin from potentially accumulating in aquatic organisms through Alternatives 1 and 2 will produce short term benefits. However, longer term improvements that have a direct relationship to the health risks associated with the consumption of fish and crustaceans will not be accomplished if additional remedial activities are not taken.

4.17.3 NO ACTION

The resuspension of fine-grained sediments through activities in the estuary would continue to result in the accumulation of dioxin and other contaminants in the biota at all trophic levels. The human health risks associated with the consumption of fish and crustaceans from this environment would continue as described in Section 3.16.

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4.18 SOCIOECONOMICS

This section assesses the potential socioeconomic impacts that could result from construction and operation of the NBCDFs. Considered in terms of the total range of construction projects, this project is neither very small nor very large. As the analysis below shows, the socioeconomic impacts attending this project are primarily associated with job creation and the additional revenue generated by project expenditures for materials and wages. These impacts are beneficial to the local economy. The project staff would be too small to generate adverse impacts related to an influx of population or increased demand for services.

The greatest socioeconomic influence of the proposed NBCDF is related to having a place for the disposal of dredged material that will permit the continued viability of the Port of NY/NJ through unrestricted and full level operation of maritime facilities, including Port Elizabeth and Port Newark. The ability to dispose of dredged material deemed unsuitable for ocean disposal from Federal navigation channels and berthing facilities located within the designated draw area will permit maintenance of current activity levels and, potentially, a return to previously higher levels attained when berthing facilities currently unavailable due to sediment buildup are returned to operation. The dredging of Federal navigation channels and port facilities will have a positive affect on the area's economy through increases in jobs and salaries.

4.18.1 ALTERNATIVES

Table 4.18-1 shows the estimates of project cost and size of workforce developed for the alternatives considered in this EIS. The estimate is based on an analysis of the activities required to complete the project. For purposes of this impact assessment, project activities have been separated into those associated with NBCDF construction and those associated with operation (mangement, facility closure, and monitoring). The basis for classifying the activities into these two classes is economic: construction activities involve one labor category, while operation involves different labor categories.

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Table 4.18-1

Estimated Workforce and Expenditures for Construction and Operation for Each Action Alternative

Activity	Estimated Value for Each CDF		
	2N	2S	1S
Total Workforce	10	19	19
Construction Cost ($)	23,100,000	45,700,000	36,200,000
Planning, Engineering, Administration and Other Costs($)	6,200,000	12,300,000	9,600,000
Total Project Cost* ($)	29,600,000	58,600,000	45,800,000

*Includes project management, monitoring, and closure costs.

The alternatives differ in terms of total expenditures. The differences result from the location and capacity of the disposal sites, as well as the engineering and construction required to develop them. For CDF 2N a dredging workforce of 10 persons working full time for 1.5 years is assumed, at the end of which the disposal site will be filled and closed. This alternative involves a total estimated expenditure of $29.6 million. Of this amount, $23.1 million is related to dredging and disposal operations. Project planning, engineering, administration, and other costs are estimated at $6.2 million.

For CDF 2S the same amount of time - 1.5 years - required to excavate, dredge, fill, and close the disposal site is assumed. Because the capacity is larger, it will require a labor force of 19. The total estimated expenditure for this alternative is $58.6 million, which includes $45.7 million for dredging and disposal, and $12.3 million for planning, engineering, admininstration, and other costs.

For CDF 1S a workforce of 19 is assumed. Because of the engineering and construction requirements, the total expenditure for this alternative is estimated to be $45.8 million, with $36.2 million for dredging and disposal, and $9.6 million for planning, administration, engineering, and other costs.

In addition to the alternatives for which cost estimates were completed, this analysis also considers the socioeconomic effects of the no action alternative. Under the no action alternative, the dredging and disposal activities would not occur. Sediment would continue to accumulate in shipping channels and berths, making it difficult, if not impossible, to maintain sufficient depth to accommodate the variety of water transportation (local and ocean-going freight carriers, as well as passenger carriers) currently using the NY/NJ Harbor.

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4.18.2 POPULATION IMPACTS

Large-scale construction often requires large numbers of workers. If the project occurs in a relatively unpopulated area, or in an area without a sufficient number of available workers, project implementation may result in an influx of population consisting of workers and their families. These conditions would not occur for this project under any of the alternatives. The largest workforce anticipated is about 38 persons for 1.5 years. Assuming that a local contractor will be selected to implement the project, the New Jersey-New York metropolitan area has a sufficient workforce to supply this labor.

Dredging on this scale requires equipment such as clamshell dredges, which are in limited supply. It is possible that existing dredging contractors in the New Jersey-New York area may already be contracted, or, for some other reason, do not have the capacity to undertake the work. In such a case, a dredging contractor from some other East Coast port may perform the project. Even in this case, the influx of population is inconsequential in terms of the total population of the project area, and is highly unlikely to result in beneficial or adverse impacts to public services.

4.18.3 DIRECT AND INDIRECT ECONOMIC IMPACTS

The expenditures associated with the alternatives described in the previous section will have significant direct and indirect economic impacts on Newark and throughout the state of New Jersey. Regional economic analysis typically classifies these impacts in terms of changes in output, earnings, and employment. Output is the total level of economically productive activity for a given region, measured in dollars. Earnings are the money paid to households employed in industries within the region. Employment is the total number of jobs within the region.

New expenditures within a region, such as expenditures for the projects described above, result in changes in the levels of output, earnings, and employment within the region. These changes consist of both direct and indirect impacts. The direct impacts are represented by the project expenditures themselves. However, these direct expenditures will also result in additional rounds of spending and job creation. Industries providing construction supplies may increase their output. Construction workers will spend some of their additional earnings on housing, clothing, food, and other goods. Taken together, the total economic impacts are thus much broader in scope and magnitude than the direct expenditures by themselves.

The analysis below estimates the total economic impacts using the U.S. Department of Commerce, Bureau of Economic Analysis (BEA) regional economic output modeling system (RIMS II) multipliers developed for New Jersey. The multipliers allow the estimation of total change in economic activity (total output, change in family earnings, and employment) that would result from changes in project-related expenditures. These multipliers, shown in Table 4.18-2 below, are based on the BEA's national input-output

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analysis table. Input-output analysis is a form of economic analysis that attempts to describe the relationship between changes in one sector of an economy and all other sectors. BEA's multipliers are based on historical studies of the relationships between 500 different economic sectors.

Table 4.18-2

Economic Output, Earnings, and Employment Final Demand Multipliers for New Jersey

	Multipliers		
Activity	Output	Earnings ($)	Employment
Dredging and Disposal	2.4210	0.7571	27.9
Monitoring	2.1817	0.7048	34.4

Use of the BEA multipliers requires definition of the appropriate economic sectors in which the initial expenditure will be made, as well as the appropriate geographic area considered to be affected by the project. For this analysis, the appropriate industrial sectors are new construction (for the dredging and disposal) and miscellaneous services (for the monitoring sampling and analysis). The appropriate geographic area is the State of New Jersey.

The multipliers indicate that for every additional $1.00 of new construction expenditure, total economic activity actually increases by nearly two-and-a-half times. Family earnings is increased by $0.75. For each $1 million of additional construction expenditure, 27.9 jobs are created.

Once the correct multipliers are selected, their use is straightforward. The multiplier is applied to the total expenditure to derive an estimate of the total change in output, earnings, and jobs. The results of this procedure are found in Tables 4.18-3 through 4.18-5. For each alternative, the total impacts to output, earnings and employment are positive. Output impacts range from an increase of about $70 million (Alternative 1) to over $307.5 million (Alternative 3). These total changes in economic activity will mean an increase in household earnings ranging from about $21.9 million (Alternative 1) to over $97.7 million (Alternative 3), and the creation of between 826 jobs (Alternative 1) to over 3619 jobs (Alternative 3). All of these are substantial beneficial impacts.

4.18.4 ESTIMATED FEDERAL TAX REVENUES

The analysis outlined above focuses on the total impact of the project economic output, earnings, and employment within New Jersey. The multipliers are those developed by

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Table 4.18-3

Estimated Output, Earnings, and Employment Impacts: Alternative 1

Activity	Total Annual Expenditure ($ million)	Multipliers			Impacts		
		Output	Earnings ($)	Employment	Output ($ million)	Earnings ($ million)	Employment (# of Jobs)
Dredging		2.421	0.7571	27.9	65.12	20.37	750.51
Monitoring	2.2	2.1817	0.7048	34.4	4.80	1.55	75.68
Total Impact					69.92	21.92	826.19

Table 4.18-4

Estimated Output, Earnings, and Employment Impacts: Alternative 2

Activity	Total Annual Expenditure ($ million)	Multipliers			Impacts		
		Output	Earnings ($)	Employment	Output ($ million)	Earings ($ million)	Employments ($ of Jobs)
Dredging	40.0	2.421	0.7571	27.9	96.84	30.28	1,116.00
Monitoring	2.2	2.1817	0.7048	34.4	4.80	1.55	75.68
Total Impact					103.60	32.46	1,222.64

Table 4.18-5

Estimated Output, Earnings, and Employment Impacts: Alternative 3

Activity	Total Annual Expenditure ($ million)	Multipliers			Impacts		
		Output	Earnings ($)	Employment	Output ($ million)	Earings ($ million)	Employments ($ of Jobs)
Dredging	127.0	2.421	0.7571	27.9	307.47	96.15	3,543.30
Monitoring	2.2	2.1817	0.7048	34.4	4.80	1.55	75.68
Total Impact					312.27	97.70	3,618.98

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BEA for economic activity within New Jersey, and no effort has been made to estimate the proportion of benefits that will actually accrue to the study area (Essex and Union counties). This approach emphasizes the geographically widespread nature of the benefits that can occur as a result of the project. In addition, the creation of jobs will lead to increased Federal tax revenues. These tax revenues represent returns to the Federal government.

The method used to estimate tax revenues is straightforward. The Annual Report of the Commissioner and Chief Counsel of the Internal Revenue Service (IRS 1996) identifies the per capita individual income tax paid in each state. A simple method of estimating the returns to the Federal government is to multiply the number of jobs created for each alternative by the average income tax paid. As shown below in Table 4.18-6, the estimated taxes resulting from project-related employment range from approximately $2.4 million for Alternative 1 to over $10.0 million for Alternative 3.

This method includes only income taxes paid by individuals. It does not include corporate taxes. Therefore, this calculation may underestimate the total tax revenues that might result from the project.

Because each alternative would be implemented over a period of years, the annual return would be only a portion of the total amount represented here.

Table 4.18-6

Project Socioeconomic Benefits: Comparison of Estimated Federal Tax Revenues for Alternatives

Factor	Alternative 1	Alternative 2	Alternative 3
Total Employment (Number of Jobs)	826	1,222	3,618
Average Per Capita Taxes Paid in New Jersey (Dollars)	2,866	2,866	2,866
Total Estimated Federal Taxes Paid (Dollars)	2,367,316.00	3,502,252.00	10,369,188.00

4.18.5 THE NO ACTION ALTERNATIVE

Under the no action alternative, the dredging and disposal activities would not occur. The potential socioeconomic effects of not conducting dredging and disposal of dredged material include:

- The potential costs of decreased shipping because the harbor would accommodate fewer vessels, as well as a different mix of vessels

- The expenditures not undertaken because the dredging and disposal activities do not occur

The potential costs of decreased shipping revenue are not known at this time. However, it is likely that, unless the shipping channels and berths are maintained, the costs are potentially quite significant. New York Harbor shipping revenues are over $20 billion annually, and account for some 200,000 jobs. Some portion of this would be lost.

The costs of dredging activities are outlined in the previous sections.

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4.19 NAVIGATION

The vicinity of the project area is characterized by a series of maintained navigation channels and berthing areas. With regard to the NBCDF, it is paramount that the NBCDF not encroach on existing navigation infrastructure or otherwise adversely impact vessel movements. Several Federally maintained channels exist within Newark Bay, including (1) Newark Bay South Reach; (2) South Elizabeth Channel; (3) Newark Bay Middle Reach; (4) Newark Bay North Reach; (5) Port Elizabeth Channel; (6) Port Elizabeth Pierhead Reach; (7) Port Elizabeth Inshore Reach; (8) Port Elizabeth Branch Reach; (9) Port Newark Pierhead Reach; (10) Port Newark Inshore Reach; and (11) Port Newark Branch Reach. The Federal channels within Newark Bay provide access to highly active port facilities at the Port Newark and Port Elizabeth Marine Terminals located on the western shore of the Bay.

Approximately 50 vessel movements per day (25% of 200) are self-propelled, ocean-going ships consisting primarily of tankers and container carriers (Section 3.18). Tankers are bound principally for the oil and product terminals on the New Jersey shore of the Arthur Kill, but some tankers are bound for Newark Bay. They typically arrive via the Kill Van Kull and leave through the Arthur Kill to the south. The largest container carriers are 60,000-dry-weight-ton (DWT) (44,800 metric tons) ships bound for Port Newark or Port Elizabeth. They enter Newark Bay through the Kill Van Kull and travel through Newark Bay South Reach Channel to Newark Bay Middle Reach Channel and then to either Port Elizabeth Channel or Port Newark Branch Channel.

The primary channels that would be affected by the NBCDF are the Port Elizabeth Channel adjacent and to the south of area 1S, Newark Bay Middle Reach Channel to the east of area 1S, the Port Newark Branch Channel adjacent and to the south of area 2S, and Newark Bay North Reach Channel adjacent and to the east of areas 2N and 2S.

The primary concern is container carriers sailing into Port Elizabeth through the Port Elizabeth Channel and into Port Newark through the Port Newark Branch Channel. Areas 1S and 2S, respectively, are adjacent to these channels, and the entrances to the proposed pits are through these channels. The number of vessels reported to move through the area is about 50 per day (including tankers not bound for Port Newark or Port Elizabeth), which is about two vessels per hour. In Newark Bay, deep-draft vessels operate at about 7.0 knots (3.6 m/sec). At this speed, the time required for a vessel to go from the entrance to Port Elizabeth or Port Newark Branch Channels and into Port Elizabeth or Port Newark (about 0.5 nautical mile [926 m]) is less than 5 min. It is not expected that the project would impact these vessel movements, or conversely, that the vessel movements would significantly impact tug and barge movements associated with the project. It is assumed that tugs and barges would give right-of-way to the container vessels, and wait the short time necessary for container vessels to pass before moving from the pit into the channel.

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4.20 LAND USE

No potential impacts to existing land use in the study area were identified from the proposed project. Lands adjacent to the proposed NBCDF sites include the Port Newark/Elizabeth marine terminals and the New York and New Jersey Federal Navigation Channels. The proposed NBCDF sites and related dredging operations are consistent with the existing industrial zoning and port-related activities associated with the western shoreline of Newark Bay.

Residential zoning and land use located along the eastern shoreline of Newark Bay and the Bayonne waterfront will not be impacted during construction or operation of the NBCDF sites. These residential areas are a considerable distance from the proposed NBCDF sites.

4.21 NOISE

Potential noise or sound level impacts from the proposed project would be minimal. Some increase in noise levels is expected in the near vicinity of the proposed NBCDF sites. However, noise produced by construction dredging and disposal operations would be temporary and likely inaudible and overshadowed by existing noise levels from the nearby marine terminals and Newark International Airport. Sources of additional noise include barge traffic and dredging operations. Typical construction equipment that may be used at the proposed NBCDF site includes air compressors and dredging cranes. Noise levels from these sources are expected to be similar to the heavy machinery and loading equipment already used along the industrial waterfront areas of the Port Newark/Elizabeth marine terminals. Some typical noise levels from heavy construction equipment are listed in the following table:

	Distance and Sound Level (dBA)			
Equipment	0 ft	100 ft	400 ft	700 ft
Compressor	120	80	67	62
Stationary Crane	125	85	72	67
Front Loader	120	80	67	62
Truck	100	90	77	72
Pile Driver	140	100	87	82

The dredging cutter itself moves very slowly, propelled by a diesel engine. As such, the resulting noise is very limited and comparable to that produced by a passing steamship (T. Patin, pers. commun.).

Increases in noise levels over existing levels at properties adjacent to the proposed NBCDF site would be minimal due to the industrial nature of the properties. Noise receptors adjacent to the proposed NBCDF site include the industrial areas of Port Newark/Elizabeth marine terminals to the west and south and the New Jersey Turnpike Extension and Newark Bay railroad lift-bridge to the north. These industrial areas and transportation corridors are not considered noise-sensitive receptors and are therefore not expected to be impacted by increases in sound levels from the proposed project.

The closest noise-sensitive receptors identified within the study area are located along the Bayonne waterfront, a considerable distance (approximately 4000 ft [1220 m]) from the proposed NBCDF site. These sites include Bayonne Park, Veterans Park, and Bayonne High School. Due to the distance separating these areas from the proposed project site no noise impacts from the proposed project are expected. Local ordinances governing noise levels and construction periods are maintained by all three municipalities (Newark, Elizabeth, and Bayonne) in the study area. Local noise ordinances governing maximum

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permissible sound levels and construction periods permitting elevated sound levels would be adhered to throughout the project.

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4.22 SOLE-SOURCE AQUIFERS AND GROUNDWATER

Groundwater in the area of New Jersey adjacent to Newark Bay is classified as II-A. Class II-A is the default classification for groundwater in New Jersey, and its primary designated use is for potable water and conversion (through conventional water supply treatment, mixing, or other similar technique) to potable water. Secondary designated uses include agricultural and industrial water. Both existing and potential potable water uses are included in the designated use (NJAC 7:9-6). This information was verified by Tom McKee of the Bureau of Water Planning, which is under the jurisdiction of NJDEP. This classification is the most recent, and supersedes any previous EPA designation as a Sole-Source Aquifer or otherwise. Groundwater in Staten Island, directly south of Newark Bay, is classified as Class GA or Class GSA (6 NYCRR 701.18). Class GA groundwaters are fresh groundwaters that are best used as a source of potable water supply (6 NYCRR 701.15). Class GSA groundwaters are saline groundwaters that are best used as a source of potable mineral waters, or conversion to fresh potable waters, or as raw material for the manufacture of sodium chloride or its derivatives or similar products (6 NYCRR 701.16).

Groundwater generally flows from land to sea, given that groundwater elevations are greater than sea level, and groundwater flows from areas of higher head to areas of lower head. As such, groundwater could be assumed to flow into Newark Bay from both the east and the west. In addition, Newark Bay is tidally influenced and the mean range of tides is 4.9 ft (1.49 m) (Suszkowski 1978), so groundwater will flow into the Bay during low tides, and groundwater may be recharged by Newark Bay as the water level rises. It is probable that no prevailing direction of groundwater flow exists, and there is some localized mixing between water from the Bay and groundwater.

Newark Bay is enclosed by Hudson County to the east, and by Union and Essex counties to the west. It is of significance to note that the water supply from 76% of Union County and 100% of Hudson and Essex Counties are from surface water sources. The remaining 24% of the water supplied to Hudson County is pumped from the ground (NJDEP 1995). Groundwater is not heavily relied upon in this area as a water supply, although it is still classified as II-A. Any material placed in Newark Bay having contaminants that leach at a concentration greater than the criteria for Class II-A groundwater in New Jersey has the potential to impact the groundwater. Factors such as solubility, density, miscibility, and adsorption properties may raise or lower the potential for the contaminated material to impact the groundwater. The contamination would most likely propagate by diffusion rather than physical transport due to the probable lack of groundwater flow direction, and concentrations could decrease markedly with distance from the source.

The stratigraphy and geology of the sediments in the proposed NBCDF areas, based on shallow and deep core sampling surveys (PA 1996) is similar. The general characteristics of the proposed NBCDF area sediments are a surface layer of compressible organic clay,

overlying sand, and finally stiff clay and silt or varved silt and clay overlying a shale bedrock. The general sediment geology and thicknesses are presented below:

Material	Typical Thickness (ft)	Typical Thickness (m)	Typical Elevation of Top of Stratum
Water	0 to 7	0 to 2.1	295 (MLW)
Black/Gray Organic Clay	15 ± 3	4.6 ± 1	292
Sand	7 ± 3	2.1 ± 1	277
Stiff Clay and Silt or Varved Silt and Clay	60	8.3	265
Shale Bedrock	—	—	205

The proposed bottom depth of the NBCDF is -70 ft (-21.3 m) to an elevation of approximately 225. Constructing the NBCDFs to elevation 225 will result in approximately 20 ft (6.1 m) of clay between the bottom of the CDF and the shale bedrock. The 20 ft (6.1 m) clay layer between the bottom of the NBCDF and the bedrock should provide ample groundwater protection.

4.23 TRAFFIC

The proposed NBCDF would not affect traffic patterns in the vicinity of Port Newark and/or Port Elizabeth. A minimal increase in traffic and parking needs would be required for dredging crews performing the construction of the facilities. Parking space is more than adequate at the Port Newark and Port Elizabeth marine terminals. The terminals are adjacent to north-south Interstate 95 (New Jersey Turnpike) and east-west Interstate 78 (New Jersey Turnpike extension); entrance and exit ramps at the intersection of these two highways provides direct access into the two ports. Additionally, other highways within 5 miles of the terminal include the Garden State Parkway (north-south), Interstate 280 (east-west), and highways 22 and 1-9. Impacts to these high-volume roadways from construction crews traveling to the terminals would be negligible.

4.24 INDIRECT AND CUMULATIVE IMPACTS

Indirect, or secondary impacts are those impacts induced by the decision to implement the project. The preceding sections evaluated the potential for direct impacts; this section will evaluate the potential for those impacts to cause additional impacts on natural and human resources.

Cumulative impacts are those impacts resulting from the combined effects of similar projects occurring in the same general area and time frame as the proposed project. Cumulative impacts occur when the combined effects are greater than the sum of the individual impacts. In other words, the fact that similar projects are occurring simultaneously creates conditions that could stress the environment beyond a threshold level that would not be reached by the individual projects alone.

4.24.1 INDIRECT IMPACTS

The preceding sections did not identify significant direct adverse impacts related to the construction and operation of the NBCDF. The direct impacts identified were of short duration and limited to the area of Newark Bay in the vicinity of the disposal facility. This level of direct impact reflects the initial conceptual development, which attempted to minimize adverse effects on natural resources during construction and operation and in the long term after closure of the facility.

The major potential indirect effects on natural resources would be related to the disruption and temporary loss of aquatic habitat, and effects related to the disturbance of contaminated sediments. The magnitude of these two effects is minimized by the selection of the disposal site location and by the procedures employed to construct and operate the facility. The disturbance of aquatic habitat is limited to a small area of Newark Bay that does not contain high-value habitat and has relatively low levels of chemical contamination. The techniques employed to construct the facility would minimize the loss of sediments during dredging and would cap the contaminated material at the disposal site in the ocean. The disposal of contaminated dredged material in the facility would confine this material to a small area during disposal and ultimately, through capping, isolate this material from contact with the water and aquatic life in Newark Bay. The capping process would restore the original contours of the Bay at the disposal site, which would facilitate the rapid redevelopment of an aquatic community at this location. Long-term monitoring of the disposal site would ensure that the dredged material would remain isolated. The lack of significant direct adverse effects minimizes the possibility of indirect effects on natural resources from the NBCDF.

An important indirect effect on human resources from the NBCDF would be maintenance of the economic infrastructure related to the existing commercial shipping operations in Newark Bay and adjacent areas of the Harbor. The need to dredge berthing areas and shipping channels was discussed in Chapter 1.0. Without a disposal mechanism for

contaminated dredged material the existing facilities could not continue to operate, resulting in significant economic impacts. The loss of shipping would have far-reaching effects on economic activities related to the movement of goods and products through the local and regional economy. The maintenance of the economic infrastructure associated commercial shipping is a significant indirect beneficial impact of the NBCDF.

4.24.2 CUMULATIVE IMPACTS

There are two areas of potential impact that could result in cumulative effects because related activities are occurring simultaneously in the general vicinity of the NBCDF. One potential impact is dredging and disposal because several areas may be dredged simultaneously when the NBCDF is available for disposal. In addition, other dredging activities could be occurring in the Harbor simultaneously with dredging activities related to the NBCDF. The other potential impact is the disturbance of and remediation of contaminated sites. Chemical contamination is widespread in the sediments of Newark Bay and upstream of the Bay in the Hackensack Meadowlands. Some sites continue to discharge contaminants to the Bay and its tributaries, while other sites are being remediated to remove contaminants or stop the loss of contaminants to the aquatic environment. The NBCDF would disturb and release to the environment some existing contaminants during dredging and disposal operations, as well as serve as remediation for existing contamination by isolating contaminated sediments. The NBCDF thus has a dual effect in relation to the contaminant issue. The potential cumulative effects will be addressed from the point of view of the balance between disturbance and remediation of contaminants.

4.24.2.1 Dredging and Disposal. Dredging and dredged material disposal has been an ongoing activity in New York Harbor since the development of facilities to accommodate deep-draft vessels. Associated with the development of deepwater port facilities was the physical modification of the Harbor shoreline through bulkheading and the construction of extensive arrays of large finger piers. During the first half of this century frequent dredging was required to maintain these facilities due to the high sedimentation rate in some areas of the Harbor. The amount of waterborne commerce in the Harbor has declined in the second half of the century and as a result the frequency of dredging has declined. The recent restrictions on the disposal of contaminated sediments at the Mud Dump Site have reduced dredging activities to a low level.

There were no aquatic life studies conducted in the Harbor when dredging occurred on a frequent basis. However, a number of studies in the past 15 years related to proposed waterfront development projects provide insight on the effects of dredging on aquatic life in the Harbor. Many of these studies included sampling in interpier basins, some of which were still being dredged and others which had not been dredged for many years.

The recent studies show that fishes and invertebrates that can utilize the highly modified physical environment of the Harbor made liberal use of recently dredged areas. As

discussed in Section 4.06, fishes and invertebrates returned to dredged areas less than one year after dredging. An interesting relationship found for juvenile striped bass was that when they were seasonally abundant in the Hudson River between the Battery and the George Washington Bridge, they showed a preference for the deeper interpier basins, which were the most recently dredged areas. The reduction in the frequency of dredging in the Harbor may have had the effect of reducing the quality of habitat for juvenile striped bass.

The proposed NBCDF, the dredging projects that would contribute dredged material for disposal, and other dredging projects in the Harbor, collectively would represent an increase in dredging activity compared to recent levels of dredging. However, these projects collectively are probably substantially less than the magnitude of dredging over a similar time period during the first half of this century. Although the cumulative effects of relatively high levels of dredging on aquatic life were never evaluated, it is apparent from recent observations that fishes and invertebrates can adjust rapidly to the habitat disruption associated with dredging activities and utilize the dredged areas for habitat. Dredging associated with and occurring simultaneously with the NBCDF would not result in adverse cumulative impacts on aquatic life.

Since the harbor was physically modified as a major shipping facility there has been a mix of maintained channels, berthing areas, and relatively undisturbed shoal areas. The distribution of these habitat types is evident on the navigation charts of Newark Bay. The NBCDF would be placed in a shoal area, but the adverse effect on aquatic habitat would be negligible because the area would recover to usable habitat approximately one year after closure. All the dredging contributing to the NBCDF would be maintenance and therefore would be done in previously dredged areas. After the NBCDF has been closed and the habitats have redeveloped, the mix of channel, berthing, and shoal areas would be the same as conditions just prior to the NBCDF. This is further support for the position that there would be no adverse cumulative impacts on aquatic habitat from the project.

The NBCDF would provide an alternative disposal method for dredged material to the conventional method of ocean dumping. Long-term dredged material disposal at the Mud Dump Site has had an adverse impact on aquatic habitat at the Mud Dump. The disposal of low-level contaminated material (with capping) and the uncontaminated sediments from the deep areas of the pit(s) at the Mud Dump Site would not alter existing habitat conditions at the Mud Dump. The NBCDF would reduce the exposure of aquatic life to contaminated sediments, while not significantly altering habitat effects at the Mud Dump. The disposal of dredged material from the NBCDF and associated dredging operations would not have an adverse cumulative impact on aquatic life or habitat.

4.24.2.2 Chemical Contaminants. The NBCDF was conceived as a dredged material disposal facility for sediments not suitable for ocean disposal. Although the disposal and confinement of chemical contaminants is not the primary purpose of the NBCDF, the fact

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that the facility would handle sediments with Category II or III contamination necessitates a consideration of the interaction of the NBCDF with chemical contamination in the general area of Newark Bay (see Section 4.09 for a listing of known hazardous waste sites). As discussed above, the NBCDF (and its associated dredging sites) is both a potential source of contamination and a method to remediate existing contamination in Newark Bay and adjacent areas.

The dredging activities at the NBCDF and associated sites has the potential to release some contaminants during dredging and disposal. As discussed in Chapter 5.0 a variety of techniques would be used at the dredging sites and disposal facility to minimize the loss of sediment to the surrounding water. The loss rate would be very low and the vast majority of sediments that do escape would resettle in the vicinity of the dredging and disposal sites.

The contaminants in the dredged material were deposited from chemicals released from upstream sources. Because there is no source of chemicals at the dredging sites, the dredging activity does not contribute any new quantities of contaminants to the aquatic environment. The disturbance and loss of a small amount of contaminants during dredging and disposal results in a redistribution of these contaminants in the Bay. Because there is widespread chemical contamination in the Bay sediments, the redistribution of a small quantity of contaminants in the Bay would not appreciably alter the exposure levels of aquatic life to these contaminants.

Upstream sources of chemical contamination are in various stages of remediation. Remedial action may occur at some upstream sources while the NBCDF is being constructed and in operation. However, the operational life span of the NBCDF is expected to be between 1 and 2 years. It is unlikely that there would be any major change in the sources of contamination during the construction and operation of the NBCDF. Dredging and disposal activities could not alter the source of new contamination to the Bay and would cause only a minor redistribution of a very small quantity of contamination already present in the Bay. There would be minimal adverse cumulative effects on the quantities and distribution of chemical contaminants in Newark Bay.

The NBCDF would isolate a small percent of chemical contamination from contact with aquatic life in Newark Bay. Although the distribution of various chemical contaminants in Newark Bay has not been well documented, the contaminants are known to be widespread. NBCDF could accommodate only a small portion of all contaminated sediments because of its limited capacity. The dredging sites that would be the sources of dredged material placed in the NBCDF would provide relatively clean habitat areas immediately after dredging compared to existing contamination at these site. However, because there are existing upstream sources of contamination that will not be remediated in the near future, these sites would be recontaminated as new sediment is deposited in these areas. If remediation of upstream contaminant sources eventually takes place, then the sediments

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at the surface in these dredged areas may become progressively less contaminated over time.

The confinement of contaminated sediments is a benefit of this dredging project, but because large areas of the Bay would remain contaminated and some upstream sources of contamination have not been remediated, the long-term beneficial impact of the project on chemical contamination is very small. The presence of the NBCDF should have no cumulative interaction with any remedial actions proposed for contaminated waste sites.

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5.0 IMPLEMENTATION STRATEGIES FOR USE OF NBCDF

5.01 PROCEDURES FOR IDENTIFICATION OF DREDGED MATERIAL FOR FACILITY USE

USACE-NYD evaluated several dredged material disposal options for the Port of NY/NJ and concluded that the use of subaqueous borrow pits (confined disposal facilities [CDFs]) is the environmentally preferred disposal method for potentially contaminated dredged material deemed unsuitable for unrestricted ocean disposal (USACE-NYD 1988). The preferred use of CDFs is based on their long-term ability to isolate contaminants from the water column, minimal impacts to aquatic resources and human health, and their immediate availability and high probability of success. The New York Harbor Dredged Material Management Plan: Phase I Report - Plan of Study (USACE-NYD 1996) identifies subaqueous pit containment facilities as potential locations for the disposal of both Category II and Category III dredged material. A CDF located in Newark Bay was identified by Governor Whitman's Task Force Report in February 1995 (DMMT 1995) as a potential short-term disposal site for dredged material not suitable for ocean disposal. In the Joint Dredging Plan for the Port of New York and New Jersey (NJ/NY 1996) the Newark Bay borrow pit(s) (NBCDFs) are listed as short-term options for the disposal of approximately 1.7 MCY of dredged material from the designated draw area deemed unsuitable for ocean disposal.

The State of New Jersey in the March 1996 draft report titled The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Waters (NJDEP 1996), defines subaqueous disposal pits as "submarine trenches or pits excavated below the ocean/bay bottom for the specific purpose of containing contaminated dredged material." General testing requirements to determine dredged material contaminant levels and therefore eligibility for disposal in the CDFs include grain-size analysis and bulk sediment chemistry for dredged material. Bulk sediment chemistry on dredged material to be disposed of in the NBCDF will be conducted in accordance with NJDEP permit requirements.

Dredged material considered for disposal in the NBCDF will be from permitted dredging operations located in the draw area defined as waters in New York-New Jersey Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull. Only dredged material deemed unsuitable for ocean disposal will be considered, i.e., Category III dredged material and Category II dredged material to the extent required. Dredged material testing to determine disposal categories will be in compliance with USACE and NJDEP guidelines and requirements in force at the time of the permit application.

Table 5.01-1 presents the estimated New Jersey and New York dredged material volumes by category type for the three-year period 1997-1999 (the maximum period the proposed

Table 5.01-1

Estimated Quantity of Category II and Category III Maintenance and Channel Improvement Dredged Material
Port Authority of New York and New Jersey Harbor Area

Site		Estimated Quantity of Dredge Material (CY)					
		1997		1998		1999	
Organization	State	Category II	Category III	Category II	Category III	Category II	Category III[a]
Port Authority NY/NJ	New Jersey	0	170,000	0	0	0	0
	New York	0	88,000	0	75,000	0	75,000
USACE - NYD	New Jersey	70,000	0	0	300,000	45,000	0
	New York	860,000	1,174,000	362,000	551,000	490,000	629,000
	NY&NJ	0	586,000	5,170,000	0	0	0
State and Local Agencies	New Jersey	0	29,000	0	1,100,000	0	0
	New York	161,500	1,340,500	16,500	219,500	16,500	219,500
Private Organizations	New Jersey	358,000	570,250	0	35,200	25,000	13,800
	New York	105,000	170,500	50,000	0	75,000	52,000
Total	New Jersey	428,000	769,250	0	1,435,200	70,000	13,800
	New York	1,126,500	2,773,000	428,500	845,500	581,500	975,500
	NY&NJ	0	586,000	5,170,000	0	0	0

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NBCDF will be available). Information presented in Table 5.01-1 is from the PA's MudOne database; the disposal category of dredged material in the MudOne database is based on recent permit applications and information received from the respective organizations and is not based on actual sediment testing.

5.02 CAPACITY AND LIFE SPAN OF THE FACILITY

This section provides a description of the size and operational life of the proposed NBCDF, and includes surface area, estimated volumes, and approximate filling rates.

5.02.1 CAPACITY OF THE FACILITY

Area 1S. Area 1S has a generally triangular configuration, with a surface area of 26 acres (0.11 km^2). The east-west base is about 1250 ft (380 m) long and the north-south altitude is about 1700 ft (520 m) long. The side slope of the excavation to a depth of approximately 16 ft (4.9 m) (surficial sediments) is designed to be 3 horizontal to 1 vertical (3:1); the side slope to a depth of approximately 70 ft (21 m) is calculated to be 1.5:1. The in situ estimated volume of the excavation based on these figures is 1.98 MCY (1.52 MCM), which includes 579,000 CY (442,700 CM) of surficial sediments. Volume of the 3-ft (1-m) cap (see Section 5.04) will use about 125,000 CY (95,575 CM) of this volume. Considering construction methods available and capping requirements associated with construction of Area 1S, it is estimated that the net capacity of Area 1S will be 1.55 MCY (1.18 MCM) of dredged material.

Area 2S. Area 2S has a roughly rectangular surface area of about 20.9 acres (0.08 km^2). The east-west side is about 650 ft (198 m) long and the north-south side is about 1300 ft (396 m) long. The side slope of the excavation in the unconsolidated surface sediments to a depth of 16 ft (5.0 m) is calculated to be 3 horizontal to 1 vertical (3:1); the side slope in the deeper undisturbed sediments to a depth of approximately 70 ft (21 m) is calculated to be 1.5:1. The in situ estimated volume of the excavation based on these figures is approximately 1.36 MCY (1.04 MCM), which includes about 485,000 CY (370,830 CM) of surficial sediments. Emplacement of a 3-ft (1-m) cap (see Section 5.4) will fill about 97,000 CY (74,166 CM) of this volume. It is estimated that the nominal usable volume of Area 2S would be about 1.05 MCY (802,830 CM) of bulked dredged material.

Area 2N. Area 2N has a roughly rectangular surface area of 9.8 acres (0.04 km^2). The east-west side is about 450 ft (137 m) long and the north-south side is about 1000 ft (305 m) long. The side slope of the excavation in the surficial sediments to a depth of 14 ft (4.3 m) is calculated to be 3 horizontal to 1 vertical (3:1); the side slope in the undisturbed bottom sediments, to an approximate depth of 70 ft (21 m) is calculated to be 1.5:1. The in situ estimated volume of the excavation based on these figures is approximately 645,000 CY (493,167 CM), which includes about 200,000 CY (152,920 CM) of surficial sediments. Emplacement of a 3-ft (1-m) cap (see Section 5.4) will fill about 50,000 CY (38,230 CM) of this volume. It is estimated that the bulked dredged material net storage capacity of Area 2N would be about 495,000 CY (378,477 CM).

Total Capacity. Based on the above computations and using a bulking factor of 1.2, the three CDFs are estimated to have a total net storage capacity of about 2.4 MCY (1.8

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MCM). Sediment chemical and biological test data obtained during the preparation of the DEIS indicates that the surficial sediments in proposed CDFs 2S and 2N are not suitable for ocean disposal. Usable capacity of the project contained in Area 1S is then 1.55 MCY (1.18 MCM).

5.02.2 LIFE SPAN OF THE FACILITY

Operational life span of the facility depends on the sediment characteristics and the type of equipment used for placement of dredged material, the rate at which dredged material is conveyed to the site, and management of the operations. Section 5.5 describes methods used for placement of dredged material into the facility. The facility has a relatively small volume (1.55 MCY [1.18 MCM]) that is greatly exceeded by the short-term (1997-1999) projected volumes of dredged material deemed unsuitable for ocean disposal in the NY/NJ Harbor (approximately 13.5 MCY [10.4 MCM]). Equipment is available that could fill Area 1S fairly rapidly. It is estimated that for Alternative 2, Area 1S, would be in operation for approximately one year, inclusion of Areas 2S and 2N would extend the operational time frame up to three years.

5.03 DISPOSAL METHODS

NBCDF dredged material disposal options and strategies are described in this section. The dredged material that would be disposed of at the NBCDF would be material that is deemed unsuitable for ocean disposal and would be from waters in New York-New Jersey Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull, and could possibly include surface sediments from Area 2 CDFs.

5.03.1 DREDGED MATERIAL DISPOSAL OPERATIONS

In general, dredged material determined to be unsuitable for ocean disposal can be deposited within the demarcated perimeter of the NBCDF by bottom dumping from split-hull scows until the material reaches the base of the entrance channel at -20 ft (-6.1 m) MLW. The entrance channel will then be partially filled to about -10 ft (-3.0 m) MLW and bottom dumping continued. The disposal operations conducted following partial filling of the entrance channel may require smaller scows, more lightly loaded scows, or high tide transit to allow travel over the partial entrance closure. When bottom dumping is no longer feasible due to lack of water depth, the entrance channel will be filled with non-contaminated material to about three ft (1.0 m) below the original surface elevation.

Final filling of the CDF storage capacity will be by removing dredged material from scows with a clamshell bucket. Scows will be positioned inside the CDF at high tide by shallow draft tugs. Dredged material will then be removed with clamshells, lowered through the shallow water to the depth of the previously placed dredged material and opened to release the dredged material. This process will minimize any suspension of dredged material in the water column, prevent the surge due to bottom impact, and keep the effects of placement to the immediate vicinity of the clamshell bucket.

The filling of the CDF will proceed from the area farthest from the entrance channel and proceed toward the entrance channel for all methods of filling in order to maintain the maximum clearance at the entrance channel and to measure the natural slope for the placed dredged material.

When the fill reaches the base of the planned cap, placement of dredged material will cease and the cap will be placed on the CDF to isolate the contaminated sediments from the overlying water column. The sand cap will be placed by sprinkling sand from the end of a hydraulic pipeline. Sprinkling the cap material minimizes displacement of dredged material and the potential for resuspension of contaminated sediment. At this stage the CDF is complete and the long term integrity monitoring will begin.

5.03.2 RECOMMENDED EQUIPMENT

Scows and barges that bring the dredged material to the NBCDF will vary in size depending on equipment availability and the water depths in the CDF. Bottom dumping scows are available in sizes ranging from 500 to 6000 CY (380 to 4600 CM). It is

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scows are available in sizes ranging from 500 to 6000 CY (380 to 4600 CM). It is anticipated that smaller scows will be used in the confined areas of the project and during the last stages of CDF filling. Larger scows will be used during the initial disposal operations. The basic equipment a contractor would use for NBCDF disposal operations will likely consist of a nominal 3000-CY (2300-CM) scow. It is anticipated multiple scows will be used to service each operating dredge, which will require movement sequencing between the dredge site and the NBCDF to maximize dredge and disposal operations. The scows will probably be moved from the draw area dredge sites to the NBCDF by harbor tugs. Additional equipment that might typically be on site may include a survey/crew boat crane barge, equipment barge, and possibly a small boat to move the floating pipeline during final filling of the CDF.

The disposal operation will be continuously monitored to assure that specific minimum performance criteria are met. The monitoring will include verification of CDF depth by periodic hydrographic soundings performed in accordance with USACE Class 1 standards, requiring accuracy to 0.5 ft (0.15 m).

Disposal activities, such as the positioning of a scow during dumping operations, will not ordinarily require the accuracy of a Class 1 survey. Positioning of the scows to within approximately 15 ft (5 m) will be sufficient. Monitoring of potential movement of the dredged materials placed in the CDF will be performed to the more demanding accuracy required of a Class 1 survey because of the need to accurately determine the slopes of the materials placed in the CDF.

5.04 CAPPING STRATEGIES

Several factors determine the design, efficacy, and long-term performance of a protective cap for dredged material including: (1) the vulnerability of the cap to wave- and current-induced erosion, (2) the extent to which the cap chemically and biologically isolates the underlying contaminated sediments from the surrounding aquatic environment, and (3) construction methods and design features that minimize the potential for contaminated sediment remobilization.

5.04.1 CAP DESIGN

The required total cap thickness, T_{Total}, depends on several components and is computed as follows (Moffatt and Nichol 1993):

$$T_{Total} = T_{chemical} + T_{bioturbation} + T_{consolidation} + T_{erosion} + T_{tolerance}$$

where

$T_{chemical}$	=	thickness required for physical and chemical isolation, which depends on the properties of the contaminated and capping sediments
$T_{bioturbation}$	=	thickness required to isolate against bioturbation
$T_{consolidation}$	=	thickness required to combat cap consolidation after placement
$T_{erosion}$	=	thickness required to protect against wave- and current-induced erosion
$T_{tolerance}$	=	an additional cap thickness to account for inaccuracies associated with cap placement during construction

The governing equation used to obtain the estimate of the total cap thickness follows the accepted USACE and USEPA formula used for total required cap thickness, that is, the additive thicknesses required for chemical isolation, bioturbation, consolidation, and erosion (Palermo et al. 1995). Palermo (1991) presents a detailed discussion of the criteria used to determine the required cap thickness. A brief summary of each of these factors is presented in the following paragraphs.

A sediment cap must provide a barrier between the underlying contaminated material and the surrounding aquatic environment. The thickness necessary to achieve chemical isolation of contaminated sediment is normally determined through laboratory testing of the contaminated and cap sediments. On the basis of such tests, Sturgis and Gunnison (1988) have shown that typical minimum cap thicknesses for chemical isolation are on the order of 1 ft (0.3 m) for most contaminated sediments. Bioturbation is a term used to describe the vertical extent of organism movement within a sediment cap. An appropriately sized cap must be thick enough to prevent organisms from burrowing into either the portion of the cap designated for chemical isolation or the contaminated sediment itself. Accordingly, the thickness required for bioturbation is dictated by the maximum burrowing depth of organisms likely to colonize the site in significant numbers. Bioturbation depths are site-specific, highly variable, and best determined on

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the basis of field measurements. Typical bioturbation depths range from 1 to 2 ft (0.3 to 0.6 m) for organisms known to populate the NBCDF area in great numbers (USACE 1985). The results of numerous studies on capping strategies (Rhoads and Carey 1997 and studies cited in their paper) indicate that one ft (30 cm) of a three ft (1.0 m) sand sap is sufficient for biological isolation. Boudreau (cited in Rhoads and Carey 1997) gives a universal average bioturbation depth of 3.9-in. (10 cm) for macrofauna, the most abundant organisms on disposal sites in the New York Bight. Nilsen et al. (cited in Rhoads and Carey 1997) notes that the bioturbation depth in reduced salinity areas, such as Newark Bay, are less than in areas of full marine salinity. Rhoads and Carey (1997) conclude "A conservative management approach for isolating contaminated sediments from the ecosystem for very long periods of time would be to reserve one ft (30 cm) of cap thickness for bioturbation; three-fold thicker than the universal mean bioturbation depth for macrofauna and two times thicker than the plus (+) one standard deviation value . . ." A one ft (30 cm) cap thickness was used for bioturbation in determining the total thickness for the NBCDF cap.

Thicknesses for bioturbation and chemical isolation are additive since, as previously stated, it is undesirable to allow organisms to reach the portion of the cap intended for chemical isolation. In the absence of detailed design, the minimum cap for chemical isolation and bioturbation is taken as 2 ft (0.6 m).

A loosely placed cap may consolidate after construction, resulting in a gradual thinning of the chemical/bioturbation barrier. Consolidation must be estimated in order to determine whether there is a need to overbuild the cap to maintain the minimum cap thickness. Conversely, settlement of the cap would allow fine material to redeposit into the area, causing the site to biologically revert back to the existing substrate condition. The potential for cap consolidation was examined using the USACE LTFATE model (see Appendix 4.02) and was found to be negligible.

Wave-current-induced erosion can reduce the thickness of the cap and additional cap thickness may be provided in order to account for losses resulting from erosion. The additional cap thickness is designed to assure that the minimum cap thickness for chemical isolation and bioturbation is maintained for the life of the project. It should be noted, however, that it may be necessary to periodically replenish the cap thickness lost to erosion. Cap erosion potential was evaluated using the FASTTABS numerical model (see Appendix 4.02) and is addressed in Section 5.04.3.

Care must be taken to ensure that the proper cap thickness is distributed over the site. As it is difficult to place the cap at the exact thickness required for design, the specified cap thickness should include a contingency that accounts for uneven placement of material. This contingency should be about 0.5 to 1 ft (0.15 to 0.3 m). The tolerance is analogous to the allowable pay overdepth used in conventional dredging projects.

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5.04.2 AVAILABLE CAPPING MATERIALS

Pending final design, it has been assumed that the cap will consist of a fine- to medium-grain sand or other suitable clean dredged material. Sand would be the preferred cap material because of its ease of placement. This material would be dredged from one of several approved sources in the NY/NJ Harbor area and would likely be taken from Lower New York Bay or offshore.

Extensive offshore investigations in the NY/NJ Harbor area were conducted from 1974 through 1992 for the purpose of obtaining geotechnical data on existing sediment (USACE 1993). The data were used to evaluate and select potential sediment sources with suitable characteristics and volumes for use as borrow material for beach nourishment/shore protection projects. The investigations included locations within Lower New York Bay and along the Atlantic coasts of New Jersey and Long Island, New York; they consisted a combination of seismic profiling and vibratory coring techniques to obtain the data. Locations within Lower New York Bay included the East Bank Shoal due south of Coney Island and the area within Rockaway Inlet.

The investigations found several potential sediment borrow source locations (Note: Cap material must come from a permitted borrow site or a dredging project with appropriate material.):

- East Bank Shoal south of Coney Island
- South of Rockaway Beach (offshore) between the west end of Coney Island and Atlantic Beach, Long Island
- Within Rockaway Inlet
- South of Rockaway Beach near East Rockaway Inlet
- South of Atlantic Beach

The above borrow sources were evaluated with respect to sediment grain size, and the analysis is used here to assess suitability as cap material for the NBCDF project. The assessment included using the borrow source sediment grain size as input into the STUDH sediment transport model (see Appendix 4.02), and evaluating erosion characteristics of the cap when subject to various wave and current conditions. Sediment samples obtained from the East Bank Shoal and South of Rockaway Beach (offshore) contained material having mean grain sizes ranging from 0.012 to 0.019 in. (0.30 to 0.48 mm). Based on analysis of the modeled wave and current conditions, the grain size of material contained in these two locations should be adequate for the cap. (See the following section for details regarding sediment transport modeling of the cap.)

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Approximate volumes of suitable material from these sources indicate that there is a sufficient quantity available for the capping of the three NBCDF areas. An estimated volume of about 275,000 CY (208,800 CM) would be needed to place a 3-ft (1-m) thick cap over the three NBCDF areas (1S, 2S, and 2N). Material contained within the potential borrow sources are on the order of tens of millions of cubic yards.

5.04.3 EVALUATION OF CAP EROSION POTENTIAL

As previously stated, the FASTTABS model was used to investigate the stability of the cap against wave and current forces. Modeling efforts were conducted in order to evaluate the vulnerability of a sand cap to: (1) 100-year river flow conditions, (2) an extreme 100-year storm-induced wave coupled with normal tidal surface water elevation conditions, and (3) average wave conditions coupled with normal tidal surface elevation conditions. Physical parameters used in the modeling for the cap are presented in Table 5.04-1. The simulation of cap erosion potential entailed noncohesive sediments because sand is considered the best choice for the cap of the CDFs.

100-Year River Flow and Normal Surface Water Elevation. The first modeling effort was directed toward evaluating the integrity of a sand cap with grain sizes of 0.001 and 0.012 in. (0.1 and 0.3 mm) during 100-year flow conditions of the Passaic and Hackensack rivers. As the grain sizes used in the model are finer than the available capping material, the model is conservative, i.e., tends to overestimate erosion. Special hydrodynamic model runs were prepared in order to route the 100-year flow hydrograph through the Newark Bay area. The methodology for modeling the 100-year conditions was taken from work developed by the USACE - Waterways Experiment Station (WES). Example plots of peak storm flow velocities for 100-year conditions are presented in Figures 5.04-1 and 5.04-2 for ebb and flood tidal flows, respectively. STUDH sedimentation model runs were made for a sand cap having a mean grain sizes of 0.001 in. (0.1 mm) and are presented in Figure 5.04-3 for a 14 day model simulation period. As shown in Figure 5.04-3, the sand cap is not expected to suffer any significant erosion as a result of 100-year river flow conditions.

100-Year Wind/Wave Conditions and Normal Tidal Surface Water Elevation. STUDH computations were prepared for a cap consisting of 0.001- to 0.012-in. (0.1- to 0.3-mm) median grain size sand under normal tidal conditions along with 100-year wind (82 mph [132 km/h]) and resulting wave conditions. These STUDH results indicate that the sand cap would be vulnerable to erosion under these wind/wave conditions. During a normal tidal cycle, however, only for a fraction of the time is the surface water elevation high enough, i.e., water depths great enough at or near high tide, to allow these extreme waves to reach the NBCDF, travel over the cap, and impart an erosive energy to the cap. Erosion of the cap as a result of these high waves would be limited in time to about one-fourth of a tidal cycle (approximately 3 hrs) and would scour approximately 6 to 12 in. (15 to 30 cm) from an unsettled cap.

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Table 5.04-1

Noncohesive Sedimentation Parameters

Model Parameters	Units	Values
Crank-Nicholson THETA		0.66
Particle shape factor		0.07
Length factor (deposition)		0.05
Length factor (erosion)		10
Particle-specific gravity		2.65
Median grain size	mm	0.1
Effective diffusion	m**2/sec	50
Inflow concentration	kg/m**3	0.005
Settling velocity	m/sec	0.01
Manning's n		0.025

Normal Wave and Tidal Surface Water Elevations. Model efforts also considered cap erosion under normal tidal conditions, waves of 1 to 2 ft (0.3 to 0.6 m), and periods of 3 sec. Results indicate that a cap constructed of sand having median grain size ranging from 0.001 to 0.012 in. (0.1 to 0.3 mm) would be subject to minimal erosion, on the order of 2 to 3 in. (5 to 8 cm) per year, assuming that waves occur constantly. Because in the absence of waves net deposition is projected, there would be a dynamic equilibrium between slight erosion due to normal waves and deposition during calm conditions.

