DISPOSAL OF CONTAMINATED SEDIMENT FROM THE PORT OF NEW YORK

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University of Rhode Island

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16. Abstract

The Port of New York and New Jersey has experienced nearly continuous dredging, and a significant quantity of these sediments have required special treatment because of the levels of contaminants present. Through examination of laws, regulatory frameworks, sediment testing protocols, stakeholder positions, litigation, and specific management actions, this case study examines the multiple decision processes that relate to placement of dredged sediments over about a decade.

Primary conclusions include the use of science, regulatory and broader decision process change, and the evolving social values illustrated by both. In New York, the hierarchy of sediment tests proposed in the Green Book has been transformed to specific bioaccumulation tests for benthic organisms with threshold or matrix values. Frequently, thresholds are related to reference sediments as required by law, but the selection of reference sediments remains problematic. Over the decade, regulatory and decision processes were driven by litigation from ocean environmental groups and from prospective ocean dumpers. Strongly held views not easily accommodated by consensual processes such as the Harbor Estuary Program resulted in a Three-Party Letter among senior government officials that, among other objectives, severely curtailed the use of the ocean for sediment disposal. By the decade's end, the Mud Dump Site had become an Historic Area Remediation Site with the potential to accept only a small percentage of the material from harbor dredging. Port development and dredging continued. Thus, valuing the ocean environment and the economic benefits of the port has resulted in increasing use of nearshore and terrestrial environments for disposal.

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Abbreviations

AFB	Alternative Formulation Briefing
CARP	Contamination Assessment and Reduction Project
CCMP	Comprehensive Conservation and Management Plan
Cd	Cadmium
CDF	Confined Disposal Facility
CFR	Code of Federal Regulations
CPIP	Comprehensive Port Improvement Plan
CWA	Clean Water Act
DDT	Dichlorodiphenyltricloroethane
DEC	Department of Environmental Conservation of New York State
DMMIWG	Dredged Material Management Integration Workgroup
DMMP	Dredged Material Management Plan
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
HARS	Historic Area Remediation Site
HEP	Harbor Estuary Program
Hg	Mercury
HNS	Harbor Navigation Study
ITM	Inland Testing Manual
LPC	Limiting Permissible Concentration
MCY	Million Cubic Yards
MDS	Mud Dump Site
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPRSA	Marine Protection Research and Sanctuaries Act
NBCDF	Newark Bay Confined Disposal Facility
NEPA	National Environmental Protection Act
NIMBY	Not In My Back Yard
NMFS	National Marine Fisheries Service
NYD	New York District of the Corps of Engineers
PAH	Persistent Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
ppb	Parts per billion
ppm	Parts per million
pptr	Parts per trillion
PRA	Prime Remediation Area

SCRWG	Sediment Contamination Reduction Workgroup
RMWG	Remediation Material Workshop
SEIS	Supplemental Environmental Impact Statement
SERG	Senior Executive Review Group
SMMP	Site Management and Monitoring Plan
TMP	Theoretical Bioaccumulation Potential
TEU	Twenty-foot Equivalent Unit
USACE	U.S. Army Corps of Engineers
USC	United States Code
WQC	Water Quality Criteria

Executive Summary

In recent years, the Port of New York and New Jersey has ranked third in cargo volume among ports in the United States. It has over 75 container berths and significant capacity for bulk cargo. The port requires nearly continuous dredging and, by one estimate, over 5.5 million cubic yards of harbor sediments were moved each year from 1976 to 1997. Due to the industrial history of harbor and watershed, a significant quantity of these sediments may require special treatment depending on the sediment quality standards utilized.

This case study examines the last decade of activity related to the management of contaminated sediments in New York. High demand for dredging, strong environmental interests, litigation, and multiple planning groups have made this port issue arguably one of the most complex. Here we consider how decisions concerning contaminated sediments are made through the contemporary U.S. regulatory system.

Primary guidance for water disposal of contaminated sediments resides in the Clean Water Act and the ocean dumping provisions of the Marine Protection Research and Sanctuaries Act. Regulations and guidance pursuant to these laws control the scientific testing of sediments. In practice, assessing the bioaccumulation of contaminants in benthos determines the acceptability of sediments for ocean disposal in the New York region. In addition to threshold levels established in the federal guidance document, the New York District of the Corps of Engineers has established thresholds specific to New York which are referred to as matrix values. Should Cd, Hg, DDT, PCB, or dioxin accumulate in organism tissue above the specified matrix value, then ocean disposal is excluded as a possibility. These processes and thresholds attract intense debate as will be

described in this report, but the American Sugar Refining Company permit also covered here illustrates how they may be applied in a routine manner.

Selection of reference sediments, establishment of thresholds, and the utilization of professional judgment, when unequivocal scientific answers are not available, render the decision process vulnerable to debate. Litigation from Clean Ocean Action in the 1990s focused on dioxin levels and bioaccumulation testing procedures. These cases resulted in changes to the rules and procedures.

By the mid 1990s, attempts at collaborative deliberation through activities such as the Harbor Estuary Program succumbed to value conflicts that elevated ocean disposal to more senior government officials. With the involvement of Congressional delegations and Vice-President Gore, federal agencies (EPA, DOT, and the U.S. Army) reached a new agreement referred to as the Three-Party Letter of July of 1996. Simultaneously, the agencies pledged to close the ocean dumping site, remove obstacles to dredging, and ensure the health of the port and the environment. The letter closed the Mud Dump Site and established a framework for a Historic Area Remediation Site to emerge in the same geographic area. In concept, the latter enabled "clean" sediment disposal to restore areas of the sea bottom that had been a location for dumping harbor sediments over many decades.

Multiple and perhaps conflicting objectives in the Three-Party Letter established the need for a new round of planning. The Harbor Estuary Program, a program spawned under the federal Clean Water Act, issued a chapter on dredging in the fall of 1997. In addition, through the Contamination Reduction and Assessment Project of the Harbor Estuary Program, several steps

were taken to reduce the flow of contaminants to the harbor. That could halt their deposition in sediments which, if successful, would limit the volume of contaminated sediments in the future.

In late 1997, the Corps released a Dredged Material Management Plan. This plan estimated the need to annually accommodate 4.4 million cubic yards of maintenance material, of which perhaps one quarter of the total would be suitable for ocean disposal under the new sediment quality standards. A subsequent 1999 implementation report estimated maintenance and new project dredging related to deepening and/or widening could total nine million cubic yards per year. While multiple solutions were explored in the plan, apparently the Regulatory Branch of the Corps is not bound by its contents.

The question of sediment disposition was tied to two other planning processes. First, the Harbor Navigation Study and associated Environmental Impact Statement required under the Water Resources Development Act of 1996, which was completed in 1999, examined the feasibility of dredging all major channels in the harbor. Second, a Comprehensive Port Improvement Plan and Environmental Impact Statement focuses on water and landside infrastructure apart from the channels. It was initiated in 2000. In meeting the future demand to move 19 million, twenty-foot equivalent unit containers, a variety of air pollution, harbor restoration, highway/rail access, berthing and associated issues require attention.

While these comprehensive planning activities advanced, individual decisions continued to trigger litigation. In July of 2000, U.S. Gypsum received a permit to dispose of sediments in the ocean. By September of the same year, the Environmental Protection Agency withdrew its support for the permit because, in the interim, the matrix value for PCB had been reduced and

the sediment in question was no longer suitable for ocean disposal. In the litigation that followed, the court found changing the threshold level required a full rulemaking procedure which had not been undertaken in this case. In the meantime, U.S. Gypsum agreed to use the material to cap a local landfill rather than attempting ocean disposal of it.

This report assesses the developments up until late 2002. The period was marked by increasingly restrictive ocean disposal options. Throughout, the bioaccumulation testing standards attracted multiple reviews. More recently, a peer review was completed in 2000. A second peer review of bioaccumulation testing was initiated in 2000 by Memorandum of Agreement between the Corps and the Environmental Protection Agency.

This report presents a highly dispersed decision process. What has been the aggregate effect on dredging and ocean disposal? Throughout the period under review, the bioaccumulation testing standards remained contentious. At the same time, dredged volumes increased substantially, and ocean dumping of dredged materials declined. By establishing what some have categorized as the most stringent criteria for ocean dumping in the country, the regulatory structure in New York has moved most sediment disposal out of the ocean. Prior to 1992, approximately 95% of the dredged material was suitable for ocean disposal. Presently, by one estimate, upland and confined disposal facilities, such as the Newark Bay site, accept approximately five times more material than is placed in the ocean at the Historic Area Remediation Site. Thus, with a background of ever more complex decision processes, both dredging and ocean protection co-exist.

In conclusion, increasing scientific understanding and apparently shifting values resulted in rapidly declining ocean disposal. Port maintenance and expansion requires dredging. Therefore, the dredged materials are accommodated in nearshore and terrestrial environments.

I. Introduction

Overview of the Issues

Dredging and disposal of contaminated sediments enters the discussion of most port developments because economics of scale demand ever larger ships and deeper channels. However, this massive transfer of earth materials causes many changes to land and sea environments. Elaborate law, regulation, and guidance pertain in this situation. The record shows that dredging continues, but remains contentious, in major ports. However, the disposal of contaminated sediment is changing. Hence, the governmental intervention may be viewed as a series of actions to accommodate disposal without large and socially significant impacts on the environment. But who participates in these decisions and how? How are decisions affecting dredged material placement made? What processes are used, and what information is deemed most important? To assess these and associated questions, we have examined recent events related to disposal of contaminated sediment from the Port of New York and New Jersey. Through this case, we describe the complexity and current resolution of these issues in a major port. When dredging and dredged material management re-emerges as an important issue in Rhode Island, this report will serve as a compendium of techniques that have been applied elsewhere.

New York/New Jersey Harbor

New York/New Jersey Harbor is located at the apex of New York Bight, which is the area extending along the New Jersey coastline from Sandy Hook, NJ south to latitude 40º 10' and east along the Long Island coastline from Rockaway Point to 73º 30' longitude.[1] Figure 1

[1] USACE and USEPA, Site Management and Monitoring Plan for the Historic Area Remediation Site, 1997.

visually depicts the entire bight and relative location of New York Harbor located within the apex.