Summary. The model results described above show that the proposed sand cap would be stable under 100-year flood flow conditions due to relatively high water surface elevations and high suspended sediment concentrations. However, the cap may be vulnerable to wave-induced erosion. A relatively high degree of erosion might be expected during a 100-year wind/wave and normal tidal conditions. Erosion may also occur during relatively frequent occurrences where wave heights are as low as 1 to 2 ft (0.3 to 0.6 m). Such waves can be generated by boat wakes or winds from the northeast having speeds on the order of 20 to 25 mph (32 to 40 km/h). For the purposes of the present work, it will be assumed that a 1.5-ft (0.5-m) sand cap thickness is sufficient to counter long-term erosion; however, this estimate requires engineering verification.

Two factors make the modeling of erosion potential conservative, or tending toward overestimating erosion. The first factor is that, in general, the bed of Newark Bay is composed of 34% sand, 38% silt, and 28% clay (Suszkowski 1978). This introduces some error in to the calculation of cap thickness, as the sediments in the CDF area of Newark Bay are predominantly silt. Therefore, sediments outside the cap, which have a lower threshold for scour compared to the sand cap, will tend to scour before the sand cap. The second factor is that settlement of the cap within two years of its placement would result in greater water depths over the cap than outside the cap. Therefore, velocity and shear stress along the surface of the cap will be lower than the outlying Bay area and scour of the cap is less likely to occur. Cap settlement will induce greater deposition of Newark Bay sediments over it, and eventually a dynamic equilibrium condition will be reached in which the bed over the cap is practically level with the surrounding area. This natural sediment overburden resulting from a normal sedimentation rate of 6 to 12 in./year (15-30 cm/year) on the cap provides an additional margin of protection against erosion of the cap.

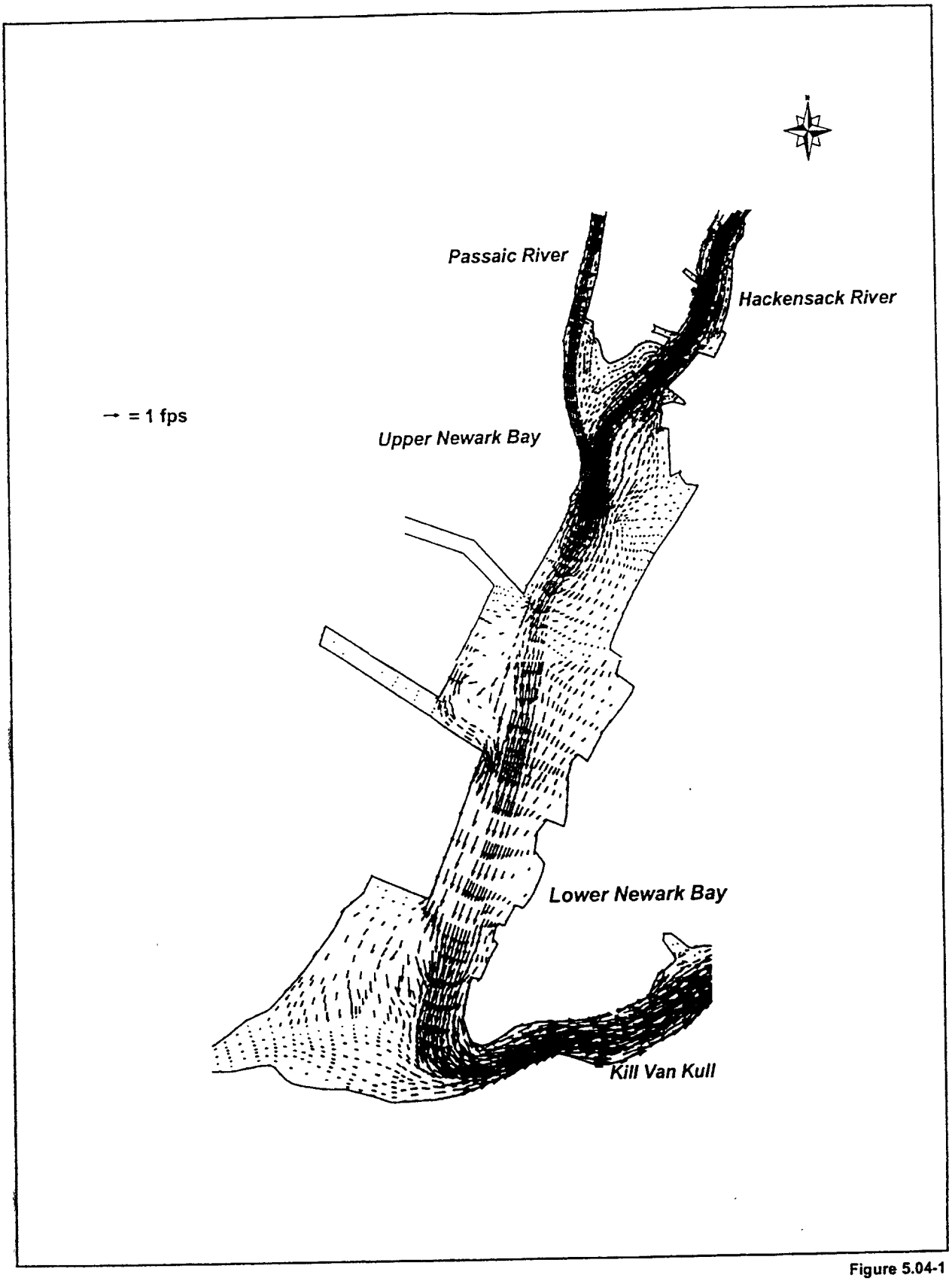

Figure 5.04-1

Peak Ebb Tidal Currents in Newark Bay

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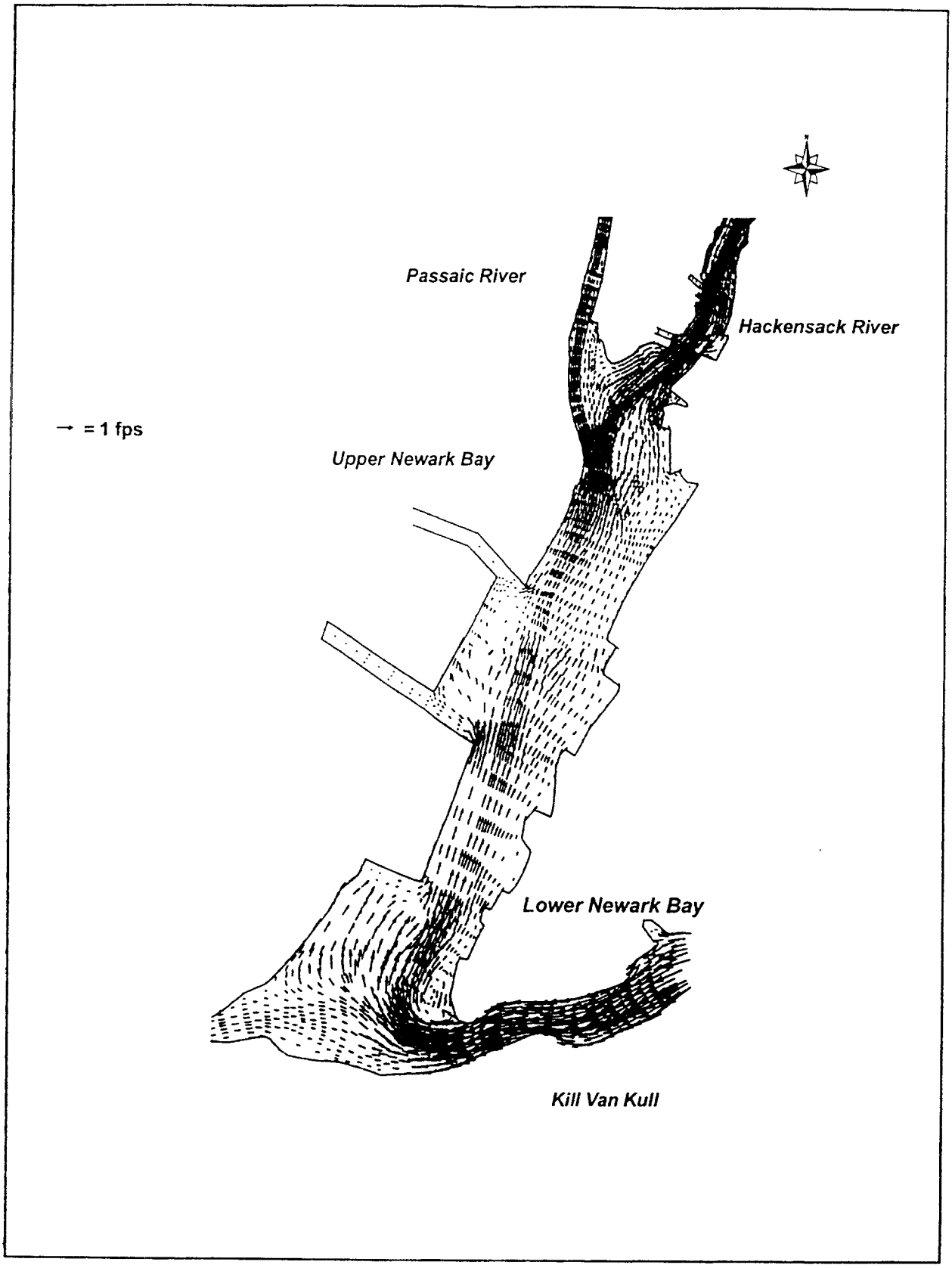

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Figure 5.04-2
Peak Flood Tidal Currents in Newark Bay

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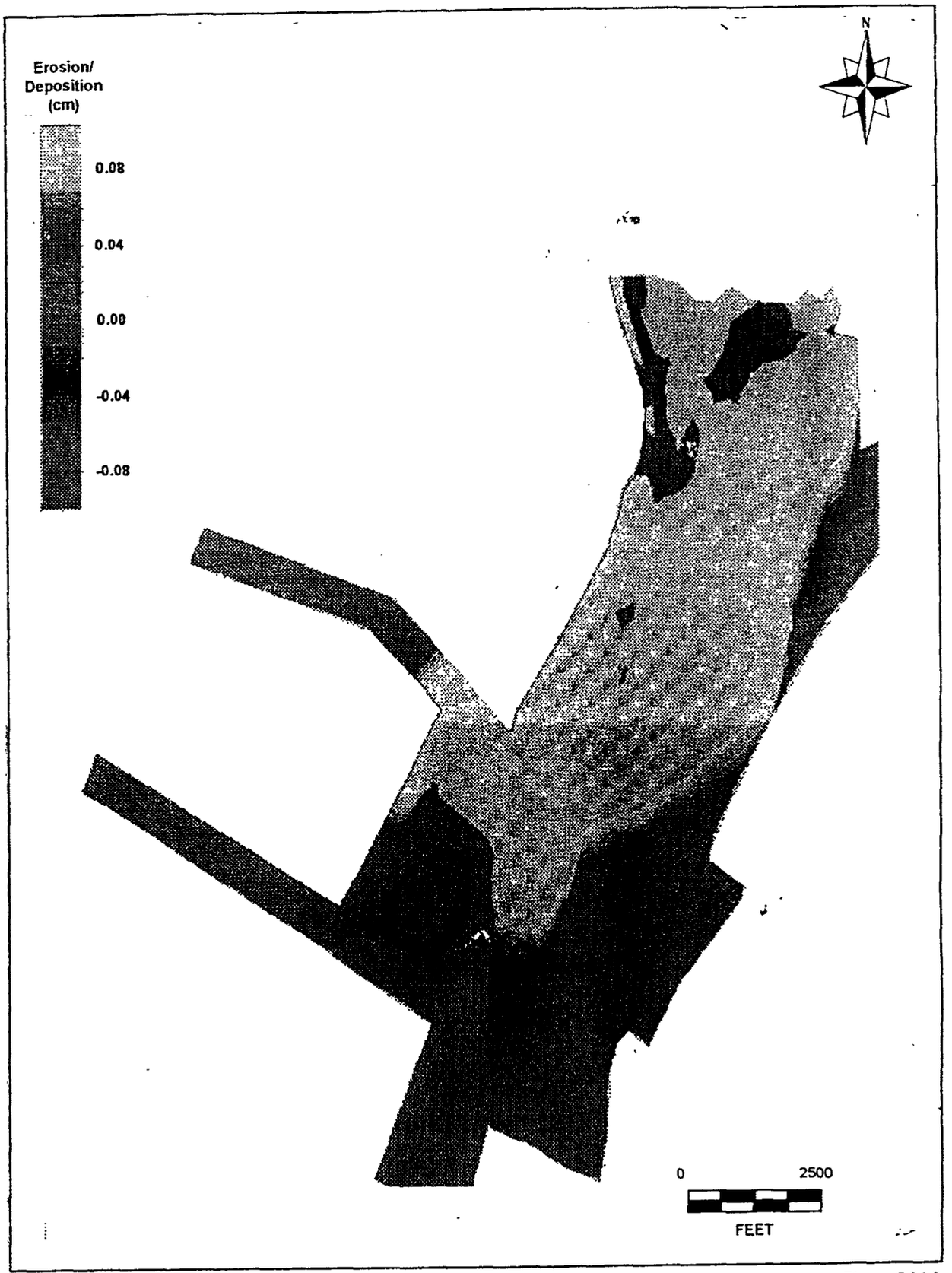

Figure 5.04-3

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Sand Cap Erosion/Deposition for 100-Year Storm (Grain Size 0.1 mm)

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5.04.4 SUMMARY OF CAP THICKNESS

The various contributions to the total cap thickness, T_{Total}, are summarized below:

$$T_{chemical} = 1.0\ ft$$
$$T_{bioturbation} = 1.0\ ft$$
$$T_{consolidation} = 0.0\ ft$$
$$T_{erosion} = 1.5\ ft$$
$$T_{tolerance} = 0.5\ ft$$

The total cap thickness is computed as follows:

$$T_{Total} = T_{chemical} + T_{bioturbation} + T_{consolidation} + T_{erosion} + T_{tolerance} = 4.0\ ft$$

The relatively high Newark Bay sedimentation rate (6-12 in./year [15-30 cm/year]) and the relatively rare occurrence of storm events that would result in cap erosion suggest that the NBCDF closure should include a sand cap thickness of 3 ft (1 m), with cap monitoring and replenishment if scour is noted following storm events or regular monitoring intervals.

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5.05 EQUIPMENT AND CONSTRUCTION TECHNIQUES

This section provides a detailed description of the equipment and construction techniques expected to be used on the project, operating and production characteristics of the equipment, and "best management" dredging practices that are applicable to the project. The following subsections address the proposed construction sequence. This sequence could be applied to any of the proposed NBCDF subareas.

5.05.1 DREDGING ENTRANCE CHANNEL TO NBCDF AND REMOVAL OF UPPER-LAYER MATERIALS

Area 1S will be used as an example for the discussion of equipment and construction techniques. Figure 5.05-1 shows Area 1S with a cross section drawn through the CDF and the entrance channel. The closed clamshell dredge will create an access to the NBCDF from the navigation channel by digging a 200-ft (61-m) (bottom width) wide by 20-ft (6.1-m) deep entrance channel to the NBCDF. Once access is provided to the NBCDF, the upper layers of the NBCDF will be removed. The unconsolidated surface sediment layer is characterized as gray silty clay and sand, with surface layer sediment depths ranging from 14 ft (4.3 m) in Area 2N to 16 ft (4.9 m) in Areas 1S and 2S. With compliance of the NJDEP barge overflows will be permitted during surficial sediment dredging operations.

Once within the CDF perimeter, the dredge will widen the excavation to within a minimum setback of 40 ft (12.2 m) from the edge of the CDF perimeter. This setback will ensure that any local sloughing of material will not cause material from outside the identified CDF footprint to enter the CDF area. The slope stability can also be monitored to determine the maximum final slope. This will allow for the maximum storage capacity to be developed later in the excavation process without concern that material that had not been environmentally characterized could affect the construction of the CDF. Once the first dredge has removed a sufficient amount of the surficial sediments to permit work in the area by two dredges, a second dredge will be used to complete the construction of this phase. It should be noted that only a clamshell dredge(s), or a hydraulic marine excavator (backhoe) dredge, employing slow lift rates, will be used to remove the surficial black silty clay. This phase of excavation is shown as the vertical lined area in Figure 5.05-1.

When the clamshell dredge is no longer effective in removing deeper or stiffer material, either a dipper, cutter-head, or hydraulic marine excavator dredge will be brought to the site to complete the excavation. Modern dipper, cutter-head and hydraulic marine excavator dredges can excavate to about -80 ft (-24 m) depth. Cutter-head and hydraulic dredge activity, which will only be used to excavate the deeper undisturbed clean sediments, will be accompanied by overflow barge discharging, with the barge located within the perimeter of the CDF. This phase of material excavation is shown as the cross-hatched area in Figure 5.05-1.

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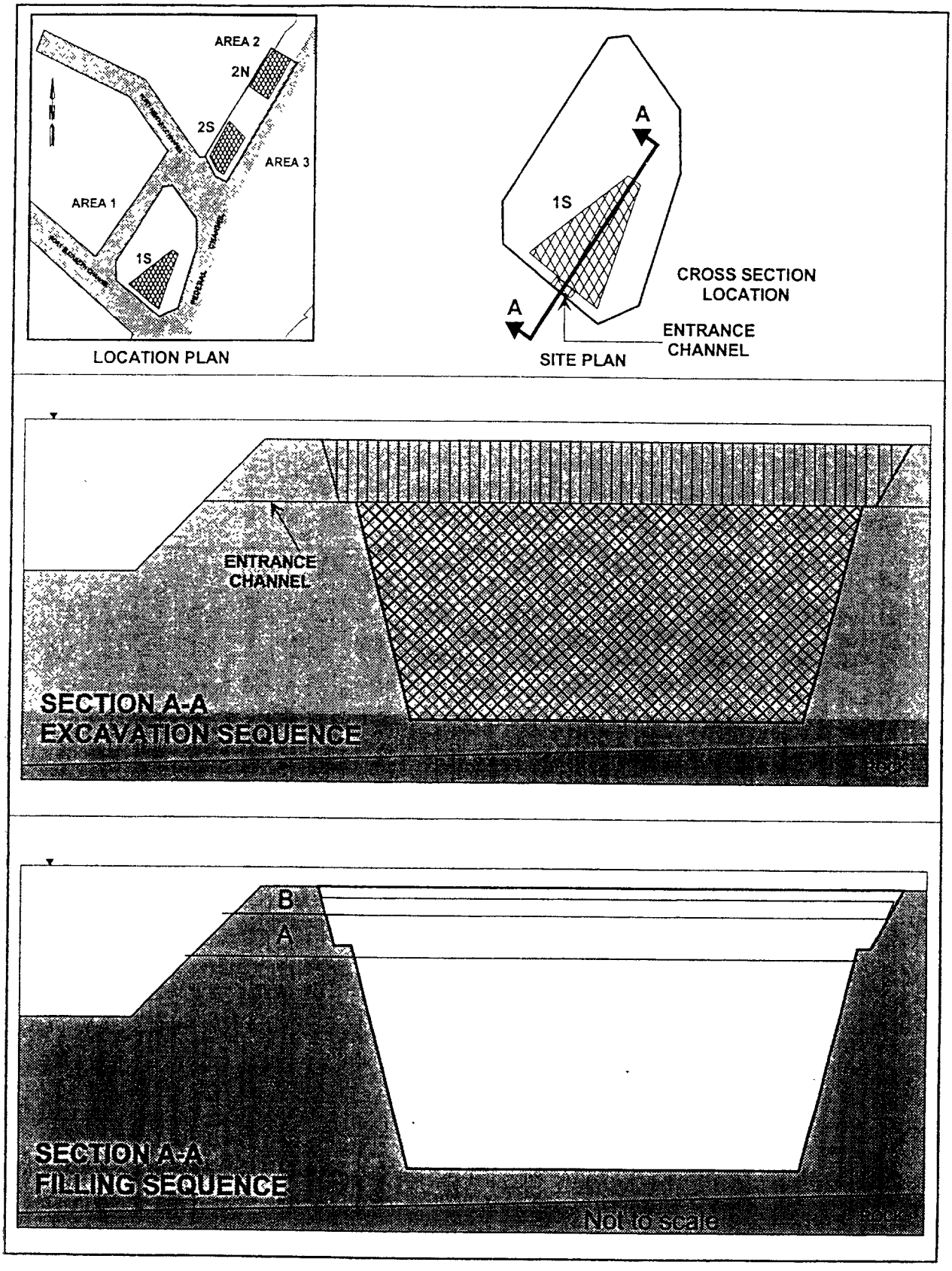

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Figure 5.05-1
CDF Excavation and Filling Sequence

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DESCRIPTION OF EQUIPMENT

Both the entrance channel to the NBCDF and the surficial silt and clay found in the upper layers of the NBCDF will be dredged by a clamshell bucket. The dredges likely to perform this work have dimensions ranging from 45 ft by 120 ft (13.7 by 36.6 m) to 75 ft by 225 ft (22.9 by 68.6 m) and draw from 7 ft to 20 ft (2 to 6 m) of water.

Attendant plant required for dredge operations and estimated size ranges are listed below:

Vessel	Number on Site	Length (ft)	Beam (ft)	Draft (ft)	Capacity (CY)
Hopper or dump scows	2-4	60-180	25-50	3-15	1500-6000
Tug boats	1-4	30-65	10-18	2-5	
Survey/crew boat	1-2	27-45	9-14	2-4	
Crane/derrick barge	1-2	45-80	15-30	3-6	
Equipment barge	0-1	60-120	25-45	3-8	

Conventional clamshell dredges, hydraulic marine excavator (backhoe) dredges and environmental versions of both of these dredges have been used successfully for remediation dredging applications (see Section 5.05-1).

Conventional Clamshell Dredge. Conventional clamshell or bucket dredges operate from a barge-mounted crane. Once the open bucket is positioned over the target area, it is lowered by the cable to the subsurface bed. Upon contact with the bottom, the crane operator closes the bucket to excavate the sediment. The speed at which the bucket is lowered and brought back to the surface can be manipulated to minimize sediment resuspension and dispersion. The level of vertical accuracy available on conventional clamshell equipment is in the range of 1-4 ft, depending upon sediment characteristics, operator skill level, tides, and sea state. The bucket capacities of conventional clamshell dredges that could complete the work range from approximately 5 to 50 CY (4-38 CM). The conventional clamshell dredge is most effective in excavating unconsolidated silts and sands. A smaller, heavier bucket is required for excavation of dense material such as consolidated (stiff) clay.

Environmental Clamshell Dredge. The environmental clamshell dredge was developed to excavate sediment on projects requiring tight vertical tolerance and minimal sediment resuspension/dispersion. The environmental clamshell dredge operates from the same barge platform as the conventional clamshell dredge and moves in the same manner. More precise vertical and horizontal control is achieved by the environmental clamshell by using pressure (depth) sensors, differential global positioning systems, and modern computer software. Modifications to the bucket permit the excavation of sediment in

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level cuts, as opposed to pockets. Additionally, the environmental clamshell bucket provides a cover and seal closure to minimize sediment dispersion into the water column as the excavated material is brought to the surface. The environmental clamshell dredge is most effective in excavating unconsolidated silts and sands and is less applicable to the excavation of stiffer clays.

Marine Excavator (Backhoe Dredge). Marine excavators use a turret-mounted backhoe as the primary excavator, and are capable of performing both the surficial dredging of unconsolidated contaminated sediment and the excavation of the stiffer, consolidated clay expected to be encountered deeper in the NBCDF. A number of new hydraulic marine excavator (backhoe) dredges have been constructed by the U.S. dredging industry in recent years. Ranging in size from 6 to 40 CY (4.6-30.6 cm), these backhoe dredges are capable of tight-tolerance excavation of marine sediment with minimal water entrainment. Vertical dredge tolerances of 0.5 to 1 ft (0.2-0.3 m) are possible, as is submeter horizontal positioning, with these modern, highly computerized excavator dredges. Achievable tolerances are dependent on sediment characteristics, operator skill level, tides, and sea state.

Production. The production capacities of the dredges capable of performing this project are highly variable and depend on operating parameters that include dredge sediment characteristics, depth of excavation, size of excavator bucket, dredge cycle time, and crew skill level. Of particular consequence to the dredge production, while excavating the surficial unconsolidated sediment, may be the necessity to decrease the rate of descent and rate of haul of the excavator to reduce resuspension of sediment as a result of washing from the bucket. This will lengthen the cycle time of the dredge.

Estimated Production Ranges of Dredges - Surficial Unconsolidated Sediments

Dredge	Bucket Size (CY)	Cycle Time (Min)	Operating Day (Hr)	Operating Efficiency	Production (CY/Day)
Conventional clamshell	5	2	24	0.65	2,300
	10	2	24	0.65	4,700
	30	2	24	0.65	14,000
	40	2	24	0.65	18,700
	50	2	24	0.65	23,400
Environmental clamshell	8	2.5	24	0.45	2,100
	16	2.5	24	0.45	4,100
	26	2.5	24	0.45	6,700
Marine excavator	12	1.5	24	0.65	7,500
	24	1.5	24	0.65	15,000
	40	1.5	24	0.65	25,000

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CONSTRUCTION METHODOLOGY

Working inward from the Port Elizabeth Channel, the dredge will advance in set ranging from 5 to 15 ft (1.5 to 4.5 m). Once the dredge advances it will lower and set its spuds into the bottom sediment, providing a stable and fixed platform from which the excavator can operate. Dredge mobility will be supplied either by tugboats or an on-board spud carriage. If a dredge with a spud carriage is used, the dredge will be capable of a certain amount of self-propulsion, setting itself ahead up to 30 ft (9.1 m) per set of the carriage, before the tug assist would be required for resetting. If the dredge is not equipped with a spud carriage, the dredge will be moved into position for its next cut sequence by one or more tugboats. Material dredged from the entrance channel and unconsolidated surface layer will be placed in hopper or dump scows for transport to the Mud Dump Site (MDS). One scow will be moored alongside the dredge for filling when excavation is in progress, while one or more scows are in transit to/from the disposal location. The dredge sequence will proceed along a predetermined cut path, preferably in long, straight lines, to optimize production.

Production is based on dredging operations being conducted 24 hrs per day. Delays due to weather and mechanical repairs are inevitable, but these will be minimized by the contractor. Little to no delay due to navigation traffic is expected for the dredge operations as the dredge area is not a navigation area. Hauling operations are more susceptible to weather and navigation delays. Weather and mechanical delays are incorporated into the operating efficiency used to calculate production.

5.05.2 DREDGING STIFFER NBCDF MATERIALS

Based on information gathered during the geotechnical borings, stiffer, previously undisturbed, consolidated and unconsolidated sediment is expected to be encountered at around -16 ft (-4.9 m) MLW.

DESCRIPTION OF EQUIPMENT

The stiffer, more consolidated clays expected to be encountered in the lower depths of the NBCDF will likely require the use of either a marine excavator dipper or other dredge for effective bulk material excavation. Attendant plant required for dredge operations in this phase of the project are the same as that listed in Section 5.5.1

Marine Excavators (Backhoe Dredge). Marine excavators, also described in Section 5.5.1, are capable of performing both the surficial dredging of unconsolidated contaminated sediments and the excavation of the stiffer, consolidated clays expected to be encountered deeper in the NBCDF. However, because of the large volume of material to be excavated in this phase and the depth at which dredging is to occur, only the larger marine excavators with larger buckets and with vertical reaches exceeding 70 ft (21 m) could be used.

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Dipper Dredge. The dipper dredge offers superior excavation power in the removal of stiff clays and rock. With bucket capacities up to 28 CY (21 CM), the dipper dredge operates from the same barge and crane as the clamshell dredge. The dipper dredge provides efficient bulk excavation of material utilizing a cantilever arm mounted bucket. The dipper is lowered to the target dredge area and digs forward and upward into the bank. The dredged material is placed in the dump scow by opening the bottom cover of the dipper bucket. The bucket is reset and another dredge cycle begins.

Production. The production capacities of the dredges capable of performing this phase are less dependent on sediment characteristics and depth of excavation than are the dredges evaluated for the shallow-dredging phase of this project. This is because the dredge cycle time will not vary significantly whether the material is consolidated or unconsolidated. The size of the excavator bucket, dredge cycle time, and crew skill level will impact production. Because neither contaminated nor loose sediment is anticipated, it is not expected to be necessary to decrease the rate of descent and rate of haul of the excavator. This could increase production.

Estimated Production Ranges of Dredges - Deeper, Consolidated Sediments

Dredge	Bucket Size (CY)	Cycle Time (Min)	Operating Day (Hr)	Operating Efficiency	Production (CY/Day)
Hydraulic marine excavator	24	1	24	0.65	22,500
Hydraulic marine excavator	40	1	24	0.65	37,400
Dipper dredge	28	1	24	0.65	26,200

CONSTRUCTION METHODOLOGY

The dredging sequencing and construction methodology used for the deeper-dredging phase of this project is much the same as that employed for the shallow-dredging phase described in Section 5.05.1. The depth of excavation in this phase, to -70 ft (-21 m), may require the use of an anchor and cable system rather than spuds for dredge mobility and stability. Most dredges capable of performing the work in this phase can use spuds in this depth range. Material excavated from the dredge area in this phase will be placed in scows for transport to the MDS. One scow will be moored alongside the dredge for filling when excavation is in progress, while one or more scows are in transit to/from the disposal location. The dredge sequence will proceed along a predetermined cut path, preferably in long, straight lines to optimize production. It is assumed that dredge operations will be conducted 24 hrs per day.

5.05.3 HAULING MATERIAL EXCAVATED FROM NBCDF TO MDS

Material excavated from the NBCDF will be transported to and placed in the MDS located east of Sandy Hook, New Jersey. The filled scows will be towed by tugboats from the NBCDF to the MDS via Newark Bay, the Kill Van Kull, and the Ambrose Channel to the disposal site offshore. The total round trip is roughly 55 to 60 nautical miles (92 to 111 km). The transport rate should range from 5 to 10 knots (2.6 to 5.1 m/sec), depending on tugs and scows utilized, vessel traffic, currents, and weather. Hauling operations are more susceptible to weather and navigation delays than the dredge operations and at times could affect the dredge production and project schedule. All Category II material will be properly and appropriately capped with clean material at the MDS. Category I material may be used for remediation at the Historic Area Remediation Site (HARS).

5.05.4 FILLING NBCDF WITH CONTAMINATED MAINTENANCE MATERIALS USING DUMP SCOWS

Placement of contaminated material in the NBCDF with dump scows will be conducted in two phases. The initial phase will fill the NBCDF to the bottom of the 20-ft-deep access channel. When the NBCDF reaches this level, the access channel will be filled to a 10-ft depth with clean sediment. This reduced entrance channel depth will prevent access to the NBCDF for some larger dump scows. The second phase - placement of contaminated dredged materials in the NBCDF - will use shallower-draft dump scows or lightly loaded dump scows, and may take advantage of the tides.

Contaminated material to be placed in the NBCDF will be transported and placed via hopper or dump scows. The scows likely will be towed to the site with bridle connection or side connection to tugboats and maneuvered into place by the tugboats. Prefill hydrographic surveys will aid in determining optimal placement location for the material. Using differential global positioning systems, the scows will be maneuvered to within 16 ft (5 m) of the desired dump location and alignment. Once positioned, the scows will open their bottom dump doors, or hopper, to release the contaminated material.

A number of measures can be taken to minimize the resuspension and dispersion of contaminated sediment released from the scows. If necessary, operational controls, such as limiting placement of fill material to periods of slack tide or intermittent disposal, can be implemented to control resuspension of sediment. If operational controls are not sufficient to meet water quality standards, intermittent use of a silt curtain or containment booms will be considered.

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5.05.5 PLACEMENT OF CONTAMINATED MAINTENANCE MATERIALS INTO THE NBCDF

When the NBCDF has been filled to the level of the 10-ft (3.1-m) deep entrance channel, the entrance channel will be filled with clean material. Shallow draft or lightly loaded dump scows will continue the disposal of dredged material until site access is precluded. Additional contaminated dredged material will then be placed in the NBCDF using a clamshell dredge with underwater release to a depth of -3 ft (-1.0 m). Underwater release of contaminated dredge material will minimize sediment resuspension and the effect of tidal currents since release will be below the sediment-water interface.

5.05.6 CAPPING CONTAMINATED MAINTENANCE MATERIALS IN NBCDF

Clean sand material will be used to cap the NBCDF. Due to depth restrictions, bottom dump scows will not be capable of navigating into the cap fill area. A pipeline system is best used for this activity. The cap material slurry will be transported to the area in barges and pumped directly from the barge depositing the sand material over the NBCDF.

To control resuspension of contaminated sediments, the discharge velocity should be minimized. To avoid creation of humps and reconstruct as level a depth contour as possible, one small boat or shallow-draft tug would be used to control the pipeline discharge location. A diffuser can also be used at the discharge to reduce the discharge velocity and provide a more even distribution of the capping material.

5.06 BEST MANAGEMENT PRACTICES

In March 1996 NJDEP published its draft guidance document on "The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters" (NJDEP 1996). This draft document presents the policies and procedures under which the NJDEP proposes to conduct regulatory reviews of dredging activities in tidal waters of the State of New Jersey. The policies and procedures were developed to ensure that proposed dredging projects and the management of dredged material are conducted so as to minimize the potential for adverse impacts to the environment and public health.

The NJDEP draft guidance document presents and includes a discussion on Best Management Practices (BMPs) as they relate to the management of dredging and disposal operations. BMPs are procedures that the guidance document states should be used to minimize the potential for, and magnitude of, adverse environmental impacts that could result from dredging and disposal operations. The BMPs to be employed during the construction and disposal operations at the NBCDF will be determined by the NJDEP and will be included as permit conditions. The applicability of the use of a particular BMP for a dredging and/or disposal project will be evaluated by the NJDEP, on a case-by-case basis, in consultation with the permit applicant. The BMPs determined to be applicable to the applicant's project will be incorporated as permit conditions.

The document presents several potential environmental impacts and regulatory objectives related to dredging operations and the management of dredged material disposal operations. Potential environmental impacts and human health risks considered by the NJDEP in reviewing dredging and dredged material management operations include:

- Physical disruption of benthos at/or in the immediate vicinity of the dredge/disposal site
- Water column toxicity and contamination
- Benthic toxicity and contamination
- Interference with anadromous fish migrations
- Ecosystem impacts if capped contaminated dredged material is not adequately contained and isolated from the marine environment

Following are summaries of BMPs included in the NJDEP draft guidance document (NJDEP 1996) related to dredging activities and the management of dredged material disposal operations that are considered applicable to the construction and operation of the proposed NBCDF:

- ***Closed Clamshell Bucket***: The use of a closed, watertight clamshell dredge bucket (i.e., environmental bucket) reduces the production of suspended

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solids at the dredging site. The use of an environmental bucket is applicable for the dredging of the top layer of contaminated sediments (down to 12 to 20 ft [3.7-6.1 m]) at the proposed NBCDF.

- ***Dredging Practices***: Procedures employed to minimize the creation and dispersal of suspended sediments when using a clamshell dredge. The following dredging practices are applicable for proposed NBCDF surface sediment dredging operations:

  - maximizing the size of the "bite" taken by the clamshell bucket. This also results in a minimization of the number of "bites" needed to dredge a particular volume of sediment;

  - slowly withdrawing the clamshell bucket through the water column;

  - not hosing down or rinsing sediments off the sides and gunwales of the barge while at the dredge site.

- ***Barge-Overflow***: At the dredge site, the elimination of barge-overflow reduces the creation and dispersal of suspended sediments when finer-grained sediments are dredged. Barge-overflow will not be permitted by the NJDEP when the dredged material is contaminated at levels warranting concern (NJDEP 1996). NJDEP may permit barge overflow when the dredged material will be taken to a designated ocean disposal site. Use of barge overflow tends to produce a more consolidated dredged material which results in less dispersal at the ocean disposal site. The use of barge-overflow and the relative impacts at the dredge site and the disposal site during the dredging of the proposed NBCDF will be reviewed by the NJDEP and any restriction listed as a permit condition. Barge overflow is currently anticipated for the dredging of all NBCDF sediments.

- ***Split-hull Barges***: Split-hull barges should only be used in dredging projects which will use open water disposal methods. The use of split-hull barges is projected for both the construction and disposal operations at the proposed NBCDF.

- ***Point Disposal:*** Adherence to strict navigational requirements designed to ensure point disposal of dredged material into the subaqueous CDF. Proper placement of dredged material in the CDF will be part of the facility operational plan.

- ***Weather and Tide Restrictions:*** Dredging and dredged material disposal operations may be restricted during severe weather and/or tidal conditions. High wind speeds and unusually high tidal ranges (such as

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those that occur during severe storms or during particular spring tides) may result in increased current velocity over the subaqueous CDF and could cause dispersal of contaminated sediments away from the disposal area. Permit conditions related to weather and tides may be applicable during the construction and operation of the proposed NBCDF. Permit conditions will be determined by NJDEP.

- *Geotextiles and Direct Shunting:* No use of geotextiles is considered feasible for the proposed NBCDF. The feasibility of using direct shunting of dredged material into the pit will be considered. For this alternative, concerns about weather and tide are less important than if dredged material is dropped from the surface of the water into the pit. Direct shunting would involve a conduit leading from above the surface well into the CDF into which dredged material would be dropped. The use of direct shunting may be used during the final stages of dredged material disposal, when it is projected to use hydraulic pumping to complete filling of the CDFs.

- *Silt Curtains:* Silt curtains or turbidity barriers are vertical barriers designed to enclose or contain the turbid water generated by a dredging operation. Curtains are manufactured for a variety of depths and, in general, their design includes four elements: a skirt that forms the barrier, flotation material at the top, ballast weight at the bottom, and usually a tension cable. The flotation and ballast serve to maintain the deployed curtain in a vertical position, while the tension cable absorbs the loads imposed by the hydrodynamic (current) forces (JBF 1978). However, when current speeds exceed 1.6 ft/s (0.5 m/s), silt curtains may not be practical (NJDEP 1996). Thus, depending on the hydrodynamics of the study area silt curtains may or may not be feasible. Silt curtains or containment devices may be used around the end of the barge-overflow discharge pipe to minimize the plume area and facilitate sediment settling. The use of silt curtains is not currently considered necessary or feasible for construction or operation of the proposed NBCDF.

- *Dredging Inspector:* The use of an on-site inspector is anticipated for both dredging and dredged material disposal operations at the proposed NBCDF.

- *Biological Windows:* Dredging and dredged material disposal operations conducted during appropriate biological "windows" may be required in some areas of New York Harbor to avoid interference with anadromous or other migratory finfish, nesting shorebirds, overwintering waterfowl, and other biological populations. Evaluation of the biological information from Newark Bay and surrounding environs does not indicate the need for "windows" for the construction or disposal operations at the proposed NBCDF.

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Another management practice that should be considered for disposal operations at the proposed NBCDF is the use of bathymetric surveys to monitor CDF disposal capacity. Furthermore, inadvertent creation of mounds along the pit boundary could result in premature topping of the pit. Thus, periodic bathymetry surveys can be used to determine whether the placement location of the dredged material needs to be modified to prevent this from happening. Additionally, an even application of dredged material in the CDF will tend to maximize its consolidation, which would also increase its stability and maximize capacity.

Additional BMP items to be incorporated involve site safety procedures and determining the best operation schedule to minimize interference with shipping and operations at Ports Elizabeth and Newark.

In addition, potential environmental impacts can be minimized upon closure of the subaqueous CDF by designing an appropriate cap and maintaining the cap's integrity. The final cap needs to be thick enough to prevent burrowing organisms from reaching the contaminated sediment, and also to effectively isolate contaminated sediments from release. In general, NJDEP indicates that one meter of suitable clean material will be required as a final cap thickness.

Restoration of the natural bathymetry of the subaqueous CDF using appropriate clean material as a final cap will serve as de facto mitigation for the loss of benthic habitat resulting from the construction of the pit. Capping at the proposed NBCDF will restore the bottom bathymetry to pre-existing conditions. Monitoring of the subaqueous CDF, its final cap, and the surrounding environment is required to ensure the integrity of the cap. A monitoring plan for the NBCDF is presented and discussed in Section 5.07.

Any pertinent Occupational Safety and Health Administration (OSHA) safety regulations in 29 CFR 1926 (Construction) will be followed, as well as any pertinent General Industry standards in 29 CFR 1910. Furthermore, specific guidance on safety issues regarding dredge-related projects are included in USACE (1992). This document will provide guidance on safety practices.

5.07 MONITORING AND MANAGEMENT PLAN

The purpose of the monitoring and management plan is to establish the organizational framework and information needed to manage the dredging and disposal operations at the proposed NBCDF. The potential adverse environmental impacts associated with the construction, operation, and closure of a CDF depend directly upon the location and existing ecological functions of the proposed CDF site. Potential impacts which may require evaluation include physical disruptions during construction and disposal operations, short-term benthic and water column toxicity impacts as a result of the disposal of contaminated dredged material, and water column impacts associated with the resuspension of sediment. In addition, long-term impacts to biota and the ecosystem may result if the contaminated dredged material placed in a CDF is not adequately contained and isolated from the marine environment.

Due to the short time period that the proposed NBCDF will be open and the implementation of BMP permit conditions, the construction and operation of the NBCDF will not have long-term negative environmental impacts. A project-specific monitoring and management program has been designed to gather sufficient information to: 1) ensure that water quality standards are complied with during construction and operation, and 2) ensure that the closure activities (capping) sufficiently contain the contaminated sediments. In addition, as suggested in the NJDEP guidelines for the management and regulation of dredging activities in New Jersey's tidal waters (NJDEP 1996), the proposed NBCDF will be located in an area impacted by similar levels of existing sediment contamination as the dredged material proposed for disposal. Based on the existing level of sediment contamination in the immediate vicinity of the proposed NBCDF, there is no reason to propose any short-term or long-term permit conditions for surficial sediment or water column chemistry monitoring or tissue bioaccumulation testing, as it will not be possible to separate out the influence of the disposed sediments from the existing sediments.

The overall emphasis of the monitoring and management plan is to monitor the cap of the closed CDF to determine its effectiveness at containing/isolating the contaminated sediments placed in the CDF, and if necessary, to rectify any problems (most probably through the addition of cap material). The second area emphasized in the monitoring plan is the health of the biotic community through periodic sampling of the benthic community, and comparing the results to previously collected data including baseline data to establish recolonization patterns/trends and the return and continued use of the area by higher trophic level populations. Monitoring will be conducted during disposal events to ensure turbidity levels in the surrounding water do not exceed permitted levels. This will help to ensure that unacceptable negative impacts to water quality does not occur.

The monitoring plan covers the establishment of predredging baseline conditions through long-term monitoring following capping. This plan incorporates the experience gained through other dredging and disposal monitoring programs at both open- water and confined disposal sites. However, no attempt has been made to directly relate this

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program to other monitoring programs because this program is very specific, while the others were generally broader in scope.

The following assumptions have been made during the development of this monitoring and management plan:

- The results of the environmental assessment indicate that there is no need for non-water (sediment, air) related monitoring.
- Monitoring will be conducted for NBCDF dredging and dredged material disposal activities only.
- Monitoring at source dredging sites will be performed by the site owner according to the terms of the permit for the site. This is assumed to include loading of the barges and transport of the dredged material to the CDF. Floatables and petroleum by-products will not be permitted for disposal at the CDF.
- Monitoring for the CDF begins with the collection of physical, chemical and biological samples to establish baseline conditions. (NOTE: The baseline sampling program was conducted during the period April 1995 through March 1996 (LMS 1996).)

The purpose of setting these objectives is to develop and implement a monitoring plan that inspects the site, documents conformance to design standards, and provides remedial action options if design standards/permit conditions are contravened.

The objectives of this plan are to:

- Establish an organizational framework for management of the NBCDF.
- Provide baseline information for physical, chemical, and biological conditions at the NBCDF and at reference/control stations, which will be used during operational and postcapping monitoring. The baseline data base will include both existing information and data obtained during the NBCDF project. (Ample preconstruction baseline information is available.)
- Provide a general sampling protocol for the data and information needed for operational management and long-term monitoring of the proposed NBCDF. The final monitoring plan, quality assurance/quality control procedures, and reporting requirements will be specified in the project specific Federal and state permits.

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5.07.1 MANAGEMENT PLAN

The management plan is dependent on a functioning organizational framework that includes all involved agencies and the responsible organization (RO) (site owner/ operator). The Port Authority of New York and New Jersey will be the RO for the proposed NBCDF. The RO will assign a project manager(s), who will be responsible for the execution of the monitoring program specified in the Federal and state permits, including the pre-operational, operational, and post-operational phases of the program. If an outside contractor is required to conduct the technical monitoring program, the RO will be responsible for preparing a request for proposal, selecting and managing a contractor, and sponsoring (funding) the contract.

5.07.2 PROPOSED MONITORING PROGRAM

The proposed monitoring program is planned as a series of monitoring tasks conducted during four stages of the project. The final NBCDF monitoring program will be based on agreements among the regulatory agencies. The tasks considered for inclusion in the monitoring program will be conducted at the CDF to ascertain the following:

- Confirmation that design criteria are satisfied prior to disposal of dredged material;
- Assurance that dredged material disposal operations proceed in accordance with protocol and contaminated sediments are contained within the CDF; and
- Assurance that the cap functions as designed to contain the contaminated sediments for the long-term.

The project is divided into the following stages:

- Predredging (baseline) (Phase complete)
- CDF construction dredging/predisposal
- Disposal of contaminated dredged material and capping
- Postcapping.

The most comprehensive physical, chemical, and biological sampling will be conducted during the predredging (baseline) phase. Information gathered during this effort will be used as the baseline for monitoring efforts at both the control and disturbed sites for the remainder of the program.

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The following monitoring program components are proposed in accordance with the specified schedule.

Bathymetry. Bathymetric surveys will be conducted at the proposed CDF sites along transects, with transect spacing sufficient to obtain detailed bottom contour profiles. Differential global positioning system (DGPS) or equivalent technology should be employed to accurately position the boat (± 5 ft [±1.5 m]). Tidal corrections will be made with respect to a known datum with real-time water level information.

Predredging bathymetric surveys will be conducted to establish the existing bottom contours for the purpose of restoring the Bay bottom to its original configuration following disposal operations and capping. Bathymetry may be used during the dredging operations to ensure adherence to design drawings and establish the bottom depth/profile. During disposal of dredged material in the CDF, bathymetry will help to determine dredged material placement, and to monitor depth or available volume. CDF capping procedures will result in bottom profiles similar to predredging bottom contours, with the bottom contours confirmed through the use of bathymetry. Bathymetry may also be used during the postcapping/long-term monitoring phase of the program. Side-scan sonar used to validate bathymetric traces and to provide more complete images of project site elevations is not applicable to the proposed NBCDF due to shallow water depths.

Surficial Sediments. Sediment sampling was conducted at the proposed NBCDF and at other Newark Bay sites during 1995 and 1996. The 1995 and 1996 sediment sampling programs established the baseline conditions for the NBCDF sediments. Since the baseline sediment sampling program established that the sediments in the immediate vicinity of the proposed NBCDF are as contaminated as the sediments proposed for disposal in the CDF, no sediment sampling is projected for the dredging, disposal, or postclosure phases of the NBCDF project.

Biological Monitoring. Biological monitoring should consist of sampling to determine benthic infaunal species composition and density (baseline, and postcapping/long-term monitoring phases). The information gathered during this portion of the program will be used to characterize the predisturbance conditions at the CDF sites and at control/ reference locations. Biological data will be used to establish the recolonization rate of the disturbed areas and functional use of the area by higher trophic level populations. Information will be obtained on the successional pattern of benthic populations related to colonization of different substrates (clean cap material (sand) and fine sediments deposited in the area through natural sedimentation), and changes noted in species composition over time.

Monitoring of the Cap. The 3-ft (1-m) sand cap (cap thickness recommended by NJDEP [NJDEP 1996]) that will be placed on the CDF must be monitored to assure that it is functioning as designed. Based on studies conducted at other disposal sites where sand was used to cap contaminated soft sediments, it is expected that the cap will prevent contaminated sediments from escaping the CDF. It is also expected that the dredged

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material placed in the NBCDF will compact after the sand cap is in place, the sand cap will sink below the rim of the facility, and subsequently natural sedimentation will result in the deposition of soft sediments on top of the cap. The following plan is designed to test the integrity of the cap, detect erosion of the cap, and confirm soft sediment deposition on the cap. The initial portion of this monitoring is independent of the long-term monitoring program, but the latter portion is incorporated into that program.

In addition to bathymetric surveys to monitor cap integrity and settlement/sedimentation rates, cap monitoring will primarily rely on shallow core sampling and/or penetrometer testing. Core samples to a total depth of approximately 4 ft (1.3 m) will be taken following cap placement to determine overall cap thickness (compliance with permit conditions). Subsequent to cap placement, shallow depth cores will be taken at various intervals over the first year (especially following major storm events) to monitor cap thickness and integrity. The cores will penetrate the sand cap into the underlying dredged material for a distance of approximately 1 ft (0.3 m). The depth of the sand portion of the core and any overlying deposition will be measured and recorded. Following the first year, monitoring will become part of the long-term monitoring program, with cores collected according to permit conditions. The primary method of monitoring cap integrity (cap thickness) will be through the use of penetrometer testing. Penetrometer testing offers a fast, reliable, and economical technique to monitor cap integrity by measuring the difference in cap material resistance compared to the lower resistance of the soft sediments. Possible core/penetrometer sampling locations are presented in Figures 5.07-1 and 5.07-2.

Results of the core sampling and/or penetrometer testing will be compared to each other and to the result of earlier tests to determine whether the integrity of the cap is breached and/or erosion is taking place. If either condition is identified, a remedial action will be required. Additional testing will be required to determine areal extent of the problem. Additional capping may be added to remediate the problem.

Water. Turbidity has been selected as the indicator water quality parameter to be monitored during both dredging and dredged material disposal operations at the proposed NBCDF. Increased turbidity may indicate escape of fine sediments from the work area. Because chemical constituents are most frequently bound to these fines, increased turbidity in the water column outside the work area would indicate the escape of contaminated sediments to the surrounding environment. This condition may trigger the need for immediate corrective action on the part of the site manager. The monitoring plan is designed as an early warning system to provide the site manager the necessary information upon which to base his decisions.

In situ recording turbidity meters will be placed at up-current and down-current locations from the dredging/disposal activities to detect the escape of either on-site dredged or disposal sediments from the area during construction and operation of the CDFs. Data will be downloaded daily, displayed, and analyzed for conformance with project design and permit conditions. One meter will be placed at a control location that is located

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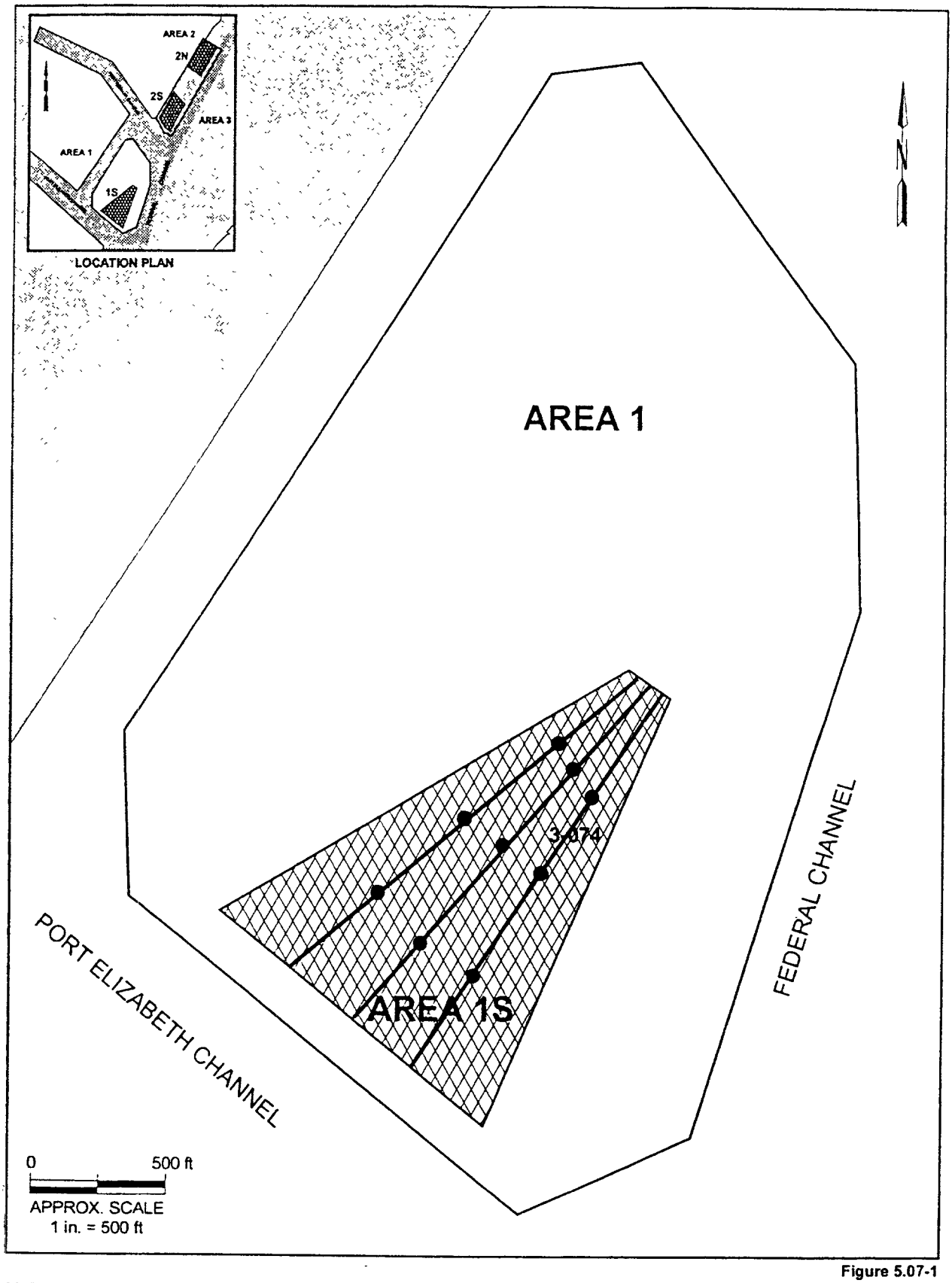

Figure 5.07-1

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Possible Core Sampling Locations for CDF 1S

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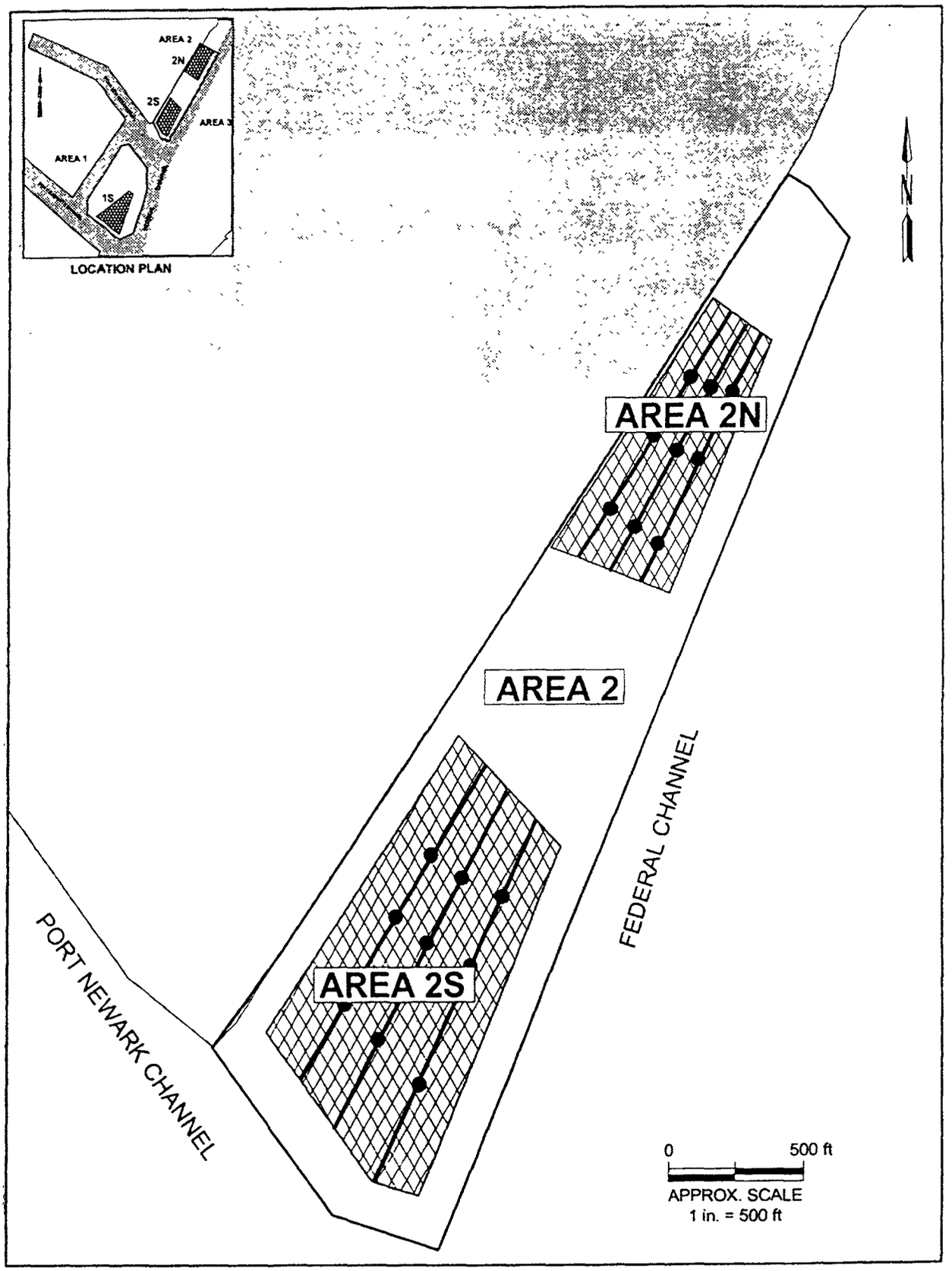

Figure 5.07-2

U.S. Army Corps of Engineers
Newark Bay Confined Disposal Facility

Possible Core Sampling Locations for CDF 2S and 2N

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outside of the project area and will provide background data for the daily evaluation (Figure 5.07-3). Turbidity monitoring as a means of monitoring the disposal operation must take into consideration other sources of turbidity that may occur at the same time as dredged material disposal operation. Other turbidity sources include shipping traffic, combined sewer overflows, storm water outfalls, and storm events disturbing the shallow-water sediments. No water quality monitoring is projected as part of the long-term monitoring plan.

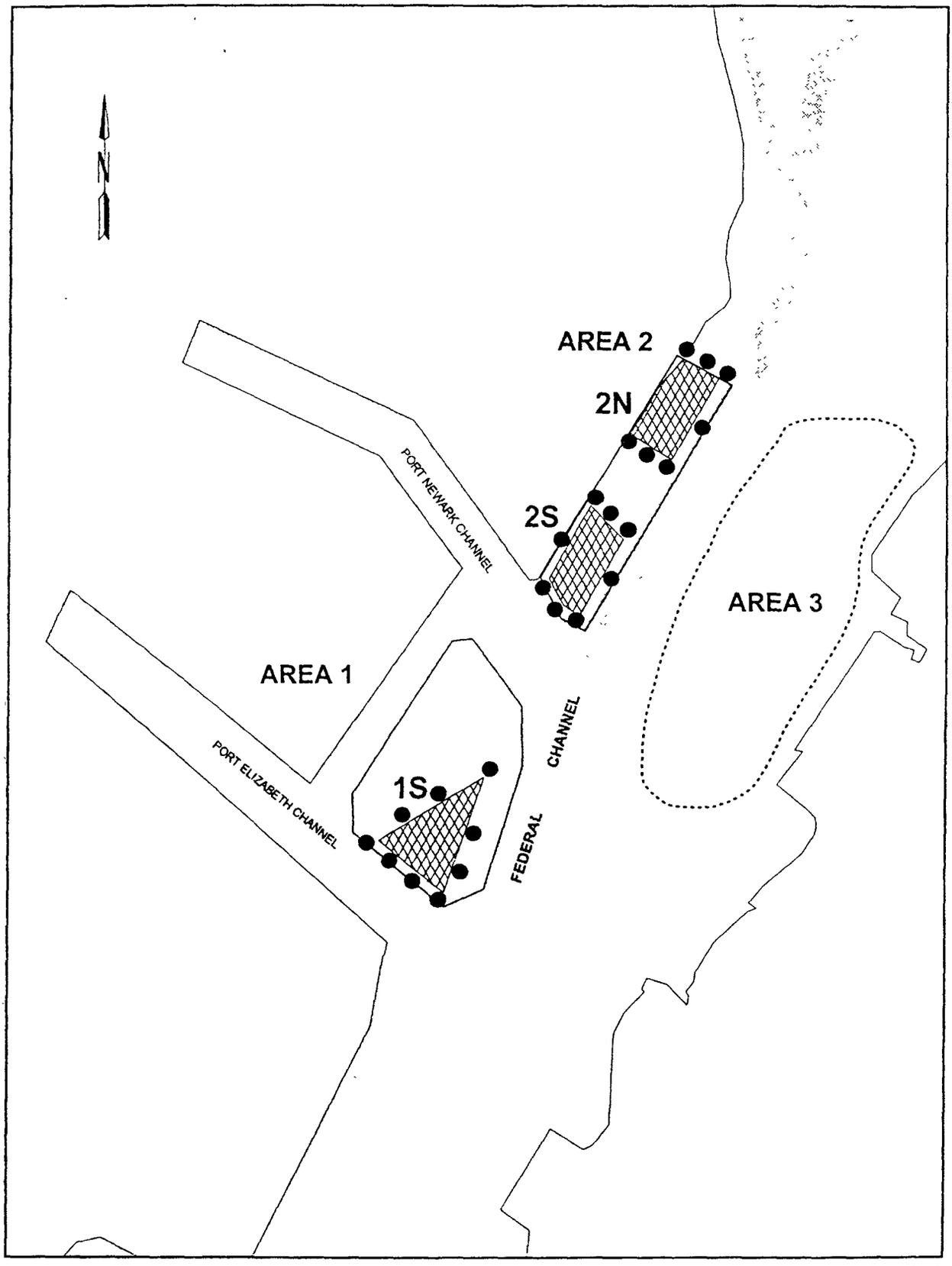

Figure 5.07-3

U.S. Army Corps of Engineers
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Possible Location of In Situ Turbidity Meters

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5.08 MITIGATION MEASURES

The intent of developing mitigation measures is to avoid, minimize, or compensate for identified impacts determined to be adverse to the environment within or adjacent to a project area. Avoidance and minimization of adverse effects are mitigation techniques that are developed as the project is designed and are incorporated into the final design of the project. Adverse effects that may require compensatory mitigation are evaluated to characterize their magnitude, importance, and persistence. The critical part of the evaluation is the determination of importance and persistence. If the effect is deemed important, an assessment is made to determine whether it is short term and naturally reversible or long term and/or irreversible. Those impacts found to be long term and/or irreversible require development of mitigation measures to compensate for the environmental loss.

The NBCDF project is intended to be an interim, short-term solution for disposal during the period in which the Federal and state agencies identify a long-term disposal site for contaminated sediments within the NY/NJ Harbor region. The urgency of this project is underscored by the fact that the MDS will be closed for disposal dredged material by 1 September 1997 (following closure a Historical Area Remediation Site [HARS] consisting of the MDS and historical surrounding areas impacted by precious dredged material will be designated); loss of revenue to the ports located on Newark Bay because sedimentation has filled both the channel and berthing areas to a point where fully loaded ships cannot use the port; and the priority put on this project by Governor Whitman of New Jersey. Combined, these elements have given this project a very high priority.

The immediate need for this project has caused the project design and the environmental assessment to proceed on concurrent, parallel paths. This has permitted evaluation of environmental effects of the various components of the project to be completed before the project design was finalized. As a result, the opportunity has been afforded to incorporate mitigation measures to avoid or minimize impacts into the final project design, to the extent practicable. The most significant change was effected after field testing identified contaminated sediments within a sizable portion of the original area to be dredged for the CDFs. This information led to a downsizing of the project and altered the plan of operation of the facility to avoid/minimize the disturbance of these sediments and to contain those that are to be moved during the creation of the facility. The choice of location both minimizes distances dredged material will need to be transported for disposal and avoids transporting these materials across the shipping channel, thus minimizing chances for accidental spills. Other examples of mitigation techniques that will be incorporated into the operating procedures include possible use of an environmental clamshell bucket during excavation of the disposal facilities and possible installation of a silt curtain around the areas being dredged. If necessary, these will minimize/avoid the movement of resuspended sediments from the areas of excavation to adjacent areas within Newark Bay.

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Even with this opportunity to incorporate mitigation into the project design, certain adverse effects are unavoidable. These effects, which are identified in Chapter 4 of this document, have been evaluated for the purpose of requiring mitigation in the context of short-term vs long-term and naturally reversible vs irreversible impacts. All adverse effects that have been deemed short term and naturally reversible, irrespective of magnitude, are considered to be transitory; thus no mitigation is required. Examples of this type of impact are the loss of individuals and habitat for both the infaunal benthic community and the fish community during the excavation and operation of these facilities. However, after proper capping of the facilities, both communities will begin to re-establish themselves in the disturbed area after soft sediments are naturally deposited on the cap. Evaluation of the remainder of the adverse effects identified several potential long-term adverse impacts that would require mitigation. These effects could include escape of sediments from the sites during dredging and the possible erosion of contaminated dredge spoils from the facilities during the operational phase of the project or after the facilities are capped.

The management and monitoring plan presented in Section 5.07 includes the mitigation plan with corrective actions to be taken if and when sediments (contaminated or otherwise) escape from the defined areas of each CDF.

It is assumed that these facilities will operate throughout the year to meet the critical dredging needs of the port. However, if severe winter weather curtails dredging before a CDF is filled and capped, an interim cap approximately 1 ft (0.3 m) thick will be placed over the dredged material to prevent movement of contaminated material from the CDF and minimize exposure of bottom-dwelling organisms to the contaminated sediments.

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6.0 SECTION 404(b)(1) GUIDELINES EVALUATION

6.01 INTRODUCTION

This section of the NBCDF FEIS presents a Section 404(b)(1) guidelines evaluation for disposal at the NBCDF of dredged material that is determined to be unacceptable for ocean disposal. The evaluation is based on the regulations found at 40 CFR 230, Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Those regulations implement Sections 404(b) and 501(a) of the Clean Water Act, which govern the disposal of dredged and fill material inside the territorial sea baseline (§230.2(b)). The evaluation addresses the proposed disposal of dredged material deemed unsuitable for ocean disposal in the proposed NBCDF from a draw area defined as waters in New York-New Jersey Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull. The evaluation covers both the disposal of dredged material from the defined draw area at the NBCDF and the relocation of dredged material unacceptable for ocean disposal from one part of the facility to another for disposal during construction (but it does not cover disposal of that material elsewhere).

This final site-specific 404 (b)(1) Guidelines Evaluation is based on the selection of Alternative 2 as the Port Authority of New York and New Jersey's (applicant) preferred alternative. USACE will evaluate the preferred alternative to determine whether it results in the least acceptable adverse effects.

6.02 FINAL 404(b)(1) EVALUATION

The following Section 404(b)(1) evaluation is presented in a format consistent with typical evaluations in the NY/NJ Harbor area and addresses all required elements of the evaluation.

I. Project Description

a. Location: West side of Newark Bay, Essex County, New Jersey, between the Newark Bay Federal Navigation Channel and Port Elizabeth and Port Newark (see FEIS Section 1.02, Project Description).

b. General Description: Disposal of dredged materials at any one of three subaqueous confined disposal facilities (CDFs) to be constructed by dredging in shoal areas at Areas 1S, 2S, and 2N; pits to be capped with clean sand when filled (see FEIS Section 1.02, Project Description).

c. Authority and Purpose: Provide for the safe disposal, under provisions of the River and Harbors Act of 1899 and the Clean Water Act of 1972, of

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dredged material generated in New Jersey waters that is determined to be unacceptable for ocean disposal (see FEIS Section 1.01.1, Regulatory Authority).

d. Dredged Material: Sediments from unspecified sites located in waters in New York-New Jersey Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull (see FEIS Figure 1.04-1), found unacceptable for ocean disposal (see FEIS Section 1.04, Objectives of the Project; and Section 5.01), and meeting any state/Federal testing requirements for disposal in the CDF.

e. Proposed Discharge Site: The proposed discharge sites include three CDFs located on the west side of Newark Bay. FEIS Section 2.03.3, Alternative CDFs, considers various combinations of these sites (also see FEIS Figure 1.02-1).

f. Disposal Methods: Controlled bottom-dumping scow discharge to within 10 ft (3.0 m) MLW; clamshell dredge underwater placement of dredged material thereafter to base of cap; pumped placement of cap material (see FEIS Sections 5.05.4, 5.05.5, and 5.05.6).

II. Factual Determinations

a. Physical Substrate

(1) Substrate elevation and slope: Three CDFs would be created, then filled to restore the original bathymetry. The original bathymetry elevations are typically between 0.5 and 5.0 ft (0.2-1.5 m) below MLW. The maximum depth of the CDFs prior to filling would be about 75 ft (23 m) below MLW. During construction and prior to filling, side slopes would be determined by the natural angle of repose of the in situ sediments, typically not more than 3:1 in surficial layer and 1.5:1 in underlying layer. Setbacks of 40 ft (12 m) would be used to assure that uncharacterized material from beyond the site perimeter does not slump into the pit (see FEIS Sections 1.02.4, Construction Concept and Costs; and 5.02.1, Capacity of the Facility).

(2) Sediment type: Existing sandy and silty clay soils of underlying layer would be replaced by various types of soils from sites within the Newark Bay complex; existing surficial silty sediments would be replaced by clean sand (see FEIS Sections 1.02.2, Geotechnical

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Information; 3.04, Sediment Quality; and 5.05, Equipment and Construction Techniques).

(3) Dredged material movement: None; the dredged material will be contained within the CDFs (see FEIS Section 5.05.4, Filling NBCDF With Contaminated Maintenance Materials With Dump Scows, and 5.05.5, Placement of Contaminated Maintenance Materials into NBCDF).

(4) Physical effect on benthos: Temporary loss of existing, contaminated habitat (see FEIS Sections 3.04, Sediment Quality, and 5.05.6, Capping Contaminated Maintenance Materials in NBCDF) supporting a benthic community with low species diversity, dominated by polychaete worms (see FEIS Section 3.08, Benthos). Replacement of substrate by clean, fine to medium sand (see FEIS Section 5.04.2, Available Capping Materials), with subsequent deposition of fine, silty sediments and reestablishment of stable, low-diversity community (see FEIS Sections 4.06.1, Habitat Disturbance; and 4.08, Benthos).

(5) Other effects: None identified.

(6) Actions to minimize impacts: Use of dredging setbacks to minimize slumping of uncharacterized sediment outside the CDF footprint. Closure of access channel during terminal placement of dredged materials. Use of performance criteria to minimize dredging errors. Use of monitoring during and after disposal operations to control short-term escape of sediments and long-term integrity of site (see FEIS Sections 5.06, Best Management Practices; and 5.07, Monitoring and Management Plan).

b. Water Circulation, Fluctuations, and Salinity Determinations

(1) Water

(a) Salinity: The NBCDF will have no effect on salinity in Newark Bay because the project does not influence the water mass movements (tidal flow and river discharge) that control salinity (see FEIS Sections 4.02, Physical Oceanography; and 4.05, Water Quality).

(b) Water chemistry: The NBCDF will have small, localized effects on water chemistry during the disposal operations. These effects would be similar to typical dredged material disposal operations, but lesser in magnitude, because the

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disposal takes place into a pit, which will reduce the interaction between the dredged material and the open water of Newark Bay (see FEIS Section 4.05, Water Quality). The localized effects will be limited to the period of time that disposal takes place (approximately one year), after which capping will prevent interaction between the dredged material and the waters of the Bay.

(c) Clarity: Changes in clarity of the water will be limited to a small turbidity plume when the dredged material is discharged from the scow. The plume will be localized, because the material will be discharged into a pit in a shoal area. The confinement of the CDF and the surrounding shallow water will inhibit the spread of the turbidity plume. Between scow dumps, the tidal currents will dissipate the dredged material that does not immediately settle to the bottom of the pit (see FEIS Section 4.05, Water Quality). There will be no long-term effect on clarity because the cap will isolate the dredged material from interaction with the waters of the Bay.

(d) Color: Not applicable.

(e) Odor: Odors typical of dredging operations will be created in the disposal area during construction and disposal operations. Because the site is remote from residential areas, the potential for odor problems is minimal. In addition, the open scows carrying the dredged material will be at the disposal site for brief periods before the material is discharged into the pit (see FEIS Section 4.15, Air Quality).

(f) Taste: Not applicable.

(g) Dissolved gas levels: Potential for short-term reduction in dissolved oxygen levels within the CDFs until they are filled, which will minimize the release of particle-bound metals and organic compounds (see FEIS Section 4.05, Water Quality). Short-term release of hydrogen sulfide and methane gases during disposal of dredged material (see FEIS Section 4.05, Water Quality). There will be no long-term effects on dissolved oxygen because the cap will isolate the dredged material from contact with the waters of the Bay.

(h) Nutrients: A short-term, localized increase in nutrients, which could contribute to an increase in algal growth, may occur. However, the method of disposal will limit the release of nutrients and the short periods during which disposal will take place will limit the potential for eutrophication. After the cap is placed, the dredged material cannot interact with the waters of Newark Bay, so there will be no long-term increase in nutrients and eutrophication will not result (see FEIS Section 4.05, Water Quality).

(i) Eutrophication: A short-term, localized increase in nutrients, which could contribute to an increase in algal growth, may occur. However, the method of disposal will limit the release of nutrients and the short periods during which disposal will take place will limit the potential for eutrophication. After the cap is placed, the dredged material cannot interact with the waters of Newark Bay, so there will be no long-term increase in nutrients and eutrophication will not result (see FEIS Section 4.05, Water Quality).

(j) Other: None

(2) Current patterns and circulation: Potential short-term, localized reduction in current velocities at the site of the CDFs; no short-term changes in current velocities or circulation elsewhere in Newark Bay; restoration of existing currents once CDFs are filled and capped (see FEIS Section 4.02.1.3, Impacts of Dredging and Disposal Operations).

(3) Normal water level fluctuations: The existence of the CDFs will not have a significant effect on normal water level fluctuations in Newark Bay. Restoration of the original bathymetric contours with capping assures no long-term effects on normal water level fluctuations (see FEIS Section 4.02, Physical Oceanography).

(4) Salinity gradients: The NBCDF will have no effect on salinity in Newark Bay, because the project does not influence the water mass movements (tidal flow and river discharge) that control salinity (see FEIS Sections 4.02, Physical Oceanography; and 4.05, Water Quality).

(5) Actions to minimize impacts: The design of the NBCDF inherently assures that there will be minimal short-term and no long-term effects on water circulation, fluctuations, and salinity.

c. Suspended Particulate/Turbidity Determination

(1) Change at disposal site: There will be short-term, localized increases in suspended particulates/turbidity during disposal operations but no long-term changes; there will be minimal changes away from the site (see FEIS Section 4.04.2, Constructed CDFs).

(2) Effects on chemical and physical properties of the water column: There will be minimal short-term effects on the chemical and physical properties of the water column due to suspended particulates/turbidity and no long-term effects (see FEIS Section 4.05, Water Quality).

(3) Effects on biota: In the short term, increased exposure to some contaminants, but no long-term effects (see FEIS Sections 4.06, Fish and Shellfish; and 4.08, Benthos).

(4) Actions to minimize impacts: Use of the Best Management Practices specified by NJDEP in the draft guidance on The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters (see FEIS Section 5.06, Best Management Practices).

d. Contaminant Determination

Specific dredging projects have not been identified for disposal at the NBCDF, so the degree of contamination in the materials to be deposited at the site is not known. However, the intent of the NBCDF is that its use be restricted to disposal of dredged material determined to be unacceptable for ocean disposal. This implies that the material deposited will be contaminated to some degree. FEIS Section 5.01 discusses how dredged material will be qualified for disposal at the NBCDF. By dredging and filling the NBCDF, relatively uncontaminated subsurface sediments will be replaced by contaminated dredged materials, and contaminated surface sediments will be replaced by uncontaminated cap material. On completion of the capping, all contaminated dredged material disposed of at the NBCDF will be isolated under the cap.

e. Aquatic Ecosystems and Organisms Determination: In the short term, disposal of dredged material at the NBCDF will result in loss of about

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1.3% of the bottom area of Newark Bay and about 2% of the shoal habitat in the Bay (see Section FEIS 4.06.1, Habitat Disturbance). That habitat is currently used by a low-diversity community composed principally of polychaete worms (see FEIS Section 3.08, Benthos). Following placement of the sand cap, the site is expected to be repopulated and there will be no long-term impairment of the benthic community (see FEIS Section 4.06.1, Habitat Disturbance; and Section 4.08, Benthos).

f. Proposed Disposal Site Determination: Based on the screening criteria developed (see FEIS Section 2.01, Criteria for Alternative Selection), nine classes of disposal alternatives were evaluated and the confined disposal facility was selected as the best alternative class (see FEIS Sections 2.02, Alternative Dredged Material Disposal Strategies). Five feasible confined disposal alternatives were evaluated and one selected (see FEIS Section 2.03, Alternative Locations Within Newark Bay). Factors considered in the evaluation of the feasible alternatives include duration of disposal operations, cost, erosive properties, sediment resuspension, sediment chemistry, water quality impacts, effects on finfish and shellfish communities, effects on wildlife communities, effects on benthic community, proximity to hazardous waste sites, effects on wetlands, effects on endangered and threatened species, effects on critical habitats and marine sanctuaries, aesthetics, cultural resources, air quality, floodplain values and hydrology, human health, socioeconomics, navigation, land use, noise, sole-source aquifers, traffic, and indirect and cumulative impacts.

g. Determination of Cumulative Impacts: Short-term negative impacts associated with increased dredging activity encouraged by availability of a site for disposal of dredged material determined to be not suitable for ocean disposal. Long-term positive impact resulting from isolation of contaminated sediments under the NBCDF cap (see FEIS Section 4.24.2, Cumulative Impacts).

h. Determination of Secondary Impacts: Long-term positive impacts on sites contributing dredged material to the NBCDF due to removal and isolation of contaminated sediments under the NBCDF cap (see FEIS Section 4.24.1, Indirect Impacts).

III. Findings of Compliance or Noncompliance

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. There are no practicable alternatives for the proposed action under the jurisdiction of Section 404(b)(1) Guidelines (see FEIS Section 2).

c. The proposed action does not appear to violate applicable state water quality standards, effluent standards, or NJDEP's guidance manual entitled The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters.

d. No threatened or endangered species and no marine sanctuaries will be affected by the proposed action (see FEIS Sections 4.11, Endangered and Threatened Species; and 4.12, Critical Habitats and Marine Sanctuaries).

e. The proposed action will not result in significant adverse impacts on human health or welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife and special aquatic sites.

f. All appropriate steps to minimize adverse impacts have been taken.

IV. Conclusions

Based on all of the above, the proposed action is determined to be in compliance with the Section 404(b)(1) Guidelines, subject to appropriate and reasonable conditions, to be determined on a case-by-case basis, to protect the public interest.

7.0. LIST OF PREPARERS

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APPENDIX 1.01

COMMENTS RECEIVED ON THE DRAFT EIS AND RESPONSES TO THE COMMENTS

COMMENT LETTERS RECEIVED ON THE DRAFT EIS

FEDERAL AGENCIES

F1 Congressman Frank Pallone
F2 U.S. Environmental Protection Agency
F3 U.S. Department of Commerce

STATE AGENCIES

S1 New Jersey Department of Environmental Protection

LOCAL AGENCIES AND OFFICES

L1 City of Bayonne, Office of the Mayor
L2 City of Bayonne, Environmental Commission
L3 County of Essex, New Jersey, Board of Chosen Freeholders

ENVIRONMENTAL GROUPS, ADVOCACY GROUPS

E1 Clean Ocean Action (February 28, 1997)
E2 Clean Ocean Action (March 3, 1997)
E3 Baykeeper, NY/NJ Harbor

COMMERCIAL INTERESTS

C1 International Longshoremen's Association
C2 The Judge Organization
C3 Hudson County Chamber of Commerce
C4 Public Service Electric and Gas Company

PRIVATE CITIZENS

P1 Gerald R. Savo

PUBLIC HEARING COMMENTS

CP Congressman Frank Pallone, Jr.
AC Assemblyman Steven J. Corodemus
COA Clean Ocean Action

NEWARK BAY CONFINED DISPOSAL FACILITY

DEIS COMMENT LETTERS AND RESPONSE

FEDERAL AGENCIES

COMMENTS AND RESPONSES

RANKING MINORITY MEMBER
HEALTH AND
ENVIRONMENT SUBCOMMITTEE
RESOURCES COMMITTEE
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March 3, 1997

F1

Colonel Gary Thomas, District Engineer
U.S. Army Corps of Engineers, New York District
Jacob K. Javits Building
New York, New York 10278-0090

Dear Colonel Thomas:

In addition to the statement that was submitted on my behalf at the public hearing on February 19, 1997, I would like to take this opportunity to submit additional written comments for the record on the Draft Environmental Impact Statement (DEIS) for the Newark Bay Confined Disposal Facility (NBCDF).

The DEIS discusses five alternatives for the NBCDF. I urge the Corps to approve a permit for the Port Authority of New York and New Jersey for Alternative 2 -- construction of a CDF in Area 1S to be followed by construction of CDFs in Areas 2S and 2N. This alternative would provide the greatest disposal capacity possible that can be made available within the given time frame for "short-term solutions."

The DEIS defines short term solutions as "covering the period September 1997 through the year 2000" and "Capable of implementation in three years (end 1999)". While Alternative 4 (construction of a CDF or CDFs in Area 3 followed by construction of CDFs in Areas 1S, 2S, and 2N) would provide the greatest disposal capacity, it would take the longest time to construct due to the need for additional sediment testing in Area 3. The Port Authority has indicated, however, that a CDF in Area 1S could be ready to receive material by October 1997. As a result, Alternative 2 is the alternative with the greatest disposal capacity that still complies with the designated time frame. F1-1

I therefore urge the Corps to issue a permit to the Port Authority of New York and New Jersey for Alternative 2.

I am concerned, however, by the Port Authority's statement at the February 19 public hearing that it plans to "defer" construction of CDFs in Areas 2S and 2N until it is "able to identify an economically viable disposal solution for the upper layer material from these areas". As described in the DEIS, Alternative 2 involves the disposal of the upper layer material from the CDFs in Areas 2S and 2N in the CDF in Area 1S. F1-2

Therefore, I also urge the Corps to stipulate in the permit the construction of all three CDFs, with use of the CDF in Area 1S for the disposal of the upper layers of the

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CDFs in Areas 2S and 2N only if an alternative disposal site cannot be identified before the construction of the CDF in Area 1S is completed. F1-2

Finally, I am concerned that construction of a CDF in Area 3 was not included as a disposal option in the Dredged Material Management Plan, Interim Report, (DMMP) issued by the Army Corps of Engineers in September 1996. The purpose of that report was "to provide a menu of options" for dredged material management in the Port of New York and New Jersey. Failure to include this option in the report is an omission that should be immediately rectified. F1-3

Thank you for allowing me this opportunity to comment further on the DEIS.

Sincerely,

Frank Pallone, Jr.

FP/gt

F1 Congressman Frank Pallone

F1-1

A permit decision cannot be made until after the FEIS has been published and comments received. These comments will be used to prepare a Record of Decision.

Alternative 2, recommended by Congressman Pallone for permit approval, is the action proposed in the Port Authority's application. It is also the Preferred Alternative defined in Chapter 2.0 of the FEIS. The reasons given by the Congressman for his selection are similar to the reasons presented in the FEIS.

F1-2

The suggestion of a permit stipulation requiring the Port Authority to construct all proposed CDFs will be incorporated into, and responded to, in the Record of Decision.

F1-3

Comment noted. The Planning Division of the USACE-NYD has been advised of your comment and furnished with a copy of your letter.

290 BROADWAY
NEW YORK, NEW YORK 10007-1866

F2

MAR 0 3 1997

Colonel Gary Thomas
District Engineer
New York District
Jacob K. Javits Federal Building
New York, New York 10278-0090

Class EC-2

Dear Col. Thomas:

The Environmental Protection Agency (EPA) has reviewed the draft environmental impact statement (EIS) and the U.S. Army Corps of Engineers' (USACE) Public Notice (PN) (95-04370-J1) for the Department of the Army permit for the Newark Bay Confined Disposal Facility (NBCDF), in New Jersey. This review was conducted in accordance with Section 309 of the Clean Air Act, as amended, the National Environmental Policy Act (NEPA), Section 103 of the Marine Protection, Research, and Sanctuaries Act, Section 404 of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 1899.

The construction of subaqueous pits in Newark Bay, which is being sponsored locally by the Port Authority of New York/New Jersey, has been recommended by various entities, including the Dredged Material Management Forum, and Governor Whitman's Dredged Material Management Team, as a short-term, environmentally sound, economically viable option for the disposal of material that is unsuitable for ocean disposal. Additionally, the proposed NBCDF has been identified as a short-term disposal solution in the USACE's Dredged Material Management Plan for the Port of New York and New Jersey. The draft EIS indicates that the NBCDF was conceived as a regional facility to receive dredged material from waters contiguous to the State of New Jersey, including, but not limited, to Newark Bay, the Arthur Kill, and the Kill Van Kull.

The draft EIS presents five alternatives: 1) construction of a CDF at Site 1S only (with net capacity of 1.55 million cubic yards [MCY]); 579,000 cubic yards of category 2 material [surficial sediments] would be dredged in the development of this pit and disposed of at the Mud Dump Site [MDS]; 2) construction of a CDF at Site 1S, followed by the construction of CDFs at Sites 2S and 2N (with net capacity of approximately 2.5 MCY; category 3 surficial material from 2S and 2N [685,000 CY] would be disposed of in 1S); 3) construction of a CDF in Area 3 (with a potential capacity of greater than 10 MCY); 4) construction of a CDF in Area 3, then construction of CDFs 1S, 2S, 2N (with potential capacity of greater than 14 MCY); and 5) no-action.

EPA reviewed and commented on a preliminary version of the draft EIS in December 1996. Based on our review of the draft EIS, we offer the following comments.

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Project Alternatives

As presented in the draft EIS and the PN, the proposed NBCDF needs to be operational by September 1, 1997 to receive material that will no longer be able to be disposed of at the Mud Dump Site (MDS). Although the draft EIS does not identify a preferred alternative, the discussions presented in the document indicate that Alternative 2 is preferred. Moreover, the USACE PN identifies Alternative 2 as the option to be considered for the permit. Given the short term need for the project, we agree with this conclusion. Nevertheless, considering the order of magnitude of the dredged material management disposal problems existing in the New York Harbor complex, we believe that Alternative 4 should be given serious consideration as a longer-term disposal option for contaminated dredged material. F2-

All of the alternatives evaluated in the draft EIS require the disposal of surficial sediments for the construction of the proposed project. Although the document mentions the potential use of upland locations, including the Orion Site, as possible disposal sites for contaminated dredged material, these areas have not been evaluated as alternative disposal options for material generated by the construction of the NBCDF; they are evaluated only as alternatives to the development of the NBCDF. The only option that has been evaluated in detail for the disposal of surficial sediments is the MDS. As you know, the MDS will be closed by September 1, 1997. Further, the MDS has a very limited capacity for category 2 material (approximately 1 million cubic yards). Clearly, there is a need to sequence and prioritize both the private and federal needs to ensure that there is sufficient capacity at the MDS for the 579,000 cubic yards of category 2 sediment from the proposed NBCDF. F2-2

Section 404 (b)(1) Guidelines

Construction and operation of the CDF would involve a discharge into navigable waters of the U.S.; it is regulated by Section 404 of the Clean Water Act, which directs "...no discharge of dredged material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem..." Unfortunately, the draft EIS and PN do not provide sufficient analysis of the five alternatives contained therein to determine which one meets this requirement. Accordingly, the final EIS should specifically choose a preferred alternative and provide sufficient information on all of the five alternatives, so that it is clear that the chosen practicable alternative complies with the section 404 (b)(1) Guidelines. F2-3

Proposed Monitoring Program

The proposed monitoring program (program) is presented in chapter 5 of the draft EIS. As stated in the document, the program will be conducted at the NBCDF to ascertain the F2-4

following: confirmation that the design criteria are satisfied prior to disposal of dredged material; assurance that dredged material disposal operations proceed in accordance with protocol and contaminated sediments are contained within the CDF; and assurance that the cap functions as designed to contain the contaminated sediments for the long-term. The program includes monitoring for turbidity changes using in situ recording during disposal operations at the proposed areas. In addition, bathymetric surveys and shallow core sampling of the cap, along with penetrometer readings are proposed to be taken to monitor cap integrity and settlement/sedimentation rates, taken at various intervals during the first year prior to cap placement and subsequently in compliance with permit conditions.

F2-

EPA concurs with the goals of the program, and believes that they can be applied in the development of any corrective actions that may be necessary. Nevertheless, we believe that more detail is necessary concerning the distribution and duration of monitoring practices. For example, we note that core sampling locations have been proposed only within the area of the proposed NBCDF pits. While this may provide information on the accretion of material within the pits, the proposed grid system would not be effective in identifying material that is dispersed beyond the disposal facility as a result of dispersal or accidental disposal in the area outside the pit. We recommend that transects through the site as a whole and for areas beyond the edges of the disposal facility be established to monitor the area, since there will be an ongoing need to evaluate the effectiveness of the disposal procedures and capping. The core sampling locations should incorporate the area where sediment could potentially be dispersed; at a minimum, samples should be taken at the edges of the disposal area.

F2-4

In a related matter, we note that the draft EIS has identified the activities at the NBCDF, shipping traffic, combined sewer overflows, storm water outfalls, and storm events as possible sources of turbidity. Although the monitoring plan includes measurement of turbidity in the area of the proposed pit, the sampling regime must be made more specific to enable a determination of the turbidity that is primarily caused by the activities at the NBCDF.

F2-4

Accordingly, we recommend additional information be included in the final EIS that would identify measures to assess the impacts of constructing and operating the NBCDF on the surrounding aquatic environment. Further, we recommend that the USACE condition any permit it may issue with a requirement that the applicant obtain state and federal approval of its monitoring plan prior to construction of the NBCDF. Last, the permit must be conditioned to require the applicant to undertake specific corrective measures to minimize impacts if monitoring data indicate that material has dispersed beyond the target disposal area.

Cultural Resources

The summary of the cultural resource investigations contained in the draft EIS suggests a lack of the potential for the discovery of undocumented shipwrecks or historic period buried deposits. However, the situation with respect to earlier prehistoric period deposits is not as clear. Specifically, the document suggests a high potential for the presence of buried prehistoric cultural deposits within the Newark Bay sediments and, therefore, within the NBCDF project area. However, insufficient information is provided in the document to determine whether the proposed action would potentially affect prehistoric period buried deposits. Accordingly, we recommend that the final EIS provide an update on the April 18, 1996 letter from the USACE to the New Jersey State Historic Preservation Officer (SHPO) concerning the proposed action's potential impacts to prehistoric cultural deposits, and cite the SHPO's determination regarding the proposed project. Moreover, the final EIS should evaluate additional factors of prior disturbance, past success at locating such deposits, and a clearer exposition of settlement patterns from this era. F2-

Based on our review, and in accordance with EPA policy, we have rated the draft EIS as EC-2, indicating that we have environmental concerns (EC) about the proposed project, and request that additional information (2) be presented in the final EIS to address these concerns. Additionally, we recommend that the USACE refrain from issuing a permit until this information has been provided to the EPA for comment

Please note that this letter does not constitute EPA's formal categorization of the dredged materials associated with any of the five alternatives contained in the draft EIS. That determination will be developed through our joint testing memorandum for the project.

Thank you for the opportunity to comment. Should you have any questions or wish to discuss this letter, please feel free to contact me at 212-637-3734.

Sincerely yours,

George Pavlou, Deputy Director for Operations
Division of Environmental Planning and Protection

cc: T. Wakeman, Port Authority of New York/New Jersey

F2 United States Environmental Protection Agency - Region II

F2-1

We note concurrence with Alternative 2 being the Preferred Alternative. In regard to Alternative 3, a new subaqueous disposal facility on the east side of Newark Bay, it will be included in the Final Report of the USACE Dredged Material Management Plan (DMMP). The report's options, including Alternative 3 of this EIS, are currently being coordinated with the States of New York and New Jersey and all other regional stakeholders for their decision on which options should proceed for additional study and design in the last phase of the development of the final DMMP report for September 1998. The knowledge and experience gained from the NBCDF, if a permit is issued, can be applied to other disposal pits.

F2-2

Out intent is to partner with the States of New York and New Jersey, as well as, other agencies and stakeholders, to optimize the use of the remaining capacity for disposal of Category II dredged material at the ocean Mud Dump Site prior to 1 September 1997 when it is scheduled to be closed.

F2-3

The FEIS stipulates a preferred alternative and provides an expanded Section 404(b)(1) Guidelines Evaluation (Section 6.0).

F2-4

The DEIS describes the major objectives to be achieved by the NBCDF monitoring program. The actual components of the program will include sampling station locations, frequency of sampling and analysis to be performed. The final plan will be developed through the regulatory process with involved agencies for the facility, and will be defined and detailed in state and Federal permits, if issued. EPA's suggestion of a transect grid system to be used for the monitoring program is sound and will be considered within the context of suggestions made by other agencies.

USACE0007428

USACE-0009410

F2-4a

Recognizing the need to develop adequate background data on possible sources of turbidity, the Port Authority has initiated a sampling program to evaluate background levels of total suspended solids (TSS) and turbidity in the vicinity of the proposed NBCDF. This program is being conducted for six weeks in the Spring of 1997. Stations in the proposed NBCDF vicinity include sampling stations in Area 1S and at locations around its perimeter. The TSS data will be provided to the U.S. Army Corps of Engineers and NJDEP to assist them in the development of an adequate monitoring program.

F2-4b

Permits, if issued by the U.S. Army Corp of Engineers, will include conditions coordinated with involved regulatory agencies defining specific measures to be taken to minimize or prevent impacts if monitoring data indicate that such impacts are imminent.

F2-5

The potential for the presence of prehistoric period deposits is addressed in greater detail in the FEIS Section 3.14.

USACE0007429

USACE-0009411

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat and Protected
Resources Division
James J. Howard Marine
Sciences Laboratory
Highlands, New Jersey 07732

March 4, 1997

F3

Colonel Gary Thomas
District Engineer
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0900

Dear Col. Thomas:

We have reviewed the Draft Environmental Impact Statement (DEIS) for the Newark Bay Confined Disposal Facility (NBCDF) (Application No. 95-04370-J1 by the Port Authority of New York and New Jersey). We commented on the preliminary DEIS in a letter dated December 17, 1996. In general, this version of the DEIS more clearly addresses the issues and impacts of the construction of a confined disposal facility on Newark Bay. Many of the issues and suggestions provided in our previous comment letter have been incorporated in this DEIS. However, a few of our comments were not. As a result we offer the following comments for your consideration:

Section 1.01.1 History

As stated in our previous letter, can the exclusionary criteria described in 227.13(b)(ii) be applied to deeper sediments in areas where the overburden has been shown to possess some threat to aquatic resources? If the intended use of the exclusionary criteria was to reduce the testing burden in unpolluted areas, is it appropriate to use these criteria in Newark Bay? The final EIS should address the applicability of the exclusionary criteria in this area. F3-1

1.02.4 Construction Concept

In this document (page 1-22) and in the preliminary DEIS (page 1-18), the volume of Category II material to be excavated from Area 1S and disposed of at the Mud Dump Site (MDS) is estimated to be 579,000 cubic yards. Does this include the approximately 40,000 cubic yards of material to be removed from the access channel? The final EIS should state what locations or elements of the dredging will produce the 579,000 cubic yards reported in the document. F3-2

The Use of Hopper Dredges

We are concerned about the potential use of hopper dredges to place material into the NBCDF. Due to their design, they are operationally sloppy, retaining few "fines" other than in the "top of F3-3

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the load" slurry. During discharge, much of the suspended sediment and water slurry is retained in the water column. As a result, the potential for the dispersal of contaminated sediments outside the boundaries of the NBCDF is greater with the use of a hopper dredge. We recommend that hopper dredges not be used to place materials in the NBCDF. F3-3

Threatened and Endangered Species

Section 3.0 of the DEIS which discusses the affected environment and Section 4.0 which discusses the environmental impacts of the dredging and disposal operations focus primarily on the resources of the Newark Bay region. Since the material excavated for the construction of the NBCDF will likely be disposed of at the MDS, the MDS should also be considered an affected environment. The final EIS should include a discussion of the potential impacts of the disposal of material excavated from the NBCDF at the MDS, including the potential impacts to threatened and endangered species of sea turtles and marine mammals. F3-4

As you are aware, several species of sea turtles including the threatened loggerhead sea turtle (Caretta caretta), and the endangered Kemp's ridley (Lepidochelys kempii), green (Chelonia mydas) and leatherback (Dermochelys coriacea) sea turtles can be found near the MDS from spring to late fall. Endangered right whales (Eubalaena glacialis) and humpback whales (Megaptera novaeangaliae) may be near the MDS during the late winter through early spring. Fin whales (Balaenoptera physalus), the most likely species to occur in the coastal waters of New Jersey, may be found in the area year round.

Currently, the Corps and the NMFS are working on a programmatic consultation for the disposal of category II material at the MDS This programmatic consultation will address the potential impacts to protected species from disposal activities at the MDS and management practices necessary to protect these species. The results of this consultation should be incorporated into the final EIS.

Lastly, there are a number of typographical errors that detract from the discussions For instance; Page 3-27, last sentence of second paragraph has an reference not cited "NOAA's guidelines (1990) and on page 4-23, in the third paragraph, fourth sentence, "writer" should be "winter." F3-5

Thank you for the opportunity to comment on the DEIS. We look forward to continuing our coordination with your staff on this project. If you have any questions concerning these comments, please contact Mr.Michael Ludwig at 203-783-4261, or Ms. Karen Greene at 908-872-3023.

Sincerely,

Stanley W. Gorski
Field Offices Supervisor

cc: EPA - Region II
FWS - Pleasantville
- Cortland

F3 National Marine Fisheries Administration

F3-1

The lower layer sediments (grey sand and red clay) were determined to meet exclusionary criterion specified in 40 CFR Parts 227.13(b)(1) and 227.13(b)(3)(iii) by the USEPA and the USACE. The determination was based on: (1) chemical analyses from below the 20 ft level showing very low or nondetect values for various metals and (2) the grain size of the gray sand unit. A memorandum to this effect is included in Appendix 3.04.

The lower layer sediments are:

1. Geologically older than the material that overlies it;

2. In a hydrostatic environment precluding the migration of contaminants downward into the older material, thus indicating their removal in time and space from historic and known existing sources of pollution; and

3. In the case of the red clay, nearly impermeable.

F3-2

The volume of Category II material to be disposed of at the Mud Dump Site (MDS), estimated at 579,000 yd^3, includes the surficial Category II sediments to be removed from the access channel. Text on page 1-22 has been modified to include a statement that access channel dredged material is included in Category II volume estimates.

F3-3

Disposal of dredged material in the NBCDF will use bottom dumping spilt-hull scows until the depth of sediment precludes access to the site. The final dredged material layer will be put in place using a clamshell dredge. Disposing of dredged material in the NBCDF with a hopper dredge is not proposed.

USACE0007432

USACE-0009414

F3-4

Impacts associated with release of dredged materials that meet the criteria for disposal at the MDS including potential impacts to threatened and endangered species, have been evaluated in the regulatory review of the MDS and are beyond the scope of the NBCDF EIS process.

The conditions and requirements for disposal at MDS have been designed with consideration for environmental impacts to threatened and endangered species. The USACE and the National Marine Fisheries Service (NMFS) are developing a programmatic consultation that will address disposal of Category II material. Any Category II sediments for NBCDF that are deposited at the MDS will comply with the conditions of this consultation. At the time this FEIS was printed the consultation document was not available.

F3-5

Typographical errors have been corrected.

USACE0007433

USACE-0009415

STATE AGENCIES

COMMENTS AND RESPONSES

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

March 3, 1997

S1

Joseph J Seebode
Chief, Regulatory Branch
Department of the Army
New York District, Corps of Engineers
26 Federal Plaza, Room 1937
New York, NY 10278-0090

RE: Newark Bay Confined Disposal Facility
Draft Environmental Impact Statement (January 1997)

Dear Mr. Seebode

As a cooperating agency on the proposed Newark Bay Confined Disposal Facility (NBCDF), the New Jersey Department of Environmental Protection has completed its review of the above referenced Draft Environmental Impact Statement (DEIS). This document has been prepared and reviewed pursuant to the requirements of the National Environmental Policy Act.

The purpose of the proposed Newark Bay Confined Disposal Facility is stated in Section 1.04 of the DEIS (page 1-31):

> The objective of the proposed project and the alternatives evaluated is to provide a repository for dredged material deemed unsuitable for ocean disposal from the draw area, defined as water contiguous to the State of New Jersey, including but not limited to Newark Bay, Arthur Kill, and Kill Van Kull.

The "draw area" (also see Sections 5.01 and 5.03) for the proposed NBCDF is poorly defined. It may be appropriate to define the "draw area" as follows:

> Waters in New York-New Jersey Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull.

S1-1

A figure showing the "draw area" should also be included in the Final EIS.

The Final EIS must include, at a minimum, a conceptual outline of any "management agreement" between the proposed NBCDF site landowner and the project sponsor/NBCDF operator. The NBCDF project area must also be protected from future disruption/excavation (for example, new channels, pipeline/cable crossings, etc.).

S1-2

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The DEIS Alternatives #1 and #2 are based on the disposal of the surficial Category II sediments from Area 1S (approximately 579,000 cubic yards) at the Mud Dump Site (with capping). The Final EIS should also evaluate potential alternative disposal scenarios for this material if the Mud Dump Site is not available (i.e. for NBCDF construction activities after September 1, 1997). **S1-3**

The Department's main concerns with the proposed NBCDF are (1) potential impacts to surface water quality during disposal operations into the NBCDF, and (2) ensuring that the contaminated dredged material is contained within the NBCDF by adequately designing, placing, monitoring, and maintaining the integrity of the sand cap. In addition to these concerns, technical comments on the document are included as Attachment #1. **S1-4**

Impacts to Surface Water Quality During Disposal Operations

Additional consideration of potential surface water quality impacts during the operational period of the proposed NBCDF is needed. As part of its permitting process for the proposed NBCDF, the Department will evaluate potential impacts to surface water quality by comparison to applicable surface water quality criteria. Evaluations of likely suspended solids plume dimensions, and the concentrations (upstream and downstream) and temporal spans of both dissolved and suspended contaminants resulting from representative disposal operations are needed. Potential impacts to surface water quality prior to capping must also be considered. **S1-5**

The disposal of dredged material into the NBCDF is proposed to occur in three stages:

1. bottom dumping from "large" split hull scows until a depth of -20 feet MLW (the depth of the NBCDF entrance channel) is reached, at which point the entrance channel will be partially filled to a depth of -10 feet MLW with clean material;

2. bottom dumping from "smaller" scows, light-loaded scows, etc., until depth limitations restrict the use of scows, at which point the entrance channel will be filled to its original depth with clean material;

3. final filling with dredged material using hydraulic methods. This will be to the level of the cap.

With the initial depth of stage #2 disposal operations at -10 feet MLW, the requirement for a minimum 1 meter cap, and the existing shallow water depths at the NBCDF site (-1 to -5 feet MLW), "final" placement of contaminated dredged material will be difficult. Given the need to minimize the dispersal of contaminated sediments during disposal operations, "final filling" of the proposed NBCDF using hydraulic means has the potential to result in significant adverse impacts to surface water quality. Alternative methods for placing the "final fill" of contaminated dredged material within the NBCDF should be evaluated. **S1-6**

In addition, specific and detailed Best Management Practices (BMPs) must be developed to minimize the resuspension and dispersal of contaminated dredged material during all phases of the NBCDF operation. The Department will evaluate the need for any specific BMPs as part of its regulatory review process for the proposed project. S1-6

Capping Operations

Section 5.04.1 (page 5-8) discusses the model used to design the required sand cap for the proposed NBCDF. Using this model, a minimum cap thickness of four (4) feet is required; however, this thickness is reduced to only three (3) feet (see Section 5.04.4, page 5-16), based on the "relatively high Newark Bay sedimentation rate and the relatively rare occurrence of storm events that would result in cap erosion". Note the following comments on the assumptions used to calculate the required sand cap thickness: S1-7

- the thickness used for bioturbation isolation is one foot, although it is stated (page 5-8) that "typical depths range from one to two feet" and are "best determined on the basis of field measurements". S1-7a
- it is assumed that cap consolidation will be minimal (page 5-9). However, Section 4.05 (page 4-18) states that "settlement of the cap in the first two years after placement is projected to be 3.5 ft". Some consolidation of the cap would be expected to occur with this settling and as a result of its placement using hydraulic methods. S1-7b
- cap erosion due to the 100-year wind/wave condition is estimated to be 0.5 to 1.0 foot; this represents approximately one-third of the proposed cap. Erosion under normal wave conditions is predicted to be 2 to 3 inches per year (Section 5.04.3, page 5-12 S1-7c

Given the points noted above, it appears that a cap thickness of only three (3) feet may be insufficient to ensure the long-term containment of the contaminated dredged material placed in the proposed NBCDF. Additional analyses are needed to determine/verify the required depth for a sand cap and the operational aspects of placing a dense sand cap on top of the less dense contaminated dredged material. S1-7

Proposed Monitoring Program

The Department has concerns with the monitoring program proposed in Section 5.07.2 (page 5-32). Development of the monitoring plan must be further coordinated with the State and federal regulatory agencies. This would include considerations of water quality monitoring during the operational phase f the NBCDF and bulk sediment chemistry monitoring of the NBCDF cap. The "final" monitoring plan will be incorporated into any permits issued by the S1-8

Department for the proposed NBCDF. Additional monitoring requirements may be needed for the disposal of contaminated dredged material from selected projects. Adequate funds must be set aside for this monitoring program prior to the initiation of construction of the NBCDF. S1-8

The Department will regulate the construction of any of the NBCDF alternatives pursuant to the Rules on Coastal Zone Management (N.J.A.C. 7:7E-1.1 et seq.). Additional comments and concerns may arise during the permit review process for the proposed project.