Figure 1: New York Bight and Apex

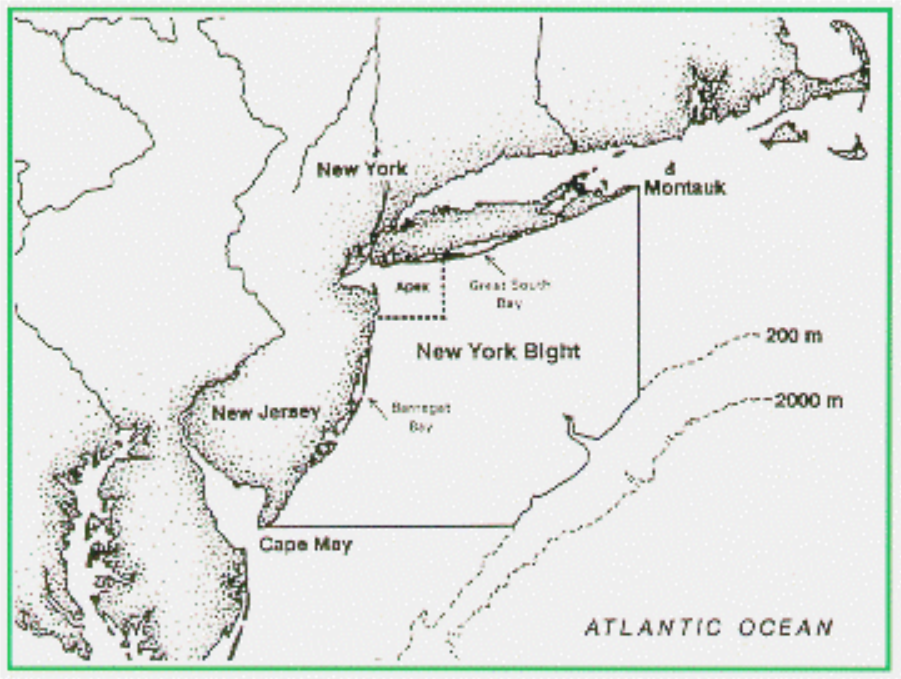


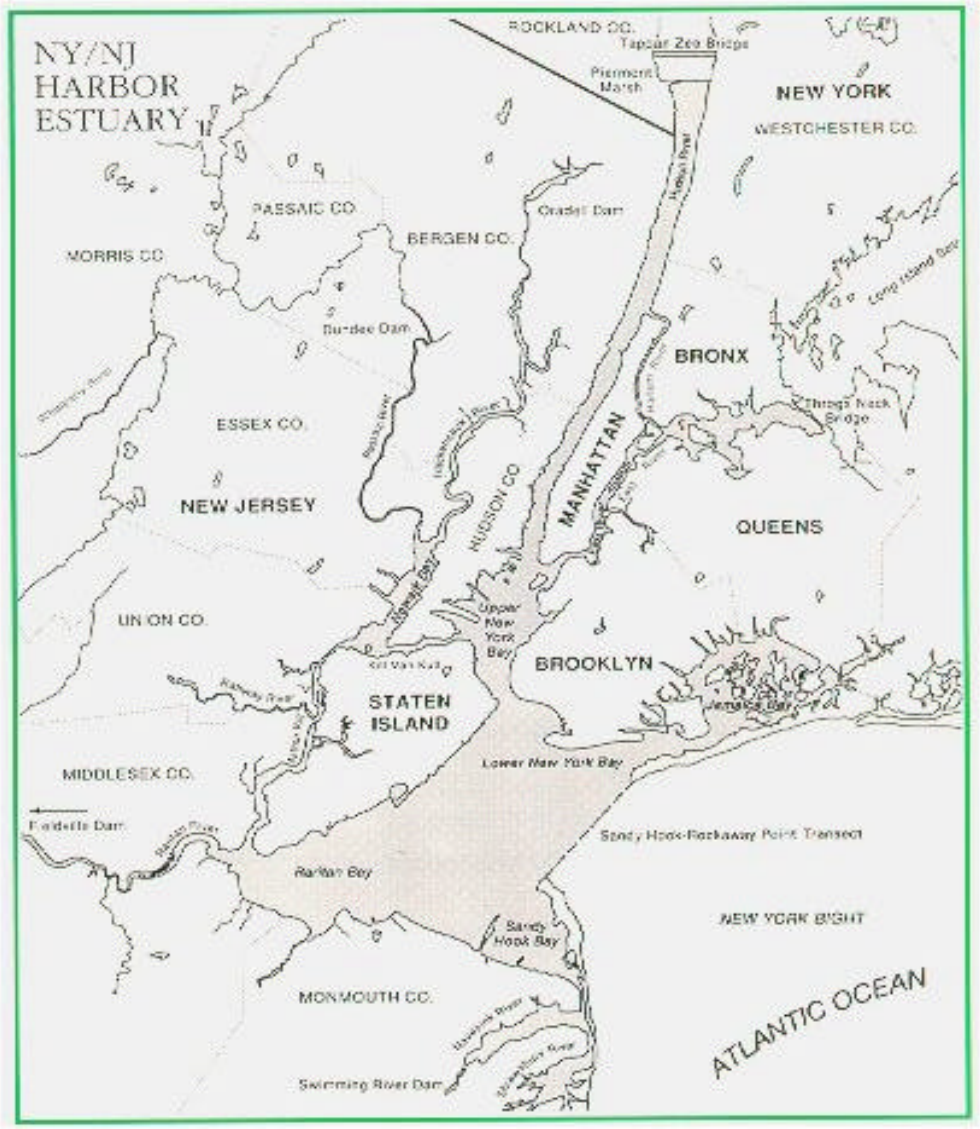
Photo taken from www.harborestuary.org/about

The Harbor exists within the larger Hudson-Raritan estuary, which extends from the upper Hudson River to the Sandy Hook-Rockaway Point transect of the harbor's entrance.[2] The harbor itself is comprised of four large embayments: Upper and Lower New York Bay, Newark Bay, and Raritan Bay. The Verrazano Narrows connects Upper New York Bay to Lower New York Bay. Newark Bay, the smallest of the four, is connected to Upper New York Bay by the Kill Van Kull channel and to Raritan Bay/Lower New York Bay by the Arthur Kill channel. The Harbor also contains a network of public and private channels and berths. The Harbor includes

[2] Army Corps of Engineers, New York District. Harbor Navigation Study Section 5.1. December 1999. Obtained through personal communication with Tom Shea.

approximately 298 square miles of surface water and has an average depth of 21 feet.[3] Figure 2 shows a more detailed view of the Harbor and its components.

Figure 2: New York Harbor



Map taken from www.harborestuary.org/about

Habitat types found in the Harbor include tidal rivers, salt and freshwater tidal marshes, woodlands, shallow bays, barrier beaches, and sand dunes. Water is the predominant habitat

[3] Army Corps of Engineers, Harbor Navigation Study Section 5.1.

type, but salt and freshwater tidal marshes cover 180,000 acres in New Jersey and 25,000 acres in New York. The Harbor supports diverse and productive finfish, crustacean, and shellfish populations, with over 100 species of fish, including striped bass (*Morone saxatilis*), winter flounder (*Pleuronectes americanus*), lobster (*Homarus americanus*), blue crab (*Callinectes sapidus*), and the northern quahog or hard clam (*Mercenaria mercenaria*).[4]

The Port of New York/New Jersey is located within the Harbor, and is a major American transportation center with a complex channel system. The Port ranks third nationally in cargo volume, and handles nearly half of the total cargo in the North Atlantic, providing bulk cargo, automobiles and petroleum for the larger New York area. The Port houses over 75 container berths (30,000 feet) and 48 container cranes. The Port generates $30 billion dollars in revenues and $620 million dollars in state and local taxes, as well as providing approximately 200,000 port-related or dependent jobs.[5] Figure 3 illustrates the major channels within the Port of New York/New Jersey.

Collectively, these channels supported the nation's third largest port in 2001 with a total cargo volume of 137,484,344 short tons.[6]

[4] Army Corps of Engineers, Harbor Navigation Study Section 5.1.
[5] Pabst, Douglas. "NY/NJ Harbor Dredged Material Management," Powerpoint Presentation obtained through personal communication on 9/25/02.
[6] http://www.iwr.usace.army.mil/ndc/wcsc/portname01.htm consulted on 6/25/03.

Figure 3: The Port of New York/New Jersey

Map taken from http://www.nan.usace.army.mil/harbor/index.htm

Since the harbor is naturally shallow, a large amount of dredging takes place and is needed to maintain the high cargo capacity in the port. There is a lengthy history of dredging activity in the port, and is summarized in Table 1 (taken directly from the Army Corps of Engineers Harbor Navigation Study). These authorizations result in a nearly continuous dredging operation for the harbor.

Table 1: History of Dredging Authorizations in NY/NJ Harbor

Approving Legislation or Authority for Project Construction	Remarks
Ambrose & Anchorage Channels	
River and Harbor Act 3 March 1899	Authorized construction of a channel 35 ft deep, to be ultimately deepened to 40 ft and 2000 ft wide from the Narrows to the sea through East (Ambrose) Channel.
River and Harbor Act 8 August 1917	Authorized extending project of 1899 to include improvement of Anchorage Channel in Upper Bay to the same dimensions as Ambrose.
River and Harbor Act 26 August 1937	Authorized modification of existing Ambrose and Anchorage Channels to provide a channel 2000 feet wide, suitably widened at bends, 45 feet deep from the Atlantic Ocean to West 40th Street Manhattan, thence 48 feet to West 59th Street.
Section 201(b) of the Water Resources Development Act of 1986	Authorized deepening Ambrose Channel to a depth of 55 ft MLW, 770 ft wide; and deepening Anchorage Channel to a depth of 55 ft MLW, 660 ft wide, subject to a favorable report by the Chief of Engineers.
Kill Van Kull and Arthur Kill to Gulfport Reach	
River and Harbor Act 23 August 1874	Original project for a "channel between Staten Island and New Jersey", 150 feet wide, 16 feet deep.
River and Harbor Act 13 June 1902	Recommended a channel between New York and New Jersey passing south of Shooter's Island, 21 feet deep and 300 feet wide except at turns where width would be 400 feet.
River and Harbor Act 25 June 1910	Authorized channel north of Shooter's Island 1 mile long, 300 feet wide, 16 feet deep.
River and Harbor Act 22 September 1922	The original project for "New York and New Jersey Channels", provided for a channel 400 feet wide and 30 feet deep.
River and Harbor Act 30 August 1935	Provided for present project depth of 35 feet and channel 600-800 feet wide.
Section 202 of the Water Resources Development Act of 1986	Authorized deepening the Kill Van Kull to 45 feet MLW from deep water in the upper New York Bay to its junction with the Newark Bay Channels and the Arthur Kill Channel. (Also authorized deepening the Newark Bay Main and Pierhead Channels to 45 feet.)
Section 301(a)(12) of the Water Resources Development Act of 1996	Re-authorized the 45-foot project in the Kill Van Kull and Newark Bay at a higher cost in accordance with Section 902 cap procedures.
Section 202(b) of the Water Resources Development Act of 1986, subject to a Secretary of the Army Report	Authorized deepening the 35-foot Arthur Kill Channel to 41-foot MLW from its confluence with the Kill Van Kull and Newark Bay Channels in the vicinity of Shooter's Island westward to Howland Hook Marine Terminal in Staten Island. The legislation also authorizes a 40-foot deep channel to extend south to the Gulfport Reach.

Approving Legislation or Authority for Project Construction	Remarks
Section 301b of the Water Resources Development Act of 1996	Authorized a further deepening of the Arthur Kill to Gulfport not to exceed 45-foot MLW.
Water Resources Development Act of 1999	Re-authorized deepening of the Arthur Kill to Howland Hook to 41 ft MLW and 40 MLW to Gulfport in accordance with the 23 July 1999 report.
Newark Bay	
River and Harbor Act 13 June 1902	Provided for a 12-foot deep channel, 200 feet wide on the main axis of Newark Bay.
River and Harbor Act 2 March 1907	Provided for a 20-foot deep channel, 300 feet wide on the main axis of Newark Bay.
River and Harbor Act 24 November 1915	Recommended 400-foot wide channels 20 feet deep in Newark Bay main channels and extending to Port Newark pierhead lines.
River and Harbor Act 22 September 1922	Authorized 30-foot channel in Newark Bay and 30-foot channel in Hackensack River below Central R.R. of NJ Bridge.
Rivers and Harbor Act 2 March 1945	Authorized a 35-foot, 400-foot wide project in the main channel of Newark Bay and the branch channel and inshore channel at Port Newark, along with removal of a portion of rock area at Bergen Point.
River and Harbor Act 23 October 1962	The Act modified the existing Federal project for Newark Bay, Hackensack and Passaic Rivers. The Chief of Engineers in a report to the Secretary of the Army, dated 29 November 1963, concurred with the views of the Board of Engineers for Rivers and Harbors and recommended modification of the existing project for Federal maintenance after non-Federal construction to a depth of 35 feet of: Port Elizabeth Branch Channel, 500 to 950 feet wide and 3,500 feet long from the junction with the existing 400-foot channel in Newark Bay to Port Elizabeth Inshore Channel; Port Elizabeth South Branch Channel to the Port Elizabeth East and South Channels, minimum width of 550 ft and 1,250 ft long from the junction with the 400-ft channel in Newark Bay to Port Elizabeth; Port Elizabeth Inshore Channel to Port Elizabeth and Port Newark, 500 ft wide and 5,250 ft long; Port Newark East Channel connecting Port Elizabeth and Port Newark Branch Channels, 200 ft wide and 4,150 ft long; Port Elizabeth East Channel 200 ft wide and 3,750 ft long; Port Elizabeth So Channel, 200 ft wide and 3,100 ft long; subject to certain conditions of cooperation.