Thank you for providing the Department the opportunity to review the DEIS for this project. If you have any questions, you may contact me at (609) 292-2662.

Sincerely,

Lawrence Schmidt
Director
Office of Program Coordination

c. Lewis Nagy, Policy and Planning
Dorothy Guzzo, Historic Preservation
Robert McDowell, Fish, Game and Wildlife
Rob Piel, Land Use Regulation
John Roe, Non-point Source Permitting
Frank McDonough, Maritime Resources
Thomas Wakeman, Port Authority NY & NJ

Attachment #1

Technical Comments on the NBCDF Draft EIS

(1) Section 1.01, page 1-3: includes a reference to Section 1.02 for additional information justifying the draw area for the NBCDF. However, Section 1.02 (nor any other section of the DEIS) adequately explains the rational for the draw area. **S1-9**

(2) Section 1.03.1, page 1-24: omit the sentence " Such a technique ... program of reprofiling. **S1-10**

(3) Section 4.04.1, page 4-12: discusses sediment transport modeling, which was based on cohesive clay and noncohesive sand. The silt fraction should also be considered, since it is a predominant grain size in the project area, and would be both fine-grained and only partially cohesive. **S1-11**

(4) Section 4.05, page 4-18: states that there will be a decrease in the total suspended solids (TSS) concentration in the vicinity of the NBCDF, due to a decrease in current velocities which will increase sedimentation in the pits. This would be true if the pits were dug an left unattended. However, sediments will be suspended and dispersed during excavation of the pits and whenever dredged material is deposited into the NBCDF. **S1-12**

(5) Section 4.05, page 4-19, para. #2: states "... there would probably be a reduction in contaminant levels in the dredged area because maximum contamination is presently within the to 2 ft (0.6 m) of sediment (see Section 3.04)". This statement is not supported in Section 3.04. Depending on the site, contaminants which were historically discharged (such as dioxin) tend to increase with depth, even in maintenance dredging projects. **S1-13**

(6) Section 4.08, page 4-28, para. #4: states "Life cycle activity of benthic infauna is generally limited to the top few centimeters of the bottom sediments ..." However, polychaete worms, the dominant benthic biota in the project area, can bioturbate up to one foot in depth. The protocol for designing the final sand cap was based on a bioturbation component of one foot. **S1-14**

(7) Section 4.14, page 4-47: the Department's Historic Preservation Office could possibly review the proposed NBCDF project pursuant to Section 106 of the National Historic Preservation Act. An explanation of coordination activities with this Office should be included in Section 4.14. This would include an explanation of the Section 106 process and how it will or will not be applied relative to this project. **S1-15**

(8) Section 4.14, page 4-47: states that there is a high potential for prehistoric cultural resources within Newark Bay, now inundated and buried as the result of subsequent sea level rise. However, there is no recommendation for further analyses as a result of this finding, nor any discussions of what precautions will be taken or procedures will be followed in the event that prehistoric cultural resources are encountered. **S1-16**

(9) Section 4.19, page 4-61: the Department is concerned with the potential conflicts between the construction and operation of the proposed NBCDF and existing shipping in the Port Elizabeth and Newark Bay North Reach Federal Channels (N.J. Rules on Coastal Zone Management, N.J.A.C. 7:7E-3.7). The DEIS does not provide any specifics on how conflicts will be avoided, particularly during excavation of the entrance channels to the pit areas. Due to the shallow water depth in the pit areas, it is likely that the dredged and barge equipment will be located at least partly within the navigation channels while the access channels to the pits are excavated **S1-17**

(10) Section 5.05.1, page 5-21: states that "[l]ittle to no delay due to navigation is expected for the dredge operations as the dredge area is not a navigation area." See Comment #9. **S1-18**

(11) Section 5.08, page 5-39: this section should be revised and split into two sections discussing the (1) avoidance, and (2) minimization of potential project impacts. Also, avoidance and minimization are not types of "mitigation". **S1-19**

(12) Section 5.08, page 5-41, para. #2: omit the sentence "The Newark Bay Confined Disposal project is, in and of itself, a mitigation measure ..." **S1-20**

(13) Section 5.08, page 5-42, para. #3: discusses the potential need for interim caps in the NBCDF during the winter. Depending of the final schedule of disposal operations, an interim cap may also be needed during other times. **S1-21**

S1 New Jersey Department of Environmental Protection

S1-1

References to the draw area were changed to correspond to the definition presented in the comment letter. A figure showing the draw area was added (Figure 1.04-1).

S1-2

A management agreement between the NBCDF site landowner and the Port Authority is being developed. This agreement will include stipulations that protect the NBCDF from disruption or excavation in the future. The management agreement will be a condition of the USACE-NYD permits for the proposed facility.

S1-3

During the construction phase of the proposed NBCDF, no alternative disposal site for the contaminated upper layer sediments will be available for use (see Section 2.03.4 and Comment Response F1-2).

S1-4

Potential impacts to surface water quality as a result of the disposal of dredged material in the NBCDF are presented and discussed in the FEIS. Monitoring and maintenance of the sand cap's integrity to ensure that contaminated dredged material is contained within the NBCDF will be conditions of the NJDEP and USACE permits for the proposed project.

S1-5

Since the contamination level of the dredged material to be disposed of in the NBCDF is similar to the contamination levels of the sediments surrounding the NBCDF, the ability to detect any influence on surface water quality as a result of dredged material disposal will be negligible. However, monitoring for increased levels of TSS and/or turbidity around the perimeter of the CDF during disposal operations could be useful in determining the potential for water quality impacts due to the disposal of dredged material.

USACE0007441

USACE-0009423

Recognizing the need to develop adequate background data on possible sources of turbidity, the Port Authority has initiated a sampling program to evaluate background levels of total suspended solids (TSS) and turbidity in the immediate vicinity of the proposed NBCDF. This program is being conducted for six weeks in the Spring of 1997. Stations in the proposed NBCDF vicinity include sampling stations in Area 1S and at locations around its perimeter. The TSS data will be provided to the agencies to assist them in the development of an adequate monitoring program.

S1-6

The dispersal of contaminated sediment during disposal of the final layer of dredge materials in the NBCDF will be minimized using point placement with clamshell buckets. The revised construction concept using point placement of the final layer of dredged material is presented in detail in FEIS Sections 1.02.4 and 5.03-1. Additionally best management practices (BMPs) will be provided to state and Federal agencies as part of their regulatory review.

S1-7

S1-7a

NJDEP states under the heading, Capping Operations, that the computed minimum cap thickness is 4 ft; however, it is reduced to only 3 ft. The NJDEP commented on three aspects or components of the cap design: (1) the DEIS (page 5-9) states that typical depths for bioturbation range from 1 to 2 ft; the thickness for bioturbation was 1 ft (page 5-16). A report entitled "Capping Dredged Materials in the New York Bight: Evaluation of the Effects of Bioturbation" by Rhoads and Carey (January 1997) provides information to supplement the DEIS. This report states that "the most abundant organisms on disposal sites in the New York Bight are macrofauna" and that "the minimum bioturbation thickness required in the New York Bight would be 30 cm". The report continues, ""A conservative management approach for isolating contaminated sediments from the ecosystem for very long periods of time would be to reserve 30 cm of cap thickness for bioturbation; 3-fold thicker than the universal mean bioturbation depth for macrofauna and 2 times thicker than the +1 standard deviation value . . ." This conclusion, developed at a workshop of participants with extensive experience on bioturbation and cap thickness, supports the 1 ft thickness for bioturbation used in the DEIS.

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S1-7b

NJDEP states that some consolidation of the cap would be expected to occur with settlement of the cap (3.5 ft) (Note: Nowhere in section 4.05 does the DEIS mention that the "...settlement of the cap in the first two years after placement is projected to be 3.5 ft.)" due to consolidation of the disposed material and as a result of its placement using hydraulic methods. The DEIS states that the USACE LTFATE model showed negligible compaction and zero was used in the DEIS.

S1-7c

NJDEP points out that the estimated erosion of 0.5 to 1 ft due to the 100-year wind/ wave condition is approximately ⅓ of the proposed cap. A thickness of 1.5 ft was assumed in the DEIS with the statement that this estimate requires engineering verification.

Considering the above points, NJDEP states that additional analyses are needed to determine/verify the required depth for a sand cap and the operational aspects of placing a dense sand cap on the less dense contaminated dredged material.

The DEIS (page 5-25) states that a diffuser can be used to reduce the discharge velocity of the cap material slurry and provide a relatively even distribution of capping material. Further, the cap will be monitored by taking core samples that penetrate into the dredged material and the depth of sand will be measured and recorded. This will be done following cap placement. The long-term monitoring will also use penetrometer testing. The results of core sampling and penetrometer testing will be compared to each other to identify any deficiencies in the cap. If a breach or erosion of the cap is identified, additional testing will determine the areal extent of the problem. Additional material will be added to remediate the problem.

S1-8

The proposed monitoring program will be developed in coordination with state and Federal regulatory agencies as described in response to comment F1-4.

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S1-9

The draw area was jointly determined by the applicant, NJDEP and USACE-NYD. In determining the definition of the final draw area consideration was given to NJDEP's preference that only sediments from New Jersey be included in the NBCDF, and to the goal of the applicant and the USACE-NYD to include a sufficient volume of sediment needing disposal within the draw area to assure smooth, expedient construction, operation and closure of the facility. The sentence on page 1-3 was modified to reflect the FEIS sections that justify the draw area, and the definition of the draw area on page 1-31 was modified.

S1-10

This sentence was omitted in the FEIS.

S1-11

NJDEP states that the silt fraction should be considered since it is the predominant grain size in the project area.

Hydrodynamic and sediment transport modeling to date has simulated fine cohesive sediment (clay) for the open pit condition and non-cohesive sand for the capped condition. These two simulations have bracketed the silt fraction, which is an intermediate size and predominantly non-cohesive. As silt has a settling velocity greater than or equal to clay, silt would be deposited along with other fine sediment (clay and fine sand) in the open pit. Because silt has a lower shear strength than sand, it will scour more at lower shear stresses than sand. Hence, increasing wind and wave conditions would first scour the silt in Newark Bay outlying the capped pits before the sand is scoured. This suggests that the sand cap will be more resistant to erosion than the model simulation which assumed the entire bottom of the bay to be sand.

The DEIS considered the silt fraction in the context of model simulations by evaluating clay and sand fractions that bracket its characteristics.

S1-12

Commented noted. The monitoring program to be included in the permit will impose conditions to assure that TSS is monitored during construction and operation of NBCDF.

S1-13

There is no statement to this effect in the cited paragraph or in any part of the cited Section (Section 4.05).

S1-14

Refer to response S1-7a. The biomonitoring design criteria accommodate the zone of major bioturbation observed for the species recorded from the Newark Bay sites.

S1-15

The NJHPO was contacted with respect to archaeological and cultural resources in the project area as part of the preparation of the DEIS. Proposed project review under Section 106 of the National Historic Preservation Act is discussed in comment response S1-16

S1-16

Title 33 of the Code of Federal Regulations, Part 325, Appendix C defines USACE-NYD responsibilities and procedures for the protection of historic properties and prehistoric cultural deposits pursuant to the National Historic Preservation Act.

In the DEIS, it was noted that information provided in the cited references suggested that there was a high potential for the presence of buried prehistoric cultural deposits in the CDF area. Accordingly, a reevaluation of subaqueous core logs and photographs of the cores collected from the area was conducted.

As noted in other sections of the DEIS, specifically Section 3.01, 3.04, and Appendix 3.04, the stratigraphy of Newark Bay consists of 3 units that overly Mesozoic bedrock. The lowermost unit consists of Pleistocene red to red-brown clays. These are overlain by gray sands, gravelly sands, or sandy gravels, also of Pleistocene age. The uppermost unit consists of Holocene black organic muds, black sandy muds, and black muddy sands.

The lowermost unit represents deposition in a glaciolacustrine environment. This depositional environment was entirely subaqueous. Thin silt bands and local silt grains noted were most

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likely the product of aeolian deposition. The absence of sand or observable layering, the high oxidized nature of the sediment as indicated by the reddish color, and fine-grained nature of the sediment indicates that deposition occurred in a quiescent environment, possibly in the deeper portions of a proglacial lake. By contrast, the intermediate unit, consisting of much coarser, more poorly sorted material, probably represents deposition in a highly energetic environment. The coarser grain size, lack of bedding, and poorer sorting suggest deposition by highly energetic, proglacial streams. In either case, the probability of finding cultural deposits is negligible. In both instances the depositional environment would have been subaqueous, hence, not a site for habitation. In the second case, the energy of the environment could have provided a high potential for erosion of any artifacts.

The uppermost unit is representative of geologically younger sedimentation in estuarine environments associated with post-glacial sea level rise. The nature of the sedimentary succession gives no indication of the depositional environment, other than being low energy and, in the top part, estuarine. Examination of core logs and photos of cores from the permit area did not indicate the presence of any anthropomorphic material. Examination of these materials constitutes an investigation of the permit area pursuant to the requirements of 33 CFR, Part 325, Appendix C, Paragraph 5.

S1-17 and S1-18

With respect to issues of navigational safety, there are several considerations that led to the statements made in the DEIS. The present of traffic in the area of the proposed project is approximately 2 vessels per hour. Not all of these are container vessels entering Port Newark-Port Elizabeth. Tugs and scows associated with the dredging operation would "give way" to the larger vessels. In addition, the Port Authority of New York/New Jersey has schedules for vessels entering and leaving the Port Elizabeth Channel. This information will be given to dredging contractors, so that movement of scows and dredges can be scheduled to avoid potential interference as much as possible.

To avoid navigational interference when the entrance channels to the CDF areas would be dredged, initial operations could be scheduled to commence during a period of "light" vessel traffic. However, even if this is not possible, the size of dredging equipment relative to channel width would make interference unlikely. As shown on p. 5-19 (tabulated information), the maximum width of dredging equipment that could be used is 50 ft. The maximum encroachment channelward would be 100 ft, approximately 20% of the channel width, if a

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scow were moored outboard of a dredge and both were situated entirely in the channel. A more probable scenario is that the dredge would only partially impinge upon the channel, if at all, and that dredge scows would be moored fore and/or aft of the dredge.

S1-19

Comment noted.

S1-20

Comment noted. Subject sentence removed.

S1-21

The volume of contaminated material likely to be dredged during the life of the NBCDF appears to be sufficient to allow for nonstop operation. In the unlikely event of a shortfall of dredging operations and materials needing disposal in the NBCDF, the permittee, USACE, USEPA, and NJDEP would meet to determine the utility of an interim cap. Cap material and thickness would be mutually decided.

USACE0007447

USACE-0009429

LOCAL AGENCIES AND OFFICES

COMMENTS AND RESPONSES

OFFICE OF THE MAYOR

CITY OF BAYONNE

630 AVENUE C • BAYONNE, NEW JERSEY 07002-3898
TEL. (201) 858-6010 • FAX (201) 858-6077

LEONARD P. KICZEK, *MAYOR*

L1

February 24, 1997

U.S. Army Corps of Engineers, New York District
Regulatory Branch
Jacob K. Javits Building
New York, New York 10278-0090

Re: Draft Environmental Impact Statement
On the Newark Bay Confined Disposal Facility

Attention: CENAN-OP-RE, Marc Helman, Project Manager

Dear Mr. Helman:

On behalf of the City of Bayonne, I am objecting to the Draft Environmental Impact Study regarding dredging and containment islands in the Newark Bay area.

The report of the city's Environmental Specialist, Jim Monkowski, is enclosed and is to be part of the original record of our objection.

Very truly yours,

LEONARD P. KICZEK
LPK:sm

DEPARTMENT OF
HEALTH & WELFARE
CITY OF BAYONNE
630 AVENUE C
BAYONNE, NEW JERSEY 07002-3898

February 21, 1997

U.S. Army Corps of Engineers, New York District
Regulatory Branch
Jacob K. Javits Building
New York, New York 10278-0090

Attention: CENAN-OP-RE, Marc Helman, Project Manager

The study presents five alternatives, two of which impact the area off of Bayonne. The other two are on the west side of Newark Bay. The other is a no build scenario

The alternative # 3 has a borrow pit being constructed off of Hudson County Park only. The Army Corps indicates this could be a larger pit than those on the west side of the bay. Alternative # 4 is a combination of #s 1 & 2, construction of the pits on the Westside of the bay, in addition to construction of the pit off of Bayonne's shoreline

Yet this study does not address many items on the Bayonne side of the bay. It only mentions the Bayonne side in passing, and what it does mention is not factual. Specifically the following:

In chapter 3, page 3-115, the last paragraph dealing with the intertidal mudflat, located south of Hudson County Park is incorrect. The paragraph indicates " These mapped flats will probably not be exposed by daily tidal cycles but only during extreme (spring/fall and storm) tidal events." These tidal flats are exposed during the normal tidal activities, as anyone who is familiar with this area can attest to. They are more exposed (a larger surface area) during these extremes, but to say this is the only time is inaccurate. The report does not mention the area found north of Hudson County Park. The area directly adjacent to the park is a tidal mudflat with spartina grass supporting a thriving wildlife population. The northern area from this cove has the phragmities, not the cove area itself. Numerous species of waterfowl, raptors, songbirds, wading birds etc. have been seen repeatedly at this location as well as the adjacent areas, depending on the time of year. L1-1

Table 3.07-2 found on page 3-93 lists various avian species which may use the Newark Bay Shoal Area. However this list apparently did not include the above mentioned area north of the park. If they had included the northern part of the park and the adjacent open waters, the list would have had a lot more species with the confirmed status. This would include the following: L1-2

Great Blue Heron
Great Egret
Snowy Egret

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HEALTH & WELFARE
CITY OF BAYONNE
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Glossy Ibis
Brant Goose
Rudy Duck
Lesser Scaup
Greater Scaup
Black Skimmer
Common Merganser
American Coot
Common Loon
American Bittern
Osprey
Peregrine Falcon (Which has been found nesting on bridges in the area.)
Red Tail Hawk (on upland areas)
Northern Harrier (upland areas)
American Kestrel (upland areas)

L1-2

The report also makes references to climatological data recorded at La Guardia Airport, which is located approximately twenty (20) miles from this site. The more appropriate location to gather this information would have been from the Newark Airport site. This is located in close proximity to this proposed locations

L1-3

At a July 1993 meeting of the Dredged Material Forum, a representative of the Army Corps of Engineers, indicated Newark Bay might be a good location for a pilot project regarding the Borrow Pit concept. The pilot program would cover 250,000 cubic yards (CY) of material. He also stated "Newark Bay is too small to accommodate a long term Borrow Pit solution." I must ask the question, what was the dramatic change that may have been found, to alter the original thinking?

L1-4

The same Dredged Material Forum also heard proposals regarding existing pits from sand mining operations which were located in New York waters. They concluded these pits could be put into use cheaper and faster than starting from scratch in Newark Bay. They also had a proposal from AMBOY AGGREGATES to construct dredge material borrow pits at no cost to the government. This proposal and the use of New York waters was dependent on the issuance of permits by the State of New York. Amboy Aggregates already had permits from New Jersey and the Federal Government. However, there was strong opposition from New York on this proposal so it was not pursued.

L1-4a

What has to be carefully watched is the use of what could be considered a flawed Draft Environmental Impact Statement, which obviously did not examine the eastern shoreline of the bay to any

L1-5

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HEALTH & WELFARE
CITY OF BAYONNE
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BAYONNE, NEW JERSEY 07002-3898

length. This document takes what information was gathered from the western and center of the bay and assumes like information for the eastern side. Nowhere in this document, does it consider any potential impacts associated with alternatives #3 & 4 The parklands which lie adjacent to the eastern shoreline are completely ignored, as were any impacts to this area.

This report examined the western shoreline in response to alternatives # 1 & 2, while proposing two others without doing the require studies I firmly believe to accept this report as it is written, to include the eastern shoreline as part of it, borders on a travesty. If the Army Corps of Engineers wanted to include alternatives # 3 & 4, in this report than they should have studied the eastern shoreline at length, rather than just passing

L1-5

I am aware of the problem we face if the harbor is not dredged. But what I find disturbing is the push to place it in Newark Bay, which will be more costly and time consuming than some other proposals, as well as the obvious lack of adequate study of the eastern shoreline areas

L1-6

Sincerely,

James Monkowski
Sr. Environmental Specialist

JM/dr

L1 City of Bayonne, Office of the Mayor

General Comment

The City of Bayonne, Department of Health and Welfare provided data on the natural resources of Bayonne. This additional information is very helpful and will be used in any further evaluations of Area 3.

L1-1

Additional information on the mudflats south of Hudson County Park in Chapter 3 p. 3-115 has been changed to reflect tidal exposure during normal daily cycles.

L1-2

The list of avian species using Newark Bay Shoals includes those water related species identified by the city of Bayonne. Additional information on the peregrine falcon is found in Section 4.11.2 and on other raptors in Section 4.07.4

L1-3

The climatological data presented in Section 3.03 included data recorded by NOAA at a variety of locations in the vicinity of Newark Bay. The discussion on wind conditions relied upon data from LaGuardia Airport because this source provides a long term data base extending to 1947.

L1-4

The proposed NBCDF is a short-term alternative, not a long-term "Borrow Pit" solution. The original NBCDF proposal with a projected capacity of approximately 14 MCY was made by the Governor's Dredged Material Management Team in February 1995. Prior to that time locations in Newark Bay had been proposed for "shoreline-based, diked disposal," i.e., a small containment island, as discussed in the 1988 USACE study entitled "Managing Dredged Material."

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L1-4a

The USACE-NYD has an application pending before the New York State Department of Environmental Conservation for a permit and Water Quality Certification to use the East Bank Pit, in the Lower Bay for the disposal of dredged material. The State has not acted upon the application. If the permit and WQC were to be issued, and the project could be developed in time to meet the short term goal for sediments from the NBCDF draw area, then the Lower Bay Pits would have been evaluated in the Alternatives Analysis section of this FEIS, and could have been selected as the preferred alternative.

The USACE has not received an application by Amboy Aggregates for a permit to construct dredged material borrow pits. This proposal may have been suggested at the Dredged Material Forum, but there is no record of any permit requested or issued.

L1-5

The DEIS and the FEIS recommend that additional studies be conducted to evaluate the feasibility and environmental impact associated with a CDF on the east side of the bay, if consideration of such a facility is warranted.

L1-6

Alternative dredged material disposal strategies are fully evaluated in Chapter 2.0 of the NBCDF EIS, particularly Section 2.02: Alternative Dredged Material Disposal Strategies.

USACE0007454

USACE-0009436

CITY OF BAYONNE
ENVIRONMENTAL COMMISSION
MUNICIPAL BUILDING
630 AVENUE C
BAYONNE, NEW JERSEY 07002
(201) 858-6113

Leonard P. Kiczek
MAYOR

Sylvia D. Walker
CHAIRMAN

February 27, 1997

L2

U.S. Army Corps of Engineers, New York District
Regulatory Branch
Jacob K. Javits Federal Building, Room 1937
New York, New York 10278-0090

Re: Draft Environmental Impact Statement (DEIS)
Newark Bay Confined Disposal Facility
Newark Bay, Newark, Essex County, New Jersey

This letter is written on behalf of the residents of the City of Bayonne, New Jersey by members of the Bayonne Environmental Commission regarding the above referenced matter.

Based upon the information submitted in the Work Description of the DEIS and the information contained in the DEIS itself, we oppose the construction of Confined Disposal Facilities in Newark Bay. The proposed methods of construction, the filling of the CDFs, and the ultimate disposal of dredge material compromise all past environmental efforts made by residents of the State of New Jersey. L2-1

These construction and disposal methods pose potentially significant environmental impacts to already stressed areas.

The New York/New Jersey Harbor Estuary Program proposes to revitalize the Harbor area, to restore and regenerate its wildlife, to make it suitable for water access and for people's recreational opportunities.

This proposal goes in the opposite direction. It would affect air quality, aesthetic concerns, noise and odors. It would undo the trend toward improving water quality in Newark Bay. It would jeopardize wetlands and wildlife.

If Category III, the most contaminated of dredging spoils, should not be placed into the wide, open ocean, it certainly should not be placed near the shore of Bayonne, on the edge of a dense population center.

Possible disposal alternatives mentioned but not further pursued in this DEIS were eliminated from consideration because of the time frame required. The September 1996 Interim Report of the Dredged Material Management Plan for the Port of New York and New Jersey was not addressed at all. L2-1

However, even though it does not meet the timing schedule, the alternative of Area 3 of Newark Bay, the area east of the Federal Navigation Channel, is included nonetheless. Preliminary data are shown and incorporated into tables and maps, and the text refers to

> additional data would be required should a CDF in this area become a proposed action.

The DEIS is misleading or incomplete in its assessment of the impact of Newark Bay CDFs on the City of Bayonne. For instance,

on page 3-163, the description of the City's largest park, Hudson County or Bayonne Park (now named Stephen Gregg Park) labels all of its facilities thus: L2

> The park includes sitting areas, walking paths, and open area.

It does indeed. But what is not stated is that the park also includes a major new running track and associated sports facilities, a number of baseball diamonds and soccer fields, a large new children's playground, picnic areas, ten tennis courts, etc.

People are walking, running and biking; adults congregate, chat and barbecue, children play. The ten words the DEIS uses to describe the park fall far short of the park's focus and importance.

Also,

on page 3-149, Socio-economic Criteria are stated only for the City of Newark and the counties of Essex, Hudson and Union. No separate assessment or description of socio-economic impacts on the City of Bayonne is presented. Surely, since L2-4

Bayonne is the community most heavily impacted by any Newark Bay subaqueous borrow pits, any impartial analysis should certainly address the deleterious effects on quality-of-life and economic issues affecting our residents.

While in Elizabeth and Newark the Bay abuts substantial industrial facilities, on the Bayonne side the land use is primarily residential. Most of the City's residential areas are within six or seven blocks of Newark Bay, its major parks and Bayonne High School and Marist High School are on the shores of Newark Bay, and the focus of the City historically has been on the water. Currently, the construction of a boat ramp is projected for City Park. L2

Since Bayonne is densely populated, its 62,000 citizens value, treasure and utilize the available parkland and access to the water.

Property values would certainly decline if the water, rather than continuing to be a special asset for Bayonne, were to be viewed as a potential hazard in an unknowable future.

The knowledge that vast quantities of the most contaminated Category III, dredging spoils would be deposited right off our shore, and that these same dredging spoils were too contaminated to be put even into the ocean, would be constantly with us. The socio-economic impacts on the City of Bayonne would be severe indeed.

No other community, in this State and in New York, is being told to bear this kind of burden.

The existing East Bank and West Bank pits, described by the Corps of Engineers in their January 1991 study, are not now being considered. Just as those locations are not under consideration because of controversy and public opposition, neither should we be. L2-

The fact that it would be convenient and cheap for the Port Authority to use these Newark Bay CDFs is not sufficient justification to ruin a community

L2-

Lower cost is also the rational for choosing to place a three-foot cap as cover once a CDF is filled, despite the recommendation that a four-foot cap would be safer in a 100-year storm.

The Newark Bay CDF proposal is simply the cheapest, easiest way for the special interests to proceed without regard to the impact it would have on Bayonne residents every day.

The very possibility that a pit capable of storing up to 16 million cubic yards of category III dredging spoils is even being considered so close to Bayonne and its major park is simply beyond belief.

Despite assurances that there was no danger, Three Mile Island and Love Canal both happened.

There are many possible disposal alternatives and locations which are not sited in the midst of a dense population.

We strongly oppose the proposed subaqueous pits in Newark Bay.

Very truly,

Sylvia D. Walker

Sylvia D. Walker, Chair
Bayonne Environmental Commission

L2 City of Bayonne, Environmental Commission

L2-1

The NBCDF EIS evaluates the impacts associated with construction and operation of a subaqueous confined disposal facility located in Newark Bay. Impacts are identified and mitigation measures described. The NBCDF has been designed as a facility that will contain and isolate contaminants so that they are rendered harmless in the bay and the estuary.

L2-2

The NBCDF as a short-term dredged material disposal option as well as other disposal options are discussed in Section 2.02 of the EIS. Potential dredged material disposal alternatives to the proposed NBCDF were eliminated for a variety of reasons as stated in the DEIS, including, for some alternatives, the time frame for construction and operation. The Dredged Material Management Plan (DMMP) Interim Report (Sept. 1996) includes the NBCDF as one of 53 dredged material disposal options for the region.

L2-3

The additional data and information provided by the City of Bayonne could be included in any assessment of Area 3, if such an assessment is warranted. Area 3 is not included in the applicant's permit application and is not the USACE's preferred alternative.

L2-4

If a CDF is proposed for the east side of Newark Bay a more detailed economic evaluation for the facility would be prepared. The economic criteria presented in Section 3.17 relate to those areas likely to furnish port facilities and equipment for the construction and operation of NBCDF in Newark Bay. A facility constructed anywhere in Newark Bay is likely to impact the City of Newark because Newark's extensive port facilities would be used to support construction of the NBCDF.

L2-5

If a CDF were proposed for the East side of Newark Bay along the Bayonne shoreline, a full environmental assessment would be performed to evaluate any potential that the use of a CDF to render contaminated dredged material harmless in the environment would affect the City of Bayonne, its environment, or its residents, in a negative manner.

USACE0007459

USACE-0009441

L2-6

The New York District USACE has an application pending before the New York State Department of Environmental Conservation for a permit and Water Quality Certification to use the East Bank Pit, in the Lower Bay for the disposal of dredged material. The State has not acted upon the application. If the permit and WQC were to be issued, and the project could be developed in time to meet the short-term goal for sediments from the NBCDF draw area, then the Lower Bay Pits would have been evaluated in the Alternatives Analysis section of this FEIS and could have been selected as the preferred alternative.

L2-7

The environmental rational for the use of a 3-ft cap is presented in NBCDF EIS Section 5.04. Costs were not considered in that evaluation.

USACE0007460

USACE-0009442

L3

County of Essex, New Jersey
BOARD OF CHOSEN FREEHOLDERS

State of New Jersey,
County of Essex } ss

I ADRIANNE DAVIS Clerk

of the Board of Chosen Freeholders of the County of Essex in the State of New Jersey

Do Hereby Certify, the foregoing to be a true copy of a resolution adopted at a meeting of said Board on WEDNESDAY

the 26th day of FEBRUARY 19 97,

together with the certifications, signatures and endorsements thereon.

RESOLUTION NO. R-97-.

In Testimony Whereof, I have hereunto set my hand and affixed the official seal of said County at Newark

this 27th day of

FEBRUARY A.D. 19 97

Adrianne Davis

Clerk

USACE0007461

USACE-0009443

RESOLUTION NO. K-77-0106 AUTHORITY FOR RESOLUTION N.J.S.A. 40:41A-38(q)
PROPOSED BY: Acclamation AUTHORITY FOR ACTION E.C.A.C. 3.11(L)

SUBJECT:

RESOLUTION SUPPORTING THE NEWARK BAY CONFINED DISPOSAL FACILITY

WHEREAS, the impending closing of the ocean Mud Dump in September, 1977, creates the need to identify disposal alternatives for the 5 million cubic yards of material dredged each year in the New York-New Jersey harbor contiguous to the State of New Jersey; and

WHEREAS, without dredging, over 166,000 jobs are at risk and dredging is necessary to maintain adequate water depths for ships calling on the Port; and

WHEREAS, the Port generates nearly 20 billion dollars in economic activity annually including wages and state and local taxes; and

WHEREAS, the Newark Bay Confined Disposal Facility was a proposal that addressed the needs of the Port of New York and New Jersey; and

WHEREAS, the 1.5 million cubic yard capacity of the facility provides a valuable, environmentally sound, and econcomically feasible short-term option for the Port, while long-term solutions are being examined; now, therefore, be it

RESOLVED, that the Essex County Board of Chosen Freeholders strongly recommends that U.S. Army Corps of Engineers approve the Port Authority's application and grant a permit for the Newark Bay Confined Disposal Facility; and, be it further

RESOLVED, that a copy of this resolution be forwarded to the New York District Corps of Engineers, Regulatory Branch, 26 Federal Plaza, Room 1937, New York, York 10278-0900; the Port Authority of New York and New Jersey; and Mrs. Janet Evans, N.J. Representative, Office of Government & Community Relations, 1 World Trade Center, 68 South, New York, New York 10048.

Approved as to form and legality _____

RECORD OF VOTE (X = Vote N.V. = Abstention ABS = Absent)

Moved by Freeholder Oliver
Seconded by Freeholder Sebold

Freeholder	Yes	No	N.V.	ABS	Freeholder	Yes	No	N.V.	ABS
CAVANAUGH	X				ROLLI	X			
JONES	X				SEBOLD	X			
MARTINEZ	X				WATSON	X			
OLIVER, V.P.	X								
PALAGANO	X				DiVINCENZO, PRES.	X			

It is hereby certified that the foregoing Resolution was (X) adopted ( ) defeated ( ) tabled by roll call vote at a REGULAR meeting of the Board of Chosen Freeholders of the County of Essex, New Jersey, held on February 20, 1997.

Is Publication Required ( ) Yes ( ) No

Date Published _____

Joseph N. DiVincenzo, Jr. President

L3 Board of Chosen Freeholders, County of Essex, New Jersey

L3-1

The recommendation for the approval of the NBCDF is noted.

USACE0007464

USACE-0009446

ENVIRONMENTAL AND ADVOCACY GROUPS

COMMENTS AND RESPONSES

Pri 1

Participating Organizations

Alliance for a Living Ocean
American Association of University Women
American Littoral Society
ANJEC
Arthur Kill Coalition
Arts Guild, Saint Augustine Church
Asbury Park Fishing Club
Jamie Bates Marine Fisheries Commission
Big Brothers/Big Sisters of Monmouth County
Haviberry Garden Club
Belford Seafood Co-op
Belmar Chamber of Commerce
Beneath The Sea
Cape May Environmental Commission
Central Jersey Anglers
Citizens Conservation Council
Clean Sludge Coalition
Coalition Against Toxics
Coast Alliance
Concerned Businesses of COA
Concerned Citizens of COA
Concerned Citizens of Monmouth
Communication Workers Assoc., Local 1034
Defenders of Wildlife
Dead a Sea Roamers
Eastern Monmouth Chamber of Commerce
Eastern Surfing Association
Educated Consumers Group
Environmental Response Network
Fish Unlimited
Fisheries Emergency Fund
Fishermen's Dock Cooperative
Friends of Liberty State Park
Garden Club of Fair Haven
Garden Club of Long Branch Island
Garden Club of Oceanport
Garden Club of Rumson
Garden Club of Shrewsbury
Garden Club of Spring Lake
Greater Point Pleasant Charter Boat Association
Greenpeace USA
Harlan Township PBA 189
Hi-Mar Sewer Club
Hudson River Fishermen's Association NJ
International Union of Electronic Workers, Dist. 3
Ironbound Committee Against Toxic Waste
Jersey Coast Anglers Association
Jersey Coast Shark Anglers
Jersey Shore Aquatic Society
Jersey Shore Captain's Association
Jersey Shore Chief's Association
Junior League of Monmouth County
Junior League of NYC
Junior League of Summit
Junior Women's Club of Midtown
Junior Women's Club of Milton
Junior Women's Club of Westwood
Kiwanis Club of Bayshore
Kiwanis Club of Manasquan
League of Women Voters/Monmouth County
Leonardo Parry & Pleasure Boat Association
Little Silver Garden Club
Long Branch Chamber of Commerce
Long Branch Clean Communities
Manasquan Fishing Club
Manomet Bird Observatory
Marine Mammal Stranding Center
Marine Trades Association
Middlesex Chamber of Commerce
Midland Beach Sportsman's Club
Monmouth Conservation Foundation
Monmouth Council of Girl Scouts
Monmouth County Arts Council
Monmouth County Association of Realtors
Monmouth County Audubon
Monmouth County Friends of Clearwater
Monmouth County Race Meet Association
Monmouth Ocean Development Council
Morris Farms & Land Conservancy
National Alliance of Women in Waste
National Association of Underwater Instructors
National Coalition for Marine Conservation
Nature Center of Cape May
Natural Resources Protective Association
Newark YMCA
Newcomers Club of Monmouth County
NJ Audubon Society
NJ Beach Hogge Association
NJ Commercial Fishermen's Association
NJ Council of Diving Clubs
NJ Environmental DHS
NJ Environmental Federation
NJ Environmental Leaders
NJ Marine Education Association
NJPIRG
NJ Sierra Club
NYC Sea Grants
NY Marine Education Association
Ocean Advocates
Ocean County Board of Realtors
Ocean County Citizens for Clean Water
Ocean County Bank Walton League
Ocean Protection Coalition
Ocean Wreck Divers
Oceanside/United Methodist Church
People for People
Pressman Route Club
Rainforest Relief Network
Raritan Bay Anglers Club
Raritan River Friends of Clearwater
Red's Surf Devils
River Rats of Fair Haven
Saint George's by the River Church
Saltwater Sportsmen's Club
Sandy Hook Bay Catamaran Club
Save Our Ocean Committee
SLAS Monmouth
Shark Research Institute
Shark River Surf Anglers
Shore Surf Club
Sierra Club Shore Chapter
South Monmouth Board of Realtors
South Monmouth Chamber of Commerce
Staten Island Federation of Sportsmen's Clubs
Staten Island Tuna Club
Stoney Brook Westwood
Stop Ocean Dumping Coalition
Student Conservation Association
S.L.R.I. International
Surfers Environmental Alliance
Surfer's Medical Association
Surrender Foundation/NJ, FL & CA
TACKI
Thousand Fathom Club
Tri-State Metro Nature
United Bluefishers of NY NJ
United Bluefishers of NJ
United Fishermen's Association of NY
Vacation Yacht Club of America
Village Women's Club
Volunteer Friends of Hudson
Volunteer Center of Essex County
West Side Community Center
Women's Club of Keyport
Women's Club of Little Silver
Women's Club of Long Branch
Women's Club of Middletown
Women's Club of Red Bank
Women's Club of Sea Girt
Youth Environmental Society
Zonta Club of Monmouth County

E1

CLEAN OCEAN ACTION

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1600 Delaware Ave • Cape May, NJ 08204 • (609) 884-9590

February 28, 1997

Mr. Joseph Seebode, Chief
Regulatory Branch
U.S. Army Corps of Engineers
New York District
Jacob Javits Federal Building
New York, NY 10278-0090

Re: Draft Environmental Impact Statement (EIS) for the Newark Bay Confined Disposal Facility (CDF) and Public Notice No. 95-04370-J1

Dear Mr. Seebode.

Clean Ocean Action, the American Littoral Society, and Baykeeper provided preliminary comments on the above referenced draft EIS and public notice at the February 19, 1997, public hearing. The following additional comments are being submitted to the U.S. Army Corps of Engineers, the U S Environmental Protection Agency (EPA), and other cooperating agencies for their consideration when preparing the final EIS and making permit decisions for the proposed project.

1. Newark Bay CDF Proposed Alternative

Alternative 2 is composed of subaqueous pits in Areas 1S, 2S, and 2N. According to the statement presented at the public hearing by Ms. Lilian Borrone, Director of the Port Commerce Department of the Port Authority of New York and New Jersey, this is the project for which the Port Authority has submitted the permit application which is before the Corps.

E1-1

However, according to Ms. Barrone's statement, the Port Authority intends to initially pursue construction of a CDF in Area 1S immediately upon receipt of the requisite permits; the Port Authority will defer construction of CDFs in Areas 2S and 2N until they are able to identify an economically viable disposal solution for the upper layer material from these areas.

This statement is inconsistent with the description of Alternative 2 contained in the draft EIS. According to the draft EIS, Alternative 2 would proceed as follows:

> "The upper layer from both Areas 2S and 2N has not passed ocean disposal testing criteria and would be deposited in Area 1S".

We continue to support the concept for the project under the "three-pit" scenario presented by Alternative 2 and feel that going to an alternative that initially looks only toward construction and operation of pit 1S may be far too limited.

2. Other Alternatives

As stated in our preliminary comments, concurrent with reviewing the proposed project, we urge the Corps of Engineers, EPA, and other responsible parties to immediately initiate the detailed feasibility studies and sediment testing that would need to be conducted to determine the suitability of Area 3 for the siting of additional subaqueous disposal facilities. E1-2

3 Surficial Sediments from Area 1S

We remain of the opinion that the results of testing performed on surficial sediments from Area 1S do not support the Corps of Engineers preliminary determination that the proposed dredged material is Category II material and suitable for ocean dumping with capping.

We note that the public notice for the draft EIS indicates that the EPA has not made its final determination regarding this matter and that determination is expected to be made prior to publication of the final EIS. Once EPAs determination is made, we request a copy of the "Memo to File" prepared detailing the review and evaluation for this ocean disposal permit application. Furthermore, should EPA determine that it concurs with the Corps determination that this material is Category II dredged material suitable for ocean disposal with capping, when will the public notice for this permit determination be issued and will public hearings on the ocean disposal permit be held? E1-3

We look forward to your response to all of our comments.

Sincerely,

Cindy Zipf
Executive Director, Clean Ocean Action

D.W. Bennett
Executive Director, American Littoral Society

E1 Clean Ocean Action, February 28, 1997

E1-1

The applicant has not changed their permit application to only one subaqueous disposal pit. The FEIS' preferred alternative for the NBCDF is Alternative 2, which is the three-pit permit application under review by the USACE-NYD and the subject of this regulatory process.

E1-2

The NBCDF FEIS recognizes the potential and advantages for a subaqueous disposal pit in Area 3 (Section 2.03.04). However, Area 3 is not the subject of the permit application under review. However, it should be noted that the possible construction of such a disposal pit in Area 3 is one of the options in the menu of options provided in the USACE-New York/New Jersey Dredged Material Management Plan (DMMP) Interim Report of October 1996. The menu of options is currently being coordinated with the States of New York and New Jersey and other regional stakeholders to determine which options require additional study and design efforts. This comment of support has been shared with the DMMP Team.

E1-3

The USEPA and the USACE-NYD have fully evaluated the test results on the sediments from Area 1S and have jointly determined that the proposed dredged material from the upper layers is Category II dredged material suitable for disposal at the ocean Mud Dump Site prior to 1 September 1997 and to be subsequently capped. The requested memo is available at FEIS Appendix 1.02. The public notice on this action was published 17 January 1997. The public hearing was held on 19 February 1997. The FEIS has been published. After the required comment period, the Record of Decision will be executed and the applicant and the public will be advised of the USACE-NYD decision on the permit application.

USACE0007468

USACE-0009450

Participating Organizations

E2

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March 3, 1997 (Via Fax)

Mr. Joseph Seebode, Chief
Regulatory Branch
U.S. Army cops of Engineers (COE)
New York District (NYD)
26 Federal Plaza
NY, NY 10278-0090

Re: Draft Environmental Impact Statement (EIS) for the Newark Bay Confined Disposal Facility (CDF), and Public Notice No. 95-04370-J1

Dear Mr. Seebode,

This letter is in addition to our previous comments submitted regarding the above referenced documents.

E2-1

As stated previously, we are concerned about the characterization by the COE - NYD of the upper layers of Pit 1S as Category 2 material. To further support our position, we are submitting the attached figure (Figure 8) depicting stations in Newark Bay that identified the same areas in the vicinity of the proposed CDFs as being "highly toxic" in amphipod survival tests. These data are contained in the 1995 NOAA document *Magnitude and Extent of Sediment Toxicity in the Hudson-Raritan Estuary* by Edward Long, et al.

The Draft EIS admits that Long et al. futher reported high toxicity levels in Newark Bay and that the toxicity to amphipods was correlated with concentrations of PCBs, dioxins and pesticides. These concentrations often exceeded effects-based guidelines or toxicity thresholds (Chapter 3, Section, 3.09).

The COE- NYD determination that the material from this area is "Category II" appears to us to be inconsistant with the findings discussed throughout Long et al. In the Final EIS, we expect a comparative review and explanation of these inconsistencies.

We therefore submit, by reference, this document (NOAA Technoical Memoradum NOS ORCA 88) as part of the record to be evaluated in the Final EIS and the decision making process related to the proposed project.

Sincerely,

Cindy Zipf
Executive Director

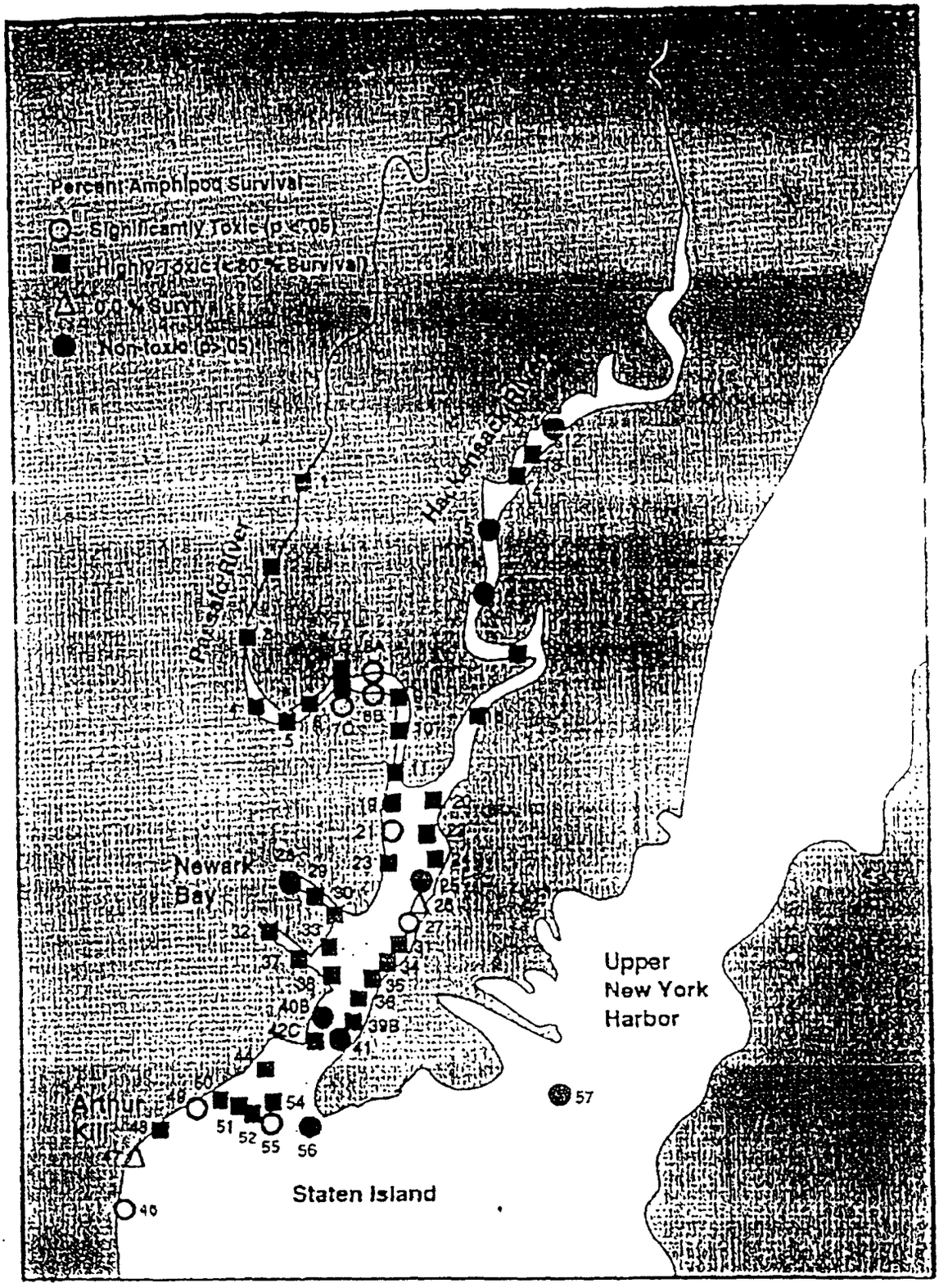

Figure 8. Distribution of stations in Newark Bay and vicinity that were toxic, highly toxic, and non-toxic in amphipod (A. *abdita*) survival tests.

USACE0007470

USACE-0009452

NOAA Technical Memorandum NOS ORCA 88

Magnitude and Extent of Sediment Toxicity in the Hudson-Raritan Estuary

Edward R. Long
National Ocean Service, Office of Ocean Resources Conservation and Assessment, Seattle, WA

Douglas A. Wolfe
National Ocean Service, Office of Ocean Resources Conservation and Assessment, Silver Spring, MD

M. John Scott and Glen S. Thursby
Science Applications International Corporation
Narragansett, RI

Eric A. Stern
U.S. Environmental Protection Agency
New York, New York

Carol Peven
Battelle Ocean Sciences
Duxbury, MA

Ted Schwartz
National Biological Survey
Washington, D.C.

Silver Spring, Maryland
August, 1995

USACE0007471

USACE-0009453

E2 Clean Ocean Action, March 3, 1997

E2-1

Clean Ocean Action states that the determination that the proposed dredged material from the upper layer of Areas 1S is Category II appears to be inconsistent with the findings of the 1995 NOAA study by Long et al.

At the outset, the sampling locations are not the same. The location of the sediment samples collected by NOAA as presented in Table 5 (page 19 of Long et al. 1995) were reviewed in relation to the delineation of Area 1S. NOAA Stations 33 and 34, which appear to be the closest to Area 1S, have a water depth of 10 m and 14 m respectively. However, the NBCDF EIS (page 3-6) states that the water depth in Area 1S ranges from 0.2 to 1.5 m. Therefore, the NOAA Stations 33 and 34 were located in the adjacent navigation channel and not located in Area 1S.

The sediment sampling and analytical procedures for the characterization of material as described in the EIS are different than the procedures used in the NOAA study. The sediments testing for the NBCDF EIS conforms to protocols used by the USEPA and USACE for determining sediment acceptability for ocean disposal; whereas the NOAA study employed different procedures to meet their study objectives. For example, the unconsolidated sediments tested as part of the NBCDF EIS were a composite of the upper sediment layer taken to represent the material proposed to be dredged and disposed at the ocean disposal site. In contrast to this, NOAA sampled the top of the surficial sediment layer using a modified Van Veen grab sampler (also known as a Young sampler), which collects only the top few centimeters of sediment taken to determine the condition of the surface sediments exposed to the water column and its organisms.

In summary, the NBCDF EIS categorization of the proposed sediments for ocean disposal from Area 1S as Category II is not inconsistent with the results of the NOAA study because sampling locations for the two studies did not overlap each other and the sampling protocols are not the same.

USACE0007472

USACE-0009454

BAYKEEPER
NY/NJ HARBOR
AMERICAN LITTORAL SOCIETY

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March 3, 1997

E3

Mr. Joseph Seebode, Chief
Regulatory Branch
US Army Corps of Engineers
26 Federal Plaza
New York, NY 10278-0090

By Fax and US Mail

Re: Draft Environmental Impact statement (EIS) for the Newark Bay Confined Disposal Facility (CDF) Public Notice No. 04370-J1

Dear Mr. Seebode

The following are Baykeeper's comments on the Draft EIS for the Newark Bay Confined Disposal Facility (CDF). These are submitted in addition to the joint comments submitted on our behalf by Clean Ocean Action.

In the 1994 Corps' Long Range Management Plan it is states that *"planning has not been linked to broader watershed management. Specifically, ... downstream sediment quality continues to suffer due to historic sources and continued inputs."* The absence of broader watershed management is the core of Baykeeper's criticism and the critical flaw in the Newark Bay CDF EIS

E3-1

There is a problem caused by inattention and lack of care which has , resulted in a contaminated sediments problem. Run off from combined sewers, from contaminated upland areas, discharges from industrial plants and public treatment works, as well as historical contamination have created a contaminated sediments problem which has in turn created a "dredged materials management" crisis.