Approving Legislation or Authority for Project Construction	Remarks
River and Harbor Act 7 November 1966	Authorized: a. Widening 35-foot main channel from Port Newark Branch Channel South, from 550 and 400 feet to 700 feet. b. Provision of maneuvering area south of the Central Railroad of NJ Bridge with a width of 300 feet and an effective length of 2,200 feet, of which the southern half would be 38 feet deep at MLW and the northern half 35 feet deep at MLW. c. Provision of maneuvering area north of the Central Railroad of NJ Bridge with a width of 300 feet, an effective length of 2,200 feet and a depth of 35 feet at MLW. d. Widening of the entrance into Port Elizabeth Branch Channel to 1,050 feet with additional removal of 250 feet of the north corner. Also, widening of the entrance into Port Newark Branch Channel to 800 feet. e. Deepening 32 foot main channel, north of Port Newark Branch Channel to the junction of Hackensack and Passaic Rivers, to 35 feet at mean low water and widening from 400 feet to 500 feet. f. Provision of turning basin 35 feet deep at MLW, 1,300 feet long and 900 feet wide at junction of Hackensack and Passaic Rivers.
Chief of Engineers on 2 June 1972 under discretionary authority contained in H.D. 494, 89th Cong., 2nd Session	Authorized modification for widening and deepening of private construction plans for service channel and turning areas adjacent to Port Elizabeth which base plans had been authorized for Federal maintenance after private construction.
Section 202a of the Water Resources Development Act of 1986	Authorized deepening the 35-foot deep Newark Bay Main, Port Newark, Port Elizabeth, Port Newark Pierhead, and South Elizabeth Channels, all to 45 feet MLW. A turning basin off the Elizabeth Pierhead Channel was also approved. Removal of debris of the Central Railroad Bridge to 1,000 feet was also authorized. (Also authorized deepening the Kill Van Kull feeder Channel to 45 feet.)
Section 301(a)(12) of the Water Resources Development Act of 1996	Re-authorized the 45-foot Kill Van Kull and Newark Bay Channels project at a higher cost in accordance with Section 902 cap procedures.
Anchorage Areas	
River and Harbor Act 30August 1935	Authorized dredging the southern end of Red Hook Flats to 40 feet and the remaining area south of the fairway to 30 feet. Also authorized dredging Liberty Island Anchorage and New Jersey Pierhead Channel to 20 feet deep, the latter being generally 500 feet wide.
River and Harbor Act 27 October 1965	Authorized deepening Red Hook Flats (Anchorage 21) to 45 feet deep in the southern area, 40 feet deep in the middle section, and 35 feet deep in the northern section. Also authorized deepening

Approving Legislation or Authority for Project Construction	Remarks
	feet deep in the northern section. Also authorized deepening Gravesend Bay to 47 feet deep.
Chief of Engineers Discretionary authority Contained in S.D. 17	Authorized expanding Red Hook Anchorage 200 yards to the west by shifting the Anchorage Channel 200 yards to the west.
Brooklyn Channel	
River and Harbor Act 3 March 1899	Authorized a channel 40 feet deep and 1,200 feet wide in the Bay Ridge and Red Hook Channels, NY.
River and Harbor Act 2 March 1907	Authorized dredging Bay Ridge and Red Hook Channels to first 35 feet, then to 40 feet.
River and Harbor Act 3 July 1930	Authorized widening Bay Ridge Channel, up to 1,780 feet.
Port Jersey Channel	
Water Resource Development Act 17 October 1986	Authorized deepening the existing 35 ft MLW channel to a depth of 45 feet and a width of 450 feet, subject to a favorable report of the Chief of Engineers. The Chief of Engineers draft report recommended a channel 41 feet deep.
Water Resource Development Act of 1999	Re-authorized deepening the existing 35 ft MLW channel to a depth of 41 feet in accordance with the Chief of Engineers report.
Claremont Terminal	
Water Resource Development Act 17 October 1986	Authorized deepening the existing 27-foot natural channel at a depth of 42 feet and a width of 300 feet, subject to a favorable report of the Chief of Engineers. The Chief of Engineers report recommended a channel 34 ft deep and 1,250 ft wide.

Table taken from Harbor Navigation Study, Army Corps of Engineers

More recently, in the 1990's, a larger venture called the Harbor Navigation Project (to be discussed later in this paper) was authorized to deepen several channels to or below a depth of fifty feet, which would solidify New York's importance as the East Coast hub for marine transportation. This 2.3 billion dollar project will accommodate a new class of containership that can carry 5,000-7,000, twenty-foot equivalent unit (TEU) containers. In contrast, large ships today carry 3,000-4,000 TEUs. Many dredging advocates believe that failure to accommodate

these new ships might divert some commerce to other Atlantic ports, which would deprive the Port of NY/NJ of economic benefits and jobs.[7]

Ocean Dumping in New York Bight

Historically, most dredged material from the Port of New York/New Jersey has been ocean disposed. Approximately six areas within the Harbor and New York Bight Apex were used for the disposal of sediments derived from dredging during the maintenance, deepening and construction of new channels in New York Harbor as well as a variety of other waste products such as garbage, city refuse, cellar dirt (natural rock and soil excavated during building construction), and floatable materials. As materials accumulated at these locations, disposal sites were relocated farther seaward to avoid navigational hazards.[8]

Hydrographic data from 1845 to 1934 showed that mounds of material were forming in the general area of the submerged Hudson Shelf Valley (Christiansen Basin), the Ambrose Light Station (Diamond Hill), and the Scotland Light Buoy. One of these sites began shoaling and forced the Supervisor of the New York Harbor to designate site uses for these different areas in 1914.[9]

From 1914 to 1977, at least 200 million cubic yards of dredged material were deposited in this area. Available bathymetric data shows that from 1936 to 1995, significant mounding occurred in the area with a net volume increase of 190 million cubic yards (mcy). This change indicates an average per year disposal of 3.2 mcy.[10]

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[7] New York Times. "Commercial Property; Making Way for Bigger Ships" by John Holusha. Section 11; Page 1; Column 2; Real Estate Desk. Sunday, August 5, 2001.
[8] http://www.nan.usace.army.mil/business/prjlinks/dmmp/benefic/hars.htm. Last accessed on 10/09/02.
[9] Ibid.
[10] Ibid.

In 1977, the EPA designated an interim ocean dredged material disposal site, known as the Mud Dump Site (MDS). The MDS is a 2.2 square nautical mile area in ocean waters approximately 3.5 nautical miles east of Sandy Hook, NJ and 7.7 nautical miles south of Rockaway, NY.[11] The MDS is illustrated by the smaller box inside the Historic Area Remediation Site, or HARS, which was later designated as its replacement and will be later explained.

Figure 4: Location of the Mud Dump Site

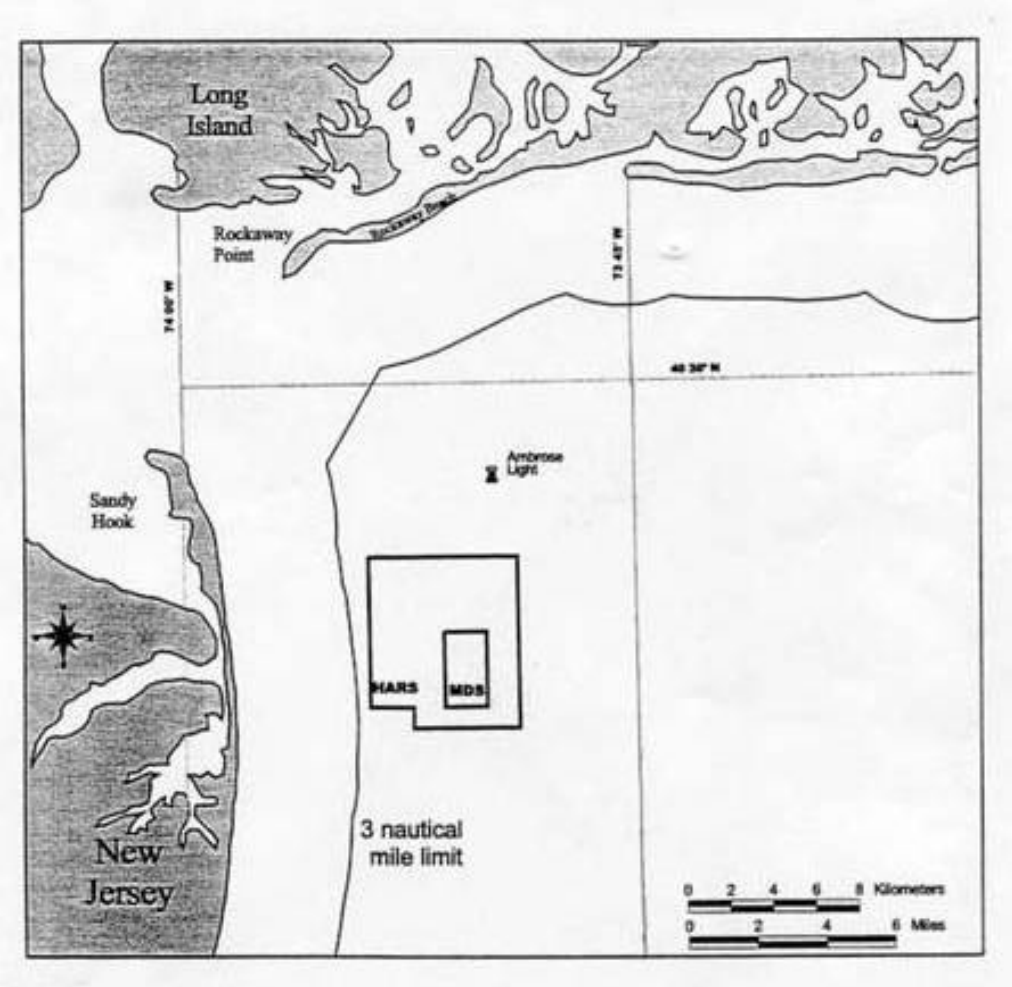


Photo taken from http://www.epa.gov/region02/water/dredge/intro.htm

[11] USACE and USEPA, Site Management and Monitoring Plan for the Historic Area Remediation Site, 1997.

The MDS was officially designated in 1984 as the offshore ocean disposal site for 100 million yards of dredged material (from navigational and other dredging projects) associated with the Port of NY/NJ and other nearby harbors.[12] From 1976 to 1997, when more reliable disposal volume records were kept, approximately 115 million cubic yards of dredged sediment were actually disposed within the boundaries of the 2.2 square nautical mile MDS. The composition of this material varied from the coarser fraction of "one-man stone" and "derrick stone" to the finer grained material of sand, silt and clay. Recently, larger stones have been diverted to artificial reef sites for beneficial use as well as to leave more room for dredged sediment to be disposed of at the MDS.[13] In the 1990's, however, several legal and regulatory events took place that triggered the closure of the MDS, which in turn caused the management of dredged material to become an even greater challenge.

The Purpose and Structure of the Analysis

Since the viability of the port has already been confirmed through channel deepening investments and long-term contracts with terminal operators, it is likely that dredging in the port will continue. At the same time, environmental values have recently reflected a growing concern of where this dredged material is being disposed and a decreased tolerance for dumping such material in ocean waters, even though this is almost always the least costly option. These contradictory issues are addressed here.

In an earlier report, the structure of the decision-making system for dredged material disposal at sea was viewed from the top down and from the perspective of law and scientific

[12] Federal Register, August 29, 1997.
[13] http://www.nan.usace.army.mil/business/prjlinks/dmmp/benefic/hars.htm. Last accessed on 10/09/02.

assessments.[14] Here we develop a new perspective by looking from the bottom up in New York. In specific, we will evaluate the regulatory structure, implementation, and litigation that relates to ocean dumping of dredged material.

We will contrast the general guidance explained in the earlier article with actual practice in New York. We have three objectives in this regard. First, we will consider the science used to make routine determinations. Second, we will consider the regulatory process and changes in it. Third, by observing these changes in regulatory process, we will establish a perspective to clarify social values. Our goal is to contribute to empirical understanding of environmental decision making in the face of these multiple influences.

In Chapter II, we lay out the scientific basis of testing what goes to sea and examine it in operation through a September 2002 decision memorandum. Chapter III presents the initial litigation that has arisen, and how it has resulted in regulatory change. In Chapter IV, the role of collaboration within consensus-based processes is juxtaposed with direct appeals for political support. Chapter V assesses how the emergence of new environmental values translates into more restrictive use of the ocean for dredged material disposal. Chapter VI identifies how agencies are planning for the future. Finally, Chapter VII concludes by returning to our central question concerning how environmental regulations are implemented on the ground under the influence of changing science, process, and values.

[14] Juda, L. and R. Burroughs. In Press. Dredging of Navigational Channels in a Changing Scientific and Regulatory Environment. *Journal of Maritime Law and Commerce.*

II. TESTING WHAT GOES TO SEA: DREDGED SEDIMENT REGULATIONS, GUIDANCE, AND OPERATIONS

National Guidance

Disposal of dredged material in ocean waters is controlled through Section 102 of the Marine Protection Research and Sanctuaries Act (MPRSA). This law prohibits the dumping of most materials into the ocean and, for those that may be dumped, directs EPA to develop criteria for reviewing permit applications.[15] These criteria have been promulgated through regulations 40 CFR 220-228. The Army Corps of Engineers (Corps) issues permits for dumping of dredged material that will not unreasonably degrade the ocean at sites designated by EPA pursuant to these regulations. Table 2 explains the general purpose of the various sections of the regulations and identifies those portions that have attracted recent legal challenge in New York.

Table 2: Ocean Dumping Regulations

40 CFR Section	Purpose	Regulations subjected to recent litigation
220: General	Defines terms and establishes permit categories and authorities	
221: Applications	Establishes application procedures and information adequacy	
222: Actions on Application	Hearings and issuance of permits	
223: Contents of Permits	Describes what the permit requires and procedures for changes	
224: Reports by Permittees	Reporting requirements	
225: Corps of Engineers Permits	Provides a means for EPA to review projects	
227: Criteria for the Evaluation of Applications	Presents criteria related to environmental impact, need for ocean dumping, impact on ocean uses, and important definitions.	227.6 (a)(5): dumping of known or suspected carcinogens may not be permitted unless classified as trace contaminants or an emergency situation. Discrepancy on whether sediment met these criteria. 227.6 (c): agency discretion on testing in

[15] 33 U.S.C Section 1412.

		the suspended particulate phase. Contention on whether agencies can use discretion to require testing in this phase or whether their discretion only applies to how this testing is carried out. 227.27: gives definition of appropriate sensitive organisms used for testing. Definitions are further clarified after litigation.
228: Criteria for Management of Sites	Covers site selections, use, monitoring and modification.	

The "Green Book", a joint publication of the EPA and the Corps of Engineers, provides guidance for evaluation of dredged material proposed for dumping in ocean waters.[16] Most importantly, this manual indicates the types of tests and their use in making regulatory decisions. Ocean waters are located seaward of the baseline and include the territorial sea, the contiguous zone, and the oceans. The Inland Testing Manual (ITM) contains similar technical guidance for determining potential contaminant-related impacts of dredged material in state waters regulated under Section 404 of the Clean Water Act (CWA).[17] In short, waters inside of the baseline are governed by the CWA and guided by the ITM, while waters seaward of the baseline and inside of three miles are governed by MPRSA and CWA. Waters outside of three miles are governed by the Marine Protection Research and Sanctuaries Act (MPRSA) and guided by the Green Book.[18]

The Green Book revises the 1977 version of ocean dumping guidance. Both the new and old versions were designed to specify an approach to be used to determine whether dredged materials can be placed in the ocean without causing serious biological impacts. The primary innovation in the 1991 Green Book is to introduce a tiered testing approach that sequentially

[16] USEPA and USACE, 1991.
[17] EPA and Department of the Army, 1998.

[18] U.S. Congress, 1987.

increases the amount of information collected to fully consider biological impacts. The information obtained at a tier may result in an approval for ocean dumping, rejection, or the requirement for additional data collection at a subsequent tier. There are a total of four tiers. When the information is sufficient to determine whether the dredged material in question complies with the regulations for ocean dumping the analysis is deemed complete.

Tier I uses existing information and may require a chemical analysis of the sediments.[19] In general, the analyst seeks to determine if the material is far removed from pollution sources, beach sand, or similar to material at the disposal site. Through the regulations (40 CFR 227.27) a Limiting Permissible Concentration (LPC) is established. When dredged material is disposed it changes the chemical composition of the waters in the area. If those changes do not exceed marine water quality criteria (WQC) or 1% of the acutely toxic concentration, then the dredged material meets the LPC and is suitable for ocean disposal. EPA has established the maximum concentrations of many contaminants in marine waters that are acceptable and refers to them as water quality criteria. For suspended particulate and solid phases, a similar concentration threshold is set at a level that will not cause unreasonable toxicity or bioaccumulation. Sediments that do not exceed these levels are within the LPC and suitable for unconfined ocean disposal. However, "unreasonable" here and elsewhere in this guidance document has an element of uncertainty. In this circumstance, contradictory professional judgments may arise.

If compliance with Water Quality Criteria (WQC) remains uncertain after Tier I analysis, then Tier II procedures commence utilizing contaminant concentrations in the sediment and numerical models for initial mixing evaluations.[20] The goal is to predict release of contaminants into the water column and compare levels with marine WQC to determine compliance or lack

[19] EPA, 1991.
[20] EPA 1991, Appendix B.

thereof. If the proposed disposal operation will exceed WQC according to the model, an elutriate test is conducted. The latter directly measures the concentration of contaminants in water that has been in contact with the sediments proposed for dredging under controlled conditions. Elutriate data are used to modify the modeling approach. If specific contaminants of interest do not have WQC limits then water column impact is evaluated by toxicity testing.

As originally proposed, Tier II testing of impacts on benthos focuses on the calculation of a theoretical bioaccumulation potential (TBP) of selected organic compounds such as PCBs, hydrocarbon pesticides, many PAHs, dioxins, etc. The TBP is estimated from associations of the contaminant with sediment organic carbon and animal lipid content. If the TBP for dredged sediments exceeds that for reference sediments, or if other contaminants not covered by it are involved, then bioaccumulation testing in subsequent tiers is required. The bioaccumulation potential of the proposed dredged material is compared with reference sediments. The Green Book defines reference sediments as substantially free of contaminants and as similar as practicable to grain size of dredged material and disposal site sediments, subject to additional somewhat flexible conditions. Reference sediments for ocean dumping off of New York are sampled from an offshore site that is presumed to be relatively uncontaminated, yet is located in a region similar to the dumpsite.

In Tier III, suspended and dissolved portions of the dredged material that remain in the water column after mixing are evaluated for their toxicity. Test organisms are exposed to elutriate dilutions of dissolved and suspended materials and effects on some subset of 22 appropriate species are noted.[21] Direct determinations depend upon toxicity testing utilizing regionally "appropriate" organisms.

[21] EPA, 1991, 11-4.

Appropriate sensitive marine organisms and appropriate sensitive benthic marine organisms are defined in Sections 227.27 (c) and 227.27 (d), respectively. Appropriate sensitive marine organisms used for testing in suspended particulate toxicity testing are defined as "at least one species each representative of phytoplankton or zooplankton, crustacean or mollusk, and fish species chosen from among the most sensitive species documented in the scientific literature or accepted by EPA as being reliable test organisms to determine the anticipated impact of the wastes on the ecosystem at the disposal site."[22] This subsection of the regulations also defines bioassay procedure. Except on plankton, bioassays must run for a minimum of 96 hours under temperature, salinity and dissolved oxygen conditions representing the extremes of environmental stress at the disposal site.

Appropriate benthic marine organisms that are to be used in solid phase testing are currently defined as "two or more species that together represent filter-feeding, deposit-feeding and burrowing characteristics."[23] These also are chosen from among species that are most sensitive for the type they represent. It should be noted that the wording contained in Section 227.27 (d) on benthic organisms was a significant point of contention.

Tier III guidance also allows the results from toxicity tests to be compared with the modeled concentration of a contaminant in the water column. If the concentration of the contaminant is greater than 0.01 of the lethal concentration that kills 50% of the organisms in the toxicity test then the water column LPC is not met.[24]

In practice, acute toxicity bioassays and bioaccumulation tests of benthos living in test sediments attract much of the regulatory attention in Tier III. In acute tests, toxicities of material proposed for dredging and for the reference sediments are compared. If the dredged material is

[22] 40 CFR Section 227.27 (c).
[23] 40 CFR Section 227.27 (d).
[24] EPA, 1991.

statistically more toxic, and exceeds that of the reference sediment by 10-20%, then it does not meet the LPC for benthic toxicity. In 1991, approved benthic impact tests relied on 25 species of which 5 were recommended.[25] Amphipods are the organisms of choice for sediment testing, but the appropriateness of individual species varies and sensitivity differences are documented within and among species. Tier III bioaccumulation tests on benthic organisms rely on comparing the tissue levels of contaminants with the Food and Drug Administration (FDA) action levels, where available. Tissues of organisms are analyzed for metals and/or organics after 28-day exposures. When these exposures result in levels above the FDA standards then the sample exceeds the LPC. If the FDA levels are not exceeded but the reference sediment values are exceeded then case specific evaluation consistent with the regulations (40 CFR 227.13(c)(3)) is required.[26]

Testing is done at tier III in the New York District/Region 2.[27] The EPA and the Corps, with each application for such disposal, issue a joint memorandum outlining project compliance with testing requirements specified in 40 CFR 227.6 and 227.27, which indicates whether material is suitable for the designated disposal site in New York Bight. The former section prohibits certain materials from being placed in the ocean unless they are considered "trace contaminants" or if it is considered an emergency, while the latter section provides regulations for compliance with Limited Permissible Concentration (LPC).

Materials can be classified as trace contaminants when they are present as solid, liquid or suspended particulate forms in amounts that "will not cause significant undesirable effects,

[25] EPA, 1991.
[26] EPA 1991, 3-12.
[27] Doug Pabst, Personal Communication, 9/26/02. See subsequent section on national testing guidance in this report for a discussion of the tiers.

including the possibility of danger associated with their bioaccumulation in marine organisms."[28] The potential for significant undesirable effects is determined through bioassay testing to determine if the material meets certain criteria which are specified in 227.6 (c) (1) (2) and (3) and are carried out through agency testing procedure. In New York solid-phase testing determines most, if not all, decisions.

The Limited Permissible Concentration (LPC), of the liquid phase of a material, is a concentration which does not exceed applicable marine water quality criteria after initial mixing (or if there is no criteria) a concentration that would not exceed 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms in an approved bioassay procedure.[29] The LPC of the solid and suspended particulate phases of a material is a concentration that will not cause unreasonable acute or chronic toxicity or other sublethal adverse effects based on bioassay results using appropriate sensitive marine organisms (or benthic marine organisms in the case of the solid phase), and will not cause accumulation of toxic materials in the human food chain. It should be noted that in the July 2001 version of the regulations, it states that bioaccumulation testing in the suspended particulate phase is not required

The complexity and costs of tests in Tier IV expands yet again. It consists of water column and benthic bioassays interpreted with respect to case specific criteria. Also in Tier IV steady state bioaccumulation is determined and compared with the FDA level by contaminant. Samples that fall below the FDA levels meet the LPC requirement. However, if tissue levels do not exceed FDA standards but are higher than reference sediments, then an additional comparison is made with organisms living around but not in the disposal site. If dredged

[28] 40 CFR Section 227.6 (b)
[29] 40 CFR Section 227.27 (a)

material organisms do not exceed body burdens of field organisms then the LPC is met. If not additional case specific reasoning is employed.

Regional Thresholds and Sediment Categories

The 1977 and 1991 national guidance documents concerning dredged material disposal were expanded with regional guidance related to solid-phase testing. Specific bioaccumulation thresholds called "matrix values" were established for the New York Region in 1981 and a regional implementation manual on performing sediment tests was updated in 1992. Both are described in this section. Note that in current practice in New York, analysis focuses upon solid phase bioaccumulation and risk based assessment without explicitly relating them to tiers of the Green Book.

Decision guideline limits or matrix values for bioaccumulation were established in 1981 by the Army Corps of Engineers, with the intention of establishing a baseline for thresholds and preventing the disposal of materials more contaminated than those levels already present.[30] The matrix values are used as thresholds for solid phase bioaccumulation testing, and address levels of cadmium, mercury, DDT, PCB's, and dioxin. The decision guideline limits were 0.3 mg Cd/kg wet weight, 0.2 mg Hg/kg wet weight, and 0.04 mg DDT/ kg wet weight of organism.[31] Levels of acceptability for bioaccumulation of PCB were established at 0.4 parts per million (ppm).[32] In later documents this is reported as the equivalent value of 400 ppb. These matrix values, later supplemented with a similar level for dioxin (10 pptr), became the standard against which bioaccumulation data from laboratory testing could be compared. Presumably sediments

[30] Doug Pabst, Personal Communication, 9/26/02.
[31] Robinson 1981.
[32] Engler et al, page 18.

that produced bioaccumulations higher than these in laboratory tests were excluded from ocean disposal.

The passing or failing of regional matrix values, however, is not clear-cut, and matrix values are not considered bright lines (pass/fail). The mean values of test sediment have a standard deviation that may either pass or fail standards according to the confidence level that is used.[33] According to EPA guidance using the Green Book, 95% confidence limits are calculated and the *lower* confidence interval is then compared to the matrix value.[34] A recent example is sediment dredged from three reaches of the U.S. Naval Weapons Station Earle Pier Complex in New Jersey. Sediment from the second and third reaches both fell below the allowable PCB level (using both confidence intervals), while sediment from the first reach resulted in a mean value of 123.6 ppb. The upper 95% confidence level of PCB concentration is 143.9 ppb while the lower level is 103.3 ppb. At the time, the new PCB matrix value was 113 ppb. This sediment would pass testing standards using the lower confidence level, with rationalization by the Green Book that in such cases the project data is not statistically greater than the action level to which it is compared.[35]

The use of thresholds in determining the acceptability of dredged sediment for ocean disposal is still based on original matrix values, and is evident in the bioaccumulation table contained in agency memoranda that review project compliance with federal regulations. A revision of the matrix value relating to PCB levels in worms was attempted in a 2000 Memorandum of Agreement, in which the allowable level was lowered from 400 to 113 ppb. The associated litigation that ultimately reversed this change will be discussed later in the report.