The EIS assumes that we "must" dredge -- because, it appears, that the Corps has bought into the dangerous assumption, that unless we dredge everywhere -- now -- the port will close. The port will not close. It may change in configuration, and it may get larger or smaller depending on market and other forces, and it may change in nature. Dredging is not the only issue that port users are dealing with in this region. Poor transportation infrastructure narrows the options for shippers; high wages, high rents and leases, and

E3-2

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irrevocable pension plans, are also factors. Be that as it may, the New York metropolitan area is one of the largest and by far one of the most dense population centers in the nation. New York Harbor, despite its shallow nature is one of the best and most protected ports in the world. It is counter productive for the Corps to buy into the idea, that if we do not dredge to fifty feet where ever it is demanded that the port will close. E3-2

We have already gone a long way towards compromising to accommodate the needs of the port. It is now time for the Corps to seriously consider the needs of the Estuary. It is time to enforce your mandate along with other agencies to protect the public and the innate benefits derived from the Estuary.

Port users have no "intrinsic right" to dredge or discharge in "Public Trust Lands" or Waters of the United States. It is a "privilege" granted through the permit process by the agents of the government in the name of the people of the United States. Port interests are neither clients nor customers of the Corps. They are part of the "regulated community," and should be granted no special exemptions.

It is Baykeeper's position that it is logical to dredge where it is necessary, but that the management of the contaminated material should not contribute to the degradation of water and habitat quality at either the dredge or disposal site..

The Hudson-Raritan Estuary (of which Newark Bay is a part), where the Hudson, Raritan and a half dozen other rivers meet the sea, is a remarkable natural resource. It is home to over 330 bird species, and provides essential habitat to over 80 percent of all Mid-Atlantic commercial fish species. Raritan Bay is an integral part of the Hudson-Raritan Estuary. Estuaries, where fresh and salt water mix, are the most biologically productive portions of the marine ecosystem. Because of the complicated hydrodynamics of a semi-enclosed system like Newark Bay and the rest of the Estuary, and because of the shallow water and associated biological activity, the Hudson/Raritan Estuary and its tributaries are critical habitat at every trophic level. E3-3

The priority for the Corps, EPA, the States, and other stakeholders should be to develop upland disposal sites in conjunction with decontamination facilities. The Corps along with its federal, state, and local partners must aggressively pursue decontamination technologies. EPA is currently testing various decontamination technologies that break down the toxics, generally at high temperature, and produce a clean, useful material. This technology may not be ready in time for the next round of dredging. In the meanwhile, toxics immobilization, upland disposal and beneficial reuse (such as landfill cover) are the best options. E3-4

The source of the problem; pollution and sedimentation must be eliminated. If pollution is prevented from entering the Bay, sediments will no longer become contaminated. EPA, state, and federal law enforcement officials and environmental agencies must strictly enforce current regulations on industries and develop programs to combat non-point source pollution and other rain induced discharges; and similarly, if we reduce rates of E3-5

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sedimentation by regulating development that causes excessive erosion, such as building along stream edges or in wetlands, there will be less need to dredge.

Water, whether it be the ocean or the Estuary, is the worst place to dump contaminated dredge materials. The aquatic environment allows the greatest opportunity for the toxins to enter the food chain. These toxins accumulate in fish to hazardous levels and will eventually reach humans. In contrast, the more stable upland environment provides few pathways by which the toxins can reach humans. E3-6

The long term goal of the New York Harbor Dredged Material Management Plan is to "clean the harbor estuary to an acceptable condition so that special measures are no longer required to dispose of dredged material." No disposal option should be considered that removes the incentive to work hard (and creatively) to reach this laudable goal. E3-7

Thousands of tons of sediments enter the harbor from up and down stream sources everyday. To reach the goal, any plan must include a sediment reduction plan that includes land use decisions for upstream development, wetlands preservation, and stream corridor restoration

Harbor sediments are contaminated with toxics to the point where fish cannot be harvested from the harbor and ingested by humans. There is a spot on the Passaic River where Dioxin, the most toxic synthetic chemical ever produced by man, from the Diamond Shamrock plant, attached to bottom sediments, is migrating down and up stream and being deposited into the deep water channels of the Port We know where the contaminants are and who put them there, yet we make no effort to exact from the polluter the cost of their natural resource damage or the cost of remediation. The additional costs of dredging contaminated sediments should not be borne by the public, but by the polluters. Diamond Shamrock is only one example. Dozens of other PRP's have been identified by the agencies of both states and the federal government. In some cases, that list includes some the industries that are in need of the dredging (e.g. historic pollution from the petroleum industry as well as unchecked pollution from Port Authority facilities in NY and NJ. E3-8

If we do not address the issue of pollution prevention now, we will be debating these issues continuously -- sitting around a table in 2001, debating how to manage contaminated dredged materials -- *the shoreline of the Bay and its tributaries will be lined with poisonous piles of mud, and the Bay bottom will be full of holes containing toxic muck. The fish will still be inedible, and polluters will still profit at the expense of the Estuary, and the public.* If pollution prevention, and sediment control is not an *enforceable* part of dredging permits, I believe this nightmare will become reality. E3-9

We do not propose that dredging projects, and disposal options including the Newark Bay CDF, be "held up" until the pollution prevention plans are implemented; however we believe that there should be **a strong, enforceable, link** between pollution prevention and dredging to avoid repeating this arduous EIS process every five to ten years. We also E3-10

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March 3, 1997
Comment letter on NB CDF EIS

think that in cases where there is a recognized party "responsible" for pollution that is causing dredge spoil disposal problems, **the polluter should pay!**

The Port Authority of New York and New Jersey, and other port users are exerting enormous pressure (as are the petroleum terminals) to enable them to dredge and dispose. The Port Authority and the petrochemical industries are polluters. All polluters must "pay" a fair share of the cost to solve pollution and sediment problems because of present-day impacts on the very areas they are attempting to dredge.

Roadways, and other point and non-point sources pollute the Raritan River, Rahway River, the Arthur Kill, Newark Bay, and The Passaic and the Hackensack Rivers which all eventually deposit sediments and toxic materials. Unaddressed impacts from Combined Sewers are a major contributor to contamination of the sediments -- *Millions of tons of sediments are deposited in the Bay from tributaries, every year.* E3-1

Filling almost *800 acres in the Hackensack Meadowlands* and at the same time trying to address down stream sedimentation and toxic accumulation in Newark Bay and the rest of the Estuary system, is dumb and indefensible. It is ironic that the same agencies are all involved in both efforts.

That said:

The Newark Bay Pits are a good interim solution to disposal, however without appropriate compensation for the loss of habitat, and for the host community, it may be a no-starter. We have said in many other documents that there has to be enforceable links to pollution prevention initiatives and a concentration on decontamination technology, before we are ready to grudgingly endorse any aquatic disposal method when upland (non-aquatic) disposal options exist. The Newark Bay CDF's may actually fulfill some of our linkages and commitments, but the present EIS does not include commitments to any. You have seen our list before, but I do not think it will hurt to repeat the linkages and commitments we feel are necessary. E3-1

1. that the disposal option is limited in size and of limited duration and is coordinated with a dredging prioritization plan *The Newark Bay subaqueous disposal pits, the River Terminal near shore confined disposal proposal, The Orion Elizabeth project, and NY City Parks' landfill closure and habitat proposals are an examples of recommendations of an appropriate location, size, and scope*; E3-12
2. that the disposal option selected is done on a reach by reach basis; *i.e. Arthur Kill, Newark Bay, East River, etc., with local spoils contained at local sites as close as is practicable to the dredge site.* E3-13
3. that there is an **enforceable pollution prevention plan for each reach.** *(There is no such plan for the Newark Bay) The pollution prevention plan must be linked to the* E3-14

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dredging and disposal of the reach; and the plan must be in effect before dredging or disposal operations can begin;

4. that there is aggressive implementation of decontamination and stabilization technologies. *The July 24, 1996, agreement, states that decontamination technologies will come on line within the next year. We now need to know more about the technologies. What are the broad range of decontamination technologies; will vendors other than those on the "approved" list be able to demonstrate pilot sized projects; what financial resources are committed by the federal government; and which dredge material will be decontaminated in the short term, by September 1997? Additionally, there must be widespread dissemination of literature, and peer reviewed results of the suitability of proposed "stabilization" technologies which are being implemented as part of land fill closure operations;* ***(This is not now in place).*** E3-15

5. that a plan is in place to develop a permanent upland disposal solution, which does not impact human health or the environment, including but not limited to beneficial re-use of the material after decontamination and or stabilization *i.e. land fill cover, hazardous site closure, brownfield remediation, non-aquatic habitat creation/restoration, etc. The Orion development project in Elizabeth, NJ, is an example of an appropriate upland disposal option (* ***If Orion is no longer available for the disposal of Newark Bay contaminated materials, a new upland disposal site must be found before work on the Newark Bay CDF's proceeds),*** *(filling wetlands with contaminated dredge materials, such as the proposal put forward by the Mills/Empire permit application in the Hackensack Meadowlands is not appropriate);* E3-16

6. that dredging techniques are implemented which minimize resuspension of contaminants; *hundreds of thousands of tons of contaminated mud can be resuspended at the dredge and disposal site when existing dredging technologies are used such as: closed clam shell dredging with no barge overflow and suction dredging where practicable and appropriate, among others.* ***(Technology should be included in the Newark Bay CDF final EIS which minimizes resuspension of contaminants);*** E3-17

7. that dredged material volume is reduced by prioritizing dredging activities and needs, and by improving Port planning to maximize the use of natural, deep water channels. *Brooklyn, NY, and Bayonne, NJ, are excellent possibilities. Rail and barge movements of cargo, inter and intra-port, is a cost efficient, job generating alternative to digging all channels to some specified depth. And the Corps should begin to inventory and then de-commission federal channels which serve only one or very few facilities;* ***(Newark Bay, by all accounts is not the optimum place to have a deep water port, therefore it is likely that the Newark Bay ports have a finite life, and therefore any decisions made must take that likelihood into consideration).*** E3-18

8. that New York and New Jersey, The United States Attorneys, and the USEPA commit *to investigate and prosecute water polluters.* Water polluters have caused a dredge E3-19

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material management crisis that Governor Whitman of New Jersey has described as the greatest economic crisis her administration will face. *Polluters have destroyed a local fishing industry, denied a generation of urban citizens the opportunity to fish for sustenance and recreation, put the health of the public at risk, and cost the region billions of dollars in disposal costs, interruption of transportation services, and lost business opportunity. **(This is particularly important in Newark Bay because of the proximity of Diamond Alkali/Occidental, to the dredge and disposal area);*** E3-1

9. that there is a source reduction, sediment control, and pollution prevention plan which limits development along shorelines, wetlands, and in watersheds of tributaries to the Hudson/Raritan Estuary, *or where development is "water dependent" and "unavoidable," places a surcharge on construction that contributes to sediment loadings and the release of toxic materials into the streams and rivers that empty into the harbor. **(This is again very important because of the proximity of the Hackensack Meadowlands and the Passaic River to the disposal site);*** E3-2

10. that the states pursue historic and contemporary law breakers for penalties, natural resource damages, and contributions to the cost of, and mitigation for the dredging and disposal of contaminated sediments. *NOAA, the Department of the Interior, or the States of New York and New Jersey as Trustees for Natural Resources, should begin an immediate Natural Resource Damage Assessment paid for by Diamond Shamrock/Maxus, petroleum facility operators, and other responsible parties (CERCLA: 107, (a) (C) Responsible Parties shall be liable for, not only the costs of response and remediation, but also liable and responsible for "damages for injury to destruction of, or loss of natural resources including the reasonable costs of assessing such injury)." **(We understand that the Corps is not a "Trustee" agency, however the Corps can play a role by encouraging others with an NRD mandate to move quickly);"*** E3-2

11. that a plan is developed to compensate for adverse environmental impacts, including habitat loss, caused by any aquatic disposal (which follow all other conditions, linkages, and criteria) of contaminated sediments. *Section 404 of the Federal Clean Water Act states.... "discharges can be permitted under the Guidelines only if all appropriate and practicable steps are taken to minimize or mitigate the adverse impacts of the discharge on the aquatic ecosystem, including compensating for unavoidable impacts." When this compensation cost is added to the formula, alternatives which had previously been too expensive, such as upland disposal, decontamination and stabilization become more cost effective. We propose that a per ton surcharge (in addition to any "mitigation" for the discharge into the aquatic habitat) be assessed to fund compensation and restoration projects. **(There is little or no mention made of compensation for the loss of habitat which would occur during construction and filling of the pits, nor is there any mention of compensation to the host communities for aesthetic, access, or other quality of life concerns);*** E3-2

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12. that short and long term agreements are reached with municipalities and authorities to abate combined sewer overflows and other rain induced discharges through enforceable watershed based plans; *that the EPA, the Corps, and the States, develop a memorandum of agreement with the Natural Resource Conservation Service to develop sedimentation suppression plans; and with the federal natural resource agencies (NMFS and USFWS) and non-government organizations (such as Baykeeper/American Littoral Society, New Jersey Audubon, New York City Audubon, the Nature Conservancy, New Jersey Conservation Foundation, the Passaic River Coalition, and The Trust for Public Land among others) to implement wetlands acquisition, habitat restoration, stream corridor re-forestation, and other projects which will result in decreased sedimentation. (Baykeeper recently brought a law suit against the municipality of Ridgefield Park, NJ for violations of their CSO General Permit, and are investigating other New Jersey communities and authorities which we suspect may also be violators. We should not be doing this work if the mandated federal and state agencies were doing theirs. In addition we are puzzled why the Corps has not made use of the NRCS's capabilities. It seems like a waste of time and resources not to use another federal agency's skills and resources;.*

E3-2

13. that cooperative agreements with the Regional Plan Association and non-government organizations are developed to formulate a regional transportation plan which incorporates the needs of the port, and protects the environment. The port may be more at risk because of poor transportation infrastructure than because of the "dredging crisis." The debate so far has centered around the very high risk hypothesis that assumes that if we do not dredge any where at any time the port will "close" and that jobs, the economy, and the environment will be at risk; *we need to know how each dredge material proposal will affect the regional economy in a dispassionate rational way. There must be, as is needed for other aspects of this debate, data from which decisions can be made, for example: what percentage of the regional economy is directly dependent on the port, what changes are necessary to accommodate barge transfers of cargo from one part of the port to another, do we make up for any loss of jobs directly linked to the port with jobs in other sectors of the economy if circumstances change, what are the ramifications of a continuing trend of energy conservation on the need for water transport of petroleum products over the next fifty years, and what are the costs of building a tunnel to connect Brooklyn and Jersey City or Staten Island, etc.? Until these questions and hundreds of others posed by commenters for years are answered, there is no way to tell how dredging policy will actually affect the regional economy and environment;*

E3-2

Baykeeper intends to continue to work with the New Jersey Legislature, the Departments of Environmental Protection of the States, and the Federal EPA and the Corps of Engineers to find:

E3-2

- a rational, responsible way of keeping the ports open
- a way to assure that polluters pay for the substantial costs of cleaning up sediments,

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- why unwise development projects which create sedimentation and release toxins are being considered (and in more cases than not, being approved),
- a compatible way that citizen's and the agencies can work together to make sure that pollution is abated at the source, and polluters pay compensation to the citizens, for their environmental wrong doing, and to the resource that they have despoiled.

In general we support efforts to contain dredge materials which includes the following criteria

- The site should be in an area of minimal environmental impact, avoiding areas of ecological, wetlands, historic, recreational and agricultural significance. (area of least environmental impact.
- In an area of minimal disturbance to Bay bottom.
- Area of non-permeable material
- the site should be selected to minimize contaminant pathways, including surface water discharges, runoff, groundwater leachate, plant and animal contaminant uptake
- Full NEPA review
- Site selected to ensure ease of implementation
- The site should be near the dredging area and configured to provide acceptable access
- The site should be in an area already developed or impacted by pollution, but not so heavily contaminated that it should remain undisturbed in order to keep contaminants buried.

E3-24

The following are some additional comments and suggestion in response to the Newark Bay CDF Draft EIS:

- Pollution prevention and contaminant reduction, are by far the more economically valuable alternatives, than aquatic disposal of all kinds.. Even by the Corps conservative 5% per year reduction, we save $2.5 billion, or 40% of the cost of the entire project (alternate E, no aquatic disposal of category 3) over the next 25 years. If we continue to prevent pollution at this rate over the next 50 years, more is saved, nearly $6 billion or 60% of the project cost.

E3-25a

- The Corps does not identify a preferred alternative in the DEIS, but rather evaluates the costs and benefits of five alternatives

1. construction of Area 1S only;
2. construction of areas 1S, 2S, and 2N;;
3. construction of Area 3 only;
4. construction of areas 1S, 2N and 3,
5. and a no action alternative

E3-25b

- The resuspension of contaminants because of dredging and disposal may have an affect on threatened or endangered species in the area. The US Fish and Wildlife Service has informed the Corps of the presence of nesting peregrine falcons (Falco peregrinus), a federally listed endangered species. The EIS must be revised to include a Biological Assessment of potential project related affects on peregrine falcons.

E3-26

Baykeeper, Building 18, Sandy Hook, Highlands , NJ 07732
908 291 0176, Fax 908 872 8041, NYNJBAY@Keeper.org

- Baykeeper continues to be concerned with the potential resuspension and redistribution of bioaccumulating environmental contaminants, and the effects of these contaminants on water quality and the fish and wildlife resources of Newark Bay and the larger Estuary (we have personally observed plumes of mud 4-5 miles in length that have resuledt from similar projects in the past). E3-27
- There is very little in the DEIS which addresses monitoring of the effects of dredging and the resuspension of contaminants from dredging and disposal of the sediments, and from the pits if they are constructed. E3-28
- There is insufficient information in the DEIS of the effects of locating a pit on the eastern side of the channel. There needs to be additional site investigations before the eastern side can be considered for a CDF. E3-29

Baykeeper looks forward to the Corps' response to these concerns and to others we have raised in our joint comments with Clean Ocean Action, and the American Littoral Society

Sincerely,

Andrew J. Willner
Baykeeper

Baykeeper, Building 18, Sandy Hook, Highlands , NJ 07732
908 291 0176, Fax 908 872 8041, NYNJBAY@Keeper.org

TOTAL P.09

E3 Baykeeper NY/NJ Harbor

E3-1

Comment noted. Construction of the CDF in Newark Bay serves to reduce sediment contamination in the Bay proper to a measurable extent, but cannot address the larger watershed-issues. The NBCDF may be viewed as part of a larger and broader watershed program which, if it were to be implemented, could result in long-term substantial gains in improving the sediment and water quality of Newark Bay.

E3-2

The DEIS does not make the assumption that we "must" dredge. Rather, the EIS is a technical document addressing the environmental impact issues associated with decision made on the part of the State of New Jersey DMMT and in the broader concept of the New York District, COE Dredged Material Management Plan (sections 1.02 and 1.03, DEIS)

E3-3

Comment noted. The DEIS presents data in appropriate format documenting the richness and production of Newark Bay, and acknowledges Newark Bay as an integral part of the larger Hudson-Raritan Estuary system.

E3-4

Comment noted. The agencies responsible for preparation of the DEIS acknowledge the necessity to pursue multiple solutions to the problem of disposal and otherwise rendering harmless toxic materials in sediments from the entire Hudson-Raritan Estuary system. Placement of contaminated dredged material in confined in-water sites is one of the several options that remove contaminants from circulation in Newark Bay.

Moreover, USACE maintains that the use of subaqueous borrow pits, either existing or specially constructed, is the environmentally preferred alternative for disposal of contaminated dredged material. Documentation to support this conclusion can found in the Final Supplemental Environmental Impact Statement: Use of Subaqueous Borrow Pits for the Disposal of Dredged Material from the Port of New York/New Jersey, published in January 1991 and the DEIS for the Newark Bay Confined Disposal Facility. Data regarding potential for biomagnification and bioaccumulation of contaminants in a terrigenous food chain is an often overlooked or discounted risk.

E3-5

Comment noted. The agencies responsible for preparation of the DEIS acknowledge that the long-term solution to contaminated sediments in downstream areas will, ultimately, be the control of contaminants entering the system from sources upstream.

E3-6

Acknowledgment of the fact that unconfined, in-water disposal is, in fact, an unacceptable alternative for the disposal of contaminated dredged material is precisely the reason that CDF facilities are proposed, and under consideration, for such disposal. The construction and capping of the facility is designed specifically with the intent of preventing further circulation of the contaminants in the sediments in the Newark Bay complex.

E3-7

Comment noted.

E3-8

Comment noted. It is not within the purview of this DEIS to address the problems associated with contaminants known to be in the Newark Bay drainage basin, nor to suggest ways in which hazardous materials clean-up programs are initiated, funded, or executed.

E3-9

Comment noted. See comment E3-8.

E3-10

Comments noted.

E3-11

With respect to the issues of loss of habitat and compensation for that loss, the DEIS points out that there will be a temporary loss of habitat if the proposed NBCDF is constructed. Specifically, as indicated in Section 4.06.1 of the DEIS, a calculation was made of the percentage of the Bay that would be affected by the NBCDF. Only 1.4% of the total area and 2.0% of the shoal areas of the Bay would be affected, a small amount of temporary habitat disturbance by any standard. Moreover, after construction, disposal and capping operations are complete, the area would be monitored with respect to the recolonization succession. It is anticipated that removal of contaminated sediments and capping the CDF with clean sand will provide a net benefit to the area, thus obviating the need for formal mitigation.

USACE0007483

USACE-0009465

With respect to the issue of compensation for the host community, USACE believe that his is a local matter that is best dealt with by the applicant and the elected officials of the municipalities in question (City of Newark, Essex County). In this regard, we note that Resolution No. R-97-0106, endorsing the NBCDF and recommending permit issuance, was passed unanimously by the Board of Chosen Freeholders, County of Essex, New Jersey on February 26, 1997. In addition, no comments were received from representatives of the City of Newark regarding the DEIS or permit application.

E3-12

Comment noted

E3-13

Comment noted

E3-14

Comment noted

E3-15

Comment noted

E3-16

Comment noted

E3-17

Comment noted

E3-18

Comment noted

E3-19

Comment noted

E3-20

Comment noted

USACE0007484

USACE-0009466

E3-21

Comment noted

E3-22

Comment noted

E3-23

Comment noted

E3-24a

Comment noted

E3-24b

Comment noted

E3-24c

Baykeeper states that it supports dredged material containment projects that meet eight specific criteria. We believe that the NBCDF meets these criteria.

The project site is in an area already affected by contamination, thus resulting in any easily implementable project with minimal environmental impact, including only a minimal disturbance of bay bottom. The draw area for the facility is contiguous to the project site. The NBCDF will be constructed in impermeable clays that will help ensure that contaminants do not migrate. However, impermeability should not be considered a particularly critical feature of a subaqueous CDF unless the contaminants are water soluble. As most organic contaminants are hydrophobic and adhere to fine-grained sediments, they are immobile under most circumstances regardless of the permeability of the CDF host material. Finally, the NBCDF is undergoing a complete review under the provisions of the National Environmental Policy Act.

E3-25a

This refers to one of the Alternatives to the Base Plan of the DMMP Interim Report and not to any of the alternatives or to the alternatives analysis in the DEIS. DMMP Alternatives are beyond the preview of this EIS.

E3-25b

The FEIS indicates Alternative 2 as the preferred alternative.

USACE0007485

USACE-0009467

E3-26

Comment noted. The EIS includes a discussion on the potential impact of the project on peregrine falcons in the project area.

E3-27

The potential impact of resuspension and redistribution of bioaccumulating contaminants has been addressed in the EIS in section 4.06, page 4-23 and 4-24. Contaminant concentrations in the water column at the CDF during disposal may increase slightly; however, such concentrations will be similar to background water-column concentrations in the Bay. With the progressive removal of contaminated sediments to the CDF, and capping with clean materials, the overall mass of contaminant materials for resuspension to the water column will decrease.

Bottom-feeding organisms in Newark Bay would not be exposed to contaminant concentrations any greater than those to which they would be exposed at present, or if the no-action alternative were to be taken. With the removal of Category II and Category III surficial sediments from their current location to burial in the CDF, the overall exposure of benthic biota and bottom-feeding fishes and invertebrates will decrease.

E3-28

The monitoring plan in the DEIS (Section 5.07.2) describes both the objectives of the monitoring plan that will be implemented at the Newark Bay CDF, as well as a detailed description of the parameters that will be monitored to assure compliance with all conditions of the project permits. Suspended and resuspended sediments will be monitored using recording nephelometers placed upstream and downstream of the CDF site. Data will be downloaded daily, and there will be a daily evaluation as to whether materials placed in the CDF are escaping in the form of finely divided suspended particulate. Monitoring of suspended solids and turbidity will indicate if and when any corrective action might be required to contain suspended material in the CDF.

E3-29

Appropriate investigations will be undertaken if a CDF is proposed for the east side of Newark Bay.

USACE0007486

USACE-0009468

COMMERCIAL INTERESTS

COMMENTS AND RESPONSES

FINAL
ENVIRONMENTAL IMPACT STATEMENT
ON THE
NEWARK BAY CONFINED DISPOSAL FACILITY

April 1997

Responsible Lead Agency
U.S. Army Corps of Engineers
Regulatory Branch
Jacob K. Javits Federal Building
New York, New York 10278-0090

Cooperating Agencies
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
National Marine Fisheries Service
New Jersey Department of Environmental Protection
New Jersey Department of Transportation

Abstract:

In accordance with the National Environmental Policy Act (NEPA), and the U.S. Army Corps of Engineers (USACE) regulations for implementing NEPA, a Final Environmental Impact Statement (FEIS) has been prepared as part of the permit application review process for the Newark Bay Confined Disposal Facility (NBCDF).

Dredging of shipping channels and berthing areas in the Port of New York and New Jersey is necessary to maintain sufficient water depths for safe navigation and maintenance of a viable shipping industry. In recent years this has been hampered by the lack of disposal sites for dredged material. The NBCDF is proposed as an environmentally acceptable short-term method of disposing of contaminated dredged material.

The concept for the NBCDF came from New Jersey Governor Christine Todd Whitman's Dredged Material Management Team (DMMT), which recommended the construction of subaqueous borrow pits in Newark Bay as a short-term alternative for the disposal of contaminated dredged material deemed unsuitable for ocean disposal. The team selected the Newark Bay sites because they are located in an area of maritime activity with a history of previous environmental impacts. At the Governor's request, the Port Authority of New York and New Jersey agreed to initiate action and serve as the project sponsor. The NBCDF, as described in this FEIS, is an outgrowth of the DMMT recommendation.

The current application proposes to construct three subaqueous pits with a combined capacity of approximately 3 million cubic yards (MCY) on the west side of Newark Bay near the Port Newark-Port Elizabeth terminals. The dredged material that would be disposed of in the NBCDF would come from waters in New York-New Jersey Harbor contiguous to the State of New Jersey, including Newark Bay, the Arthur Kill, and the Kill Van Kull. Alternatives to the proposed action, described and evaluated in Chapter 2, include construction of only one of the three proposed CDFs, construction of a CDF on the east side of Newark Bay, construction of CDFs on both sides of the Bay, and taking no action. Other alternative disposal options, including but not limited to upland disposal, aquatic peninsulas or containment islands, and

borrow pits in other areas (including other parts of Newark Bay) are described and evaluated in the same chapter.

The database for evaluation of the affected environment and potential impacts included all available literature on the environment and flora and fauna of Newark Bay, a field research program that focused on benthos and fish/shellfish, a hydrographic/sedimentation modeling program, and chemical and geotechnical laboratory analyses of Newark Bay sediments. The affected environment is described in Chapter 3 and the environmental impacts in Chapter 4.

Potential impacts, including indirect and cumulative impacts, were evaluated for the proposed action and the other action alternatives. The analysis indicates that short-term adverse environmental impacts, such as benthic habitat disruption, would be balanced by beneficial impacts, such as removal and isolation of contaminants from the biosphere and revitalization of the maritime industry. Long-term adverse impacts are not expected to occur if the NBCDF is built.

Construction practices, management plans, and postclosure monitoring plans and techniques are discussed in Chapter 5. The purposes of the monitoring are to ensure the integrity of the cap and to document the community successions in recolonization of the site(s).

A 404(b)(1) evaluation has been prepared for the NBCDF and is included in the FEIS as Chapter 6. The preliminary determination is that the proposed action and alternatives do not represent a significant threat of degradation to the aquatic environment and are in compliance with the Section 404(b)(1) guidelines of the Clean Water Act.

A public notice announcing the availability of this document will be published concurrently with an announcement of its availability in the Federal Register.

Send written comments to:

U.S. Army Corps of Engineers, New York District
ATTN: Dr. Marc Helman
Regulatory Branch
Jacob K. Javits Federal Building
New York, New York 10278-0090

For further information, or additional copies of this document, write to Dr.Helman at the address above or call him at (212) 264-3912.

Approved by: _____ 1 Apr 97
Gary Thomas — Date
Colonel, U.S. Army Corps of Engineers
New York District Engineer

OFFICE OF:

ALBERT (AL) CERNADAS
Executive Vice President

International Longshoremen's Association
AFL-CIO

17 BATTERY PLACE, NEW YORK, NEW YORK 10004 TELEPHONE: (212) 425-1200

February 25, 1997

send postcard
PM: Mar
Port NY 95-0437

Chief
Regulatory Branch
U.S. Army Corps of Engineers
New York District
Jacob K. Javits Federal Bldg.
New York, New York 10278-0090

C1

Re: Environmental Impact Statement -- Newark Bay Confined Disposal Facility

Dear Sir:

The International Longshoremen's Association, AFL-CIO, herewith submits its supplemental statement on the above-referenced matter. You already have the verbalized positions of the undersigned and Herzl S. Eisenstadt, Esq. of our General Counsel's Office which were delivered at a hearing on February 19, 1997 at the International Seafarer's Center in Port Newark, New Jersey. C1-1

In addition to the considerations which we have already brought to your attention and which are now a matter of record, we further invite your attention to some additional serious adverse environmental impacts of the failure to proceed with the excavation and filling of the proposed borrow pits in order to clear the harbor for trip traffic. Among these considerations are: (1) the unavoidable and widespread dangers to marine life as well as quality-of-human-living in and about the port should there be a recurrence of an incident that in the recent past threatened the beaches, coastal industries and recreational industries of New York and New Jersey, when a significant spillage of oil took place in the process of lightering; and (2) the dire implications that follow whenever ships cannot clear the harbor bottoms and either run aground or are themselves endangered, together with their cargoes and crews, all of which discourages masters and owners of vessels who then go to deeper and more accommodating ports.

These impacts are neither conjectural nor simply prospective. They are *very real* situations which *have* occurred, *are* occurring and *will* increasingly occur if the needed permits are not timely issued and the navigation channels are not cleared to allow safe C1-2

passage for tankers and for heavily laden commercial vessels that must reach their berths to load and unload their cargoes. We are confident that the Corps will be cognizant of these as well as the other environmental problems that will have to be faced, such as air pollution, economic degradations and the continuous rising level of the plateaus of sediment that have been forming in the channels and throughout the harbor with the passage of each day, week, month and year.

C1-2

As was pointed out at the meeting, even these borrow pits will have minimal remedial effects. Assuming that they would all be excavated and filled, they would contain no more than three-quarters of one year's deposits. This pales in comparison with the almost 20 million cubic yards of silt that *must* be removed in order first to even meet current needs, as evaluated by your District and the Division. Moreover, you no doubt are already acutely alert to the fact that the timeline to meet the Administration's Plan is out-of-sync with the schedule for dredging disposal actions in the Port of New York and New Jersey. This ostensibly includes the testing, permit issuance, dredging and capping phases that must be completed *on or before September 1, 1997.* The feedback that we have been getting clearly indicates to us that what *should* be happening is *not* happening; and that there is either outright confusion or a paucity of initiative and impetus to move these testing, permit, etc. activities forward consonant with the scheme of the Plan. If so, then the environmental, economic and other impacts that have haunted all of us to the present time, while there has been a proliferation - virtually a cacophony - of studies, investigations, testing, reports, meetings, announcements and projections, will, Cassandra-like, inevitably befall this port and all of us who rely upon it for our livelihoods, sustenance and our futures. This is plainly unacceptable. Something must be done here and now to stop the procrastination and to get on with the action.

C1-3

We therefore urge you to promptly complete the public and other phases involved in this borrow pit project and to get on with the work as quickly as possible. Only then will there be *some* credibility to this effort, however short it may fall of what is yet to be done. It must be followed up with serious, energetic and meaningful steps to get all of the other permits that are out there for your action and approval under way, and at an accelerated pace at that, if that credibility is to be sustained. The timeline must be met. If not, then it must be extended in order to carry these projects forward and not make a sham out of the accommodation worked-out by the Administration.

C1-4

Seeing is believing. We're still waiting to see what has been promised and what has to be done if this port is to survive not just *in*, but *to* the fast-approaching next century.

Sincerely yours,

Albert Cernadas
Executive Vice President

2/kc

cc: Mr. John Bowers, Pres., ILA, AFL-CIO
Mr. Robert E. Gleason, Sec.-Treas., ILA, AFL-CIO
Mr. Benny Holland, Jr., Pres., SA&GCD, ILA, AFL-CIO
Mr. Frank Lonardo, Gen. Org., ILA, AFL-CIO
Mr. Gerald Owens, Asst. Gen. Org., ILA, AFL-CIO
Mr. Harold J. Daggett, Sec.-Treas., ACD, ILA, AFL-CIO
New York Shipping Assn., Inc.
Lambos & Junge
Gleason & Mathews, P.C.

HSE LTR.ARMYCORP AC

C1 International Longshoremen's Association

C1-1

Comment noted.

C1-2

Comment noted.

C1-3

Commented noted.

C1-4

Commented noted.

USACE0007493

USACE-0009475

THE JUDGE ORGANIZATION

port elizabeth
TERMINAL & WAREHOUSE CORP.
1320 Dakar Street • P O Box 1069
Elizabeth, New Jersey 07207 - 1069
(908) 352-2100/Fax: (908) 352-4491

C2

March 3, 1997

Mr Marc Helman - Project Manager
US Army Corps of Engineers
New York District
Regulatory Branch
26 Federal Plaza
New York, New York 10278-0090
FAX (212) 264-4260

Re: Statement by Patrick Wynne on the Draft Environmental Impact Statement for the Newark Bay Confined Disposal Facility.

My name is Patrick Wynne and I am President of the Judge Organization, an umbrella group for companies working in the Port of New York and New Jersey. Our companies include Port Elizabeth Terminal and Warehouse Corporation, P. Judge and Sons Trucking, and Amex Shipping Agent Inc We are a family owned company which started operations in Brooklyn in 1924 working primarily as a trucking and drayage company on the Brooklyn Waterfront This company was started by my grandfather and continues today on the New Jersey side of the Harbor working out of Port Newark/Elizabeth. We currently lease approximately 500,000 sq ft of warehouse space from the Port Authority of New York and New Jersey and are involved in draying containers on and off the New York Piers and very heavily involved in expediting inland transportation of these containers, both for import and export

American Warehouse Association

Over the past 5 to 7 years our company has become very heavily involved in transloading of containers at the Port of New York. We receive cargo by rail into the port and convert this to container tonnage moving to container ships for export, and perform a reverse procedure on import containers. All of our international business moves through the Port of New York. We also work very closely with overseas companies primarily in Europe but also South America and South Africa influencing their decision to ship cargo through the Port of New York, and also arranging efficient inland transportation. Over the past 4 years we have worked closely with the Port Authority of New York and New Jersey in attracting additional cargo to move through the Port of New York, both by joining them in trade missions overseas and also working with them in effecting more efficient flow of cargo through the Port of New York

Through our facilities we are able to affect an efficient flow of cargo both by rail and by inland trucking both for import and export. On imports we utilize the base of very large movements into the port which result in efficient back haul cargoes moving to the mid-west and to the south In addition, we currently handle over 4,000 boxcars of railroad freight through our facility, a growing phenomenon which was long thought dead as a of means cargo transportation.

We currently employ over 80 employees in our warehousing operations and have a cadre of over 30 owner operators which have been long time contractors with our company for trucking within a 200 to 250 mile radius of the port. These owner operators utilize our over 80 trailers and flatbeds which are constantly on the road through out the immediate metropolitan area.

Over the past 3 years through the efforts and assistance of the New York Port Authority we have been very effective in attracting additional freight to move through our port, much of it previously moved through Canada! Our warehouses are primarily

involved in handling paper products on and off the piers and transloading containers. However, in the recent past we have also been branching into other commodities utilizing the efficiencies of our New York Port area. This includes a potential opportunity for break bulk vessels, a sight that has not been seen in Port Newark in years! Our business is very dependent on the efficient movement of large container ships drawing a deep draft through our port. In fact it is very important that the Port of New York be able to provide deep berths and channels for the vessels traversing the port so that containers which have heavy freight in them can utilize the port

Over the recent past it has been noticed that many of these cargoes have been diverted through other ports to the north (Halifax and Montreal) and very far to the South; much to our port's detriment It is therefore very much in the interest of our company and our employees and also of other companies in the Port Region, that dredging projects to deepen our channels precede in a very efficient manner. C2-1

It should be noted that in the past, dredged spoils moving to the "mud dump" had been efficiently placed there with no noticeable detriment to the environment. While environmental concerns are to be taken in account; I believe that the methods of topping the dredge spoils with 2' of sand has certainly taken care of any concerns of dredge spoils moving from one location to another It appears that the project currently underway to provide pits within the Newark Bay area in which dredge spoils can be deposited will certainly present the most effective, efficient and environmentally sound method so that required dredging can precede. C2-2

A period of time should be taken in which to come up with more efficient or at least a more effective way of taking care of dredge spoils. I believe that the projects to create a Dredge Spoils Island within the harbor is probably the most effective way for the future! It boggles my mind why such a sensitive environmental area as the Chesapeake C2-3

Bay can expand it's "Dredge Spoils Island" by 15 million cu yds. at the same time New York seeks approval for only 1.5 million cubic yds. in the Port Newark CDF. Why can't the Port of New York come up with a similar solution?

It should be noted that over 25 years ago there were projects out there being recommended by the Tri- State Planning Authority to create such an island in the lower New York Bay I believe that the pits that the current project is proposing should be pursued as quickly as possible, and that the long term solutions for a Dredge Spoils Island in lower New York Harbor be followed up on and improved in an effective manner.

Our company has worked in the Metropolitan New York/ New jersey area for over 70 years and our company and employees strongly endorse the Dredging Projects for the port. Many of us live and use the " Jersey Shore " both for living, fishing and recreation and strongly support the continued use of the Mud Dump and dredging of the harbor

Very Truly Yours,

Patrick J Wynne
President

PJW tb

** TOTAL PAGE.005 **

C2 The Judge Organization

C2-1

Comment noted.

C2-2

Comment noted.

C2-3

Commented noted. A dredged material containment island is one of the 53 dredged material disposal options presented in the DMMP Interim Report.

USACE0007498

USACE-0009480

HUDSON COUNTY
Chamber of Commerce

February 19, 1997

C3

U.S. Army Corps of Engineers
New York District
Jacob J. Javits Federal Building
New York, N.Y. 10278-0090

Attn: Regulatory Branch

Re: Public Notice Number: 95-04570-J1

To Whom It May Concern:

On behalf of the Hudson County Chamber of Commerce, its membership and trustees, I am writing in support of the Port Authority of New York and New Jersey's application for a federal permit to construct and operate a Confined Disposal Facility (CDF) for dredge materials in Newark Bay, Essex County, New Jersey. That application was submitted pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), Section 404 of the Clean Water Act (33 U.S.C. 1344), and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended (33 U.S.C. 1413)

Once again, our Chamber, which sits smack in the middle of the impacted area, is in full support of the Port Authority's application for the establishment of this Confined Disposal Facility. As you know, Hudson County is surrounded by the New York waterways, and the dredging of those waterways as well as the disposal of dredge material is extraordinarily important to the long and short-term economic health of our area and the region as a whole. It bears repeating that our port attracts in excess of 165,000 jobs creating $20 billion plus in economic activity including over $6 billion in wages and $500 million in state and local taxes.

I believe all of us can agree that dredging is critical to maintaining adequate depths for existing and newer ships calling in this port. With the closing of the ocean mud dump in September of 1997, the Port of New York and New Jersey needs alternative disposal facilities for 5 million cubic square yards of dredge materials from the harbor each year. The Newark Bay Confined Disposal Facility, a key recommendation from the Port, came as a result of New Jersey Governor Christine Todd Whitman's dredge material management team. As you are aware, that proposal has enjoyed Board support from the Maritime Industry, the business community at large, and environmental interests. The 1.5 million cubic yard capacity of this facility will provide a

574 Summit Avenue • Suite 404 • Jersey City, New Jersey 07306 • 201 653-7400 • Fax 201 798-3886

HUDSON COUNTY
Chamber of Commerce

valuable environmentally found and economically feasible short-term option for the port while long-term solutions are identified by the states and the federal government.

For these reasons and many others, we believe that the U.S. Army Corps of Engineers should approve the Port Authority's application and grant a permit for the Newark Bay Confined Disposal Facility.

Sincerely,

Peter T. D. Murphy
President

PTDM/mts

C3 Hudson County Chamber of Commerce

Comment noted.

USACE0007501

USACE-0009483

PSE&G Electric and Gas Company

80 Park Plaza, Newark, NJ 07101 / 201 430-7000 MAILING ADDRESS / P.O. Box 570, Newark, NJ 07101

March 3, 1997

C4

Mr. Joseph J. Seebode, Chief
Regulatory Branch
New York District Corps of Engineers
26 Federal Plaza, Room 1937
New York, NY 10278-0900

Dear Mr. Seebode

PUBLIC SERVICE ELECTRIC AND GAS COMPANY
NEWARK BAY CONFINED DISPOSAL FACILITY
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Public Service Electric and Gas Company (PSE&G) has reviewed the above-referenced Draft Environmental Impact Statement (DEIS) and wishes to express support for the construction of a Newark Bay Confined Disposal Facility (NBCDF) for dredge spoils. As you recall, PSE&G operates electric generating stations along the Arthur Kill and Hackensack River. We are gratified to note that the comprehensive environmental assessment for the DEIS incorporates some of the biological studies conducted at our Hudson, Sewaren, and Linden Generating Stations, and are pleased to have contributed to the environmental data used to accurately assess the NBCDF.

C4

As a fervent supporter of the maritime transportation industry in the metropolitan New York and New Jersey region, PSE&G has no doubt that New Jersey's economic status is dependent upon the vitality of the Port of New York and New Jersey. The interim solution of one or more NBCDFs, and the establishment of a long-term disposal facility, are essential to enable the Port to participate fully in the global economy by allowing effective competition with other domestic and international ports

The lack of adequate spoil disposal facilities has already adversely affected the operation of the Port. Bulk tankers and containerships cannot navigate the Port with full cargo loads. Fuel is wasted and environmental risk is increased as more tankers/ships are required to 'lighter' cargo. In our opinion, additional port operation restrictions would have enormous, perhaps irreversible, detrimental impacts on the metropolitan regional economy. Some containerships have already relocated to other ports. If the NBCDF is not constructed, the movement of goods through the

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metropolitan area will be seriously impeded and will result in significant increases in air pollution as cargo is transported over land to New York and New Jersey from other ports. Air pollution, growing traffic congestion, and deteriorating roads and bridges are already problems that will be exacerbated without timely construction of the NBCDF. C4-

While timely maintenance dredging of the navigation channels and shipping berths is of significant importance, PSE&G is pleased that the DEIS considers spoil disposal needs of various entities to further the project justification (Section 1.03.2) PSE&G and its customers have been adversely affected by the lack of available facilities for spoil disposal. We look forward to receiving information concerning the fair allocation of capacity of the proposed NBCDF. Accordingly, the DEIS should address how much of the NBCDF will be available to the Port Authority of New York and New Jersey, the U.S. Army Corps of Engineers, state and local governmental agencies, and private organizations. PSE&G fully understands the urgent need for long-term adequate disposal facilities and supports all efforts to develop such facilities. C4-

We look forward to the successful construction of the NBCDF. Please contact Mr Eugene R Creamer of our office at (201) 430-8305 should you require any additional information or clarification

Very truly yours,

Raymond A. Tripodi

Raymond A. Tripodi
Manager - Licenses and Permits - T17H

ERC/NM

C4 Public Service Electric and Gas Company (PSE&G)

C4-1

Comment noted.

C4-2

Criteria for use of the proposed NBCDF are given in Section 2.05 of the EIS. No *a priori* space allocations have been made. The ultimate responsibility for allowing use of the proposed NBCDF will rest with the owner/operator.

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PRIVATE CITIZENS

COMMENTS AND RESPONSES

REC'D TSB
USAED, NY
FEB 3 4 27 PM '97

P1

February 1, 1997

District Engineer, Corps of Engineers
New York District United States Department of the Army:

In addition to all that is implicit within this communication, each and every statement of local, county and state elected/appointed officials, including a copy of a resolution of the Board of Chosen Freeholders of the County of Hudson, State of New Jersey, which has been submitted to your office, pertinent to a monstrous design, which has been identified as the "Confined Disposal Facility", the proposed/conceived utilization of the Newark Bay, an interior waterbody, as a dump for refuse/discard, shall thus respond.

Additionally, among other species of marine life, the blue crab is the source of moderate to heavy concentrations of recreational activity along the Newark Bay shoreline, Bayonne, New Jersey, which may include: 1) Bayonne City Park Bulkhead, foot of West 16th Street, 2) Veterans Park Bulkhead foot of West 25th Street and 3) Hudson County Bayonne (3) Park Bulkhead, foot of West 37th Street.

Also, among waterfowl species, which utilize/inhabit the Newark Bay environment, Bayonne, the mallard duck is residential.

Sincerely,
Gerald R. Savo
Gerald R. Savo

USACE0007506

USACE-0009488

P1 Gerald R. Savo

P1-1

Comment noted. See also comments L3 and C3.

P1-2

Use of Newark Bay by the species noted in this letter was discussed in Sections 3.06 and 3.07 of the NBCDF EIS.

USACE0007507

USACE-0009489

PUBLIC HEARING COMMENTS

COMMERCE COMMITTEE:
ENERGY AND POWER SUBCOMMITTEE
RANKING MINORITY MEMBER
COMMERCE, TRADE, AND
HAZARDOUS MATERIALS SUBCOMMITTEE
RESOURCES COMMITTEE:
S. WILDLIFE AND OCEANS SUBCOMMITTEE
NATIONAL PARKS, FORESTS AND LANDS
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WASHINGTON, DC 20515-3006
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FRANK PALLONE, JR.
6TH DISTRICT, NEW JERSEY

Congress of the United States
House of Representatives
Washington, DC 20515-3006

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(908) 249-8892
☐ I.E.I., AIRPORT PLAZA
(ROOM 33) HIGHWAY 36
HAZLET, NJ 07730-1701
(908) 264-9104

STATEMENT

CP

of

CONGRESSMAN FRANK PALLONE, JR.

PUBLIC HEARING
on the
DRAFT ENVIRONMENTAL IMPACT STATEMENT
for the
NEWARK BAY CONFINED DISPOSAL FACILITY

FEBRUARY 19, 1997

I would like to thank the U.S. Army Corps of Engineers, New York District, for holding this public hearing on this very important project for the Port of New York and New Jersey. I would also like to thank the New Jersey Department of Environmental Protection for its assistance in this endeavor.

As originally identified, the Newark Bay Pits project consisted of two pits on the west side of the bay that would have provided a combined disposal capacity of approximately 14.5 million cubic yards. This would have provided sufficient disposal capacity to sustain the port for at least the next few years. Unfortunately, this original proposal had to be abandoned because the majority of the sediments that would have been removed to create these pits would have required special handling and disposal themselves due to high levels of contamination.

The Port Authority is now pursuing a permit to construct three smaller subaqueous borrow pits in Newark Bay. If all three of these pits are constructed, they could provide a potential combined capacity of 2.5 million cubic yards. According to the DEIS prepared by the Corps, time constraints make this proposal the only dredged material disposal option that could be ready for operation by this fall. Therefore, while the capacity that this project provides may only be sufficient for the Port to pursue the most critical of dredging projects over the next year or two, it will provide the necessary breathing room for the Port Authority and state and federal agencies to identify and develop further disposal options

for the port. With that in mind, I fully support the Port Authority's effort to pursue this project and I look forward to working with the Port Authority and Governor Whitman and her team to bring further disposal options on-line by the end of 1998.

Certain federal agencies have expressed concern about the potential environmental impacts of this project. In particular, there appears to be concern over the potential resuspension and redistribution of contaminants as a result of this project which would make these contaminants available again for uptake by marine biota. This would result in increased bioaccumulation of contaminants in the food chain and would pose an increased risk to both marine life and humans. Therefore, I strongly urge that every possible precautionary measure be taken to ensure that resuspension and redistribution of sediment contaminants is kept to an absolute minimum during the construction and operation of these subaqueous borrow pits in Newark Bay. In addition, I urge the Corps to clearly outline the measures that need to be taken to minimize this environmental impact during construction and operation of these borrow pits in the Final Environmental Impact Statement.

In addition, it is absolutely imperative that the contaminated sediments that are to be excavated in order to create these pits are disposed of properly and responsibly. In order to ensure that these sediments are handled in the correct manner, they must be thoroughly tested and the data properly reviewed and analyzed in order to result in an accurate sediment characterization.

This characterization is critical to determining eligible disposal options for this material.

Finally, I would like to stress the importance of the proper management and monitoring of this project, both during the construction and operation as well as after the pits are filled and capped. The documented success of this operation will hopefully serve as a model for future, similar projects both in the Port of New York and New Jersey and nationwide. Proper monitoring is also necessary to ensure that the project is operating in an environmentally safe manner.

Aside from these concerns that I have just briefly outlined, I fully support this project and hope for its rapid implementation and successful operation.

As I said earlier, it is my intention to work with the Port Authority, the states, and the federal government to continue to provide environmentally safe and economically viable dredged material disposal options for the Port of New York and New Jersey. With the language that my colleagues and I were successful in getting incorporated into the 1996 Water Resources Development Act, we now have the authority at the federal level to help with the costs of constructing and operating confined disposal facilities and have already received Congressional authorization for the establishment of such a facility for the Port of New York and New Jersey. As a result, I am even more optimistic that working together we will be able to come up with additional disposal options to be available when the

Newark Bay Pits have reached their capacity.

In addition, I will continue to pursue federal funding for the sediment decontamination technology study that is currently ongoing in the Port of New York and New Jersey. This study has already identified numerous promising technologies with the ability to remove contaminants from Port sediments. Several of these potential technologies are now being tested at the pilot scale and I am very optimistic that we will have full scale decontamination capabilities at the Port within the next year or so.

We are really starting to make progress with dredged material management in the Port of New York and New Jersey. The Newark Bay Pits idea is an example of this. With the Mud Dump Site closing as of September 1, we will need to continue to build upon this idea and come up with a continuous stream of alternatives to provide sufficient disposal capacities for the Port until decontamination technologies are up and operating at an adequate level to serve the Port's needs. With the time that the Newark Bay Pits will buy for the Port, I hope that we can all put our heads together and come up with this series of alternatives. I think we are up to the challenge.

CP Congressman Frank Pallone, Jr.

Comments noted.

USACE0007514

USACE-0009496

AC

NEW JERSEY GENERAL ASSEMBLY

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GOVERNOR WHITMAN'S DREDGED MATERIALS MANAGEMENT TEAM
MEMBER
ASSEMBLY INSURANCE COMMITTEE
CLEAN OCEAN AND SHORE TRUST COMMITTEE (COAST)
STATE BEACH EROSION COMMISSION

CORODEMUS ANNOUNCES SUPPORT FOR NEWARK BAY CONFINED DISPOSAL FACILITIES TO SAFELY DISPOSE OF CONTAMINATED DREDGED SPOILS

(Newark)--February 19, 1997--State Assemblyman Steven J. Corodemus, Chairman of Governor Whitman's Dredged Materials Management Team, announced today that he supports the application by the Port Authority of New York and New Jersey to construct and operate an underwater Confined Disposal Facility (CDF) for the safe and effective disposal of contaminated dredged materials from the Port shipping channels and berthing areas. The Assemblyman urged citizens to attend the U.S. Army Corps of Engineers' public hearings on the proposed project, which was first recommended by Cindy Zipf of Clean Ocean Action to Governor Whitman's Dredged Materials Management Team.

"The CDF will be constructed in Newark Bay to hold the most contaminated dredged materials (Category III) from the Port area," said Corodemus. "This will allow the Port to be dredged so that commerce can continue and jobs will no longer be threatened by a shutdown of Port operations." In addition, the Assemblyman noted that, "the Jersey Shore will no longer be adversely affected by the dumping of contaminated sediments at the "Mud-Dump" located 5.5 miles off Sandy Hook, New Jersey." The dumping of contaminated sediments adversely affects the Shore's tourism economy.