[33] Monte Greges, Personal Communication, 9/26/02.
[34] EPA Region 2, "Talking Points for HARS Dredging Issues."
[35] EPA Region 2, "Talking Points for HARS Dredging Issues."

Local information was also being expanded in 1992 through "Guidance for performing tests on dredged material proposed for ocean disposal" which will be referred to as the Regional Testing Manual.[36] The purpose of the document was to interpret the Green Book for local circumstances. It updated a 1984 regional guidance manual by incorporating the tiered approach, focused acute toxicity testing on amphipods, expanding the bioaccumulation test to 28 days, and identified a more complete list of contaminants. It also incorporated regionally appropriate species for biological tests. The guidance document provides regional plans for Tier II and Tier III water-column evaluations. However, the most critical tests are related to the contamination of the solid phase or sediments. This is measured through consideration of toxicity and bioaccumulation effects related to benthic organisms. Therefore, the following material will focus on regional guidance for these assessments.

If toxic compounds bioaccumulate in benthic organisms at the disposal site a variety of environmental and human health issues become apparent. Most ocean disposal decisions in the New York region focus on this critical Tier III assessment. The amount of bioaccumulation is determined through a solid phase test in which organisms live in material from the proposed dredge site and then their body tissues are chemically analyzed. If tissue samples exceed LPC then the applicant must abandon ocean water disposal, take special measures to lessen impact on the ocean (cap or other means of sequestering), or consider site-specific actions requiring additional testing on a case-by-case basis.[37]

Specific bioaccumulation guidance includes the requirements of a 28-day exposure for metals and organic contaminants using sand worms (Nereis virens) and blunt nosed clams

[36] USACE NYD and EPA Region 2, 1992.
[37] USACE NYD and EPA Region 2, 1992.

(Macoma sp.).[38] Tissue levels are compared with those from organisms treated similarly in reference sediments that are retrieved from 70 feet of water 2.6 miles southwest of the center of the historical Mud Dump Site. Using this protocol, if the tissue concentration for any contaminant is two times higher or more than organisms from the reference sediments, then a review with case specific evaluative criteria is undertaken.[39]

At that point the New York guidance adopts Green Book factors for compliance. One measure is the FDA action level if available. When tissue samples meet or exceed the FDA action level the fish or shellfish is no longer deemed safe for human consumption. In 1991 there were FDA action levels for 14 pesticides, one metal (Hg) and two industrial chemicals (PCB and dioxin). Other materials such as lead, cadmium, and other persistent organic pollutants were not covered. If one or more tissue contaminants is above the FDA action level then the dredged material if discharged would result in levels higher than the LPC and hence would not comply with the regulations (40 CFR 227.13(c)(3)).

If there is no FDA action level for the contaminant of interest or the level observed is not higher than the FDA level, then the New York manual uses additional considerations from the Green Book. If tissue concentrations related to the material proposed for dredging do not statistically exceed those measured from organisms in the reference sediment, the dredged material passes this assessment. If accumulations of contaminants in the material proposed for dredging exceed those found in reference materials, then the Corps and EPA are left to develop "case-specific" evaluative criteria utilizing factors such as magnitude of exceedance, biomagnification potential, and others adopted from the Green Book.

[38] Ibid.
[39] Ibid.

Three outcomes are possible after bioaccumulation testing. One is that the material proposed for dredging meets the LPC and may be acceptable for ocean disposal if it also meets toxicity and water column considerations. A second possibility is that it exceeds the LPC and is not suitable for unconfined ocean disposal. Finally, information may be deemed insufficient and further testing in Tier four becomes necessary.

In addition to the Regional Implementation Manual, other local guidelines existed for disposing of dredged material at the former MDS (now referred to as the Historic Area Remediation Site, HARS). During the era of ocean disposal at the MDS, dredged material was classified as Category I, II or III. Table 3 describes these categories. Both Categories I and II were permitted to be disposed at the site, the latter requiring a cap of cleaner sediment after disposal. Currently, only sediments classified as Category I (clean, uncontaminated sediments that cause no adverse biological effects including bioaccumulation), which are now referred to as HARS-suitable material, are permitted for disposal at HARS. Material formally classified as Category II or III material is now identified as HARS-unsuitable.

Table 3: Categories of Materials for Ocean Dumping in New York

Category I (no bioaccumulation or toxicity) *HARS-suitable*	• Sediment meets ocean dumping criteria (including acute toxicity) **and** • Bioaccumulation test results below the regional matrix levels for cadmium, mercury, total PCB's, and total DDT, and below the regional Category I values for dioxin. • Bioaccumulation test results for other chemicals of concern identified in the Regional Implementation Manual do not indicate a potential for undesirable effects using conservative assessment techniques (evaluating human and ecological risk and other relevant synergistic effects information, as provided for in the Green Book).
Category II (some bioaccumulation, no toxicity) *HARS-unsuitable*	• Sediment meets ocean dumping criteria (including acute toxicity) **but** • Bioaccumulation test results exceed any of the regional matrix levels for cadmium, mercury, total PCB's, and total DDT, or exceed the regional Category I values for dioxin but are less than the regional Category III value for dioxin OR • Bioaccumulation test results indicate potential for those compounds or other chemicals of concern to accumulate at levels that *could* indicate a potential for undesirable effects using environmentally conservative assessment techniques, but do not indicate that dumping *would* result in significant undesirable effects.
Category III (bioaccumulation and toxicity) *HARS-unsuitable*	• Sediment does not meet ocean dumping criteria. Sediment fails acute toxicity testing or poses a threat of significant undesirable effects due to bioaccumulation that cannot be addressed through available disposal management practices. Sediment cannot be disposed in the ocean.

Source: EPA Region 2.[40]

An Operational Decision: American Sugar Refining Company

Regulatory requirements and testing guidance result in a process for sediment testing that is jointly carried out by the EPA and the Corps and then reviewed in the compliance memorandum. It provides a summary of all sediment test results for a particular project, and

[40] USEPA Region 2, October 19, 2000, Appendix C.

determines if the sediment is eligible for HARS disposal. Table 4 is an example outlining the testing procedure and results for the American Sugar Refining Company permit issued on September 17, 2002.

Table 4: Testing Procedure as displayed in agency memorandum

Evaluation of Liquid Phase	Liquid phase of the test material was evaluated for compliance with Sections 227.6 (c) (1) and 227.27 (a). Applicable water quality criteria would not be exceeded after initial mixing and would not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms.
Evaluation of Suspended Particulate Phase	Suspended particulate phase of the material was evaluated for compliance with Sections 227.6 (c) (2) and 227.27 (b). Material in this phase would not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic in laboratory bioassays and thus would not result in significant mortality. Moreover the duration of exposure is short and was determined not to cause significant undesirable effects including danger of bioaccumulation.
Evaluation of Solid Phase	Solid phase of the material was evaluated for compliance with Sections 227.6 (c) (3) and 227.27 (b). <u>Solid phase toxicity evaluation</u> 10-day toxicity tests were conducted using mysids and amphipods (appropriate sensitive marine organisms). Testing criteria mandates that for shrimp, the difference between the test sediment and the reference sediment has to be less than 10%. For amphipods, the difference between the reference sediment and the test sediment must be less than 20%. The sediment did not exceed mortality in the reference sediment by more than these percentages, and was not statistically greater than reference for either species. <u>Solid phase bioaccumulation evaluation</u> 28-day bioaccumulation tests are used with sand worm and bent-nosed clam (appropriate sensitive benthic marine organisms that meet characteristics of the required

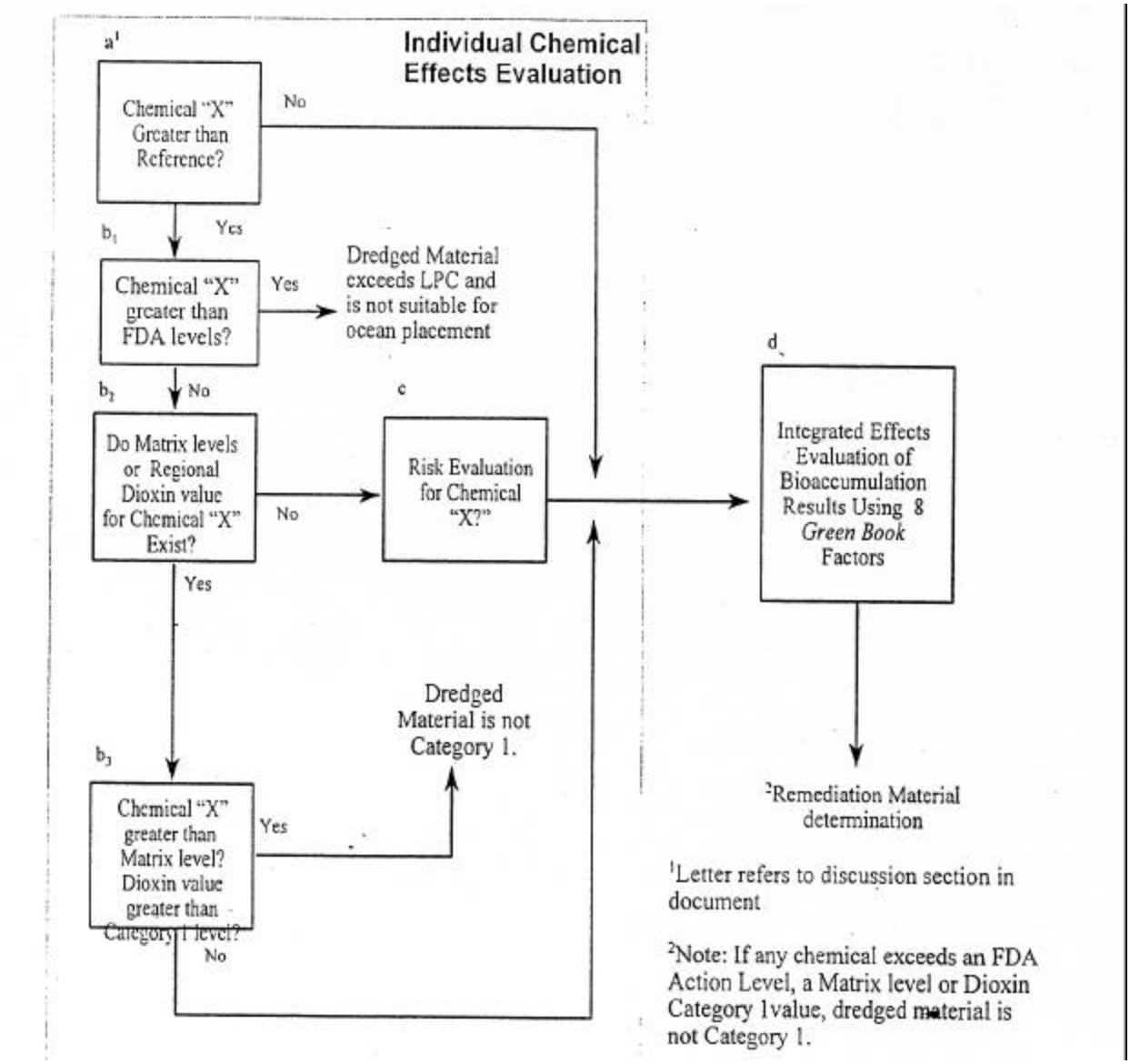
	organism types of suspended-feeder, filter-feeder, and deposit-feeder). Testing criteria mandates that the test sediment is compared to reference sediment bioaccumulation, FDA action levels and evaluation of eight additional factors for assessing the significance of bioaccumulation.[41] The framework for evaluating project sediment bioaccumulation contains four consecutive evaluations. In the first three, the test sediment is compared to: • Reference test results • FDA Action levels, Regional Matrix Values, nd Regional Dioxin Values • General risk-based evaluations (including comparison to background tissue concentrations) The fourth evaluation uses all the information and results of the individual chemical evaluations (as they relate to the eight Green Book factors) to evaluate the solid phase of dredged material as a whole. This process is displayed visually in Figure 5, and details of testing results for each of these evaluations can be found in pages 8-18 of the Memorandum. In addition, the Memorandum contains a bioaccumulation table displaying values in each tested species. This chart shows the test sediment values as well as the criteria or screening values to which the test sediment is compared. These standards are now being reviewed by the EPA. The material in this particular project met the criteria for Sections 227.6 (c) (3) and 227.27 (b).