The benefits of the Newark Bay project are many. First, the project will allow dredging, which has been foreclosed by the actions of the federal government to proceed. Second, the project will allow for safe disposal of the most severely contaminated sediments from the Port. Lastly, the project will clean up part of the Newark Bay bottom sediments which contain the highest levels of dioxin, a known carcinogen.

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Assemblyman Corodemus noted that the this project will be funded by the State, through the use of Port Authority of New York and New Jersey monies plus funding that is now available from the 1996 Port Revitalization Bond Act (sponsored by Corodemus) that was approved by the voters in November. "The lack of financial support from the federal government and the Clinton Administration shows how little regard there is for New Jersey's business community in both the Port and Shore regions of the State. The federal government should be funding this CDF project which will serve as model for contaminant disposal across the nation," said Corodemus. "Unfortunately, the President and the Mud Dump closure advocates Congressmen Pallone, Menendez, and Toricelli threatened to shut down the "Mud-Dump" by September 1st of this year, but did not offer any solutions or financial assistance to the state."

Assemblyman Corodemus believes that the next steps are to provide economic incentives for the development of high-tech decontamination technologies in New Jersey and to begin construction on a containment island for dredged materials. Both decontamination and containment islands can be used to meet the long-term dredging needs of the Port region. Corodemus will be holding the next meeting of the Dredged Materials Management Team on March 11, 1997 at 10:00 a.m. the North Jersey Transportation Planning Authority at One Newark Center, Newark, NJ. For more information, please call (908) 229-6070.

AC Assemblyman Steven J. Corodemus

Comments noted.

USACE0007517

USACE-0009499

ticipating Organizations

Alliance for a Living Ocean
American Association of University Women
American Littoral Society
ANJEC
Arthur Kill Coalition
Arts Guild, Saint Augustine Church
Asbury Park Fishing Club
Atlantic Steam Marine Fisheries Commission
Brookers/Big Sisters of Monmouth County
Berkeley Garden Club
Belford Seafood Co-op
Belmar Chamber of Commerce
Beneath The Sea
Cape May Environmental Commission
Central Jersey Anglers
Citizens Conservation Council
Clean Sweep Coalition
Coalition Against Toxics
Coast Alliance
Concerned Businesses of COA
Concerned Citizens of COA
Concerned Citizens of Monmouth
Communications Workers Assoc., Local 1034
Defenders of Wildlife
Dead Sea Runners
Eastern Monmouth Chamber of Commerce
Eastern Surfing Association
Educated Community Group
Environmental Response Network
Fish Unlimited
Fisheries Emergency Fund
Fishermen's Dock Cooperative
Friends of Liberty State Park
Garden Club of Fair Haven
Garden Club of Long Beach Island
Garden Club of Oceanport
Garden Club of Rumson
Garden Club of Shrewsbury
Garden Club of Spring Lake
Greater Point Pleasant Charter Boat Association
Greenpeace U.S.A.
Harbor Township PBA 199
Hi-Mar Sport Club
Hudson River Fishermen's Association/NJ
International Union of Electronic Workers Dist. 3
Irondbound Committee Against Toxic Waste
Jersey Coast Anglers Association
Jersey Coast Shore Anglers
Jersey Shore Audubon Society
Jersey Shore Captain's Association
Jersey Shore Chef's Association
Junior League of Monmouth County
Junior League of N.Y.C.
Junior League of Summit
Junior Women's Club of Manasquan
Junior Women's Club of Milltown
Junior Women's Club of Westwood
Kiwanis Club of Rumson
Kiwanis Club of Manasquan
League of Women Voters Monmouth County
Leonardo Parts & Pleasure Boat Association
Little Silver Garden Club
Long Branch Chamber of Commerce
Long Branch Clean Communities
Manasquan Fishing Club
Manomet Bird Observatory
Marine Mammal Stranding Center
Marine Trades Association
Middletown Chamber of Commerce
Midland Beach Sportsman's Club
Monmouth Conservation Foundation
Monmouth Council of Girl Scouts
Monmouth County Arts Council
Monmouth County Association of Realtors
Monmouth County Audubon
Monmouth County Friends of Clearwater
Monmouth County Race Meet Association
Monmouth Ocean Development Council
Morris Parks & Land Conservancy
National Alliance of Women on Waste
National Association of Underwater Instructors
National Coalition for Marine Conservation
Nature Center of Cape May
Natural Resources Protective Association
Newark YMCA
Newcomers Club of Monmouth County
NJ Audubon Society
NJ Beach Buggy Association
NJ Commercial Fishermen's Association
NJ Council of Diving Clubs
NJ Environmental DBS
NJ Environmental Federation
NJ Environmental Lobby
NJ Marine Educators Association
NJPIRG
NJ Sierra Club
NYC Sea Gypsies
NY/NJ Harbor Bankkeeper
NY Marine Educators Association
Ocean Advocates
Ocean County Board of Realtors
Ocean County Citizens for Clean Water
Ocean County Izaak Walton League
Ocean Protection Coalition
Ocean Wreck Divers
Outreach/United Methodist Church
People for People
Pleasure Bayka Club
Rainforest Relief Network
Raritan Bay Angler's Club
Raritan River Friends of Clearwater
Reel & Surf Divers
River Rats of Fair Haven
Saint George's by the River Church
Saltwater Sportsmen's Club
Sandy Hook Bay Conservation Club
Save Our Ocean Coalition
SEAS Monmouth
Shark Research Institute
Shark River Surf Anglers
Shore Surf Club
Sierra Club Shore Chapter
South Monmouth Board of Realtors
South Monmouth Chamber of Commerce
Staten Island Federation of Sportsmen's Clubs
Staten Island Tuna Club
Stewart Gross Westwood
Stop Ocean Dumping Coalition
Student Conservation Association
S.U.R.F. International
Surfers Environmental Alliance
Surfer's Medical Association
Surfrider Foundation N.J. FL & CA
TACSI
Thousand Fishermen Club
Tri-State Marine Protection
United Businesses of N.J. N.J.
United Businesses of N.J.
United Fishermen's Association of N.Y.
Waterman Yacht Club of America
Village Women's Club
Volunteer Friends of Brookers
Volunteer Center of Essex County
West Side Community Center
Women's Club of Rumson
Women's Club of Little Silver
Women's Club of Long Branch
Women's Club of Middletown
Women's Club of Red Bank
Women's Club of Sea Girt
Youth Environmental Society
Zonta Club of Monmouth County

COA

CLEAN OCEAN ACTION
P.O. Box 505 • Highlands, NJ 07732 • (908) 872-0111 • Fax (908) 872-8041
1600 Delaware Ave • Cape May, NJ 08204 • (609) 884-9590

Comments of
Clean Ocean Action, American Littoral Society and Baykeeper

on the
Draft Environmental Impact Statement (DEIS)
for the Newark Bay Confined Disposal Facility
Newark Bay, Newark, Essex County, New Jersey

and

Public Notice 95-04370-J1

Presented at the Public Hearing
February 19, 1997
Newark, New Jersey

The following preliminary comments are being submitted to the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency and other cooperating agencies for their consideration when preparing the Final Environmental Impact Statement for the proposed project and making their permit decisions related to the Port Authority proposal to construct and operate subaqueous pits in Newark Bay to provide a facility that would be used for the disposal of contaminated dredged material deemed unsuitable for ocean disposal.

Clean Ocean Action, the American Littoral Society, and Baykeeper reserve that right to provide additional written comments within the public comment period scheduled to close on March 3, 1997.

Clean Ocean Action, the American Littoral Society, and Baykeeper support the concept for the proposed project. It is consistent with the recommendations of New Jersey Governor Christine Todd Whitman's Dredged Material Management Team (DMMT) as well as the intent of the July 1996 White House agreement to end ocean disposal of contaminated dredged material by closing (dedesignating) the Mud Dump Site in the New York Bight and establishing an Historic Area Remediation Site (HARS) in the vicinity of the dump site. COA-1

However, our support for these smaller confined disposal facilities, if constructed in a manner that minimizes environmental disturbance and disruption, must be linked with two critical elements:

1. Acceleration of development and implementation of sediment decontamination technologies; and
2. Development and implementation of regional, harbor-wide pollution prevention strategies. COA-2

In addition, there are a number of outstanding issues that must be resolved for the project to move forward.

For example, the potential for sediment resuspension and loss during excavation and construction of the subaqueous pits and during placement of dredged material in the pits once constructed is a major concern. If these operations are not handled properly, redistribution of contaminants could potentially affect the biota of the region surrounding the project site as well as organisms upstream and downstream. The draft EIS discusses a variety of best management practices for dredging activities and dredged material disposal that are considered applicable to the project and that should be considered for possible use in conjunction with the proposed disposal operations. Unfortunately, a detailed description of the technologies that will be employed, operational details, and contingency plans are lacking. Absent such information it is impossible for us to comment on the adequacy of the individual management practices associated with implementation of the proposed project. It is essential that these details are worked out ahead of time and that they are described in detail in the final EIS and available for public review and comment prior to a final decision on the proposed project. COA-3

In terms of the siting of the proposed subaqueous pits and the screening of alternatives, we note that the draft EIS states that data collected in alternative Area 3 indicate that the surficial layer of sediments is thinner and that the near surface layers in that area have lower concentrations of metals and dioxin than Areas 1 and 2. The area is also described as an area that could potentially accommodate a much greater volume of dredged material than Areas 1 and 2. For these reasons, we urge the Corps of Engineers, EPA, and other responsible parties to immediately initiate the detailed feasibility studies and sediment testing that would need to be conducted in order to determine the suitability of Area 3 for the siting of additional subaqueous disposal facilities. Subsequently, this information could be coupled with documentation of demonstrated success with the "pilot" project in Areas 1 and 2 to further the use of this disposal method in Area 3. COA-4

Our remaining comments and concerns relate to the quality of the material that would need to be excavated from Area 1S. The surficial sediments in this area have been characterized by the COA-5

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Corps of Engineers as Category II material, and it is proposed that this material would be transported to the Mud Dump Site and capped with the dredged material from the deeper, uncontaminated portions of Area 1S.

It must be noted that, according to information contained in the Public Notice and information provided to us at the February 11 public information sessions, the data used to make the determination that the proposed dredged material from the upper layer of Area 1S is considered Category II dredged material are currently under review by the EPA and they will apparently be making their final determination prior to publication of the final EIS for the project.

The basis for the Corps determination that the sediments in the upper layer of Area 1S are Category II and suitable for ocean disposal with capping is summarized in the Public Notice as follows:

> "Concentrations of dioxin (2,3,7,8-TCDD) above 1 part per trillion (pptr), but less than 10 pptr, were measured in the tissues of organisms exposed to proposed dredged material sediments from Area 1S."

> "As per New York Harbor regional disposal criteria for dioxin-contaminated dredged material developed by the Federal Inter-Agency Dioxin Steering Committee, dredged material that results in tissue concentrations of dioxin between 1 pptr and 10 pptr requires capping following disposal."

COA-5

However, it is our understanding from scientists participating in the regional committee referred to by the Corps, that the actual risks associated with dioxin-contaminated sediment are still unclear and under review and that the 1-10 pptr range, to date, has not undergone any level of peer review. In addition, it has not been subjected to public review or comment. Therefore, deeming this range a "regional disposal criteria" for dioxin-contaminated dredged material developed by the Federal Inter-Agency Dioxin Steering Committee is unfounded.

Furthermore, in 1991 faced with questions about dioxin's carcinogenic potential in humans and increased evidence of other adverse health effects, the EPA began a national scientific reassessment of dioxin. This reassessment involved more than 100 scientists from the EPA, other federal agencies and the scientific community. In 1994, EPA released the preliminary findings of its dioxin reassessment in a two volume draft report entitled "Estimating Exposure to Dioxin and Related Compounds" and Health Reassessment of 2,3,7,8-tetrachloro-p-dibenzodioxin (TCDD)". This three-year effort was described as "the most exhaustive scientific review of a single compound ever undertaken by the agency" (EPA Environmental News, Tuesday September 13, 1994).

According to the EPA, the reassessment report reaffirms the link between dioxin and cancer and concludes that dioxin exposure at some level may result in a number of non-cancer health effects described in humans including immunological and reproductive effects. The documents also concludes that because dioxin is persistent and accumulates in biological tissues, the major route of human exposure is through ingestion of foods containing minute quantities of dioxin-like

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compounds. Furthermore, the document clearly states that it is not currently possible to determine exactly how or at what levels people will respond with adverse impacts on development or reproductive function.

In light of the scientific information contained in EPA's own dioxin reassessment, it is not clear how the Corps of Engineers New York District can support their contention that the level of 10 pptr is an acceptable criteria for evaluating and assessing risks associated with disposal of dioxin-contaminated sediments. To the contrary, the EPA reassessment supports the contention that the best available science does not allow a finding that dioxin-contaminated sediment "will not cause significant adverse effects, including the danger associated with bioaccumulation in marine organisms" in accordance with 40 CFR 227.6. In other words, the best available science dictates that a finding that this dioxin-contaminated sediment complies with the Ocean Dumping Criteria is simply not possible. COA-5

Based on all of the above, it is our opinion that all surficial sediments to be excavated from Areas 1S, 2S, and 2N are unsuitable for ocean disposal and should be characterized as Category III materials. Therefore, to proceed with the proposed project, plans should be made to dispose of all these sediments in the subaqueous pit to be constructed in Area 1S or at an appropriate upland disposal site.

As stated previously, simultaneous with construction and operation of the disposal facilities in Areas 1S, 2S and 2N, the requisite studies to demonstrate the feasibility of additional disposal operation in Area 3 should be initiated. If accomplished in a timely manner, the small loss of disposal capacity that would be experienced if disposal of surficial sediments from Area 1S in the pit in 1S is necessary would be offset by additional volume provided by pits in Area 3.

Proceeding in this manner is consistent with the 1988 draft environmental impact statement for subaqueous borrow pits issued by the Corps of Engineers New York District in which they concluded that the use of subaqueous borrow pits was an environmentally preferred disposal method for potentially contaminated dredged material deemed unsuitable for unrestricted ocean disposal (i e., Category II material). COA-6

In addition, it is consistent with the 1996 New York Harbor Dredged Material Management Plan Phase I Plan of Study Report issued by the Corps of Engineers New York District which identified subaqueous pit containment facilities as potential locations for the disposal of dredged materials that the Corps and EPA characterize as both Category II and Category III dredged material.

Finally, to suggest that "the proposed project is, in and of itself, a mitigation measure" is unacceptable. The proposed project must be linked to plans for compensation for the temporary loss and disruption of aquatic habitat in the project areas. Furthermore, as discussed early on in this process, there should be compensation for the host community in the form of some type of public amenity. COA-7 COA-8

Clean Ocean Action (COA) Hearing Statement

COA-1

We note the support for the applicant's proposal.

COA-2

While the USACE-NYD supports pollution prevention strategies and the investigation of sediment decontamination technologies, they are not a direct component of the NBCDF permit application.

USEPA reports that decontamination pilot-level study efforts are nearing completion and funding is being made available to pursue a larger scale demonstration project. The Water Resource Development Act of 1996 (WRDA 1996) calls for developing one or more sediment decontamination technologies on a production-scale level demonstrating a capacity of treating at least 500,000 CY of dredged material per year by 1999. For this production-scale demonstration project, $10 million has been authorized by Congress over three years. Two million has been actually appropriated to USEPA in the current fiscal year, 1997. Because of funding limitations, the WRDA 1996 approach is based on the formulation of public-private partnerships with cost-sharing between the public and private sectors. The long-term goal is to assist in developing profitable and self-sustaining business enterprises based upon the WRDA demonstration project.

The New York-New Jersey Harbor Estuary Comprehensive Conservation and Management Plan (CCMP) was recently formally approved by the two Governors and is awaiting expected USEPA Administrator concurrence. This plan contains several initiatives for pollution prevention strategies in the area of source control, toxins control and watershed management.

COA-3

Best management practices to minimize sediment resuspension during pit construction and disposal of dredged material, as discussed in FEIS Sections 5.05 and 5.06, respectively, will be employed in the final permit decision. In addition, modified dredged material disposal methods, i.e., the use of a barge-mounted clamshell bucket crane instead of the previously proposed hydraulic dredge pumps, will be used to place the final dredged material into the NBCDF. This change further minimizes sediment resuspension.

COA-4

Please refer to response to Comment E1-2.

COA-5

The USEPA and USACE have made their joint determination on the acceptability of the proposed dredged material from the surficial layers of Area 1S. The proposed dredged material is characterized as Category II. It is acceptable for disposal at the ocean Mud Dump Site prior to 1 September 1997, with subsequent capping. For further explanations, please refer to the joint agencies' memo at FEIS Appendix 1.02.

The consensus conclusion of the Federal Inter-Agency Dioxin Steering Committee in 1989 was to proceed with the recommendation that dioxin (2,3,7,8-TCDD) tissue concentrations greater than 10 pptr were not acceptable for disposal at the ocean Mud Dump Site. Tissue concentrations between 1 pptr and 10 pptr were acceptable for disposal with the management technique of subsequent capping, and tissue concentrations less than 1 pptr were acceptable for unrestricted disposal.

Following on the Steering Committee's consensus conclusion, in developing the actual disposal criteria rational for dioxin-tainted dredged materials, a review of existing guidance and threshold levels for dioxin in fish and animal tissue was conducted. The effects data, exposure conditions and assumptions in the guidance were reviewed as the first step in developing the regional protocol for managing dioxin-tainted dredged material. The next step was to consider the appropriate exposure factors relevant to disposal at the ocean Mud Dump Site. The resulting regional protocol included guidance levels based on operational and environmental conditions at the ocean Mud Dump Site.

The New York State Department of Health (NYSDOH) human health advisory level is 10 pptr in edible fish flesh, based on it's assessment of the aforementioned effects data. Since the State advisory level pertains to the local marine organisms, it was used to assess impacts associated with the ocean disposal of dioxin-tainted dredged material at the ocean Mud Dump Site. This number is protective of human health because the state based the advisory on the risks associated with consuming marine organisms specific to regional waters.

In addition to being appropriate for protecting against human health effects, the NYSDOH value of 10 pptr is also protective of ecological effects. Since this is considerably less than the 50 pptr estimated by Cook et al. (1993) as the "low risk" concentration for adverse effects on fish, the level of 10 pptr in 28-day bioaccumulation tissue is protective of upper food chain aquatic species.

Based on the above information, material which bioaccumulates dioxin in the 28-day test organisms above the Category I level is capped to minimized exposure to the marine environment. Materials which bioaccumulate dioxin to concentrations greater than 10 pptr is prohibited from being disposed at the ocean Mud Dump Site. Capping as a conservative management tool has been successfully demonstrated at the ocean Mud Dump Site and elsewhere in the world.

USACE0007523

USACE-0009505

The USEPA dioxin reassessment continues, but ongoing activities and decisions related to dioxin should move forward. The regional disposal criteria for dioxin-tainted dredged material have been in place since 1990, and were in place when the Administration's Plan for New York-New Jersey Harbor was issued in July of 1996.

COA-6

Please refer to Response to Comment E1-2.

COA-7

The statement indicating that the proposed project is a mitigation measure has been removed from the FEIS. The FEIS concludes that the project's temporary impacts to aquatic habitat are not substantial and do not require compensation.

COA-8

With respect to compensation for the host community, USACE-NYD believes that this is not a matter germane to this permit application review. In this regard, we note that Resolution No. R-97-0106, endorsing the NBCDF and recommending Department of the Army permit issuance, was passed unanimously by the Board of Chosen Freeholders, County of Essex, New Jersey on 26 February 1997. In addition, no comments were received from representatives of the City of Newark regarding the permit application and the DEIS.

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APPENDIX 1.02

COMPREHENSIVE REVIEW AND ANALYSIS OF SEDIMENT TEST RESULTS

US ARMY CORPS
OF ENGINEERS
NEW YORK DISTRICT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2

2 6 MAR 1997

MEMO FOR THE RECORD

SUBJECT: Review of Compliance with the Testing Requirements of 40 C.F.R 227.6 and 227.27 for Permit Application No. 95-04370-J1 of the Port Authority of New York and New Jersey - Subaqueous Disposal Facility at the City of Newark, Essex County, New Jersey

FROM: Mario Del Vicario
Chief, Place Based Protection Branch
EPA Region 2

John Tavolaro
Chief, Operations Support Branch
New York District
U.S. Army Corps of Engineers

I. SUMMARY

This memorandum provides comprehensive review and analysis of sediment test results for the Newark Bay Confined Disposal Facility (NBCDF) consisting of three subaqueous pits located at the intersection of the Port of Newark Channel and the Federal Channel in Newark Bay at the City of Newark, New Jersey. The three sites will herein be referred to as Area 1S, Area 2S, and Area 2N. This memorandum addresses compliance with the regulatory testing criteria of 40 CFR Sections 227.6 and 227.27, using the testing results described in the Public Notice (P.N.) for the project (CENAN 1997a), and other technical reference documents. This evaluation confirms that: 1) all tests required under the Ocean Dumping Regulations were conducted; 2) the sediments of Area 2S and Area 2N do not meet the ocean disposal criteria at 40 CFR Section 227.6 for trace contaminants and are Category 3, as defined by joint US Environmental Protection Agency (USEPA)Region 2/Corps of Engineers, N.Y. District (CENAN) guidance; 3) the sediments of Area 1S meet the ocean disposal criteria at 40 CFR Section 229.6 and Section 227.27 for Limiting Permissible Concentration (LPC); and, 4) the dredged material of Area 1S is Category 2 based on USEPA/CENAN guidance.

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II. PROJECT DESCRIPTION

The original proposal was to dredge and dispose of approximately 3.1 million cubic yards (yd) of material. The project was divided into three subaqueous pit areas (Areas 1S, 2S, and 2N) covering a total area of 55 acres and 22 sediment core samples were taken to characterize the sediment (see sampling plan (CENAN, 1996)). The top layer (surficial) volumes and the total CDF volume, respectively, for the three areas are: Areas 1S (579,000 cy; 1,984,000 cy), 2S (485,000 cy; 1,360,000 cy) and 2N (200,000; 645,000). The P.N. contains a more detailed description of the proposed work and details of the test results.

III. REGULATORY REQUIREMENTS

The Marine Protection, Research, and Sanctuaries Act (MPRSA) prohibits the dumping of materials into the ocean except as authorized by USEPA or, in the case of dredged materials, by the U.S. Army Corps of Engineers (USACE). Section 102 of the Act directs the USEPA to establish and apply criteria for reviewing and evaluating permit applications (33 U.S.C. Section 1412). The USEPA has adopted such criteria for the evaluation of permit applications for the ocean dumping of materials in the Ocean Dumping Regulations. 40 CFR Section 227.6(a) lists constituents that are prohibited from being dumped unless only present as trace contaminants in material otherwise suitable for dumping (hereinafter referred to as "listed constituents"). Section 227.27 addresses compliance with the LPC. See also, Section 227.13(c). Section 227.6(b) states that constituents are considered to be present as trace contaminants only when they are present in such forms and amounts that the "dumping of the materials will not cause significant undesirable effects, including the possibility of danger associated with their bioaccumulation in marine organisms". The regulations set forth criteria for determining the potential for significant undesirable effects in Section 227.6(c). In order to be found environmentally acceptable for ocean dumping, it must be found that the liquid phase does not contain any of the listed constituents in concentrations that would exceed applicable marine water quality criteria after allowance for initial mixing (Section 227.6(c)(1)). For the suspended particulate phase (Section 227.6(c)(2)) and the solid phase (Section 227.6(c)(3)), bioassay results must not indicate occurrence of significant mortality or significant adverse sublethal effects due to the dumping of wastes containing the listed constituents.

Section 227.27 of the regulations addresses the LPC. For the liquid phase, Section 227.27(a) provides that the LPC is that concentration which does not exceed applicable marine water quality criteria after initial mixing, or when there are no applicable marine water criteria, that concentration of material that, after initial mixing, would not exceed 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms in a bioassay carried out in accordance with procedures approved by USEPA and USACE. For the suspended particulate phase and the solid phase, Section 227.27(b) provides that the LPC is that concentration of material which will not cause unreasonable acute or chronic toxicity or other sublethal adverse effects based on results of bioassays using appropriate sensitive organisms and conducted according to procedures that have been approved by USEPA and USACE, and which will not

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cause accumulation of toxic materials in the human food chain.

IV. GUIDANCE FOR TESTING AND EVALUATION OF DREDGED MATERIAL

The discussion below describes how the material proposed for ocean disposal, resulting from the construction of the Newark Bay Confined Disposal Facility, was evaluated for compliance with the requirements of 40 CFR 227.6 and 227.27. Testing of the material was conducted following procedures approved by USEPA and USACE, and contained in the joint USEPA/USACE national guidance "Evaluation of Dredged Material Proposed for Ocean Dumping - Testing Manual" (February, 1991) (the "Green Book") (USEPA/USACE, 1991), and the regional implementation manual developed by the USEPA Region 2 and CENAN (USEPA/CENAN, 1992).

These test results were analyzed in accordance with the ocean dumping regulations to ensure that the proposed disposal meets the ocean dumping criteria. In addition, for dredged material that meets the ocean dumping criteria, USEPA Region 2 and CENAN guidance (USEPA/CENAN, 1992) describes two categories of dredged material. Category 1 material is suitable for unrestricted ocean disposal. Category 2 material, while meeting the ocean dumping criteria, is allowed for disposal in the ocean with appropriate management techniques (such as capping) to provide an extra measure of environmental protection. The determination of whether materials meeting the ocean dumping regulations are assigned to Category 1 or 2 is based upon technical and scientific judgment as set out below.

Applying the USEPA Region 2/CENAN guidance to this project, the material would be Category 1 if it meets the ocean dumping criteria (including the requirements regarding acute toxicity) and:

- bioaccumulation test results are below the regional Matrix levels for cadmium, mercury, total PCBs, and total DDT, and below the regional Category 1 values for dioxin; and
- bioaccumulation test results for the other bioaccumulative chemicals of concern identified in USEPA/CENAN (1992) do not indicate a potential for undesirable effects using conservative assessment techniques.

The material from this project would be Category 2 if it meets the ocean dumping criteria (including the requirements regarding acute toxicity) and:

- bioaccumulation test results exceed any of the regional Matrix levels for cadmium, mercury, total PCBs, and total DDT, or the regional Category 1 values for dioxin, but are less than the regional Category 3 value for dioxin; or
- bioaccumulation test results indicate a potential for those compounds or other bioaccumulative chemicals of concern to accumulate at levels that could indicate a potential for undesirable effects using environmentally conservative assessment techniques,

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but do not indicate that dumping would result in significant undesirable effects.

For material determined to be Category 2, as an extra measure of protection, management techniques (such as capping) are used to isolate the dredged material from the marine environment.

V. RESULTS OF EVALUATION OF THE MATERIAL

A. Evaluation of the liquid phase

The liquid phase of the material from Area 1S was evaluated for compliance with Sections 227.6(c)(1) and 227.27(a). There are applicable marine water quality criteria for constituents in the material, including listed constituents, and the applicable marine water quality criteria were not exceeded after initial mixing. In addition, liquid phase bioassays run as part of the suspended particulate phase on three appropriate sensitive marine organisms, show that after initial mixing (as determined under 40 CFR 227.29(a)(2)), the liquid phase of the material will not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms. Accordingly, it is concluded that the liquid phase of the material from Area 1S is in compliance with 40 CFR 227.6(c)(1) and 227.27(a). The specific test results and technical analysis of the data underlying this conclusion are described and evaluated in CENAN (1997a).

B. Evaluation of the suspended particulate phase

The suspended particulate phase of the material from Area 1S was evaluated for compliance with Sections 227.6(c)(2) and 227.27(b). Bioassay testing of the suspended particulate phase of the material using three appropriate sensitive marine organisms is described in the P.N. That information shows that after initial mixing (as determined under 40 CFR 227.29(a)(2)), the suspended particulate phase of this material would not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic in the laboratory bioassays, and thus would not result in significant mortality. The specific test results and technical analysis of the data underlying this conclusion are described in the P.N. The factor of 0.01 was applied to ensure that there will be no significant adverse sublethal effects. Moreover, the fact that after dumping, the suspended particulate phase would only exist in the environment for a short time, means the suspended particulate phase would not cause significant undesirable effects, including the possibility of danger associated with bioaccumulation, since these impacts require long exposure durations (see USEPA, 1994). Accordingly, it is concluded that the suspended phase of the material from Area 1S complies with 40 CFR 227.6(c)(2) and 227.27(b).

C. Evaluation of the solid phase

The solid phase of the material from Area 1S was evaluated for compliance with Sections 227.6(c)(3) and 227.27(b). This evaluation was made using the results of two specific types of evaluations on the solid phase of the material, one focusing on the acute (10-day) toxicity of the material, and the other focusing on the potential for the material to cause significant adverse

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effects due to bioaccumulation. Both types of tests used appropriate sensitive benthic marine organisms according to procedures approved by USEPA and the USACE. The remainder of this memorandum addresses the results of those tests and further analyzes compliance with the regulatory criteria of Sections 227.6(c)(3) and 227.27(b) and with EPA Region 2/CENAN guidance.

1. Solid phase toxicity evaluation

10-day toxicity tests were conducted on project materials using mysids and amphipods, which are appropriate sensitive benthic marine organisms. These organisms are good predictors of adverse effects to benthic marine communities (see, USEPA, 1996a). The toxicity of project sediments for Area 1S and 2N were within 10% of the reference sediment toxicity for mysid shrimp, and well within 20% for amphipods, and were not statistically greater than the reference sediment for either species tested. These results show that the solid phase of the material from Areas 1S and 2N do not cause significant mortality and meet the solid phase toxicity criteria of Sections 227.6 and 227.27. The toxicity of project sediments for Area 2S exceeded 10% of the reference sediment toxicity for mysid shrimp and was statistically greater than the reference sediment. Therefore the sediment of Area 2S does not meet the solid phase toxicity criteria of Sections 227.6 and 227.27 and is classified as Category 3 under USEPA/CENAN guidance.

2. Solid phase bioaccumulation evaluation

USEPA/USACE (1991) describes an approved process of evaluating bioaccumulation potential using comparative analysis of project sediment bioaccumulation to reference sediment bioaccumulation, FDA Action Limits and evaluation of eight additional factors for assessing the significance of bioaccumulation. These factors are:

- number of species in which bioaccumulation from the dredged material is statistically greater than bioaccumulation from the reference material
- number of contaminants for which bioaccumulation from the dredged material is statistically greater than bioaccumulation from the reference material
- magnitude by which bioaccumulation from the dredged material exceeds bioaccumulation from the reference material
- toxicological importance of the contaminants whose bioaccumulation from the dredged material exceeds that from the reference material
- phylogenetic diversity of the species in which bioaccumulation from the dredged material statistically exceeds that from the reference material
- propensity for the contaminants with statistically significant bioaccumulation to

biomagnify within aquatic food webs

- magnitude of toxicity and number and phylogenetic diversity of species exhibiting greater mortality in the dredged material than in the reference material

- magnitude by which contaminants whose bioaccumulation from the dredged material exceeds that from the reference material also exceed the concentrations found in comparable species living in the vicinity of the proposed disposal site

In following this guidance, USEPA Region 2 and CENAN used a framework (described in Figure 1) for evaluating project sediment bioaccumulation results for Areas 1S and 2N. Area 2S failed the solid phase bioassay; it was therefore not evaluated further for bioaccumulation potential. As shown in Figure 1, this process involves four consecutive evaluations. In the first three evaluations, the project sediment bioaccumulation test results for each compound of concern are sequentially compared to: a) reference test results; b) FDA Action Limits, regional Matrix levels and regional dioxin values; and, c) general risk-based evaluations (including comparison to background tissue concentrations). If these evaluations show that the project sediment does not exceed the reference test results in step (a) or the regional Matrix levels/dioxin values in step (b) for a particular compound, this indicates that the disposal of the material would not result in adverse effects due to that chemical, and there is no need to further evaluate that individual chemical in the next step. Markings in columns 5 or 7 of Table 1 indicate where project test results were statistically greater than the reference levels for the clam or the worm. If any species are marked for a particular compound, the evaluation will proceed to the next step. General risk based evaluations are conducted in step (c) for compounds not resolved in steps (a) or (b). The fourth evaluation (d) uses all the information and results of the individual chemical evaluations (particularly as these results relate to the eight Green Book factors listed above), to evaluate the solid phase of the dredged material as a whole. These evaluations for this project are discussed below in the order described in Figure 1.

Bioaccumulation tests were conducted on the solid phase of the project material for Areas 1S and 2N for contaminants of concern identified in USEPA/CENAN (1992) and the project sampling plan (CENAN 1996) using two appropriate sensitive benthic marine organisms, *Nereis virens* and *Macoma nasuta*. These species are considered to be good representatives of the phylogenetically diverse base of the marine food chain. Contaminants of concern were identified for the regional testing manual from the NY/NJ Harbor Estuary Program Toxics Characterization report (Squibb, *et al.* 1991). That report was prepared as part of development of the Harbor Estuary Program in order to identify and characterize contaminants in Harbor sediments. Those compounds with the potential to bioaccumulate (K_{ow} of approximately 4 or greater) are included on the testing list and evaluated by use of bioaccumulation tests when expected to be present in project sediments based upon the location of contaminant inputs and results of previous sediment sampling. The bioaccumulation test results were used in evaluating the potential impacts of the surficial material from Pits 1S and 2N. The results for Area 2N show that dioxin bioaccumulation exceeded the regional matrix and was therefore Cateagory 3 as per USEPA/CENAN guidance. As described in

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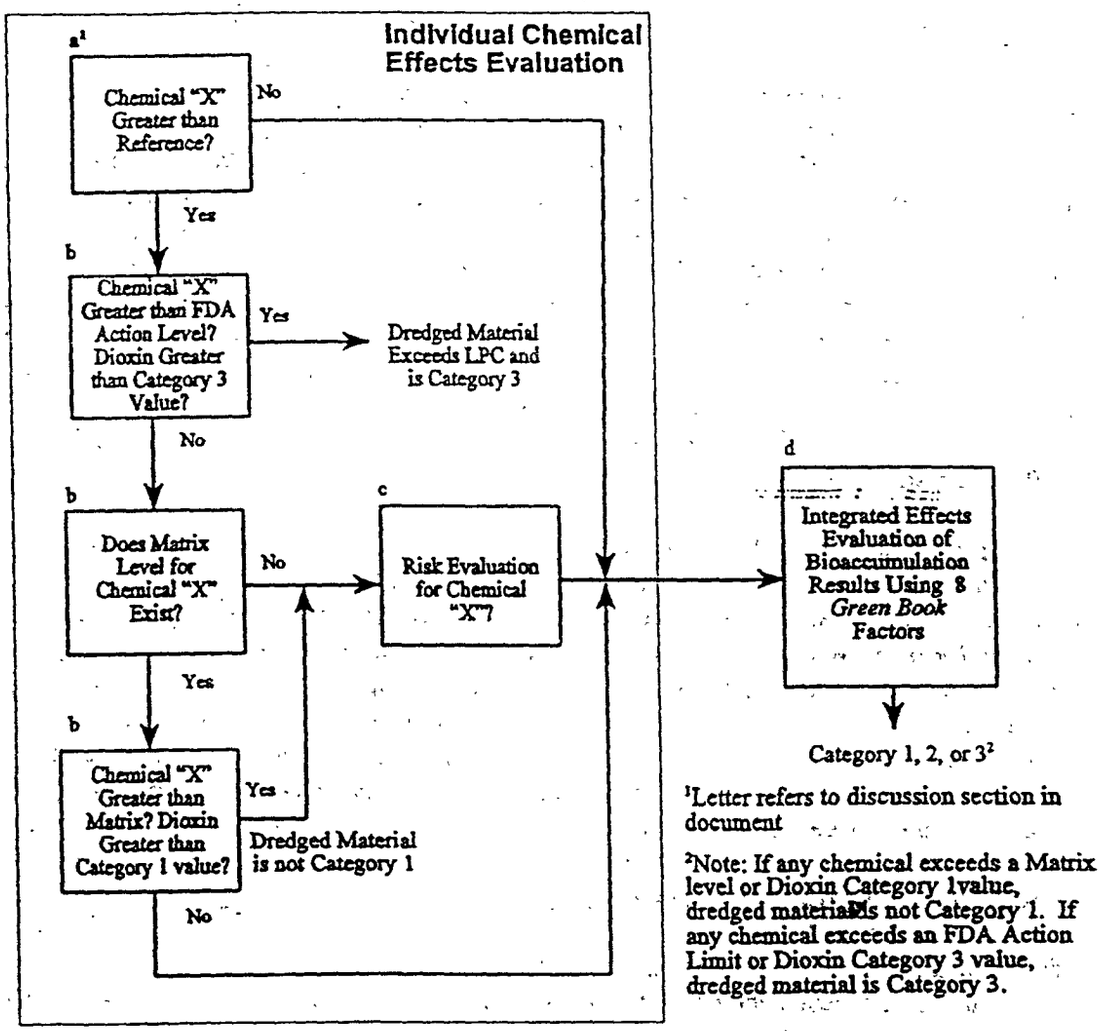
Figure 1 EPA Region 2/CENAN Framework for Evaluating Bioaccumulation Test Results For the Port Authority of NY & NJ Subaqueous Disposal Facility



[1]Letter refers to discussion section in document

[2]Note: If any chemical exceeds a Matrix level or Dioxin Category 1value, dredged material is not Category 1. If any chemical exceeds an FDA Action Limit or Dioxin Category 3 value, dredged material is Category 3.

the P.N., the determination is that the combined results of the toxicity and bioaccumulation tests indicated that the material from Area 1S met the criteria of Sections 227.6(c)(3) and 227.27(b) for ocean disposal, and that the material is Category 2 based on USEPA/CENAN guidance.

a. *Comparison of Bioaccumulation Test Results to Reference Sediment Test Results*

Concentrations of contaminants in tissues of organisms exposed for 28 days to project sediments were compared to concentrations in tissues of organisms exposed for 28 days to reference sediment. Reference sediment serves as a point of comparison to identify potential effects of contaminants in the dredged material (USEPA/USACE, 1991). In essence, exposing test organisms to this sediment allows for the prediction of contaminant levels that would result in the test organisms were they "in the wild" at the area from which the reference sediment was taken. The tissue concentrations in two species of appropriate sensitive benthic marine organisms resulting from 28-day exposure to project sediments is compared to the tissue concentrations in the same species of organisms resulting from 28-day exposure to reference sediment. In order to make a statistically valid determination that the project sediment does/does not cause greater bioaccumulation than the reference sediment, several sub-samples of the dredged material and reference are run; these separate sub-samples are called replicates. A mean can then be calculated with a standard deviation for each sediment (i.e., Area 1S and Reference). The means and standard deviations are compared using a standard statistical approach, and a determination is made, with 95 percent confidence, that there is or is not a true difference between the test and reference sediments. A statistical analysis is merely a quantification of the variability between the test and reference data, and a measure of the probability of the difference being real. For the remainder of this memorandum, statements regarding project sediment having greater or less bioaccumulation than the reference sediment are referring to statistically calculated differences at the 95% confidence level.

The reference sediment used for this project was collected at the Mud Dump Reference Site, in an area of clean, sandy sediments located in the New York Bight near the disposal site, where the sediments are unaffected by prior dredged material disposal (see reference values in Table 1, Columns 2 and 3). When bioaccumulation in organisms exposed to project sediments is not greater than bioaccumulation in organisms exposed to appropriate reference sediments, this means that dumping of the material would not result in bioaccumulation above that found to occur in the "clean" reference sediment. Accordingly, such material would not result in bioaccumulation that would cause unreasonable degradation of the environment, human health, or significant adverse effects. In cases where bioaccumulation levels are greater than in the reference, further evaluation for potential effects is warranted. A statistically significant difference between test and reference bioaccumulation is not itself a quantitative prediction that an impact would occur in the field, nor is it related to any cause and effect. A key to understanding bioaccumulation and potential adverse impacts is that bioaccumulation is a phenomenon and does not necessarily result in an effect. In addition, depending upon the exposure (concentration and duration), bioaccumulation may cause no harm. On the other hand, as exposure and subsequent bioaccumulation increases, the potential for adverse effects increases.

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As listed in the P.N. for this project, the following summarizes the test results comparing bioaccumulation from the Area 1S sediments to bioaccumulation results in the reference sediments. (Contaminants for which bioaccumulation from the dredged material was statistically greater than the reference in the clam or the worm, are indicated by a mark in columns 5 and 7 for that compound in Table 1.)

Metals

- All Area 1S metals except arsenic were at higher concentrations in clams and worms exposed to the project sediments than in those exposed to the reference sediments. Of these, six of the nine metals were statistically significantly higher in the clams, and three of nine were significantly higher in the worms. Mercury and cadmium, the only metals that are listed constituents in Section 227.6(a), were among those that accumulated to higher levels in clams and/or worms in the project sediment than in the reference sediment to a statistically significant degree. In the case of mercury the bioaccumulation was significant in both clams and worms.The levels of both cadmium and mercury in the Area 1 worm and clam tissue analyses were non-detect, but at a level slightly above the target detection limits.

- Area 2N was not evaluated due its designation as Category 3 based on dioxin bioaccumulation guidance of the USEPA/CENAN.

Pesticides

- Five of the 6 DD(X)-series analytes and total DDT accumulated to higher levels in clams exposed to the Area 1S sediment than in those exposed to reference. Of these, 3 of the 6 DD(X) and total DDT were statistically significant. Bioaccumulation in the worms was similar to that in the clams, and in the worms endosulfan sulfate was statistically significant as well. None of the cyclodiene pesticides (aldrin, dieldrin, chlordane, nonachlor, heptachlors) showed significant bioaccumulation.

- Area 2N was not evaluated due its designation as Category 3 based on dioxin bioaccumulation guidance of the USEPA/CENAN.

Industrial Chemicals

- Total PCB bioaccumulation was higher in the project 1S sediment than in reference in both worm and clam, and the difference was statistically significant in the clam.

- 1,4-Dichlorobenzene was below the detection limit in all samples.

Area 2N was not evaluated due its designation as Category 3 based on dioxin bioaccumulation guidance of the USEPA/CENAN.

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PAHs

- Fourteen of the 16 PAHs bioaccumulated to higher concentrations in the clams exposed to Area 1S sediment than in those exposed to reference sediment, and 13 of these were statistically significant. Bioaccumulation of seven of the 16 PAHs was greater in the worms exposed to project sediment, with five of these being statistically significant. Total PAH bioaccumulation was statistically significant in the clams but not in the worms.

  Area 2N was not evaluated due its designation as Category 3 based on dioxin bioaccumulation guidance of the USEPA/CENAN.

Dioxins

- Several dioxin congeners were bioaccumulated to greater than reference levels in clams and worms for Area 1 S. The concentration of 2,3,7,8-TCDD in the worms exposed to the Area 1S sediment was 1.94 pptr. The concentration of 2,3,7,8-TCDD in the worms exposed to the reference sediment was 3.75 pptr.. When the contribution in TEQs of the sixteen non-2,3,7,8-TCDD congeners is considered, the total TEQ in the worms was 2.46 pptr, and in the clams, 1.21 pptr.

  Test organisms exposed to Area 2N sediments bioaccumulated dioxins/furans to a level exceeding 10 pptr. According to USEPA/CENAN guidance, Area 2N sediments were designated as Category 3.

b. ***Comparison to FDA Action Limits, Regional Matrix Levels and Regional Dioxin Values***

i) Comparison to FDA Action Limits

There are FDA Action Limits for seven compounds (aldrin, dieldrin, -chlordane, heptachlor, heptachlor epoxide, PCBs, and mercury). None of the contaminants for which there are FDA Action Levels exceed such thresholds in the tissues of organisms exposed to project sediments for 28 days nor do projected steady state concentrations where these could be estimated (see also Table 1). The source of FDA Action Levels is described in USEPA/USACE (1991). Table 1, Column 18, identifies the relevant FDA Action Limits.

Exceedance of an FDA Action Limit results in a conclusion that the disposal of the dredged material would result in significant adverse effects. No contaminants for which there are FDA Action Limits exceeded any such limit in either the clam or the worm tissues.

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ii) Comparison to Regional Matrix Levels

The source of regional Matrix levels is described in USACE (1981). Table 1, Column 20, identifies the relevant regional Matrix levels. Bioaccumulation results that exceed the regional Matrix level indicate that the sediment is not Category 1 under USEPA Region 2/CENAN guidance. Chemicals for which the bioaccumulation from the dredged material was greater than the reference but less than the Matrix level are indicated by bolding the Matrix in Table 1, Column 20. All of the contaminants for which there is a matrix level exceed the reference level in the clam; reference levels were also exceeded for mercury and DDT in the worm. There are regional Matrix values for four compounds (cadmium, mercury, PCBs and total DDT). The detection limit achieved by the analytical laboratory exceeded the RTM-specified detection limit in some replicates and the concentration of cadmium reported in the project sediment-exposed clams was 0.39 ppm exceeding the Matrix level of 0.3 ppm (see also Table 1). The concentrations of the other analytes were less than the Matrix levels.

iii) Comparison to Regional Dioxin Levels

Regional dioxin values are intended for comparison to the results of 28 day bioaccumulation test results, and the source and use of the values are described in the USEPA (1997). Table 1, Column 20, identifies the relevant regional dioxin levels.

Twenty-eight day bioaccumulation test results that exceed the regional Category 3 dioxin value of 10 pptr result in a conclusion that the disposal of the dredged material would result in significant adverse effects. The Category 3 dioxin value of 10 pptr was not exceeded in either the worm or the clam for Area 1S sediments using the TEQ approach described in USEPA (1997). Twenty-eight day bioaccumulation test results that exceed the regional Category 1 dioxin value of 1 pptr for 2,3,7,8-TCDD (or 4.5 pptr using the TEQ approach described in USEPA (1997) for the non-2,3,7,8-TCDD congeners) indicate that the Area 1S sediment is not Category 1 under USEPA Region 2/CENAN guidance. Project test results were above the regional Category 1 value for 2,3,7,8-TCDD and below the regional Category 3 value for both the worm and the clam, meaning that, with respect to dioxin, the Area 1S project sediments are classified as Category 2.

Area 2N sediments will not be addressed further in this document since test organisms exposed to project 2N sediments bioaccumulated to greater than 10 pptr, thereby being classified as Category 3 sediments.

iv) Steady State Considerations for Matrix Compounds

When the end point to which the test data is compared potentially represents a steady-state level, rather than a 28-day level, consideration may need to be given to whether the 28-day test results are representative of bioaccumulation levels that could be expected to occur in the field after disposal. The literature was reviewed to determine the degree to which the test results reached steady state, as appropriate. The relevance of adjusting project data to steady state for comparison to regional matrix values is discussed below.

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PCBs

To assess the rate of bioaccumulation of PCBs and other compounds, Rubinstein, *et al.* (1990) and Pruell, *et al.* (1993) exposed three species of organisms, the grass shrimp *Palaemonetes pugio*; the sandworm *Nereis virens*; and the clam *Macoma nasuta*, to sediments collected from the Passaic River, N.J. Sub-samples of the exposed organisms were removed on various days into the study including days 0, 10, 28, 42, 84, and 180. For the clam tissue, the variance in the concentrations on day 28 and day 84 (by which point the maximum concentration had been reached) overlap, thus indicating that the two are not statistically different and the bioaccumulation on day 28 is at or very close to steady-state. Thus, the clam bioaccumulation for the project sediments using 28-day exposures is acceptable for use as steady-state tissue levels, and was below the Matrix level for PCBs. For the worm tissue, variances for days 28 and 180 do not overlap, thus indicating that steady-state was probably not reached in 28 days, although the variance in the data makes it difficult to quantify a real difference. However, if the means for days 28 and 180 from Rubinstein *et al.* (1990) are compared (approximately 1,750 ng/g (nanograms per gram or parts per billion, ppb) for 28 days, and 3,000 ng/g for 180 days) this indicates approximately 58% of steady-state would have been reached in 28 days. If on this basis the worm project data are conservatively adjusted upward by even a factor of two to calculate a steady-state tissue concentration, the dredged material tissue concentration is still below the Matrix level for PCBs in the worm.

Total DDT

With regard to DDT and its metabolites, the degree to which these compounds reached steady-state was also evaluated. Table 1 contains the project test results for the total DDT, which is the sum of the results for DDT and its metabolites (i.e., DDE and DDD). This level is compared to the Matrix level for total DDT. Literature results indicate that the parent DDT compound bioaccumulates much more slowly than its metabolites. These results range from approximately 10 percent of steady-state after 28 days for 4,4'-DDT to 50% for 4,4'-DDE to 60% for 4,4'-DDD (Boese and Lee, 1992). In the NBCDF project, the parent compounds (4,4'-DDT and 2,4'-DDT) were detected and, in the case of 2,4'-DDT, were statistically greater than the reference in the bioaccumulation test results for both the clam and the worm. Concentrations of the metabolites in some cases were also detected at statistically greater concentrations than the reference. On the basis that the total DDT concentration is dominated by DDE and DDD metabolites, the project data could be adjusted upward by a factor of two to calculate a steady-state tissue concentration, and the dredged material tissue concentration would still be below the Matrix level for total DDT in both the worm and the clam. An even more conservative approach to derive a steady-state tissue concentration would be to assume DDT is present and, based on the above study, apply a factor of two to the project data for DDE and DDD (see P.N.) and a factor of ten to the project data for DDT, assuming the detection limit represents the amount present when "not detected" (see P.N.). Even using these conservative assumptions, the dredged material tissue concentration is still below the Matrix level for total DDT in both the worm and the clam.

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Cadmium and Mercury

Cadmium and mercury are not regulated in marine organisms as are essential metals, and, thus, the concept of steady state is not applicable. The matrix values for cadmium and mercury, therefore, do not represent "steady state." Bioaccumulation of these metals is affected by many complex factors, and is essentially linear (Dethlefsen, 1978; Giesy, *et al.*, 1980; V-Balogh and Salanka, 1984). Therefore, there are no adjustments that can be made to reproduce "steady state," and so 28 day test results are used to compare to the matrix values.

c. Risk-based evaluations

The potential for impacts due to compounds that produced greater bioaccumulation from project sediments than the reference sediments and for which Matrix levels or Regional dioxin values did not exist, was determined using risk-based evaluations. As noted from Table 1 and the previous discussions, for this project PAHs, chlordane/heptachlor, dieldrin, aldrin, endosulfans chromium, copper, nickel, lead, and silver fall into that group.

For these compounds, the toxicological significance of bioaccumulation from the sediment into benthic organisms was evaluated by: i) consideration of steady-state bioaccumulation and food-chain transfer; ii) comparison to background tissue concentrations; iii) consideration of potential ecological effects; and, iv) consideration of potential carcinogenic and non-carcinogenic effects on human health.

i) *Consideration of Steady-State Bioaccumulation and Food-Chain Transfer*

Bioaccumulation tests were conducted using 28-day exposure of appropriate sensitive benthic marine organisms to sediment. As previously discussed, for bioaccumulation evaluations involving comparisons with "steady-state" tissue concentrations (as opposed to evaluations using other 28-day tissue concentrations such as the comparison to reference sediment), it may be necessary to understand the extent to which the organism tissue concentration has reached steady-state. Steady-state may be defined operationally as the lack of any significant difference (ANOVA, alpha = 0.05) among tissue residues taken at three consecutive sampling intervals (Lee, *et al.*, 1989). The 28-day test exposure period was selected as appropriate because most chemicals of concern will reach at least 80% of steady-state in benthic marine organisms within that time frame (Boese and Lee, 1992). For the few chemicals that may not meet steady-state tissue concentrations in 28 days, a factor may be used to adjust the data to steady-state when necessary. In order to better use the tissue concentration results of 28-day bioaccumulation exposure tests to assess the risks posed to the environment from the chemicals requiring further evaluation (see discussion above for the identification of such chemicals), consideration was given to the steady-state concentration of these compounds that could occur in the disposal site after extended periods of time. In addition, the potential movement of these compounds through the food chain was considered and appropriate trophic transfer factors applied to adjust the data accordingly, as described below.

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Metals

In general, metals bioaccumulate more rapidly than organics and 28 days tests are sufficient to evaluate potential effects (see USEPA/USACE, 1991), for example, arsenic (Naqvi, *et al.*, 1990; Riedel, *et al.*, 1987; Oladimeji, *et al.*, 1984).

Trophic transfer of most metals is not sufficient to qualify as biomagnification (Brown and Neff, 1993). The lack of observed biomagnification for such metals as chromium, copper, lead, nickel, zinc, and silver is the result of incomplete absorption of metals across the gut, rapid excretion, and dilution in muscle, which represents a large part of the total body weight of most marine animals (Fowler, 1982; Suedel *et al.*, 1994). For purposes of conducting the human health and ecological evaluations below, a conservative trophic transfer coefficient equal to one will be used for these non-biomagnifying metals (Suedel *et al.*, 1994 and references cited therein).

Pesticides and Industrial Chemicals

Uptake of non-polar organic contaminants from food is highly dependent on its hydrophobicity, a property measured by the octanol/water partition coefficient, K_{ow}. The higher the value of K_{ow}, the longer it takes to reach steady-state in benthic marine organisms. For the organochlorine compounds aldrin, dieldrin, heptachlor, trans nonachlor, and "-chlordane that have log $K_{ow} > 6$, it is possible that steady-state was not reached within 28 days. Information contained in Boese and Lee (1992) indicate that 28-day bioaccumulation tests for these chemicals achieve at least 50% of steady-state for aldrin, dieldrin, and a-chlordane. The remaining compounds, heptachlor and trans nonachlor, were not addressed in Boese and Lee (1992), however estimates of the fraction of steady state achieved after 28-days can be calculated using the equations contained in McFarland (1995). Results of such calculations indicate heptachlor and trans nonachlor reach approximately 50% of steady state after 28 days. Comparison of the project data for these compounds with the effects data discussed below after using an appropriate factor (a factor of two) to adjust the project data to an appropriate steady-state concentration, indicates that project sediment results would be below conservative ecological and human effects levels. Calculating the fraction of steady state achieved for the remaining pesticides with log $K_{ow}<6$ (i.e., endosulfan sulfate) indicates that this compound reaches steady state within 28 days, so no adjustment is necessary.

The potential for these chemicals to biomagnify was also evaluated. Although organic contaminants with values of log $K_{ow} > 4$ tend to biomagnify in the marine food chain, studies (USACE, 1995) have shown that this is not true for higher molecular weight compounds such as the most highly chlorinated PCBs or for easily metabolized compounds such as PAHs. Those organic compounds which are not efficiently excreted, such as certain pesticides (including endosulfan sulfate), can biomagnify in the food chain. For the organic constituents with a potential to biomagnify in the marine food chain, trophic transfer factors were calculated, using the approach described by Gobas (1993). The values are summarized in Appendix A. This factor, which is 1.0, was taken into account in assessing potential human health and ecological risk effects of these compounds, as discussed below.

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PAHs

The time required for a given PAH to attain a steady-state concentration following exposure to bedded sediments (t_{ss}) is determined primarily by the log K_{ow} of the compound in question (McFarland, 1995; Meador, *et al.*, 1995). Meador, *et al.* (1995) reviewed nine studies that investigated the attainment of steady-state tissue concentrations of PAHs by various marine invertebrates. In each case, tissue concentrations approached steady-state within several days to two weeks after initiating exposure to both low molecular weight PAHs and high molecular weight PAHs. McFarland (1995) estimated the time to steady-state (t_{ss}) for 15 PAHs based on their hydrophobicity. The t_{ss} values ranged from 3.5 to 326 days. The estimated steady-state concentration of the sum total of the 15 PAHs analyzed by McFarland for sediments collected from typical harbor areas revealed that the mean concentration attained after 28-day bioaccumulation tests was approximately 86% of steady-state. McFarland (1995) concluded that 28-day tests are likely to reflect steady-state. However, even using the conservative approach of adjusting the data to calculate steady-state for the individual PAHs in the project based on McFarland (1995) (using a factor of one, two, or three, as indicated) and summing the results, the project data would still fall below the effects levels as discussed below. (Note: calculations of steady-state tissue concentrations as discussed above are contained in the Appendix for Table 1).

With regard to the potential for biomagnification of PAHs, feeding studies show that assimilation rates from ingested food are extremely low, e.g., more than 98% of the target contaminant remained in an undigested form in fish gut 48 hours after feeding squid containing radio-labeled benzo[a]pyrene to young cod (Corner, *et al.* 1976) and juvenile Atlantic herring (Whittle, *et al.* 1977). PAH metabolites are also transferred through the marine food chain; however, they are absorbed even less efficiently than their parent compounds (McElroy and Sisson, 1989; McElroy, *et al.* 1991). Up to 99% of the PAH compounds taken up by fish are metabolized and excreted into bile, the usual elimination mode, within 24 hours of uptake (Varanasi, *et al.* 1989). Similar results are described in Brown and Neff (1993) who evaluated various studies describing trophic transfer. The studies cited in Brown and Neff (1993) indicate a trophic transfer rate for BaP from invertebrates to fish of between 0.02 and 0.23 times the concentration in the ingested invertebrates (Corner, *et al.*, 1976, O'Connor, *et al.*, 1988, McElroy, *et al.* 1991). This was taken into account when assessing the ecological and human health effects of the project material as discussed below.

ii) *Comparison of Test Results to Background Tissue Concentrations*

Where data regarding tissue levels of organisms living in the general area of the disposal site are available ("background levels"), it is useful to compare those levels with the test levels as part of the risk evaluation (Figure 1, Box c). However, this comparison is not, by itself, definitive. When bioaccumulation in organisms exposed to project sediments is not greater than tissue concentrations in organisms from the vicinity of the disposal site (the background levels), this means that dumping of the material would not result in bioaccumulation above existing ambient levels in the general area and thus would be unlikely to cause significant undesirable effects.

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When bioaccumulation in organisms exposed to project sediments is greater than these levels, it may or may not be predictive of adverse effects (e.g., it may reflect extremely low "background" levels). Depending on the exposure (concentration and duration), bioaccumulation may cause no harm. However, as exposure increases, the potential for adverse effects increases.

Organisms collected from a broad area of the sea floor in the vicinity of (but not inside) the Mud Dump Site have been collected and analyzed for tissue concentration for bioaccumulative contaminants of concern (USACE, 1994; USEPA, 1992c; Charles and Muramoto, 1990; Steimle, *et al.*, 1994). These field-generated bioaccumulation results provide a measure of the tissue residues for organisms living outside the dumpsite. Table 1, Columns 16 and 17 summarize the most recent background data. Of the six metals subject to further evaluation zinc and mercury exceeded the background level in the clam. Seven individual PAHs and total PAH exceeded background levels in at least one test organism, as did aldrin, dieldrin, -chlordane, *trans*-nonachlor, heptachlor, heptachlor epoxide, total residual chlordane/heptachlor, endosulfan I, endosulfan II, endosulfan sulfate, and total endosulfan.

iii) *Consideration of Potential Ecological Effects*

A review of scientific information was also done to further evaluate the test results with respect to potential ecological impacts for the chemicals requiring further evaluation (above reference and for which there is no matrix or dioxin value).

Metals, Pesticides, and Industrial Chemicals

The potential for ecological effects from the bioaccumulation of 1,4-dichlorobenzene, aldrin, dieldrin, total chlordane, total endosulfans, arsenic, chromium, copper, nickel, lead, silver and zinc was evaluated by comparison with a Water Quality Criterion Tissue Level (WQCTL) (see Appendix for Table 1). The WQCTL is calculated by multiplying the Clean Water Act Section 304(a)(1) Federal water quality criterion chronic value (CV) for the chemical by the empirically determined bioconcentration factor (BCF) for the chemical for a representative marine organism (Lee, *et al.*, 1989). A BCF is the ratio of the concentration of a contaminant in an organism to the concentration of the contaminant in water. Thus, the WQCTL represents the tissue concentration that would be expected in an organism exposed to water containing the chemical at the CV concentration. This level is set to protect 95% of all tested organisms included in the water quality criterion database, thus representing a conservative level of protection (USEPA, 1985b). Table 1 lists the calculated WQCTLs. Sources of CVs and BCFs are USEPA ambient water quality criteria documents (USEPA 1980b, 1980c, 1980d, 1980e, 1980f, 1984a, 1984b, 1985a, 1985c, 1986, 1987b and 1992a) and Calabrese (1984)(for silver). Calculations are shown in attachment A. None of the WQCTLs were exceeded in the bioaccumulation test results. Therefore, these bioaccumulation test results do not indicate a potential for undesirable ecological effects.

PAHs

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For PAHs, a more definitive method is available for evaluating the potential ecological effects. This method makes use of a direct comparison of total PAH tissue residues and the Critical Body Residue (CBR). This approach is supported by a review of the scientific literature. The CBR approach described by McCarty (1991) was used to evaluate the potential impacts of total PAHs accumulated in the dredged material bioaccumulation test organisms. CBRs are concentrations of chemical residues in organisms which elicit a deleterious biological response associated with narcosis, which is the primary non-cancer effect of PAHs. Narcotic responses measured can be acute (e.g., immobilization or death) or chronic endpoints (e.g., reduced reproduction, fecundity or growth). CBRs are represented as the ratio of the mass of toxicant to the mass of the organism, such as millimoles or micrograms of toxicant per kilogram (mmole or ug/kg) of organism. For the narcosis endpoint, each molecule of individual PAH congener is generally equipotent; thus the total PAH concentration is compared to the CBR. For example, a 400 ppb dose of naphthalene would elicit a similar toxicity response as 400 ppb of fluorene; if both chemicals are present together at these concentrations, then the dose would equal 800 ppb (see Appendix for Table 1).

As shown in Table 1, total PAH levels in tissues from the dredged material bioaccumulation test were well below levels at which chronic adverse effects might be expected from a narcotic mode of action in sensitive aquatic organisms (i.e., fish) as estimated by the CBR.

Effects of Mutagenic, Carcinogenic and Teratogenic PAHs:
Applying the uncertainty factor (UF) of 10 and a trophic transfer factor of 0.1 described in the Appendix for Table 1, to the no-effects level for BaP calculated from Hannah, *et al.* (1982), as discussed in the Appendix for Table 1 (8,021 ppb) results in a no-effect level for BaP of approximately 8,000 ppb in benthic tissue, which is considerably greater than the highest tissue concentration of BaP found in the project bioaccumulation test results (9.4 ppb in one replicate). Even when applying the more conservative steady-state factors for BaP and the other carcinogenic PAHs derived from McFarland (1995), as identified above, the calculated concentrations (18 ppb for BaP only and 34 ppb for total BaP equivalents) are still well below the no-effects level; the project tissue concentrations would still be well below this no-effect level if the higher trophic transfer level (0.23) reported by McElroy, *et al.* (1991) was used. Therefore, the most relevant aquatic effects information reviewed indicates that the highest tissue levels accumulated in the dredged material bioaccumulation tests are well below the no-effect level.

Another study that was reviewed considered the carcinogenicity of BaP in rainbow trout resulting from embryo microinjection (Black, *et al.*, 1988). A statistically significant number of liver neoplasms was found at a concentration of approximately 200,000 ppb, with non-significant effects at up to one half that concentration. Therefore, using the above across-species UF of 10 and trophic transfer factor of 0.1 results in an aquatic no-effect level of 100,000 ppb. Since this is several orders of magnitude above the highest tissue concentration of BaP for this project, as described above (and even the highest BaP-equivalent levels for human health, as discussed above), this provides additional support for a finding that the test results do not indicate

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a potential for undesirable effects to the marine environment due to mutagenic, carcinogenic or teratogenic contaminants.

Hall and Oris (1991) reported on experiments that exposed fathead minnows to anthracene during long-term exposures and observed adverse effects on reproduction. The paper reported that a concentration of anthracene in the tissue of the egg in the range of 3,750 to 8,000 ppb resulted in no significant effects on egg hatching or survivorship. Using the same approach for accounting for species-to-species uncertainty and food chain transfer described above and in the Appendix for Table 1, yields a conservative benthic tissue level of 3,750 ppb. Anthracene tissue concentrations from the project bioaccumulation tests are well below this level.

iv) *Consideration of Potential Carcinogenic and Non-carcinogenic Effects on Human Health*

Human health effects screening levels were developed for those chemicals requiring further evaluation with risk-based methods using conservative estimates of exposure to assess whether these contaminants would accumulate to levels in fish and shellfish that could lead to significant adverse effects to humans. The approach assessed consumption of fish and shellfish to derive conservative estimates of contaminant concentrations in benthic tissue protective of human health using USEPA standard risk-assessment assumptions and the process described in the Appendix for Table 1. Table 1, Column 14 lists conservative human cancer protection levels in benthic organisms for the chemicals which are known or suspected carcinogens that would lead to a human cancer risk level of 10^{-4}. When the bioaccumulation test results for those chemicals are adjusted for steady-state (as previously described), the results are below the human cancer protection levels in Table 1.

Since the analysis used conservative methods, the result represents conservative estimates of risk, or what are in effect plausible upper-bound estimates. Thus, the true risk is highly unlikely to be greater than estimated and could be much lower. None of the human health cancer protection levels were exceeded in the bioaccumulation test results

The potential for non-cancer impacts can be expressed as a hazard quotient (HQ), which is the ratio of the average daily intake divided by the toxicological reference dose for the chemical. If the HQ is less than unity (i.e., 1), an adverse noncarcinogenic effect is highly unlikely to occur. If the HQ exceeds unity, an adverse health impact may occur. The higher the HQ, the more likely that an adverse noncarcinogenic effect will occur as a result of exposure to the contaminant in the dredged material after disposal. Table 1, column 15 includes the noncancer protection levels in benthic organisms for the chemicals requiring further analysis that are known to cause, or suspected of causing, non-carcinogenic effects, that would result in a human HQ equal to unity. Those numbers were derived using the conservative assumptions and source materials described in the Appendix for Table 1. The concentrations of the chemicals requiring further evaluation were below the non-cancer protection level. It is also worth noting that the cancer protection level is much lower than the non-cancer levels; thus, the dredged material bioaccumulation results were well below the non-cancer protection levels, as well as being below the cancer protection levels.

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For the following compounds, the following special considerations were used in evaluating the results in Table 1.

Pesticides

Alpha(trans)-chlordane, trans nonachlor, heptachlor and heptachlor epoxide represent the primary components of primary chlordane and its metabolites found in the tissues of aquatic organisms (Jarman, et al, 1996; Verschueren, 1983; Sweeney et al., 1993). These constituents, summed as total chlordane, consistent with current practice for chlordane (Jarman et al., 1996) and other pesticides (e.g., total DDT). Total chlordane is evaluated using the 10-4 cancer risk level and non-cancer level for heptachlor epoxide, which has the greatest potency of the chlordane constituents or metabolites. Similarly, endosulfan I, II, and endosulfan-sulfate are summed, and the total compared to the conservative non-cancer protection level for endosulfan.

PAHs

For PAHs, this analysis used BaP-equivalents derived from the toxic equivalence factor for each carcinogenic PAH (from USEPA (1993); note:these factors are listed in column 11 of Table 1 for each of the compounds).

d. Evaluation of Solid Phase Bioaccumulation Results for Dredged Material as a Whole

The evaluation of the testing results performed above indicates that the material does not have a potential to cause significant undesirable effects to aquatic marine biota due to chronic adverse effects including such effects due to mutagenic, carcinogenic, or teratogenic contaminants, or to human health due to cancer or non-cancer effects from the individual contaminants. That evaluation includes the information relevant to the eight factors identified in the Green Book for assessing bioaccumulation test results (USEPA/USACE, 1991). As a final and additional step in the evaluative process, however, it is appropriate to go beyond assessing the individual test results in order to look at the results as a whole so as to provide an opportunity for an integrated assessment of the individual test results (Figure 1, Box d). For example, if a number of the individual bioaccumulation test results were only marginally at or below the relevant levels of concern, it is appropriate to consider this and the other relevant factors to evaluate whether, taken as a whole, the material is unsuitable for ocean disposal (Category 3) even though no single individual test result would indicate that outcome.

As indicated above, most of the chemicals of concern bioaccumulated above reference in the worm and the clam tests. Those contaminants exceeding reference also exceeded background levels but in most cases by less than an order of magnitude, but in no case did they accumulate to toxicologically important concentrations, even when conservative assumptions were used to

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evaluate the test results, as described above. Aldrin, dieldrin, chlordane, and PAHs were all well below the acceptable human health risk range and acceptable aquatic effects range using such conservative approaches and analyses. In addition, the dredged material as a whole did not cause statistically greater mortality than the reference sediment. However, 2,3,7,8-TCDD accumulated in the worm above the regional dioxin value of 1.0 pptr.

Taking into account all of the above information, it is determined that there is no potential for significant undesirable effects due to bioaccumulation as a result of the presence of individual chemicals or of the solid phase of the dredged material as a whole. Therefore, it is concluded that the solid phase of the material proposed for disposal meets the ocean disposal criteria at 40 CFR §227.6(c)(3) and 227.27(b). However, as described above, the material in Area 1S is classified as Category 2 under USEPA Region 2/CENAN general guidance.

VI. OVERALL CONCLUSION ON THE PROPOSED PROJECT

Based upon this review of the results of testing of the sediments proposed for dredging and ocean dumping from the Newark Bay Confined Disposal Facility Project, the sediments in Areas 2N and 2S do not meet the criteria for acceptability for ocean disposal as described in Sections 227.6 and 227.27 of the Ocean Dumping Regulations, and are Category 3. The dredged material in Area 1S does meet the criteria for acceptability for ocean disposal as described in Sections 227.6 and 227.27 of the Ocean Dumping Regulations, and qualifies as a Category 2 material under the USEPA Region 2/CENAN guidance for ocean disposal management.

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TABLE 1

Bioaccumulation Table for NY/NJ Harbor Projects, ALL VALUES ARE IN WET WEIGHT

Project Name: NEWARK BAY CONFINED DISPOSAL FACILITY

Sample Area/Location: AREA 18

	PROJECT DATA												COMPARISON DATA						
Col. 1	Col. 2 [11]	Col. 3 [11]	Col. 4[11]	5	Col. 6[11]	7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14	Col. 15	Col. 16	Col. 17	Col. 18	Col. 19	Col. 20
Sample I.D.	Reference	Reference	Test Sed.	[1]	Test Sed.	[1]	Conv.Fac. clam/worm	Test Sed. SS	Test Sed. SS	Carcinogenic TEF [3]	Test Sed. BaP Tox. Equiv. Conc.(clam)[4]	Test Sed. BaP Tox. Equiv. Conc.(worm)[4]	Human Health Cancer (10E-4) Level[5]	Human Health Non-Cancer Level (HQ=1) [10]	Background (clam)	Background (worm)	FDA Limits[7]	Ecological Non specific Effects Level	Regional Matrix[12]
	(clam)	(worm)	(clam)		(worm)		[2]	(clam)	(worm)										
Compound	(ug/Kg)	(ug/Kg)	(ug/Kg)		(ug/Kg)			(ug/Kg)	(ug/Kg)		(ug/Kg)	(ug/Kg)	(ug/Kg)	(ug/Kg)[10]	(ug/Kg)	(ug/Kg)	(ug/Kg)	(ug/Kg)	(ug/Kg)
PAHs																			
Acenaphthene	0.00U	0.00U	29.4U	X	26.4U	X	1/1	29.4	26.4					8,775,000	10.0	0.5		[15]	
Acenaphthylene	0.00U	192U	45.6U	X	332U		1/1	45.6	332					[6]	5.0	1.5		[15]	
Anthracene	<2.70	10.9	15.16	X	8.58U		1/1	15.16	8.58					43,605,000	12.0	10.5		3,750	
Fluorene	<2.90	2.3	<3.90		3.11U		1/1	1.95	3.11					5,805,000	10.0	0.6		[15]	
Naphthalene	0.00U	0.00U	13.6U	X	14.4U	X	1/1	13.6	14.4					[6]	27.0	3.3		[15]	
Phenanthrene	<2.70	4.08	4.27	X	2.51U		1/1	4.27	2.51					43,605,000	44.0	7.8		[15]	
Benzo(a)anthracene*	<2.80	2.9	11.56	X	2.44U		2/2	23.12	4.88	0.1	2.312	0.488		[6]	29.0	6.7		[15]	
Benzo(a)pyrene*	<2.70	3.48	9.26	X	3.05U		2/2	18.52	6.1	1	18.52	6.1		[6]	28.0	11.3		8000 [8]	
Benzo(g,h,i)perylene	0.00U	0.00U	5.10U	X	6.08U	X	3/3	15.3	18.24					[6]	26.0	10.8		[15]	
Benzo(b)fluoranthene*	0.00U	1.80U	13.08	X	8.94U	X	2/2	26.16	17.88	0.1	2.616	1.788		[6]	48.0	22.1		[15]	
Benzo(k)fluoranthene*	<2.70	1.72	1.68		2.16U		2/2	3.36	4.32	0.01	0.0336	0.0432		[6]	37.0	8.0		[15]	
Chrysene*	<2.50	3.6	22.88	X	2.00U		2/2	45.72	4	0.001	0.04572	0.004		[6]	34.0	8.0		[15]	
Dibenzo(a,h)anthracene*	0.00U	0.00U	5.20U	X	6.16U	X	2/2	10.4	12.32	1	10.4	12.32		[6]	10.0	1.5		[15]	
Fluoranthene	0.00U	12.0U	22.4	X	9.48U		1/1	22.4	9.48					5,805,000	56.0	14.6		[15]	
Indeno(1,2,3-cd)pyrene*	<0.87	<0.43	0.54		<0.52		3/3	1.62	0.78	0.1	0.162	0.078		[6]	21.0	6.2		[15]	
Pyrene	<2.90	15.6	28.8	X	15.6		1/1	28.8	15.6					4,367,000	58.0	39.3		[15]	
TOTAL PAHs	11.3	251	230	X	444			305.38	480.6		34.08932	20.8212	2,000(BaP.eqv.)		418.0	139.40		40000 [9]	
PESTICIDES																			
Aldrin	0.41	0.35	1.26		0.43		2/2	2.52	0.86				33	167	1.0	0.2	300	299[10]	
Dieldrin	1.5	0.84	0.716		0.5		2/2	1.432	1				65	518	0.7	0.2	300	4.37[10]	
a-Chlordane	0.39	0.27	0.39		0.66		2/2	0.78	1.32						1.4	1.1	300		
Trans nonachlor	0.58	0.55	0.76		0.53		2/2	1.52	1.06						na	0.8			
Heptachlor	1.37	1.36	1.27		<0.34		2/2	2.54	0.34						0.7	0.2	300		
Heptachlor epoxide	<0.34	1.88	0.45		1.36		1/1	0.45	1.36						0.7	0.3	300		
Total Residual Chlordane/Heptachlor	1.14	2.7	1.6		2.28			5.29	4.08				114	135	2.8	1.6		648[10]	
Endosulfan I	0.34	1.1	0.9		0.89		1/1	0.9	0.89				[6]		0.7	0.4			
Endosulfan II	<0.34	0.25	0.32		0.42		1/1	0.32	0.42				[6]		0.7	0.4			
Endosulfan sulfate	0.68U	0.00U	1.20U		1.20U	X	1/1	1.2	1.2				[6]		0.7	0.1			
Total Endosulfans	1.18	1.35	2.41		2.52			2.42	2.51					87,000	2.1	0.9		2.66[10]	
4,4-DDT	0.55	<0.32	1.52		0.22		10/10	15.2	2.2						1.1	0.40			
2,4-DDT	0.14U	0.45U	0.56U	X	1.05U	X	10/10	5.6	10.5						na	na			
4,4-DDD	0.30U	1.03	0.86U	X	0.92		2/2	1.72	1.84						0.7	2.70			
2,4-DDD	0.27	0.2	0.25		<0.34		2/2	0.5	0.34						na	na			
4,4-DDE	0.27	0.77	1.24	X	2.36	X	2/2	2.48	4.72						6.3	2.50			
2,4-DDE	<0.34	0.23	0.28		0.67	X	2/2	0.56	1.34						na	na			
Total DDT	1.69	2.65	4.72	X	5.38	X		26.06	20.94						na	14.4			40
TOTAL PCBs	8.32	29.8	21.5	X	40.5		1/2	21.5	81						100	122	2,000		100(clam)400(worm)
1,4-Dichlorobenzene	<0.40	<0.40	<0.40		<0.40		1/1	0.20	0.20				60,000	[6]	na	3.5		11820[10]	
METALS	(mg/Kg)	(mg/Kg)	(mg/Kg)		(mg/Kg)			(mg/Kg)	(mg/Kg)				(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)
Arsenic	2.24	2.5	2.09		2.02		1/1	2.09	2.02				[17]	[17]	5.7	5.72		12.0[10]	
Cadmium	0.03U	<0.004	0.39U	X	0.12U		[16]	0.39	0.12						0.6	0.13			0.3
Chromium (total)	0.16	0.24	0.53U	X	0.44		1/1	0.53	0.44				[6]	73	2.6	1.23		11.6[10]	
Copper	0.47U	1.40U	1.12U	X	1.48U		1/1	1.12	1.48				[6]	540	8.9	3.28		9.6[10]	
Lead	0.14	0.16	0.62	X	0.63U	X	1/1	0.62	0.63				[6]	1.3	3.0	2.14		11.9[10]	
Mercury	0.00U	0.00U	0.11U	X	0.06U	X	[16]	0.11	0.06						0.1	0.03	1		0.2
Nickel	0.32	0.23U	0.36		0.32		1/1	0.36	0.32				[6]	290	1.3	0.89		3.8[10]	
Silver	0.00U	0.00U	0.094U	X	0.09U	X	1/1	0.094	0.09				[6]	73	0.9	0.18		1.4[10]	
Zinc	10.1	16.4	10.96		32.06		1/1	10.96	32.06				[6]	4,400	1.9	25.51		1517[10]	

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TABLE 1 (continued) DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT Template Version: 3/13/97

Bioaccumulation Table for NYNJ Harbor Projects, ALL VALUES ARE IN WET WEIGHT

Project Name: NEWARK BAY CONFINED DISPOSAL FACILITY

Sample Area/Location: AREA 19

	PROJECT DATA												COMPARISON DATA						
Col. 1	Col. 2	Col. 3	Col. 4[11]	5	Col. 6[11]	7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14	Col. 15	Col. 16	Col. 17	Col. 18	Col. 19	Col. 20
Sample I.D.	Reference	Reference	Test Sed.	[1]	Test Sed.	[1]	Conv.Fac.	Test Sed.	Test Sed.		Test Sed.	Test Sed.	Human Health	Human Health				Ecological	Regional
							clam/worm	SS	SS		TEQ	TEQ	Cancer (10E-4)	Non-Cancer	Background	Background	FDA	Non specific	Dioxin
	(clam)	(worm)	(clam)		(worm)		[2]	(clam)	(worm)	TEF [3]	(clam)	(worm)	Level	Level (HQ=1)	(clam)	(worm)	Limits[7]	Effects Level	Value
Compound	(ppb)	(ppb)	(ppb)		(ppb)			(ppb)	(ppb)		(ppb)	(ppb)	(ppb)	(ppb)[10]	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
DIOXINS																			
2,3,7,8-TCDD	0.33U	3.75	0.42		1.94					1	0.42	1.94							1.00 [13]
1,2,3,7,8-PeCDD	<1.52	<1.06	<0.90		<1.32					0.5	0.225	0.33							
1,2,3,4,7,8-HxCDD	<1.84	<0.84	<1.06		<1.24					0.1	0.053	0.062							
1,2,3,6,7,8-HxCDD	<1.90	0.38	<0.90		<1.12					0.1	0.045	0.056							
1,2,3,7,8,9-HxCDD	<1.60	<0.74	<0.90		<1.10					0.1	0.045	0.055							
1,2,3,4,6,7,8-HpCDD	<2.06	0.71	0.59		0.88					0.01	0.0059	0.0088							
OCDD	2.98	3.5	4.5		7.04	X				0.001	0.0045	0.00704							
2,3,7,8-TCDF	<0.86	0.46	0.53		0.81					0.1	0.053	0.081							
1,2,3,7,8-PeCDF	<1.18	0.43	<0.62		<0.86					0.05	0.0155	0.0215							
2,3,4,7,8-PeCDF	<0.96	0.39	<0.58		<0.82					0.5	0.145	0.205							
1,2,3,4,7,8-HxCDF	<1.42	0.75	0.52		0.45					0.1	0.052	0.045							
1,2,3,6,7,8-HxCDF	<1.08	0.3	<0.64		0.33					0.1	0.032	0.033							
1,2,3,7,8,9-HxCDF	<1.50	<0.62	<0.86		<0.90					0.1	0.044	0.045							
2,3,4,6,7,8-HxCDF	0.72	0.33	0.58		0.53	X				0.1	0.058	0.053							
1,2,3,4,6,7,8-HpCDF	<1.34	0.55	0.35		0.59					0.01	0.0035	0.0059							
1,2,3,4,7,8,9-HpCDF	<2.12	<0.58	<1.10		<1.00					0.01	0.0055	0.005							
OCDF	<2.32	1.15	<1.30		1.63					0.001	0.00065	0.00163							
TEQs - non 2,3,7,8-TCDD											0.79	1.01							4.5 [14]
TEQs (all)											1.21	2.95							10 [13]

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FOOTNOTES FOR TABLE 1:

*: Carcinogenic PAHs.

#: Levels represent the conservative level of protection for the sum of the related compounds and their metabolites.

na: Not Available

1. A "X" in this column indicates that the analyte concentration in the test sediment is statistically greater than that of the reference sediment. Statistical measures used and references are given in the Appendix to Table 1.

2. Conversion factors from 28-day bioaccumulation results to steady state are obtained from the following sources; for PAH's: from McFarland, 1995; for Aldrin, Dieldrin, Chlordane, DDT, DDD, and DDE: from Boese and Lee, 1992; for PCBs: from Pruell, *et al.*, 1993, and Rubinstein, *et al.* 1983; for 1,4-Dichlorobenzene: from de Bruijn, *et al.* 1989; for Endosulfan I, Endosulfan II, Endosulfan Sulfate, Heptachlor and trans nonachlor: from Syracuse Research Corporation, 1996, and McFarland, 1995; for Heptachlor Epoxide: from Veith, *et al.*, 1979.

3. PAH TEFs taken from: USEPA. 1993; Dioxin TEFs taken from: USEPA. 1989.

4. Toxic equivalence for the carcinogenic PAHs are from USEPA (1993).

5. This value represents the 10^{-4} cancer risk level for the carcinogenic PAHs. The total concentration of carcinogenic PAHs is expressed in BaP equivalents (see discussion in the text of the memo).

6. Cancer risk factor or reference dose are not assigned by USEPA in IRIS (USEPA, 1995).

7. FDA limits are from the USEPA/USACE, 1991.

8. This value represents the benthic level expected to result in a no-effect level for possible mutagenic and teratogenic effects in fish from exposure to BaP, which is the most toxic PAH.

9. This value represents the non-specific narcosis effects level (see discussion in Appendix). This value is compared to the sum of all PAHs measured.

10. Calculations are included in the Appendix to Table 1.

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11. "<" indicates that the contaminant was not detected at the detection limit specified in the regional testing manual (USEPA/CENAN, 1992); "U" indicates that the detection limit specified in the regional testing manual was exceeded and the compound was not detected (see CENAN 1997c).

12. Chemicals for which the bioaccumulation from the dredged material was greater than the reference but less than the Matrix level are indicated by bolding the Matrix level in Column 20.

13. Levels are based on the Regional Dioxin Values.

14. Level is the sum of all dioxin congeners other than 2,3,7,8-TCDD.

15. For this PAH, the no-effect level for possible mutagenic and teratogenic effects in fish is estimated from exposure to BaP, which is the most toxic PAH.

16. Cadmium and mercury do not obey steady state kinetics, therefore, no adjustment is made (see discussion in the text of the memo).

17. Cancer and non-cancer protection levels, based on inorganic arsenic as contained in EPA's IRIS database, are not appropriate for evaluating the potential human health impacts of arsenic bioaccumulation from dredged material, and therefore, are not included in Table 1 (see discussion in Appendix to Table 1).

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Appendix for Table 1

I. CONSIDERATION OF ECOLOGICAL EFFECTS

A. Potential for ecological effects based on Water Quality Criteria (Column 19)

The potential for ecological impacts due to bioaccumulation of several compounds of concern was evaluated by calculating a Water Quality Criterion Tissue Level (WQCTL). The WQCTL is calculated by multiplying the Clean Water Act Section 304(a)(1) Federal water quality criterion chronic value (CV) for the chemical by the empirically determined bioconcentration factor (BCF) for the chemical for a representative marine organism (Lee, *et al.*, 1989). A BCF is the ratio of the concentration of a contaminant in an organism to the concentration of the contaminant in water. Thus, the WQCTL represents the tissue concentration that would be expected in an organism exposed to water containing the chemical at the CV concentration. This level is set to protect 95% of all tested organisms included in the water quality criterion database, thus representing a conservative level of protection (USEPA, 1985b). Table 1 lists the calculated WQCTLs. Sources of CVs and BCFs are from USEPA ambient water quality criteria documents (USEPA 1980b, 1980c, 1980d, 1980e, 1980f, 1984a, 1984b, 1985a, 1985c, 1986, 1987b and 1992a) and Calabrese (1984)(for silver). Calculations are shown in attachment A.

Several pesticides were evaluated based on the sum of their primary constituents and associated metabolites (e.g., total chlordane, total endosulfan, and total DDT). Alpha(trans)-chlordane, trans nonachlor, heptachlor and heptachlor epoxide represent the primary components of technical chlordane and its metabolites found in the tissue of aquatic organisms (Jarman, et. al., 1996; Verschueren, 1983; Sweeney, et. al., 1993). These constituents are summed as total chlordane as is consistent with current practice for chlordane (Jarman, et. al., 1996) and total DDT. The WQCTL for total chlordane was calculated using the WQC for chlordane as a conservative level of protection. While water quality criteria exist, and WQCTLs can be calculated, for heptachlor (133 ppb) and chlordane (64 ppb), the sum total chlordane is compared to the WQCTL for chlordane in order to be more environmentally conservative. The chlordane WQCTL provides a conservative level of protection as indicated by published residue effects levels (Sweeney, et. al., 1993; Bauman, et. al., 1987; Feroz, et. al., 1979; Parrish, et. al., 1976). Consistent with the above approach, the tissue concentration for endosulfan I, endosulfan II and endosulfan sulfate were also summed as total endosulfan and compared to the WQCTL for total endosulfan.

The WQCTLs were also calculated for all metals of concern which don't have matrix values. For total chromium, the WQCTL was calculated based on chromium(VI), which is substantially more toxic than chromium (III) and elemental chromium in order to provide a conservative level of environmental protection.

B. Potential for ecological effects based on PAH toxicity (Column 19).

The Critical Body Residue (CBR) approach described by McCarty (1991) was used to derive values for use in evaluating the potential impacts of PAHs accumulated in the dredged material

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bioaccumulation test organisms. CBRs are concentrations of chemical residues in organisms which elicit a deleterious biological response associated with narcosis, which is the primary non-cancer effect of PAHs. Narcotic responses measured can be acute (e.g., immobilization or death) or chronic endpoints (e.g., reduced reproduction, fecundity or growth). CBRs are represented as the ratio of the mass of toxicant to the mass of the organism, such as millimoles or micrograms of toxicant per kilogram (mmole or ug/kg) of organism. For the narcosis endpoint, each molecule of individual PAH congeners is generally equipotent, thus the total PAH concentration is compared to the CBR. For example, a 400 ppb dose of naphthalene would elicit a similar toxicity response as 400 ppb of fluorene; if both chemicals are present together at these concentrations, then the dose would equal 800 ppb.

McCarty (1991) states that an average critical body residue of 400,000 - 1,200,000 ppb can be used as an estimate for acute effects for a narcosis-producing chemical (e.g., PAHs) on fish populations. (Note: McCarty reports the CBR in units of millimoles per kilogram; this value has been converted to ppb for PAHs using the average molecular weight of the PAHs analyzed in the bioaccumulation test). Chronic effect critical body residues can be estimated by applying an acute to chronic ratio of 10 to the acute CBR (McCarty, 1986; Call, *et al.*, 1985). Therefore, the chronic critical body residue for PAHs can be estimated at 40,000 - 120,000 ppb of PAHs in organism tissue, and Table 1 thus uses the 40,000 ppb level.

These CBRs were based on fish data. The use of CBRs based on fish toxicity represents a conservative estimate of potential toxicity due to exposure to dredged material because: (1) it is extremely unlikely that a fish would get its whole diet from the dumpsite; and (2) fish are generally more sensitive than the benthic organisms in direct contact with the disposed dredged material (e.g., Landrum, *et al.* (1988) estimated an acute CBR for crustaceans of 800,000 ppb - 42,000,000 ppb).

C. Potential ecological impacts of mutagenic, carcinogenic and teratogenic PAHs (Column 19)

USEPA and the USACE reviewed eleven scientific journal articles to obtain information about the potential for adverse effects to the marine environment due to the observed bioaccumulation of PAHs in the marine worm, *Nereis virens*, and the clam, *Macoma nasuta*. These articles reported the results of laboratory experiments that sought to relate the concentration of a contaminant(s) in water, as injected doses, or tissue concentrations, to mutagenic, carcinogenic, teratogenic and/or reproductive effects to fish. These studies all used fish species which are considered to be among the most sensitive organisms in the marine environment to exhibit the above effects (USEPA, 1996c). In addition, most of these studies focussed on the PAH most believed to cause such effects for which there is data, benzo(a)pyrene (BaP). One study (Breteler, 1984), discussed the possible sources and distribution of PAHs in the Hudson/Raritan estuary, and ranked the threat of PAHs to aquatic biota and humans. The main threat was believed to be carcinogenicity, with a greater threat ranking assigned to humans than biota. However, Breteler (1984) did not provide specific effects-based levels that could be used in the following analysis. Two articles evaluated the effects of crude oil, and thus were not useful for evaluating the effects of specific PAHs measured in the bioaccumulation test (Rice, *et al.*, 1987; Lee, *et al.*, 1981). Three studies considered the effects of specific PAHs, but did not synoptically measure tissue concentrations in

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the organisms (Ward, *et al.*, 1981; Holcombe, *et al.*, 1983; Finger, *et al.*, 1985) and were not used, because the lack of tissue data for these studies makes their utility in evaluating the tissue concentration resulting from the dredged material bioaccumulation tests highly uncertain.

The remaining five papers reported measured tissue concentrations and observed reproductive effects in organisms exposed to PAH-spiked water. One article reported the tissue concentrations of adult fish and the observed effect on survival and health of the fish's offspring. Hose, *et al.* (1981) reported that adult English sole injected with benzo(a)pyrene (BaP) accumulated the chemical in the gonad and mature gametes. The amount of BaP taken up by the ovary ranged from 16,800 to 49,700 ppb. Two samples of ripe eggs contained 51,200 and 263,000 ppb of BaP and its metabolites. No adverse effects were reported for these concentrations. Hose, *et al.* (1981) also reported the results of injecting female flathead sole with BaP. Adverse effects to egg hatching success were reported for each female. The paper does not report tissue concentrations in either the parent fish or the egg of the flathead sole. Effects on reproductive success were reported but could only be correlated with the external dose injected into the parent. Therefore, since concentrations and effects were not synoptic in this report, it was not useful in the evaluation of the dredged material bioaccumulation results.

Three papers reported the results of experiments which measured fish egg or alevin concentrations of BaP and associated reproductive or carcinogenic effects (Hose, *et al.*, 1982; Hannah, *et al.*, 1982; Black, *et al.*, 1988). Hose, *et al.* (1982) exposed three species of sole, sand sole, English sole, and flathead sole, to BaP-spiked water. Tissue concentrations of 2,100 ppb were measured in sand sole on day 6 (24 hours after hatching) and were associated with reduced hatching success. However, we did not consider the results to be appropriate for use in setting effects levels because they may have been compromised by the methods of replication used in the experimental design.

Hannah, *et al.* (1982) estimated a concentration of BaP in tissue that caused abnormalities in development of rainbow trout eggs, using aqueous exposures and actual measured tissue concentrations in alevin tissues. An exposure to a 2.4 ppb mean aqueous BaP concentration accumulated an average of 12,340 ppb in alevins. This concentration was associated with an increase in percentage of abnormalities from approximately 6% at lower water concentrations (0.08, 0.21, 0.37 and 1.48 ppb) to approximately 13% at higher concentrations. From 0.08 to 1.48 ppb in the water, there were no increasing effects exhibited, therefore, the effects were apparently "real" (i.e., significantly greater than the threshold effect level of 6%) only at the aqueous 2.4 ppb concentration. The Hannah, *et al.*,(1982) study is considered the most reliable study for this evaluation since it used exposure series and measured tissue concentrations associated with observed effects, and therefore allows for the calculation of a no-effects level directly from the measured results.

In applying these studies to evaluations of dredged material, consideration must be given to uncertainties in converting these kinds of results to concentrations protective of other biota. Three uncertainties needing to be considered are: (1) those associated with converting effect to no-effect concentrations, (2) across-species uncertainties, and (3) uncertainties in estimating the dose of contaminants to which the organism is exposed. These uncertainties are discussed below.

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With respect to uncertainty when converting effect to no-effect concentrations, an uncertainty factor of one order of magnitude is often used when only an effect measure is reported. However, in Hannah, *et al.*(1982), the no-effect level can be estimated to be the next lowest concentration below the lowest-observed effect level, since the range of concentrations below this level did not exhibit significantly different responses. In this case, the no-effect level occurred at the water exposure concentration of 1.48 ppb. Although a tissue concentration was not measured at the 1.48 ppb water concentration, it can be calculated from the concentration measured at the effect level (i.e., the no-effect water concentration (1.48 ppb) is close to 65 percent of the observed effect concentration (2.4 ppb) so the no-effect tissue concentration should be about 65 percent of the lowest-observable effect tissue concentration (0.65 x 12,340 ppb = 8,021 ppb)). Thus, a factor to adjust these data from lowest observed effect tissue concentration to the calculated no-observed effect tissue concentration is obtained directly from the data.

There can also be uncertainty as to the proximity to the site of toxic action in the organism that a dose or concentration is measured, and with respect to species-to-species variability. Hannah (1982) reported dose concentrations in the tissue and, therefore, there is no need to account for variability associated with the large uncertainties encountered in typical water-only exposure studies where the actual concentration at the site of toxic action is unknown. When measured in the tissues, as was done for this project, concentrations of narcotic chemicals causing effects (i.e., critical body residues, CBRs) in aquatic organisms are reported to range only from 1.4 to 21 umoles/g wet weight (a factor of about one order of magnitude) for organisms as diverse as insects, crustaceans, and fish (McCarty, *et al.* 1992). Therefore, from a tissue concentration perspective, the species-to-species uncertainty factor appropriate for both total PAHs operating as narcotics and individual PAHs having teratogenic effects would be one order of magnitude, or a value of 10 (USEPA, 1996d).

In summary, a factor of 10 (representing species to species uncertainty) is an appropriate UF to use in these evaluations. Also, as described in memo SectionV, subsection C2(c)(i) above, Brown and Neff (1993) show that trophic transfer of PAHs up the food chain to fish decrease tissue levels by over an order of magnitude. Given this data and the fact that these studies included fish that spent 100% of their time feeding in the test sediment, whereas this would be highly unlikely to occur at an ocean disposal site, a trophic transfer factor of 0.1 is used in this analysis. Applying this UF of 10 and a trophic transfer factor of 0.1 to the no-effects level for BaP calculated from Hannah, *et al.* (1982), as discussed above (8,021 ppb) results in a no-effect level for BaP of approximately 8,000 ppb in benthic tissue.

II. CONSIDERATION OF POTENTIAL EFFECTS ON HUMAN HEALTH (Columns 14 and 15)

Human effects screening levels were developed with risk-based methods using conservative estimates of exposure to assess whether these contaminants would accumulate to levels in fish and shellfish that could lead to significant adverse effects to humans. The approach assessed consumption of fish and shellfish to derive conservative estimates of contaminant concentrations in benthic tissue protective of human health using the following USEPA standard risk-assessment assumptions: a 70-kilogram adult eats 6.5 grams of fish and shellfish per day over a 70-year lifetime. This assessment considered potential for both cancer and non-cancer effects in humans.

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USEPA IRIS (USEPA, 1995) and effects information from USEPA's National Toxics Rule (USEPA, 1992b) were used in the human health assessment to calculate acceptable levels in fish and shellfish to protect human health. Trophic transfer factors, as discussed earlier, were then used to convert these fish and shellfish levels into benthic tissue concentrations.

For regulatory purposes, USEPA utilizes 10^{-4} to 10^{-6} (one in ten thousand to one in one million) as an acceptable incremental risk range for activities with potential for causing cancer in human beings (USEPA, 1980a; USEPA, 1988; USEPA, 1987a; Thomas, 1987; USEPA, 1991). USEPA considers a cancer risk within this range to be safe and protective of public health. This is supported by the World Health Organization Guidelines for Drinking Water Quality (WHO, 1993), where it selected a 10^{-5} guideline value, and then explained that the application could vary by a factor of ten (e.g., 10^{-4} to 10^{-6}). Since this analysis uses conservative methods, the results represent conservative estimates of risk, or what are in effect plausible upper-bound estimates. Thus, the true risk is highly unlikely to be greater than estimated and could be much lower.

Table 1, Column 14 lists human cancer protection levels in benthic organisms for chemicals which are known or suspected carcinogens that would lead to a human cancer risk level of 10^{-4}. For PAHs, this analysis used BaP-equivalents derived from the toxic equivalence factor for each carcinogenic PAH (from USEPA (1993); note: these factors are listed in Column 11 of Table 1 for each of the compounds).

The potential for non-cancer impacts can be expressed as a hazard quotient (HQ), which is the ratio of the average daily intake divided by the toxicological reference dose for the chemical. If the HQ is less than unity (e.g., 1), an adverse noncarcinogenic effect is highly unlikely to occur. If the HQ exceeds unity, an adverse health impact may occur. The higher the HQ, the more likely that an adverse noncarcinogenic effect will occur as a result of exposure to the contaminant in the dredged material after disposal. Table 1, Column 15 lists noncancer protection levels in benthic organisms for the chemicals that are known to cause, or suspected of causing, non-carcinogenic effects, that would result in a human HQ equal to unity. Those numbers were derived using the conservative assumptions and source materials described in the introductory paragraph to this section.

For the following compounds, the following special considerations were used in evaluating the results in Table 1.

Metals

No reference dose has been established for lead. EPA has adopted a blood lead level of 10ug/dl as the level of concern and EPA policies are that regulatory programs should seek to minimize the number of children with blood lead levels above a target of 10 ug/dl (Final Rule for Lead and Copper NPDWR, 56FR26468, June 7, 1991), and this value was used to calculate the effects level in Table 1 (see USEPA 1996e).

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Attachment A:

When interpreting the importance of arsenic tissue concentrations for human health, consideration was given to the arsenic form present (i.e., inorganic vs. organic). Arsenic is found in marine organisms as an organic complex which includes such compounds as arsenobetaine and arsenocholine (Abel and Axiak, 1991). Organic arsenic in the tissues of aquatic organisms is not metabolized by predators or humans and is readily eliminated from the body through excretion (Hrudey *et al.*, 1995). As a result, the toxicity of organic arsenic ingested from seafood is low and appears to pose no significant hazard (Abernathy and Ohanian, 1992). For this reason, cancer and non-cancer protection levels, based on inorganic arsenic as contained in EPA's IRIS database, are not appropriate for evaluating the potential human health impacts of arsenic bioaccumulation from dredged material, and therefore, are not included in Table 1.

Pesticides

Alpha(trans)-chlordane, trans nonachlor, heptachlor and heptachlor epoxide represent the primary components of technical chlordane and its metabolites found in the tissue of aquatic organisms (Jarman, et. al., 1996; Verschueren, 1983; Sweeney, et. al., 1993). These constituents are summed as total chlordane as is consistent with current practice for chlordane (Jarman, et. al., 1996) and other pesticides (e.g., total DDT). Total chlordane is evaluated using the 10^{-4} cancer risk level and non-cancer level for heptachlor epoxide, which has the greatest potency of the chlordane constituents or metabolites. Similarly, endosulfan I, endosulfan II, and endosulfan sulfate are summed and the total is compared to the conservative non-cancer protection level for endosulfan.

PAHs

For PAHs, this analysis used BaP-equivalents derived from the toxic equivalence factor for each carcinogenic PAH (from USEPA (1993); note: these factors are listed in column 11 of Table 1 for each of the compounds).

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Attachment A: Tissue concentration is calculated using BCF * Water Quality Criteria (WQC) ambient aqueous concentration, and assuming the conversion factor of 1 kg=1L.

Compound	Ambient Conc. (ug/L)[1]	BCF	Tissue Conc. (ug/Kg)	Remarks
Aldrin	0.13	2,300	299	WQC was reduced by a factor of 10 to account for chronic effects; BCF estimate is based on Dieldrin since Aldrin rapidly transformed to Dieldrin in the environment; BCF is based on 1.1% lipid level for marine fish, Spot (*Leiostomus xanthurus*).
Dieldrin	0.0019	2,300	4.37	BCF is based on 1.1% lipid level for marine fish, Spot (*Leiostomus xanthurus*).
Total Chlordane	0.004	16,000	64	Total Chlordane includes alpha-chlordane, trans nonachlor, heptachlor, heptachlor epoxide; WQC for Chlordane is used for Total Chlordane; BCF is based on 3.6% lipid level for sheepshead minnow (*Cyprinodon variegatus*).
Total Endosulfan	0.0087	328	2.85	Total Endosulfan includes endosulfan I, endosulfan II and endosulfan sulfate; WQC for Endosulfan is used for Total Endosulfan; BCF is based on 3.6% lipid level for sheepshead minnow (*Cyprinodon variegatus*).
1,4-Dichlorobenzene	197	60	11820	Ambient conc. is based on lowest observed effect level (LOEL) for saltwater species from WQC, and reduced by a factor of 10 to account for chronic effects; BCF is based on the whole body for bluegill (*Lepomis macrochirus*).
Arsenic	36	350	12600	Ambient conc. is based on the saltwater criteria continuous conc. for arsenic (III); BCF is based on the Eastern Oyster (*Crassostrea virginica*).
Chromium	50	236	11800	Ambient conc. is based on Chromium (VI) since it is substantially more toxic than Chromium (III); BCF is based on polychaete worm.
Copper	2.9	3,300	9570	WQC is based on a hardness value of 100; BCF is based on soft shell clam.
Lead	8.5	1,400	11900	Ambient conc. is based on saltwater criteria continuous conc.; BCF is based on the Eastern Oyster (*Crassostrea virginica*).
Nickel	8.3	458	3802	Ambient conc. is based on saltwater criteria continuous conc.; BCF is based on the Eastern Oyster (*Crassostrea virginica*).

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Silver	0.23	6,500	1495	Water Quality Criterion (WQC) was reduced by a factor of 10 to account for chronic effects; BCF is based on the Blue Mussel (*Mytilus edulis*).
Zinc	86	17,640	1517040	Ambient conc. is based on saltwater criteria continuous conc.; BCF is based on Eastern Oyster (*Crassostrea virginica*).

[1].The following documents were used to obtain the water quality criteria values.

Calabrese, A. 1984. "Effects of Long Term Exposure to Silver and Copper on Growth, Bioaccumulation and Histopathology in the Blue Mussel (Mytilus edulis)." *Mar. Envir. Res.* 1, 253-274.
USEPA. 1980b. Ambient Water Quality Criteria for Aldrin/Dieldrin; EPA 440/5-80-019; December 1980.
USEPA. 1980c. Ambient Water Quality Criteria for Chlordane; EPA 440/5-80-027; October 1980.
USEPA. 1980d. Ambient Water Quality Criteria for Heptachlor; EPA 440/5-80-052; October 1980.
USEPA. 1980e. Ambient Water Quality Criteria for Endosulfan; EPA 440/5-80-046; October 1980.
USEPA. 1980f. Ambient Water Quality Criteria for Dichlorobenzenes; EPA 440/5-80-039; October 1980.
USEPA. 1984a. Ambient Water Quality Criteria for Lead - 1984; EPA 440/5-84-027; January 1985.
USEPA. 1984b. Ambient Water Quality Criteria for Copper - 1984; EPA 440/5-84-031; January 1985.
USEPA. 1985a. Ambient Water Quality Criteria for Chromium - 1984; EPA 440/5-84-029; January 1985.
USEPA. 1985c. Ambient Water Quality Criteria for Arsenic - 1984; EPA 440/5-84-033; January 1985.
USEPA. 1986. Ambient Water Quality Criteria for Nickel - 1986; EPA 440/5-86-004; September 1986.
USEPA. 1987b. Ambient Water Quality Criteria for Zinc - 1987; EPA 440/5-87-003.
USEPA. 1992a. Draft Ambient Water Quality Criteria for Silver.