Figure 5 is a visual depiction of how the EPA and the Army Corps of Engineers proceed in bioaccumulation evaluation, and shows the various steps contained in this process. If it is

[41] If the test bioaccumulation exceeds field results "concern over potential adverse impact increases in direct relation to" number of species affected, number of contaminants, magnitude of exceedance, toxicological importance, phylogenetic diversity of species affected, propensity for biomagnification, magnitude of toxicity and diversity of species, and magnitude of exceedances beyond that of comparable species living near disposal site. Green Book p 7-3 to 7-4.

determined that the material can be classified as HARS-suitable (after also passing toxicity testing), it can then be placed at HARS.

Figure 5: EPA Region 2 Interim Framework for Evaluating Bioaccumulation Test Results



Discussion

Managers use regulatory guidance to convert legislation into decisions at sea. A similar problem of managers without science backgrounds responding to complex scientific information has been described for a legislative setting.[42] Central to these processes is the integration of scientific facts, such as they may be known, with societal values in specific decisions. In the case of dredged material, this sequence moves from federal legislation, regulation, and federal guidance documents, to regional guidance, matrix values and criteria for levels of contamination in New York. In spite of these ever increasing specifics one can argue that the process remains cumbersome and significant elements are at times unpredictable. The main body of this chapter illustrates professional judgment, uncertainty, and values remain a significant part of the process. The structure of the process, the thresholds that are established, and regulatory goals beyond routine science are four areas where these issues become apparent.

First, the process itself is structured to specify a series of tiers for information collection and assessment. However the question of scientific adequacy is not overtly addressed. Therefore, different interests may interpret adequacy in terms that match their needs. The New York Region appears to have universally adopted Tier III assessments that emphasize bioaccumulation in benthos. This action both defines adequacy and makes sediment testing more predictable.

Second, substantial judgment goes into selecting reference sediments. In urban estuaries the selection of the site for the collection of reference sediments is critical because different locations will have differing levels of contaminants. Ultimate site selection could reflect

[42] Morgan, M.G., Houghton, A., and J.H. Gibbons. 2001. Improving Science and Technology Advice for Congress. *Science 293*:1999-2001.

varying political or management objectives.[43] Indeed the selection of a reference site is a subjective exercise and the proximity of the reference sediments to sources of contamination can determine whether material proposed for disposal near the reference sediments can pass or fail. If dredged materials and reference sediment toxicities are not significantly different then open water disposal is acceptable. But this norm is socially constructed through selection of the reference site. A reference site with a higher degree of contamination will make it possible for dredged material with greater contamination to pass. It should also be noted that statistically significant differences in survival during the testing phase do not necessarily equate with ecological significance. However, they are widely used in management.

Third, the process requires the use of thresholds for toxicity, bioaccumulation, and other factors. An early attempt at resolving this was to establish a matrix of acceptable bioaccumulation levels. Issues about the legitimacy of these levels have been raised, but revision of them appears difficult. Furthermore, from 1981-1996 the only baseline data available were the matrix levels for Cd, Hg, DDT, PCB, and dioxin. This means that there are only five values for comparison, and the problem is that many more chemical assessments are collected. For example, the American Sugar Refining Company agency memorandum shows almost 60 variations of chemicals. Yet, only five can actually be compared to values for screening purposes. Furthermore, regulators have recently attempted to change acceptable bioaccumulation levels for PCB as will be discussed in the next chapter. Recent and current reviews of the paradigm, the diversity of compounds, and acceptable bioaccumulation levels for them make a significant change in this approach likely. Similar issues arise in the establishment of categories I-III for sediments because the categories are based on determinations related to the matrix values.

[43] Chapman et al., 2000.

Fourth, in some instances regulatory decisions require judgments beyond the capability of routine science. In those instances thresholds are provided but their biological meaningfulness may be in doubt. In these circumstances, clarity may be achieved through direct regulatory action or through professional judgment in guidance documents or operational decisions. For an example of the former, consider the use of FDA action levels and/or 0.01 lethal concentration to establish LPC. In both cases, the scientific justification for using an FDA action level or one, one hundredth of a lethal concentration to determine an appropriate cutoff for ecological impacts may be questioned. The latter is illustrated by the 10% (shrimp) and 20% (amphipods) thresholds in toxicity testing. Similarly, the scientific justification for selecting 10% (shrimp) and 20% (amphipod) increased mortality in the dredged sediment over reference sediment as a threshold for ocean dumping may also be questioned.

Some of these issues have attracted litigation. We assess those lawsuits in the next section.

III. Litigation and Regulatory Change: 1991-1996

Clean Ocean Action Lawsuits and Associated Regulatory Changes

Changes in testing guidance has had rippling effects. Prior to 1992, approximately ninety-five percent of the sediment dredged from the harbor was found to be acceptable for ocean disposal. Subsequently, more rigorous testing criteria were implemented. As a result, fourteen percent of dredged material was estimated to be Category I (no bioaccumulation or toxicity), twenty percent to be Category II (some bioaccumulation, no toxicity), and sixty-six percent in Category III (bioaccumulation and toxicity).[44] According to current standards, only fourteen percent of material would be HARS-suitable, leaving the majority of sediment unfit for ocean disposal. These changes in criteria greatly affected disposal of dredged materials and created difficulties in managing its placement.

Aside from more stringent testing guidance affecting disposal, a series of lawsuits challenging ocean disposal at the Mud Dump Site were initiated during the 1990's. Clean Ocean Action, an advocacy group, along with a coalition of other groups, filed a lawsuit on June 7, 1993, making several claims against a permit granted by the Corps to dump at the MDS. Ultimately, the plaintiffs only prevailed on one claim; it was ruled that MPRSA was indeed violated.[45] MPRSA states that ocean dumping of known or suspected carcinogens, etc. shall not be approved unless it falls under the exception of 40 CFR 227.6 (a) (5), which states that either it must be an emergency situation or that the contaminants within the sediment can be classified as "trace contaminants." Trace contaminants are defined as levels "present in materials otherwise acceptable for ocean dumping in such forms and amounts in liquid, suspended particulate, and solid phases that the dumping of the materials will not cause significant undesirable effects,

[44] Van Houten, 1998.
[45] U.S District Court for the District of New Jersey, Civil No. 93-2402, June 7, 1993.

including the possibility of danger associated with their bioaccumulation in marine organisms."[46] The potential for significant undesirable effects "shall be determined by application of results of bioassays on liquid, suspended particulate, and solid phases of wastes according to procedures acceptable to EPA, and for dredged material, acceptable to EPA and the Corps of Engineers."[47] The Green Book only provides guidance for testing in the solid and liquid phases, not the suspended particulate phase. This fact will have implications in later cases.

The preliminary ruling of this case stated that it was not demonstrated that the dioxin present in the sediment was in "trace amounts" and therefore the sediment could not fall under the required exception in order for it to be disposed at the site. However, the injunction requested to halt the dumping was not granted to the plaintiffs. Instead, the court ordered that it be determined whether the dioxin was present in trace amounts or if it qualified under the other exception pursuant to Section 40 CFR 227.6 (a)(5).

During the same time period, EPA proposed a rule on May 20, 1994 clarifying that the ocean dumping regulations do not require bioaccumulation testing of the suspended particulates of materials to be dumped at sea.[48] Clean Ocean Action and the other plaintiffs filed a second suit in District Court challenging this rule.

The final decision[49] of the District Court, issued on June 24, 1994, addressed both the first and second suits filed by the plaintiffs. The court again denied the requested injunction and concluded that the bioassay tests performed on the dredged material met the requirements of the ocean dumping regulations.[50] The opinion also elaborately addressed agency discretion. EPA interpreted their regulations as not requiring bioaccumulation tests in the suspended particulate

[46] 40 CFR Subchapter H Part 220.7 (b).
[47] 40 CFR Subchapter H Part 220.7 (c).
[48] Federal Register, May 20, 1994.
[49] U.S District Court for the District of New Jersey. Civil No. 93-2402, June 24, 1994.
[50] Federal Register, February 29, 1996.

state because they would not give reliable information concerning bioaccumulation of dioxin at the test site, and that reliance on the more sensitive solid phase testing results is appropriate. In addition, the Green Book does not even present guidance on bioaccumulation in the suspended phase because of such a short exposure time. The judge ultimately ruled in their favor that "it was thus not arbitrary or capricious for the agencies to have interpreted their own regulations such that they did not require bioaccumulation tests in the suspended particulate stage for dioxin,"[51] especially since the agencies were already relying on the most conservative test procedures that would produce results of the worst case scenario. In addition, the court ruled that even before the EPA issued the rule, ocean dumping regulations did not require bioaccumulation testing of the suspended particulate phase.[52] The EPA then issued the final rule on bioaccumulation testing in October of 1994 clarifying that the ocean dumping regulations do not require bioaccumulation testing in the suspended particulate materials to be dumped at sea.

In 1995, the Clean Ocean Action case was heard by the Third Circuit Court, who reversed the ruling of the District Court because of a serious error in applying the law[53] and because of its conclusion that the bioassays performed on the dredged material met the requirements of the ocean dumping regulations.[54] Although the ruling was reversed, the plaintiffs still did not receive their requested injunction.

The EPA and the Corps argued (and the District Court affirmed) that agencies have discretion not to require bioassay tests in the suspended phase if acceptable procedures for such tests are not available and approved for use (i.e. the Green Book). The Third Circuit court disagreed, and viewed the regulations 40 CFR 227.6 (c) as implying that the agency does not

[51] U.S District Court for the District of New Jersey, Civil No. 93-2402, June 24, 1994, pages 35-36.
[52] Federal Register, October 18, 1994.
[53] U.S. Court of Appeals for the Third Circuit. No 94-5489, June 12, 1995.
[54] Federal Register, February 29, 1996.

have discretion over *whether or not* to perform bioaccumulation tests in the suspended particulate phase, but only on *how* the tests may be conducted. In addition, the court specifically addressed Section 227.27, which provides that "at least one species each representing filter-feeding, deposit-feeding, and burrowing species chosen from among the most sensitive species accepted by EPA as being reliable test organisms to determine the anticipated impact on the site."[55] The court's decision implied the use of three different benthic organisms when in the solid testing phase.

According to one EPA employee, EPA has never won a lawsuit related to contaminated sediment testing, although the agency has lost such suits on the grounds of procedure and not necessarily principle. He notes that the MPRSA regulations were first written in 1977 and were not designed to handle the complexities that now exist within the testing procedure.[56]

Nevertheless, the opinion of the Third Circuit forced EPA into additional rulemaking action. First, however, a revisiting of testing guidance is pertinent. The Green Book recommends that for the liquid and suspended phases, toxicity tests be done on three classes of organisms; phytoplankton or zooplankton, crustacean or mollusk, and fish. The Green Book recommends that for the solid phase (to test for benthic effects) a 10-day acute toxicity test and a 28-day bioaccumulation test be done for filter-feeding, deposit-feeding, and burrowing organisms. Guidance recommended that a total of three species be tested for water column effects, and at least two "appropriate sensitive marine benthic species" be tested for both bioaccumulation and toxicity in the solid phase.[57] The controversy is in the latter; the Third Circuit implied that three different benthic organisms had to be used in solid phase testing. A

[55] Federal Register, February 29, 1996.
[56] Doug Pabst, personal communication, 9/26/02.
[57] Federal Register, September 30, 1996.

proposed rule was published on February 29, 1996, which attempted to clarify the uncertainties remaining after the Third Circuit court's decision. The 1996 proposed rule would:[58]

- Amend 227.27 (d) to define "'appropriate sensitive benthic organisms' used in benthic bioassay tests to mean at least two species that together exhibit filter-feeding, deposit-feeding, and burrowing characteristics."
- Amend 220.2 (j) to clarify that bioassays are not required by the regulations in the absence of approved procedures.
- Amend 227.6 referring to bioassay language that would be redundant or unnecessary.
- Other sections of 227.27 (c) related to bioassays will be amended, so that bioassays "shall be conducted" only if tests are required.

In summary, the proposed rule would add a definition of "bioassay" that makes clear that the term means an effects-based evaluation which is to be conducted only if approved procedures exist for such evaluations (i.e., if it was contained in the Green Book), by revising language to clarify agency discretion on what, when and how evaluation processes will be used, and by clarifying that laboratory tests are not required in all cases.[59] Ultimately, however, all of these proposed changes did not come to fruition in the final rule.