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ATTACHMENT B

Benthic Cancer Protection Level Calculations for the Protection of Human Health from the Consumption of Fish Exposed to Dredged Material at the Mud Dump Site

Basis[fn1]:

$$10^{-4}\text{ Benthic Tissue Level (ug/kg)} = \frac{[10^{-4}\text{ Conc. in Fish}] \times [\text{Whole Body/fillet Factor (1.35)}]^{fn5}}{\text{Trophic Transfer Factor}^{fn2}}$$

$$10^{-4}\text{ Conc. in Fish (ug/kg)} = \frac{\text{Toxicological Dose (ug/day)}}{[\text{Seafood Consumption (6.5 g/day)}^{fn3}] \times [10^{-3}\text{kg/g}]}$$

$$\text{Toxicological Dose (ug/day)} = \frac{[\text{Risk Level } (10^{-4})] \times [\text{Body Weight (70 kg)}^{fn3}] \times [10^{3}\text{ ug/mg}]}{\text{Potency Factor, } q_1^{*}\text{ (kg-day/mg)}^{fn4}}$$

	Cancer Potency Factor q_1^* (kg-day/mg)	Acceptable Concentration in Fish (ug/kg)	Trophic Transfer Factor	Benthic Protection Level (ug/kg)
Pesticides				
Aldrin	17	63	2.6	33
Chlordane	1.3	828	2.3	486
Dieldrin	16	67	1.4	65
Heptachlor	4.5	239	2.7	120
Heptachlor epoxide	9.1	118	1.4	114
Industrial Organics				
1.4-Dichlorobenzene	0.024	44,872	1	60,577
PAHs				
Benzo(a)pyrene	7.3	147	0.1	2,000
METALS				
Arsenic	1.5	718	3	323

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ATTACHMENT C

Benthic Non-Cancer Protection Level Calculations for the Protection of Human Health from the Consumption of Fish Exposed to Dredged Material at the Mud Dump Site

Basis[fn1]:

Benthic Tissue Level (ug/kg) = $\frac{\text{[Conc. in Fish] x [Whole Body/fillet Factor (1.35)]}^{fn5}}{\text{Trophic Transfer Factor}^{fn2}}$

Conc. in Fish (ug/kg) = $\frac{\text{Toxicological Dose (ug/day)}}{\text{[Seafood Consumption (6.5 g/day)}^{fn3}\text{] x [}10^{-3}\text{kg/g]}}$

Toxicological Dose (ug/day) = [Reference dose[fn4]] x [Body Weight (70 kg)[fn3]]

	Reference Dose RfD (ug/kg-day)	Acceptable Concentration in Seafood (ug/kg)	Trophic Transfer Factor	Benthic Protection Level (ug/kg)
Metals				
Arsenic	0.3	3,231	3	1,454
Chromium	5	54,000	1	73,000
Copper	37.1	400,000	1	540,000
Nickel	20	215,000	1	290,000
Silver	5	54,000	1	73,000
Zinc	300	3,230,769	1	4,361,538
Pesticides				
Aldrin	0.03	323	2.6	167
Chlordane	0.06	592	2.3	350
Dieldrin	0.05	538	1.4	518
Endosulfan	6	64,615	1	87,231
Heptachlor	0.5	5,385	2.7	2,692
Heptachlor epoxide	0.013	140	1.4	135
PAHs				
Acenaphthene	60	650,000	0.1	8,775,000
Fluorene	40	430,000	0.1	5,805,000
Phenanthrene	300	3,230,000	0.1	43,605,000
Anthracene	300	3,230,000	0.1	43,605,000
Fluoranthene	40	430,000	0.1	5,805,000
Pyrene	30	325,000	0.1	4,387,000

NOTES:

[fn1] Human health cancer and non-cancer assessments adapted from *Guidance for Assessing Chemical Contaminant Data for use in Fish Advisories: Volume II: Risk Assessment and Fish Consumption Limits.* U.S. Environmental Protection Agency, EPA823-B-94-004, Office of Science and Technology, Washington, DC, June 1994.

[fn2] Trophic transfer factors were calculated by Mr. Lawrence Burkhard, EPA Duluth, using the food chain transfer model developed by Gobas (1993).

[fn3] Default values were taken from EPA's national toxics rule for setting water quality criteria, USEPA (1992b).

[fn4] Cancer potency factors and non-cancer reference doses are taken from USEPA (1995).

[fn5] The acceptable concentration in seafood is defined on the basis of the fillet or edible portion for humans. Trophic transfer, however, was defined on the basis of whole body characteristics, including lipid concentrations. Experience in New York State indicates a whole body to fillet ration ranging from 1.2 to 1.5 is applicable to lipophilic substances. The mid range value of 1.35 is used in this analysis.

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APPENDIX 2.01

DISCUSSION OF UPLAND DISPOSAL

APPENDIX 2.01 - DISCUSSION OF UPLAND DISPOSAL

A number of upland confined disposal facility (CDF) sites were identified for their potential to store dredged material deemed unsuitable for ocean disposal. However, the length of time required to obtain the requisite permits for an upland disposal site is estimated to be a minimum of two years. This does not meet the time needs of the project, eliminating it as a viable alternative. Because of interest in the upland disposal alternative, information is provided in this appendix regarding potential sites for upland disposal and permitting of upland disposal sites.

SUMMARY OF THE PERMITTING PROCESS

For an upland site to be considered a viable disposal option for dredged material, the site must comply with permitting regulations regarding construction, operation, and closure of upland CDFs. These regulations are described in Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters (NJDEP 1996). A summary of the application process is provided below.

Testing requirements for the design of the upland facility include engineering properties such as soil density, grain size, and percent compaction of the dredged material for disposal. Additional bulk sediment analyses may be required as determined by NJDEP on a case-by-case basis.

Surface Water Discharges. Special permitting may be necessary for an upland CDF, such as the New Jersey Pollutant Discharge Elimination System (NJPDES) regulations (N.J.A.C. 7:14A), which are the operating regulations that implement the Clean Water Act for New Jersey.

There are two categories for the permitting process for point source discharges of dewatered dredged material to surface waters in New Jersey. The first is for dredged material dewatering effluent returning to the same water body. This category requires a Water Quality Certificate (WQC) and has discharge conditions applied. The second category is for discharges from CDFs accepting material from single or multiple dredging locations in a different surface water body, or from "unidentified" sites. This category requires a NJPDES/Discharge to Surface Water (DSW) permit.

If a CDF undergoing permitting does not qualify for exemption from testing, certain testing requirements for the NJPDES/DSW and WQC must be followed. Testing could include bulk sediment chemistry, sediment elutriate analysis, and receiving water quality. Mixing zone modeling studies may also be required.

Groundwater Discharges. Dredged materials are included as a pollutant in the New Jersey Water Pollution Control (WPC) Act. Because the upland placement of dredged material represents a potential discharge of contamination, an upland CDF is subject to

regulation pursuant to NJPDES regulations (N.J.A.C. 7:14A-1) and Groundwater Quality Standards (GWQS; N.J.A.C. 7:9-6). Dredged material may leach contaminants into the subsurface environment, which may degrade water quality and threaten potable water supplies. Regulatory agencies would monitor/regulate the disposal operation to ensure that groundwater resources are protected.

Discharges from an upland CDF are regulated based on NJPDES regulations and the GWQS. The NJPDES-DGW permitting process for an upland CDF includes one or all of the following:

i. Preliminary determination of leachate quality from dredged sediments.

ii. Groundwater Protection Plan. This plan must demonstrate that the annual discharge from the upland CDF will not result in a contravention of the GWQS. The plan must include at the very least: (1) an engineering design and construction plan; (2) a detailed operation and maintenance plan; (3) a detailed evaluation of potential contaminant migration pathways; and (4) a contaminant transport model that simulates groundwater contaminant migration pathways for the active duration of the CDF, including post-closure.

iii. NJPDES-DGW permit. A NJPDES-DGW permit is issued for every upland CDF requiring a Groundwater Protection Plan. The permit may require any or all of following: (1) installation and periodic sampling of groundwater monitoring wells; (2) in situ leachate monitoring through lysimetry (soil percolation testing); (3) liner and/or leachate collection system monitoring; and (4) leachate quality analysis of dredged material.

Two types of CDFs, Type A or Type B, are recognized. Type A CDFs are disposal sites for dredged material from a specific source. As the source is known, determination of leachate quality can be made prior to proceeding with the Groundwater Protection Plan. Type B CDFs are constructed independently and are not designated for receipt of dredged material from a specific dredging project. Therefore, leachate quality cannot be evaluated prior to development of the Groundwater Protection Plan. The regulatory options for Type B CDFs are ii and iii listed above.

If wetlands are present at the site of a proposed upland CDF, a freshwater or tidal water wetlands permit is required (J. Peccholi, NJDEP, per. commun., 31 July 1996).

The estimated time required to complete the permitting process for the NJPDES-DSW and DGW and the wetlands permitting process is one year (J. Peccholi, NJDEP, per. commun., 31 July 1996). Contracting engineering studies, conducting the studies, and

preparing the required documentation could take an additional year. Therefore, the likely duration of design and permitting for a site that has already been purchased is approximately two years.

SUMMARY OF POTENTIAL UPLAND DISPOSAL SITES

Selection criteria for Newark Bay CDFs presented in Chapter 1.0 were applied to upland disposal sites identified in Dames & Moore (1996). Sites near Newark Bay are:

- NJ-159 (USACE 1996), 109 acres.
- NJ-172 (USACE 1996), 209 acres.
- NJ-161 (USACE 1996), 167 acres.
- The OENJ site, located south of the Port Elizabeth Marine Terminal. This site is currently (summer 1996) being used by the Port Authority as an example or pilot program to demonstrate that dredged material can be employed for beneficial use.

A number of sites were not considered feasible because the use of the sites will be for sediment reprocessing and the necessary permits for this reprocessing would not be available prior to fall of 1997. These sites include the Glennon Tank Farm in Elizabeth, New Jersey, and the Rossville Marine Terminal on Staten Island just south of the Fresh Kills Landfill.

A description of each upland disposal site is presented below. A comparative summary of upland disposal sites is presented in Table A2.01-1.

NJ-159: This 109-acre (0.44-km^2) site is located in the Borough of Leonia, Bergen County, New Jersey. It is located on the Weehawken, NY-NJ, U.S. Geological Survey (USGS) quadrangle. This site overlaps with a site identified in a previous upland siting study, N56 (USACE-NYD 1984). The site, adjacent to Overpeck Creek, has a potential for the existence of wetlands. There are no Natural Heritage Program (NHP) designated rare and endangered species on site, no water supply intakes within 2 miles (3.2 km) of the site, and no prime agricultural soil onsite. The site's soil type is udorthents, a refuse substratum, and the thickness of this unit is 3 ft deep or greater. The permeability is variable, but generally ranges from very rapid to moderate. The site is not in a U.S. Environmental Protection Agency (EPA) or state designated sole-source aquifer area. The site could be accessed by railway, waterway, or highway.

As discussed above, Overpeck Creek is a surface water resource located on the west side of NJ-159. About 1 mile downstream, Overpeck Creek connects with the Hackensack River, which flows into Newark Bay. Within 2 miles (3.2 km) east of the site is the

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Table A2.01-1

Comparative Summary of Upland Disposal Sites

Site	Location	Distance From Tidewater	Adjacent Land Use	Within Sole-Source Aquifer	On-site Surface Water	On-site or Adjacent Parks & Wildlife	Access	Property Ownership	Capacity/ Availability/ Permitability	Capital/ Operating Costs
NJ-159	Bergen Co., New Jersey	7.9 miles	Light industry, residential, parks	No	Yes	Adjacent park	Rail, highway, waterway	Public	1.4 mil CY/ potential/two years	
NJ-172	Hudson Co., New Jersey	4000 ft	Light industry, vacant, NJ Turnpike	No	Yes	Rare species	Rail, highway, waterway	Public (majority), private	600 k to 1 mil CY/doubtful/two years	
NJ-161	Bergen Co., New Jersey	2 miles	Airport, light industry, residential	No	Small stream	Potential for rare species	Highway	Public	1.95 mil CY/ strong potential/ two years	
OENJ	Union Co., New Jersey	Adjacent	Heavy industry, retail	No	Great ditch	No	Rail, highway, waterway	Private	150k to 1 mil CY/ presently receiving/permitted	

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Hudson River. Bellmans Creek is about 1 mile (1.6 km) to the south and flows into the Hackensack River.

Based on the site reconnaissance that took place on 12 June 1996, NJ-159 is a densely vegetated area along Overpeck Creek and is currently almost completely unused. A portion of the site, however, was being used for rubble disposal. Access to the rubble area is provided by a 10-ft (3.0 m) wide roadway that appears to have been constructed with approximately 4 ft (11.3 m) of fill. The roadway looks fairly new, although no other use for the road except access the rubble pile was observed. The vegetation covering nearly the entire site is a tall reed-type grass, standing about 10 ft tall, and some established trees. The standing water and Phragmites-type vegetation suggest that portions of this site may be considered jurisdictional wetlands under the Clean Water Act or New Jersey Freshwater Wetlands regulations. A formal delineation of the vegetation and wetlands was not made.

Bedrock exposures were not observed. There was evidence suggesting that the area may have been formerly used as a landfill because of observed debris, such as rusted cans and old tires incorporated into the soil. However, this material may have been brought to the site with fill material. There were no methane vents or hazardous materials or waste observed.

Land uses observed adjacent to NJ-159 include Overpeck Creek to the west which is about 800 ft (24.5 m) wide. To the east is a railroad track and beyond that is a community swimming pool, a school and synagogue, some residences and Sylvan Park. These land uses are estimated to be 400 to 1000 ft (120 to 300 m) away from the site. To the north is Station Park which is used for horseback riding and picnicking. To the south, are a construction company and other light industry. There is no activity immediately adjacent to Overpeck Creek or to the south of the site.

The municipality office for NJ-159 (Leonia Borough Hall) was visited on the same day as the site visit. The current records indicate that the land is owned by County of Bergen and is tax exempt. This information was viewed on the tax assessor's map (Sue Kay, 201-592-5748). The area is zoned A-2, or single family homes. This was discussed on the telephone on 13 June 1996 in a conversation with the building zoning office (201-592-5744).

NJ-161: NJ-161 is located on the Weehawken, NY-NJ, USGS 7.5-min quadrangle, in the Borough of Moonachie, Bergen County, New Jersey. The site is 167 acres (0.68 km^2). Based on the exclusionary screening process and previously collected data on selected evaluation factors, there are no parks or recreational or wildlife areas within 2 miles (3.2 km) of the site, although the site is immediately adjacent to Teterboro Airport. There is no prime agricultural soil at the site, but there is a potential for the existence of

a wetlands, given that the survey indicates that soils are frequently flooded and soils with wet substratum-type (i.e., sulfihemists, sulfaquents, and udorthents) are present. Soil thickness can be from 6 to 10 ft (2 to 3 m) and permeability is rapid or very rapid. Within 1.5 miles (2.4 km) of the site is a species on the NHP-rare or endangered species list. The site is not in an EPA- or state-designated sole-source aquifer protected area. There are no water supply intakes within a 2-mile (3.2-km) radius of the site. There is a potential for highway access to the site.

Surface water resources observed on the Weehawken quadrangle include the Hackensack River, about 1.5 miles (2.4 km) to the east of NJ-161. The Passaic River is 2 miles to the northwest. The Eight Day Swamp is about 3500 ft (1070 m) to the south of the site. Berrys Creek is about 3000 ft (910 m) south from the site. Other creeks within 1 mile (11.6 km) of the site in the direction of the Hackensack River are Bashes Creek, Moonachie Creek, Doctor Creek, and Losen Slofe.

The site reconnaissance was conducted on 12 June 1996. NJ-161 is enclosed by a chain-link fence with barbed wire on top. "No Trespassing" signs all along the perimeter fence indicate that the site is owned by the Port Authority of New York and New Jersey. Port Authority ownership was confirmed at the Town Hall as discussed below. The site is heavily vegetated with tall trees and grass. There was no apparent use of the site other than as a buffer for Teterboro Airport to the north. The airport is small and active, with small-engine planes and helicopters landing and taking off. No wetlands were observed, but a wetlands delineation was not conducted. There is a shallow, approximately 3-ft (1.0-m) wide creek that flows through the site. Bedrock exposures and hazardous material or waste were not observed.

Land use to the west of NJ-161 includes railroad tracks and Highway 17. To the east of the site is an aeronautics school. As previously mentioned, north of the site is an airport, as well as some light industry. Land use south of the site is light industry and residential across Moonachie Street.

A visit to the Moonachie Town Hall occurred on 20 June 1996. The site consists of Block 76, Lot 1.02, and is owned by the Port Authority of New York. The area is zoned for manufacturing (201-641-1813).

NJ-172: NJ-172 is a 209-acre (0.87-km^2) parcel located in the Town of Kearny, Hudson County, New Jersey. It is within the Orange, NJ, USGS quadrangle. Based on the exclusionary screening process and previously collected data on selected evaluation factors, the site appears to be dissected by several streams and has a potential for the existence of wetlands. There are no parks or recreational or wildlife areas within a 2-mile (3.2-km) radius of the site. There is a documented Priority List NHP-designated rare and endangered species on the site. Only a generalized soil survey is available for

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Hudson County, so soil thickness and permeability are unavailable. There are no water supply intakes within 2 miles (3.2 km) of the site and no prime agricultural soil at the site. The site is not in an EPA- or state-designated sole-source protection area. There is a potential for railway, waterway, and highway access to the site. Surface water resources within 2 miles (3.2 km) of the site includes the Passaic River, which is about 1 mile (1.6 km) to the west.

The site reconnaissance was conducted on 12 June 1996. NJ-172 is mostly vegetated, although a portion of the site is used as a garbage dump. Some light industry, including a metal drum storage facility and a portable toilet company were also observed. As the site's property boundaries were not readily apparent in the field it could not be determined whether the two facilities are located on NJ-172. The metal drums were apparently empty but this condition was not verified. Observed vegetation consisted of grass and medium-sized trees. No water bodies were observed and the creeks present on the USGS quadrangle were not observed and may be piped below ground. Exposed bedrock was not observed.

To the west of NJ-172, light industry, such as a recycling company and a sand and gravel facility, was observed. To the east, vegetation similar to that observed on site was present and it is unclear why the area to the east was not included in the site acreage during the initial screening process. On the north side of the site is light industry and to the south is the New Jersey Turnpike.

The Town of Kearny Municipal Office was visited, and it was found that there are multiple owners of the site (see table below). However, the majority of the property is owned by the Town of Kearny and is tax exempt. This information was obtained at the tax assessor's office (201-955-7980). The area is zoned mostly for manufacturing but a portion is also zoned for limited industry.

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NJ-172 Ownership Information

Block & Lot	Owner
Block 253, Lot 5A	Ann Newark, et al. 280 Highwood Ave, Tenafly, NJ
Block 253, Lot 5B	Port O San Corp 450 Bergen Ave, Kearny, NJ 07032
Block 205, Lots 25 & 28	John P Keegan 18 Sommerset Dr, Rumson, NJ 07760
Block 205, Lot 26A	S Malz & Sons, Inc 54 Saratoga Dr, Oakland, NJ 07436
Block 205, Lot 26B	John Coppola, etux 265 Green Ave, Lyndhurst, NJ 07071
Block 205, Lots 31, 32 & 33	Hudson Mead Urb Renew % Kings Court 525 Riverside Ave, Kearny, NJ 07071
Block 205, Lots 18, 27, 24, 29, 30, & 19; and Block 286, Lot 4	Town of Kearny 402 Kearny Ave, Kearny, NJ 07032
Block 286, Lot 5 & 6A	JJ Realty Co, Joseph Supor 2 Bergen St, Harrison, NJ 07029
Block 286, Lot 2	Conrail Corp % Prop Tax Dept PO Box 8499, Philadelphia, PA 19101
Block 286, Lot 7	H Kohnstamm & Co % Univer Flavors 5600 W Raymond St, Indianapolis, IN 46241

OENJ Site: This site is located south of the Port Elizabeth Marine Terminal and is the available upland disposal site closest to Newark Bay. Dredged material is transported via barge to a transfer station. The available capacity of this site for dredged material disposal as currently permitted is 150,000 CY (114,690 CM); however, the total fill needed for the site could utilize as much as 1,000,000 CY (764,600 CM). Regardless of the ultimate capacity of the OENJ site, the capacity of this site is not enough to address the overall dredging needs of the Newark Bay watershed, in part because the site will not be available for disposal operations after October 1997. The site is owned by the Orion Corporation. The Port Authority has a lease with the property owner for dredged material disposal. Surrounding land uses include industrial and port facilities. Transportation access is satisfactory. Physical characteristics of the site include disturbed land.

REFERENCES

New Jersey Department of Environmental Protection (NJDEP). 1996. The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters. March 1996.

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APPENDIX 3.04

OCEAN DISPOSAL TESTING

APPENDIX 3.04 - OCEAN DISPOSAL TESTING

On 27 March 1996, the U.S. Army Corps of Engineers, New York District, with the concurrence of the United States Environmental Protection Agency, provided a sampling and testing program to the Port Authority of New York and New Jersey for the purpose of determining the suitability of Holocene sediments (unlithified black organic silty clay) in the three proposed project areas in Newark Bay for ocean disposal. The sampling and testing plan was developed based upon information submitted by the Port Authority and discussions between the Port Authority and these agencies.

The primary criteria used to develop the sampling and testing program were the nature of the stratigraphic succession, the proposed mode of construction, and chemical and geotechnical data from boreholes drilled during feasibility studies. For testing purposes the stratigraphic succession was divided into 2 layers:

1. an upper layer of black organic silty clay that extends to approximately 20-25 ft below mean low water and

2. a bottom layer that extends to project depth of 70 ft below mean low water and consists of a variable thickness gray sand that underlies the upper layer and a red-brown clay with minor silt.

For sampling and testing purposes it was determined that the upper surface of the gray sand layer marked the end of the upper layer and the beginning of the lower layer. Borehole data from feasibility studies indicated no significant stratification in the upper layer. However, if during sampling any core that revealed a stratum 2 ft or more thick and significantly different in grain size, the material was to be separated and archived.

Chemical data from feasibility study cores was analyzed. Data from discrete intervals below the 20 ft level indicated very low or non-detect values for various metals. This was interpreted as indicating that these sediments represented pre-industrial deposition. They were excluded from testing in accordance with 40 Code of Federal Regulations (CFR) Parts 227.13(b)(1) and 227.13(b)(3)(iii).

The proposed manner of construction was a factor in the decision to exclude the bottom layer material from testing. As currently envisioned, the upper layer material would be dredged with a clamshell to the level of the bottom layer. As mechanical dredging is an inexact science and the upper layer thickness varies within and between project sites, it is anticipated that some part of the bottom layer will be removed by clamshell dredge. If any contaminants had leached into the upper part of the lower layer they would be disposed of with the upper layer. After complete removal of upper level material, a marine excavator or dipper dredge would be brought in to dredge the site to project depth.

APPENDIX 3.07

REGULATORY AGENCY RESPONSE LETTERS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
927 North Main Street (Bldg. D1)
Pleasantville, New Jersey 08232

Tel: 609-646-9310
FAX: 609-646-0352

IN REPLY REFER TO:

PL-NY-96/95

May 15, 1996

Mr. Joseph J. Seebode
Chief, Regulatory Branch
U.S. Army Corps of Engineers
New York District
Jacob K. Javits Federal Building
New York, New York 10278-0090

Dear Mr. Seebode:

This responds to your April 2, 1996 letter to the U.S. Fish and Wildlife Service (Service) regarding Application Number 95-04370-J1. The applicant, the Port Authority of New York and New Jersey, is proposing to construct a Confined Disposal Facility (CDF) in Newark Bay to be used for the disposal of contaminated dredged material. As currently proposed, the CDF would consist of three subaqueous pits that would be excavated and then filled with contaminated dredged material. The dredged material would be generated from various Port-related dredging projects within 5 to 8 miles of the CDF. According to your April 2 correspondence, the Army Corps of Engineers, New York District (Corps), is in the process of preparing a Draft Environmental Impact Statement (DEIS) for the proposed project and requested information from the Service regarding the presence of any federally listed threatened or endangered species in the vicinity of the proposed project, and potential effects of the proposed project on federally listed species.

Authority

This response is provided pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) to ensure the protection of endangered and threatened species, and does not address all Service concerns regarding the proposed project. These comments do not preclude separate review and comment by the Service as afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*), nor do they represent comments on the DEIS for this proposed project pursuant to the National Environmental Policy Act of 1969 (83 Stat. 852, as amended; 42 U.S.C. 4321 *et seq.*).

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Federally Listed Threatened and Endangered Species

A review of Service files indicates that the federally listed endangered peregrine falcon (*Falco peregrinus*) is known to nest on a number of bridges in the vicinity of Newark Bay, including the Goethals Bridge over the Arthur Kill, the General Pulaski Skyway over the Hackensack River, the Bayonne Bridge over the Kill Van Kull, and the I-280 Bridge over the Passaic River. Peregrine falcons feed mostly on shorebirds, waterfowl, and passerines, and may travel 10 to 18 miles in search of prey and seek feeding opportunities in marshes and riparian areas where these prey concentrate. Due to their high position on the food chain, peregrine falcons are sensitive to the effects of bioaccumulating environmental contaminants such as dioxins and polychlorinated biphenyls. Therefore, if construction and / or use of the CDF were to cause resuspension of contaminated sediments, these and other contaminants could be transported up the food chain and result in adverse impacts to peregrine falcons.

The lead federal agency for a project has the responsibility under Section 7(c) of the Endangered Species Act to prepare a Biological Assessment, if the proposal is a major construction project that requires an EIS. The assessment should contain information concerning federally listed species and any species proposed for listing that may be present in the action area and an analysis of any potential effect of the proposed action on such species. The following may be considered for inclusion in a Biological Assessment of the proposed project, although actual contents are at the discretion of the federal authorizing agency:

(1) results of field surveys to determine if listed species are present or occur seasonally;

(2) views of recognized experts on the species;

(3) literature review;

(4) analysis of direct, indirect, and cumulative effects of the action on the species; and,

(5) analysis of alternative actions.

Biological Assessments may be consolidated with interagency cooperation procedures required by other statutes such as the Fish and Wildlife Coordination Act or the National Environmental Policy Act of 1969. The satisfaction of the requirements of these other statutes, however, does not in itself relieve a federal agency of its obligation to comply with the Biological Assessment procedures of the Endangered Species Act. The results of a Biological Assessment may be incorporated into the DEIS. If the Biological Assessment indicates that no listed or proposed species are present or will be affected, and the Service concurs in writing with the assessment, then no formal consultation pursuant to Section 7 will be required.

The Corps must prepare a Biological Assessment to address the above-mentioned potential contaminant impacts to peregrine falcons. The Biological Assessment

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must address the potential impact of resuspension of contaminants, through construction and subsequent use of the CDF, on peregrine falcons and include an assessment of the effects of bioaccumulation and biomagnification.

It is likely that the construction and use of the CDF would result in at least some resuspension and redistribution of contaminated sediments. If this redistribution were wide spread it could adversely affect aquatic biota throughout the New York Harbor area. The federally listed threatened piping plover (*Charadrius melodus*) is known to nest along sandy beaches in the Lower New York Harbor. The DEIS must assess the potential extent of redistribution of contaminated sediments. If it is determined that there is a reasonable potential for the proposed project to result in the redistribution of contaminated sediments in the Lower New York Harbor area, then the Biological Assessment must also address potential project-related impacts to piping plovers. The Service's New York Field Office can provide the most up-to-date information regarding the location of nesting piping plovers and can be reached at the following address:

U.S. Fish and Wildlife Service
New York Field Office
3817 Luker Road
Cortland, New York 13045
(617/753-9334)

Except for peregrine falcon, piping plover and an occasional transient bald eagle (*Haliaeetus leucocephalus*), no other federally listed or proposed threatened or endangered flora or fauna under Service jurisdiction are known to occur in the project area. Principle responsibility for threatened and endangered marine species is vested with the National Marine Fisheries Service (NMFS). For these species, the NMFS must be contacted to fulfill consultation requirements pursuant to Section 7(a)(2) of the Endangered Species Act. The Service recommends that the Corps contact the NMFS at the following address:

National Marine Fisheries Service
Habitat and Protected Resources Division
James J. Howard Marine Sciences Laboratory
Highlands, New Jersey 07732
(908/872-3037)

In regard to State-listed species, the New Jersey Natural Heritage Program provides the most up-to-date data sources for State-listed species, and may be contacted at the following addresses:

Mr. Thomas Breden
New Jersey Natural Heritage Program
Division of Parks and Forestry
CN 404
Trenton, New Jersey 08625
(609/984-0097)

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The above comments represent the public interest for the protection of federally listed species. Should you have any questions regarding these comments or require further assistance regarding federally listed species, please contact Peter Benjamin or Annette Scherer of my staff.

Sincerely,

Clifford G. Day
Supervisor

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State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
DIVISION OF PARKS AND FORESTRY
HISTORIC PRESERVATION OFFICE
CN-404
TRENTON, N.J. 08625-0404
TEL: (609) 292-2023
FAX: (609) 984-0578

Robert C. Shinn, Jr.
Commissioner

HPO-D96-124
April 18, 1996

Mr. Joseph J. Seebode
Chief, Regulatory Branch
Department of the Army New York District
Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

ATTN: Mr. Marc Helman

RE: Essex County, City of Newark
Port Authority of New York and New Jersey
Confined disposal in three locations in Newark Bay

Dear Mr. Seebode:

Thank you for your recent letter regarding the proposed subaqueous pits within Newark Bay and your request for information regarding resources within the area of potential project impact. The Office does not have any information on resources within the specific locations slated for pit excavation. However, the ACOE's dredging and drift removal projects, particularly the c. 1980 New York Harbor Collection and Removal of Drift and the c. 1976 Kill van Kull and Newark Bay Channel Dredging Project identified numerous shipwrecks, sculled vessels, and other historic resources in the current project's vicinity, demonstrating the resource potential of this general area.

Given that loose sediments (i.e. the black organic silty clay) exist down to 18 to 25 feet below mean low water, it appears that these waters were deeper in historic times. If this was the case, they possess the potential to contain shipwrecks, scuttled vessels, or other marine-related cultural resources. I recommend at this time that you request analysis of the cultural resource potential of this area of your in-house archaeological staff. Using the results of earlier surveys, historic maps, etc. the resource potential and appropriate recommendations for additional work should become apparent.

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Thank you again for your request for information and your initial Section 106 consultation on this project. If you have any questions, please contact Deborah Fimbel, Historic Preservation Office staff reviewer for this project.

Sincerely,

Dorothy P. Guzzo
Deputy State Historic
Preservation Officer

DPG:DRF
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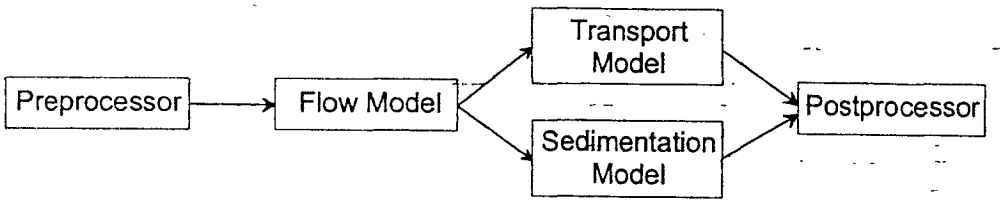
APPENDIX 4.02

PHYSICAL OCEANOGRAPHY
MODEL INFORMATION DESCRIPTION

THE TABS-2 SYSTEM

TABS-2 is a collection of generalized computer programs and utility codes integrated into a numerical modeling system for studying two-dimensional hydrodynamics, transport and sedimentation problems in rivers, reservoirs, bays, and estuaries. A schematic representation of the system is shown below:



It can be used either as a stand-alone solution technique or as a step in the hybrid modeling approach. The basic concept is to calculate water surface elevations, current patterns, transport and sediment erosion and deposition, the resulting bed surface elevations and the feedback to hydraulics. Existing and proposed geometry can be analyzed to determine the impact of project designs on flow circulation and sedimentation in the system. The three basic components of the modeling system are as follows: 1) A two-dimensional model for free surface flow (RMA-2), 2) Two-dimensional finite element program for water quality (RMA-4), and 3) Sediment transport in unsteady two - dimensional flows, horizontal plane (STUDH). All models are solved by the finite element method using Galerkin weighted residuals.

RMA-2

RMA-2 is a finite element solution of the Reynolds form of the Navier-Stokes equations for turbulent flows. Friction is calculated with Manning's equation and eddy viscosity coefficients are used to define the turbulent losses. A velocity form of the basic equation is used with side boundaries treated as either slip or static. The model automatically recognizes dry element and corrects the mesh accordingly. Boundary conditions may be

water-surface elevations, velocities, or discharges and may occur inside the mesh as well as along the edges.

The generalized hydrodynamic two-dimensional flow model solves the depth-averaged equations of fluid mass and momentum conservation and accounts for friction losses, eddy viscosity, Coriolis forces, and surface wind stresses. The form of equations is:

$$h\frac{\partial u}{\partial t}+uh\frac{\partial u}{\partial x}+vh\frac{\partial u}{\partial y}+gh\frac{\partial a}{\partial x}+gh\frac{\partial h}{\partial x}-h\frac{e_{xx}}{\rho}\frac{\partial_2 u}{\partial y^2}+Sf_x+\tau_x = 0$$

$$h\frac{\partial v}{\partial t} + uh\frac{\partial v}{\partial x} + vh\frac{\partial v}{\partial y} + gh\frac{\partial a}{\partial y} - h\frac{e_{yy}}{\rho}\frac{\partial^2 v}{\partial x^2} + Sf_y + \tau_y = 0$$

where:

u,v	=	x and y velocity components
t	=	time
h	=	water depth
a	=	bottom elevation
g	=	gravitational acceleration
ρ	=	density of water
Sf_x	=	bottom friction loss term in x-direction
Sf_y	=	bottom friction loss term in y-direction
t_x	=	wind and Coriolis stresses in x-direction
t_y	=	wind and Coriolis stresses in y-direction
e_{xx}	=	eddy viscosity term in xx plane
e_{xy}	=	eddy viscosity term in xy plane
e_{yx}	=	eddy viscosity term in yx plane
e_{yy}	=	eddy viscosity term in yy plane

Wind stress can be computed using the following formula:

$$\tau_S = 3.8 \cdot 10^{-6} W^2$$

where τ_s is wind stress (lb/ft/sec$_2$) on the water surface and W is the wind speed in miles per hour at 10 meters above the water surface.

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RMA-4

RMA-4 is the constituent transport model that simulates two-dimensional depth-averaged constituent transport in rivers and estuaries. The model solves the governing equation of constituent transport (convective-diffusion with source-sink terms) over the same finite element mesh as the hydrodynamic model (RMA-2). The governing equation is:

$$h\left(\frac{\partial C}{\partial t}+u\frac{\partial C}{\partial x}+v\frac{\partial C}{\partial y}-D_x\frac{\partial^2 C}{\partial x^2}-D_y\frac{\partial^2 C}{\partial y^2}-\sigma+kC\right) = 0$$

where:

C	=	constituent concentration
Dx	=	dispersion coefficient in x-direction
Dy	=	dispersion coefficient in y-direction
σ	=	pollutant source
k	=	pollutant sink rate

STUDH

The sedimentation and scour model solves two-dimensional depth-averaged convection-diffusion equations of sediment with the bed source terms. These terms are structured for either noncohesive sediment (sand) or cohesive sediment (clay). The Ackers and White (1973) procedure is used to calculate a sediment transport potential for the sand from which the actual transport is based on availability. Clay erosion is based on work by Partheniades (1962) and Ariathurai (1974) and the deposition of clay utilizes Krone's equations (Ariathurai, MacArthur, and Krone, 1977). The model considers a single, effective grain size for either sand or clay and treats them separately. The same finite element mesh as that use for the hydrodynamics model is used. The convection-dispersion equation in two horizontal dimensions for a single sediment constitute solved by the model is:

$$\frac{\partial C}{\partial t}+u\frac{\partial C}{\partial x}+v\frac{\partial C}{\partial y}=D_x\frac{\partial^2 C}{\partial x^2}+D_y\frac{\partial^2 C}{\partial y^2}+\alpha_1 C+\alpha_2$$

where:

u,v	=	depth-averaged x and y velocity components
C	=	suspended sediment concentration
Dx	=	turbulent diffusion coefficient in x direction
Dy	=	turbulent diffusion coefficient in y direction
α_1	=	coefficient of concentration-dependent source/sink term
α_2	=	coefficient of source/sink term

The source/sink terms in the equation above are computed in routines that treat the interaction of the flow and the bed. Separate sections of the code handle computations for clay bed and sand bed problems.

Sand Transport

The source/sink terms are evaluated by first computing a potential sand transport capacity for the specified flow conditions, comparing that capacity with the amount of sand actually being transported, and then eroding from or depositing to the bed at a rate that would approach the equilibrium value after sufficient elapsed time.

The potential sand transport capacity in the model is computed by the method of Ackers and White (1973), which uses a transport power (work rate) approach. It has been shown to provide superior results for transport under steady-flow conditions (White; Milli and Crabbe 1975) and for combined waves and currents (Swart 1976). Flume tests at the U.S. Army Corps of Engineers (USACE) Waterways Experiment Station (WES) have shown that the concept is valid for transport by estuarine currents.

The total load transport function of Ackers and White is based upon dimensionless grain size:

$$D_{gr} = D\left[\frac{g(s-1)}{\nu^2}\right]^{1/3}$$

where:

D_{gr} = dimensionless sediment particle diameter
s = specific gravity of the sediment
ν = kinematic viscosity of the fluid
D = median particle diameter

and a sediment mobility parameter

$$F_{gr} = \left[\frac{\tau^{n'}\tau^{(1-n')}}{\rho g D(s-1)}\right]^{1/2}$$

where:

F_{gr} = dimensional sediment mobility
τ = total boundary shear stress

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n' = a coefficient expressing the relative importance of bed-load and suspended-load transport
τ' = boundary surface shear stress
ρ = density of water

The surface shear stress is that part of the total shear stress due to the rough surface of the bed only, i.e., not including that part due to bed forms and geometry. It therefore corresponds to that shear stress that the flow would exert on a plan bed.

The total sediment transport is expressed as an effective concentration (G_p):

$$G_p = C\left(\frac{F_{gr}}{A} - 1\right)^m \frac{sD}{h}\left(\frac{\rho}{\tau}U\right)^{n'}$$

where:

U = average flow speed
A = dimensionless coefficient

for $1 < Dgr < 60$:

$$n' = 1.00 - 0.56 \log D_{gr}$$

$$A = \frac{0.23}{\sqrt{D_{gr}}} + 0.14$$

for $\log C = 2.86 \log Dgr - (\log Dgr)^2 - 3.53$:

$$m = \frac{9.66}{D_{gr}} + 1.34$$

for $Dgr > 60$:

$$n' = 0.00$$
$$A = 0.17$$
$$C = 0.025$$
$$m = 1.5$$

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The previous equations are used to compute a potential sediment concentration, G_p. This value is the depth-averaged concentration of sediment that will occur if an equilibrium transport rate is reached with a nonlimited supply of sediment. The rate of sediment deposition (or erosion) is then computed as

$$R = \frac{G_p - C}{t_c}$$

where:

C = present sediment concentration
t_c = characteristic time for affecting the transition (larger of two terms as explained below)

For deposition, the characteristic time is:

$$t_c = \text{larger of} \begin{cases} \Delta t \\ \text{or} \\ \dfrac{C_d h}{V_s} \end{cases}$$

and for erosion it is:

$$t_c = \text{larger of} \begin{cases} \Delta t \\ \text{or} \\ \dfrac{C_e h}{U} \end{cases}$$

where
Δt = computational time-step
C_d = response time coefficient for deposition
V_s = sediment settling velocity
C_e = response time coefficient for erosion
h = water depth

The sand bed has a specified initial thickness which limits the amount of erosion to that thickness.

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Cohesive sediments transport

Cohesive sediments (usually clays and some silts) are considered to be depositional if the bed shear stress exerted by the flow is less than a critical value. When that value occurs, the deposition rate is given by Krone's (1962) equation

$$for\, C < C_c \quad S = \frac{-2V_s}{h} C\left(1 - \frac{\tau}{\tau_d}\right)$$

$$for\, C < C_c \quad S = \frac{-2V_s}{hC_c^{4/3}} C^{5/3}\left(1 - \frac{\tau}{\tau_d}\right)$$

where

S = source term
V_s = fall velocity of a sediment particle
h = flow depth
C = sediment concentration in water column
τ = bed shear stress
τ = critical shear stress for deposition
C_c = critical concentration = 300 mg

If the bed shear stress is greater than the critical value for particle erosion, material is removed from the bed. The source term is then computed by Ariathuarai's (Ariathurai, MacArthur, and Krone 1977) adaptation of Partheniades' (1962) findings:

$$S = \frac{P}{h}\left(\frac{\tau}{\tau_e} - 1\right) for\ \tau > \tau_e$$

where P is the erosion rate constant, unless the shear stress is also greater than the critical value for mass erosion. When this value is exceeded, mass failure of a sediment layer occurs, and:

$$S = \frac{T_L P_L}{h\Delta t}\ for\ \tau > \tau_s$$

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where:

T_L = thickness of the failed layer
P_L = density of the failed layer
Δt = time interval over which failure occurs
τ_s = bulk shear strength of the layer

The cohesive sediments beds consist of 1 to 10 layers, each with a distinct density and erosion resistance. The layers consolidate with overburden and time.

Bed Shear Stress

Bed shear stresses are calculated from the flow speed according to one of four optional equations: (1) the smooth-wall log velocity profile or (2) Manning equation for flows alone; and (3) a smooth bed or (4) rippled bed equation for combined currents and wind waves. Shear stresses are calculated using the shear velocity concept, where:

$$\tau_b = pu_*^2$$

where

τ_b = bed shear stress
u_* = shear velocity

and the shear velocity is calculated by one of four methods:

1. Smooth-wall log velocity profiles

$$\frac{\overline{u}}{u_x} = 5.75 \log\left(3.32\frac{u_x h}{\nu}\right)$$

which is applicable to the lower 15% of the boundary layer, when:

$$\frac{u_* h}{\nu} > 30$$

where $\overline{u}$ is the mean flow velocity (resultant of u and v components)

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2. The Manning shear stress equation

$$u_* = \frac{(\bar{u}n)\sqrt{g}}{\sqrt{CME(h)}^{1/6}}$$

where CME is a coefficient of 1 for SI (metric units) and 1.486 for non-SI units of measurement.

3. A Jonsson-type equation for surface shear stress (plane beds) caused by waves and currents:

$$u_* = \sqrt{\frac{1}{2}\frac{(f_w u_{om} + f_c \bar{u})}{(\bar{u} + u_{om})}\left(\bar{u} + \frac{u_{om}^2}{2}\right)}$$

where:

f_w =shear stress coefficient for waves
u_{om} =maximum orbital velocity of waves
f_c =shear stress coefficient for currents

4. A Bijker-type equation for total shear stress caused by waves and current

$$u_* = \sqrt{\frac{1}{2}f_c\bar{u}^2 + \frac{1}{4}f_w u_{om}^2}$$

Finite Element Mesh

The models described above require that the estuarial system be represented by a network of nodal points (i.e., points defined by coordinates in the horizontal plane and water depth) and elements (i.e., areas made up by connecting adjacent nodal points). Nodes can be connected to form 2-dimensional (three or four nodes) or 1-dimensional elements (two nodes). The resulting nodal/element network is commonly called a finite element mesh and provides a computerized representation of the estuarial geometry and bathymetry.

The two most important aspects in the laying out of a finite element mesh are: (1) determining the level of detail necessary to adequately represent the study area, and (2)

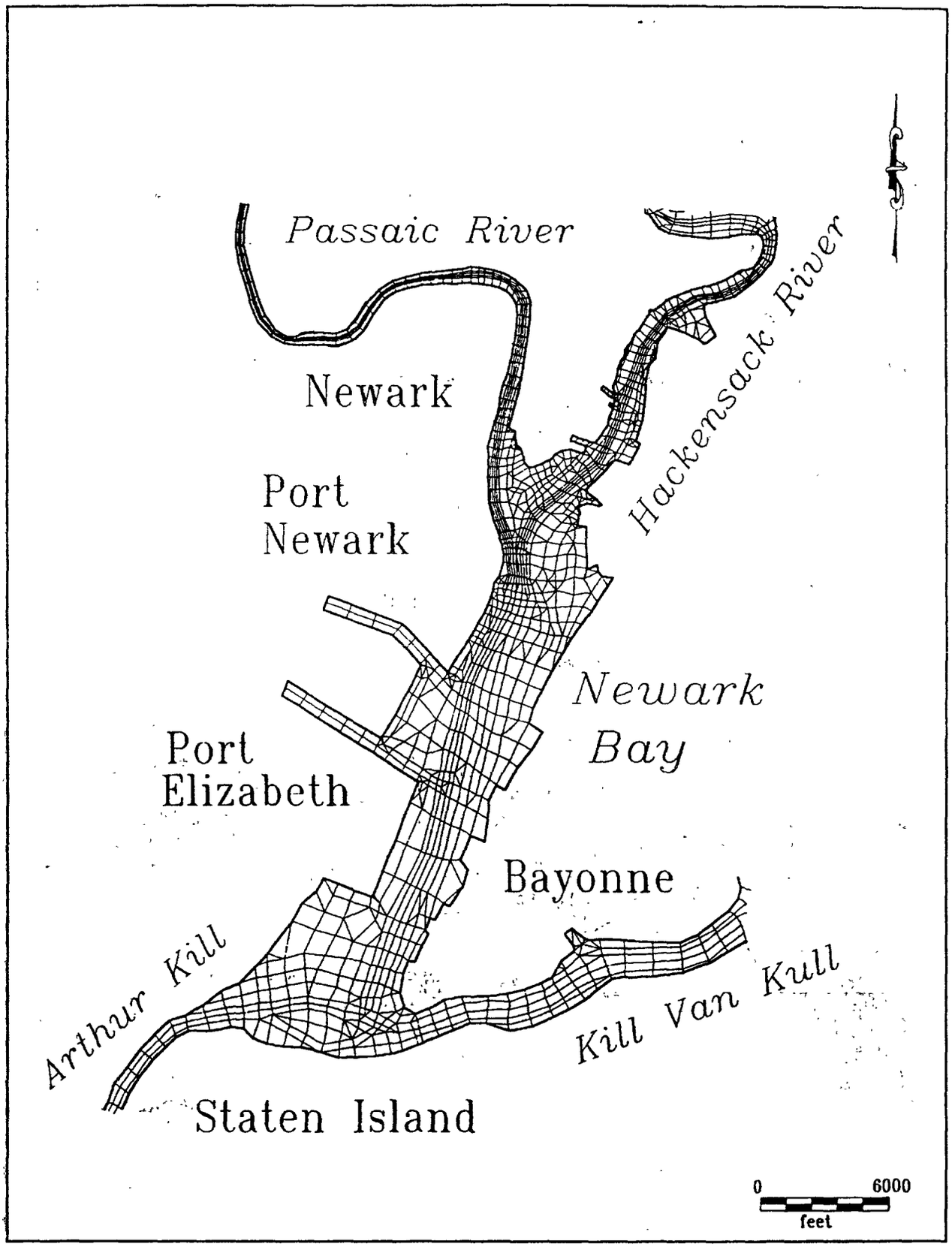

Figure A4.02-2

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Finite Element Mesh for Hydrodynamic Model

Model Calibration

WES calibrated and verified the finite element model with field measurements in order to assure accurate representation of tidal flows within the modeled estuarial system. Upon satisfactory calibration and verification, the model can then be used to evaluate the impacts of proposed changes on the system. The calibration process is a matter of adjusting model parameters so that model predictions match field observations reasonably well.

Hydrodynamic model calibration is best achieved by means of a set of simultaneous measurements both along the model boundaries and throughout the estuarial system. Boundary conditions important to the present study include tidal elevation, flow velocities, and freshwater discharge. For a given set of boundary conditions, the model is calibrated to reproduce tidal elevations and tidal velocities within the estuary by choosing appropriate controlling parameters. The hydrodynamic model was calibrated against field measurements using Troy Dam discharge along the northern boundary at the Hudson River boundary, freshwater discharge from the Passaic and Hackensack rivers, and recorded time-varying tidal elevation and velocities at the other model boundaries.

ACRONYMS

ARCS	Assessment and Remediation of Contaminated Sediments Program
AVS	acid-volatile sulfide(s)
BCD	base catalyzed decomposition
BHC	benzene hexachloride
C/B	cost-benefit
CCMP	Comprehensive Conservation and Management Plan
C&GS	U.S. Coast & Geodetic Survey
cm	centimeter
CSO	Combined Sewer Overflow
CY	cubic yards
DDD	dichloro diphenyl dichlor
DDE	dichloro diphenyl ethylene
DDT	dichloro diphenyl trichlor
DEP	Department of Environmental Protection
DMMIWG	Dredged Material Management Integration Work Group
DMMP	Dredge Material Management Plan
DMRP	Dredge Material Research Program
DO	dissolved oxygen
EAS	environmental assessment statement
EC	Executive Committee
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency (also USEPA)
ERL	effects range-low
ERM	effects range-median
FDA	Food and Drug Administration
FEIS	final environmental impact statement
ft	foot/feet
g	gram
GANTT	project management charts
GIS	Geographical Information System
GLNPO	Great Lakes National Program Office
H_s	significant wave height
HAM	Harbor Area Model
HEP	Harbor Estuary Program
HQUSACE	Headquarters, U.S. Army Corps of Engineers
HARS	Historic Area Remediation Site
in.	inch(es)
IPMP	Initial Project Management Plan
ISC	Interstate Sanitation Commission

ACRONYMS (*continued*)	
km	kilometer
LNG	liquefied nitrogen tanks
LOEL	low observable effects level
m	meter(s)
MCY	million cubic yards
MDS	Mud Dump Site (New York Dredged Material Disposal Site)
mg/kg	milligram per kilogram
mg/l	milligrams per liter
MITRE	Refers to USACE NYD sponsored workshop (1977) at the Mitre Corp. facility
ml	mililiter
MLW	mean low water
mm	milimeter
mph	miles per hour
MPRSA	Marine Protection Research and Sanctuaries Act
NAD	U.S. Army Corps of Engineers/North Atlantic Division
NBCDF	Newark Bay Combined Disposal Facility
NED	National Economic Development
NEPA	National Environmental Policy Act
ng/l	nannogram per liter
NGVD	National Geodetic Vertical Datum
NJDEP	New Jersey Department of Environmental Protection
NJDOH	New Jersey Department of Health
NJGS	New Jersey Geological Survey
NJHHPO	New Jersey Historic Preservation Office
NJNHP	New Jersey Natural Heritage Program
NMGS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NTU	nephelometric turbidity units
NWI	National Wetlands Inventory
NYC	New York City
NYCDPR	New York City Department of Parks and Recreation
NYCDEP	New York City Department of Environmental Protection
NYD	U.S. Army Corps of Engineers/New York District
NYH	New York Harbor
NY/NJ	New York/New Jersey
NYSDEC	New York State Department of Environmental Conservation
PAH	polynuclear aromatic hydrocarbon
PCA	Project Cooperation Agreements
PCB	polychlorinated biphenyl

ACRONYMS (*continued*)	
pg/kg	pico grams per kilogram
ppm	parts per million
ppt	parts per thousand
pptr	parts per trillion
POS	plan of study
R-EMAP	Regional Environmental Monitoring and Assessment Program
ROD	Record of Decision
SOW	scope of work
T_p	peak wave period
TCDD	tetra-chlorodibenzo-p-dioxin
TEPH	total extractable petroleum hydrocarbon
TEQ	toxicity equivalency quotient
TIE	Toxicity Identification Evaluation
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers (also Corps)
USEPA	U.S. Environmental Protection Agency (also EPA)
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VTC	Vessel Traffic Center
VTSNY	Vessel Traffic Service in New York
WES	U.S. Army Corps of Engineers Waterway Experimental Station
WQC	Water Quality Certification
WRDA	Water Resource Development Act
µg/kg	micrograms per kilogram

TERMS	
NEW YORK BIGHT	An area of the Atlantic Ocean near New York Harbor, as shown in Figure 1.0-1.
OCEAN DISPOSAL	Disposal of dredged materials into territorial seas and/or ocean waters, as regulated by the Ocean Dumping Act.
OCEAN WATERS[a]	Those waters of the open seas lying seaward of the baseline from which the territoral sea is measured, as provided for in the Convention on the Territorial Sea and the Contiguous Zone.
OPEN-WATER DISPOSAL	Disposal of dredged materials into waters of the United States, as defined in the Clean Water Act.
TERRITORIAL SEAS[a]	The belt of seas measured from the baseline (mean sea level and the imaginary line between Rockaway Point and Sandy Hook) along that portion of the coast which is in direct contact with the open sea, in the line marking the seaward limit of inland waters, and extending seaward a distance of 3 miles.

[a]USEPA Region II-DRAFT definitions language, Patricia Barnwell Pechko (12 April 1995).

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