The final rule was published in the Federal Register on September 30, 1996. The purpose of the rule was to clarify regulatory language that was interpreted by the Third Circuit Court in a manner different than the EPA intended. The agency decided to limit the scope of the final rule to address only species to be used in the solid phase,[60] and confirmed existing solid phase testing practices under which the use of two species is permissible (providing that they represent the three categories of organisms specified in the regulations). Although the proposed rule would have addressed changes to the liquid and suspended particulate phases (through changes to

[58] Ibid.
[59] Federal Register, September 30, 1996.
[60] Ibid.

Section 227.27 (c), and other aspects of the testing requirements), the final rule only amended Section 227.27 (d), which addressed the number of test species to be used in solid phase testing.[61]

The final rule changed the language of 227.27 (d) so that it reads "two or more species" instead of "at least two" species. This was done to make clear that the regulations are not intended to limit testing to only two species. In addition, another language revision was made to clarify that the species are to be "chosen among the species that are most sensitive for each type they represent."[62] This change was made in response to concerns addressed by some commenters that some multi-characteristic organisms might not be sensitive for each characteristic they represent.[63]

The purpose of this lengthy review is to point out that it is not uncommon that litigation leads to agency action. Indeed, the role of interest groups in creating policy windows and acting as policy entrepreneurs to fill them is well documented.[64] Litigation often challenges agency practices and protocol, and may bring attention to or magnify contentious issues that may not yet have a clear precedent. In this case, litigation has changed EPA's role and function when dealing with contaminated sediments by forcing the agency to use clearer documentation, and has inadvertently made the permit process more lengthy and cumbersome for applicants.[65]

[61] Ibid.
[62] Ibid.
[63] Ibid.
[64] Kingdon, J.W. 1995. Agendas, Alternatives, and Public Policies. New York: Longman.
[65] Doug Pabst, personal communication, 9/26/02.

IV. Changing the Deliberative Process: 1993-1998

The Dredging Forum and Work Groups in the Harbor Estuary Program

In addition to the changes in the scientific aspects of dredging (ocean dumping testing regulations) made during the 1990's, social and political activity related to dredging was increasing as well. The New York/New Jersey Harbor Estuary Program (HEP) is one of many National Estuary Programs around the country, which were authorized in 1987 by the Congress and implemented by EPA. The program is intended to protect, conserve, and restore the estuary through implementation of a comprehensive management plan.[66]

The HEP was established as a partnership of federal, state, and local governments; scientists; civic and environmental advocates; the fishing community; business and labor leaders; and educators. Their mission was to develop a plan to protect and restore the estuary. In 1987, Congress also required the preparation of a restoration plan for the New York Bight, the ocean area extending approximately 100 miles beyond harbor waters that can be seen in Figure 1. Because the harbor and bight are inextricably linked within the larger ecosystem, the two plans were joined. The Comprehensive Conservation and Management Plan (CCMP), the primary planning document to attain the protection and restoration of the harbor, was completed in March of 1996 and signed by the governors of New York and New Jersey the fall of 1997.[67]

The HEP devoted an entire chapter to Dredged Material Management in its CCMP, with the intent to "establish immediate (within 1 year), short-term (1-3 years), and mid-term (3-9 years), environmentally sound, economically feasible, dredged material disposal alternatives" with technical support from the Corps.[68] The dredged material chapter itself also outlines goals,

[66] http://www.harborestuary.org/about.htm. Last accessed on 11/18/02.
[67] Ibid.
[68] Harbor Estuary Program, 1996.

objectives, and actions to achieve those goals. It is still being revised to reflect recent changes such as the transition from the Mud Dump Site to HARS.

Pursuant to the first objective of developing a future dredged material management structure, the HEP convened a Dredged Material Management Forum in the early 1990's to bring together a wide spectrum of groups concerned with the dredging process and disposal of dredged material. The Forum created the following workgroups to focus on specific topics and issues:

- Dredging, Transport and Disposal
- Criteria (Renamed the Remediation Material Workgroup in 2000)
- Mud Dump Site
- Contaminant Facilities (including borrow pits and contaminant islands)
- Decontamination Technologies/Site for Decontamination Facilities
- Sediment Contamination Reduction
- Dredged Material Management Integration (consisting of chairs of the above workgroups as well as representatives of critical stakeholders)

The Forum was an effective process that included over 1000 people. It gave interested and involved people a place to meet, and it gave order and process when relevant issues were discussed. It provided opportunity for concerns to be voiced as well. The Forum resulted in increased communication between stakeholder groups, and also forced agencies to listen to a variety of opinions on the topic. It has even been speculated that the Forum clearly prompted agencies to change their decision-making process to better reflect and incorporate stakeholders.[69] It should be noted, however, that the Forum took place before the initiation of the lawsuits discussed in the previous section.

Initially, the Forum and workgroups seemed to be effective and productive. It even appeared that a resolution between all stakeholders could be reached concerning ocean dumping. At the time, the Mud Dump Site was a contentious issue with no clear solution. However, the process of consensus-building within the Forum had resulted in an agreement that the MDS

[69] Doug Pabst, personal communication, 9/26/02.

would eventually be closed with a gradual phase-out of Category II materials until 2005. However, not all stakeholders were willing to accept the reality of the compromise. A second process was simultaneously initiated that appeared to involve the New Jersey delegation and Vice President Gore. The outcome of these actions ultimately overrode the stakeholder process and resulted in the Three-Party Letter, which is addressed below. As a result, the Forum was essentially dismantled because the stakeholder process and consensus-building between different groups had been undermined.[70] Game theory provides a construct to consider this outcome.[71] In this case, the competing objectives of port development and environmental quality resulted in one stakeholder defecting from the negotiating process. The resulting new process, the Three-Party Letter, and the higher level of ocean protection that ensued may reflect an important change in values.

The Dredged Material Management Integration Workgroup (DMMIWG) and the Remediation Material Workgroup (RMWG) are currently the only remnants of the Forum. [72] The DMMWIG was one of the more influential workgroups and had several important functions. It helped to support and coordinate six working groups; it served as a committee of the whole to work with the Army Corps on the development of a long- term management plan; it presented policy positions and concerns to the HEP Policy Committee, the Army Corps, the New York Department of Environmental Conservation, and the New Jersey Department of Environmental Protection; and it served as an Executive Committee of the Forum.[73] DMMWIG acts like a regional dredging team, and still functions as a forum for different stakeholders and serves as a

[70] Doug Pabst, personal communication, 9/26/02.
[71] Davis, M.D. 1970. Game Theory. New York: Basic Books.
[72] Doug Pabst, personal communication, 9/26/02.
[73] Harbor Estuary Program, 1996.

sounding board for a variety of dredging-related issues. In addition, DMMWIG still coordinates with agencies on relevant plans and proposals.

The RMWG was reconvened (it was formerly the Criteria Workgroup) for the purpose of the scientific peer review process, and will be discussed in more detail later in the paper. This group is a forum for issues relating to scientific criteria at HARS. The EPA works with the RMWG to answer their questions, and had also developed the charge for the scientists participating in the peer review process to evaluate the bioaccumulation testing framework at HARS.[74]

The nature of stakeholder involvement has apparently changed in the last decade. Previously (during the time of the Forum), there were many different groups working on dredged material issues. Once a new issue arose, a new workgroup was formed to address the details.[75] Since that time, it appears that workgroups are being utilized much less than in the past; and although they had been an effective tool for addressing issues at the time, the general trend has been away from such workgroups. Public participation now takes place primarily through commenting opportunities in the NEPA process rather than direct stakeholder involvement through an integrative process.[76]

Process Change: The Three-Party Letter

As noted, the HEP dredging forum was a viable tool for building consensus about dredging issues. However, this process was suspended by other actions that ultimately resulted in a document called the Three-Party Letter. This letter was signed in July 1996 by Carol Browner of the EPA, Federico Pena of the USDOT, and Togo D. West, Jr. of the US Department

[74] Doug Pabst, personal communication, 9/26/02.
[75] Doug Pabst, personal communication, 9/26/02.
[76] Doug Pabst, personal communication, 9/26/02.

of the Army. This document essentially provided a commitment by the administration to support environmental goals while ensuring the competitiveness of the Port of NY/NJ; it also can be said that it reflects a changing value system in society.

The letter outlined a three-point plan to help attain these goals. First, it was declared that the Mud Dump Site would close by September 1, 1997. The letter acknowledged the controversy surrounding the site, and concluded that "the long-term use of this site for disposal activity is not realistic."[77] The site would then be re-designated as a Historic Area Remediation Site under 40 CFR 228.11 (c), remediated with HARS-suitable (former Category I sediment) or clean material. The letter also recognized that an immediate closure of the disposal site would jeopardize the Port, so it allowed for short-term use of the site for the disposal of Category II sediment if no other alternatives became available. Such a compromise helped achieve the second goal of the Letter, to "help remove the immediate obstacles to dredging the port." Streamlining of the permit processes by the Army Corps of Engineers was also called for. The third goal of the letter was to "help ensure the health of the port and the environment for the 21st Century." The Corps and the DOT had already committed to further this goal through a Feasibility Study for channel deepening and a study of the causes of cargo diversion from East Coast ports, respectively. In addition, EPA committed to funding $1.2 million dollars for decontamination technologies for dredged material and to participate in other pollution prevention activities. The letter stated that all of these activities would be coordinated with the Harbor Estuary Program CCMP.

Apparently, litigation surrounding the MDS resulted in the Three-Party Letter and the reclassification of the MDS as a remediation site. The letter also signifies a changing value system. In fact, the letter itself states "we expect that our commitments concerning the MDS will

[77] Three-Party Letter, July 24, 1996.

diminish or eliminate the possibility of litigation challenging permits and the EPA rule change during the period prior to September 1, 1997. This proposal is predicated on that result."[78] Since litigation dominated the dredging era in the mid-1990s, it is not surprising that action was taken to diffuse that decision process. The letter established a more predictable process that could potentially enhance New York bight environmental quality and preserve some option for continued dredging.

Rulemaking action solidified the solutions laid out in the letter. The MDS was formally de-designated as a disposal site and re-designated as HARS in one rulemaking action by the EPA on August 29, 1997. The proposal to change the MDS from an ocean disposal site to a remediation site was justified by the presence of toxic effects at the site (a Category III sediment characteristic), bioaccumulation of dioxin exceeding Category I levels in worm tissue (a Category II sediment characteristic).[79] The proposed rule (May 13, 1997) was accompanied by a Supplemental EIS (SEIS), which was prepared pursuant to EPA's voluntary EIS policy (39 FR 16186, May 7, 1974), a Biological Assessment from NMFS, and a Site Management and Monitoring Plan (SMMP).[80]

The SEIS identified four alternatives to the designation of HARS (no action, closure of the MDS without HARS, Remediation, and Restoration). Remediation was identified as the preferred alternative, culminating in the designation of HARS. Section 506 of the Water Resources Development Act of 1992 (which amended the MPRSA of 1972) required the EPA and the Corps to prepare an SMMP for HARS before implementation of the final rule. Without such a plan, the site would not be eligible to receive a final designation. The document itself identifies a number of actions, provisions, and practices to manage the operational aspects of

[78] Three-Party Letter, July 24, 1996.
[79] USEPA Region 2, October 19, 2000.
[80] Federal Register, August 29, 1997.

dredging, HARS remediation activities, and HARS monitoring tasks.[81] The final rule also outlined public comments and EPA responses to the HARS designation.

HARS is now a 15.7 square nautical mile area, requiring a minimum of 40.6 million cubic yards for remediation (a one-meter cap).[82] Remediation material called HARS-suitable and meets former Category I standards that will not cause "significant undesirable effects including bioaccumulation."[83] HARS is comprised of a 9 square nautical mile Prime Remediation Area (PRA), which will be capped with at least one meter of remediation material, a 5.7 square nautical mile Buffer Zone, which is a 0.27 nautical mile band around the PRA which is meant to accept material that incidentally spreads out from the PRA, and a No Discharge Zone, which is a 1 square nautical mile area in which no placement or incidental spread of remediation material is allowed.[84] As of January 10, 2002, over 8.6 million cubic yards of dredged material had already been placed at the HARS.[85]

In addition to the Three-Party Letter, another significant event was the issuance of the Joint Dredging Plan of NY/NJ in October 1996 by Governors Whitman and Pataki. This plan was derived from a Port Dredging Plan prepared by the Port Authority earlier in 1996,[86] and committed NY and NJ to work together and with the larger dredging community to keep the port open and viable. The states were to develop a number of short-, mid-, and long-term alternatives that considered decontamination/treatment, contaminant/sediment reduction, and beneficial uses as prominent objectives.[87] The objectives of the Joint Dredging Plan were made to be consistent

[81] USACE and USEPA, 1997.
[82] Army Corps of Engineers, January 10, 2002.
[83] Federal Register, August 29, 1997.
[84] EPA Region 2, "Talking Points for HARS Dredging Issues."
[85] Army Corps of Engineers, January 10, 2002."
[86] USACE NYD, December 1997.
[87] Ibid.

with those of the Harbor Estuary Program's CCMP chapter on dredging so that environmental goals were incorporated.

The plan called for each state to set up a dredging task force to facilitate their respective plans, and those task forces would report back to their respective governor with specific recommendations for alternatives. Common elements to both plans included:[88]

- Pollution prevention
- Stronger enforcement of existing water quality laws
- Decontamination/treatment Methods
- Use of dredged material to remediate upland sites
- Creation and restoration of aquatic and upland habitats
- Remediation of the MDS
- Aquatic contaminant facilities

In summary, the Dredged Material Management Forum was replaced by the Three-Party Letter as a means for resolving the fate of ocean dumping in New York. Subsequent rulemaking established a new and potentially more predictable process for ocean dumping decisions.

[88] Ibid.

V. Dredged Material Management Planning and Operations: 1997-2002

Comprehensively Managing Dredged Material

Pursuant to the Army Corps of Engineers policy EC-1165-2-200 (which requires each Army Corps District to prepare a long-term plan for maintaining federal navigation channels), a Dredged Material Management Plan (DMMP) was prepared for the Port of NY/NJ.[89] The DMMP is an umbrella document specifying preferred alternatives for disposal in the region. Its purpose is "to produce a regionally supported, comprehensive plan to economically meet all the dredged material management needs of the Port while also protecting and supporting the restoration of the estuary."[90] The DMMP was created by a Dredged Material Task Force, a public forum that involved EPA Region 2, Army Corps New York District, NY/NJ Port Authority, the States of NY and NJ, and the City of New York. It should be noted that the Port Authority is the non-federal sponsor of 75% of all dredging activity that requires a sponsor, and thus is a major player in the Port of NY/NJ area. This task force has also functioned as a place for the different stakeholders to keep abreast of current projects and developments.[91]

It is estimated that the DMMP would have to manage an overall *annual volume* of 2.3 million cubic yards (MCY) of HARS-unsuitable material and 1.4 MCY of HARS-suitable material between the years 2000-2040. These estimates were based on volumes through 2005, although the long-term average for HARS-unsuitable material was estimated at 2.7 MCY due to the maintenance dredging of sediments in deepened channels.[92]

[89] USACE NYD, December 1997.
[90] Ibid.
[91] Steve Dorrler, personal communication, 9/26/02.
[92] USACE NYD, September 1999, Page 4.

In October 1996, the Army Corps New York District (NYD) issued an Interim Report for the DMMP (which had not yet been completed). This report emphasized the economic imperative of dredging and the need to implement alternatives to dumping at the Mud Dump Site (MDS), since it was soon to be reestablished as HARS and would limit the amount of sediment allowed to be placed at that site. It identified numerous alternatives and sites for managing and disposing dredged material and laid out a process for selecting which ones should be potentially included in the final DMMP.[93]

In December 1997, after the MDS was no longer classified as a dredged material disposal site, a Progress Report for the DMMP was issued. Between the Interim Report (October 1996) and Progress Reports, eight public meetings were held, comments were received, and studies were done to investigate alternatives and their potential impacts. In addition, letters were written to the Army Corps New York District (NYD) by the Governors of NY and NJ, as well as the Port Authority, which helped reduce the number of alternatives and sites considered in the Interim Plan.[94] Based on these recommendations and other agency feedback, along with the HEP Dredging Forum and several ongoing studies, appropriate revisions were made to the DMMP. The Progress Report that was issued updated the DMMP from its original version to reflect these developments. For example, upland confined disposal, contaminant islands, and geotextile bag alternatives were all removed.

The Final DMMP and its corresponding EIS were issued in December of 1998; the final plan is seen as a collaborative effort that will also promote pollution prevention, decontamination and treatment technologies, and beneficial use.[95] It accounts for anticipated dredging of the port and identifies specific management alternatives to handle material on an annual basis. Research

[93] USACE NYD, December 1997, page 2.
[94] Ibid.
[95] USACE NYD, December 1997, Page 5.

and technology are also encouraged to replace more costly or less environmentally friendly alternatives. The DMMP is viewed as a "living document" with the flexibility to incorporate new ideas that could continuously improve it, and will also incorporate the findings of various other Port planning studies (whose results may influence the volume or nature of dredged material).[96]

The final DMMP was a culmination of several iterative drafts, and was reviewed by stakeholders through the HEP Dredged Material Management Integrated Workgroup and a Senior Executive Review Group (SERG) composed of upper-level management from the Army Corps North Atlantic Division, EPA, USCG, the states of NY and NJ, and the Port Authority[97] (the flow chart at the end of the document provides an illustration). Cooperative agencies assisted in the development of the associated EIS. The SERG worked with the Army Corps of Engineers New York District (NYD) to identify a Recommended Plan that was comprised of preferred options.

The final DMMP also includes a Programmatic EIS to determine the environmental impacts of all the alternatives, including the "No Action" alternative and those not considered in the DMMP itself. Although site or zone specific information can be included in the document, "the EIS is intended to serve as a basis for broad decision-making, by helping decision-makers choose among the different alternatives available. The EIS may be complimented by site-specific Environmental Assessments (EA) or supplemental EIS's before implementing selected individual components of the plan."[98] According to the Corps, any disposal activity requiring a

[96] Ibid. Pages 5-6.
[97] USACE NYD, September 1999, Page 7.
[98] USACE NYD, December 1997, Page 6.

Corps permit will require an EA, after which either a Finding of No Significant Impact (FONSI) is issued or a full EIS is performed.[99]

In September 1999, a DMMP Implementation Report was issued by the NYD which outlined various management options such as contaminant reduction, sediment reduction, beneficial uses (HARS, habitat creation/restoration, and land remediation), decontamination, Contained Aquatic Disposal Facilities, Confined Disposal Facilities, and other potential contingency options.[100] The Implementation Report also broke the Recommended Plan into short and long terms (until 2010 and 2040, respectively). The report also outlined short-, mid-, and long-term dredging needs of the port.

The Implementation Report discussed a 10-year short-term plan and a 40-year long-term plan. The 10-year plan would manage material until 2010, and includes all the current and planned deepening projects, plus all anticipated maintenance dredging. It is estimated that the 10-year DMMP would have to manage approximately 27.3 MCY of HARS-unsuitable material, 54.1 MCY of HARS-suitable material, and 9.6 MCY of rock.[101] The sediment is largely HARS-suitable material and rock since deepening involves the removal of sediments not yet exposed to contaminants. HARS-suitable material would be used for remediation at the HARS site, land remediation, restoration in Jamaica Bay, habitat creation for oysters, shellfish, and birds, and for capping of the Newark Bay Confined Disposal Facility (CDF). Of total HARS-unsuitable material:

- 2/5 of material dredged through 2010 would be treated and used to remediate various NJ upland sites.
- 1/5 of material would be treated and used to remediate the Lehigh Anthracite Mine in PA.

[99] Bryce Wisemiller, personal communication, 8/22/02.
[100] USACE NYD, September 1999, Chapter 2.
[101] USACE NYD, September 1999, Page 4.

- 8.8 MCY would be processed and converted to marketable products at the NJ processing facility and other decontamination facilities.
- 400,000 MCY would be used to complete the demonstration project at Bark Camp Mine in PA.
- 200,000 CY that meets specifications soil characteristics for placement as grading fill material are targeted for use at the Fountain and Pennsylvania landfills in NY
- 100,000 CY would be used to create marsh habitat at the head of Claremont Channel in Jersey City, NJ.

The DMMP states that these, and other preferred options provide capacity considerably over the current estimated needs through 2010, and nearly all of these placement costs for HARS-unsuitable material are at or under $29 CY.[102]

The 40-year plan (managing sediment from 2010-2040) covers the port's needs for the thirty years following completion of most current channel deepening projects and other port improvements. This long-term plan is aimed at managing more of the maintenance material from these channels, and is based on an assumption that contaminant reduction programs are implemented to meet appropriate targets. Thus, the plan assumes that most dredged material would be HARS-suitable. The plan is much less detailed than the 10-year plan due to the uncertainty of dredging needs, funding, future shoaling and contaminant reduction rates.[103]

The 2040 plan relies entirely on the use of land remediation and decontamination methods for disposal of HARS-unsuitable material. HARS-suitable material may go to HARS unless capacity is reached and there is no need for further capping. Further capping may be necessary to replace eroded material or to apply a thicker cap greater than the one-meter layer currently projected. All other practicable alternatives will be used as well, such as remediation of quarries, beach nourishment, etc.[104]

[102] USACE NYD, September 1999, Pages 36-37.
[103] Ibid, Page 40.
[104] USACE NYD, September 1999, Page 40.

In order to ensure successful implementation of the DMMP, the Corps NYD is charged with providing an implementation or updated report each year that summarizes the dredging activities of the previous year as well as plans for coming years. The report should identify requirements or projects for the current year and will confirm available capacity and uses for all anticipated dredged materials.[105] The annual report "will be instrumental in making informed choices in pursuing environmentally sound and cost-effective options.[106] The NYD had anticipated an updated draft for release in 2002.[107] The plan is difficult to update because any change in testing standards (such as those currently being peer reviewed and/or changed by the EPA) affects the volume estimates stated in the DMMP. Volume projections had initiated the creation of the DMMP because such a plan could comprehensively identify where material from all dredging projects could be placed.[108] Another EPA employee confirmed that the DMMP is a moving target because estimates of the volume of material change frequently.[109]

Although much work was undertaken to formulate and update the DMMP, it is not entirely clear how this overall DMMP relates to site-specific decision-making. The Corps' ocean disposal authority is derived from Section 103 of MPRSA (33 CFR 324.2), and the Corps issues permits to dispose of material at HARS with EPA approval and a public review.[110] Typical applicants for a permit are a non-federal entity and range from the Port Authority of NY/NJ to private marina owners (the project sponsor).[111] For channel deepening projects, the sponsor identifies the placement site. Upland areas are preferred by the DMMP, however, placement

[105] Ibid. Page 47.
[106] Ibid. Page 48.USACE NYD, September 1999.
[107] Bryce Wisemiller, personal communication, 8/22/02.
[108] Bryce Wisemiller, personal communication, 9/26/02.
[109] Doug Pabst, personal communication, 9/26/02.
[110] Army Corps of Engineers, January 10, 2002.
[111] Ibid.

policies differ with private and public (state/government owned) sites.[112] Usually placement sites such as wetlands, open water, and CDF's require a Corps permit and an EA leading to a FONSI or a full EIS. Upland sites, however, may not require a Corps permit at all if the disposal site is under state jurisdiction.

The DMMP has evolved into a regional consensus document identifying approaches and trends in the management of dredged material.[113] Although the DMMP appears to be a comprehensive assessment of the viable disposal options for the Port of NY/NJ, it remains unclear as how the plan functions in relation to everyday decision-making. Army Corps NYD staff clarified that the DMMP is essentially a feasibility document, focusing on viable disposal alternatives. It contains general planning tools and it was intended to be a source of guidance when handling different types of material. Therefore, the regulatory branch uses the plan only for reference and does not base case decisions on the document's recommended plan.[114] Regulatory decisions are based on rules and laws, and a permit could not be denied because it did not follow the principles or suggestions of the plan.[115]

Disposal Operations and Responsibility

According to recent Dredging Activity Reports issued by the Corps, several types of disposal options for dredged materials are currently being utilized. Several projects have been permitted to dispose of dredged material at HARS, and the bioaccumulation testing criteria for that site will be reviewed in the next section. This remediation site has the most stringent criteria for ocean disposal in the country.[116] The site, however, has become less reliable for project

[112] Bryce Wisemiller, personal communication, 8/22/02.
[113] Ibid.
[114] Bryce Wisemiller, personal communication, 9/26/02 and Doug Pabst, personal communication, 9/26/02.
[115] Bryce Wisemiller, personal communication, 9/26/02.
[116] Monte Greges, personal communication, 9/26/02.

sponsors in recent years due to increasingly stringent standards for disposal, forcing the dredging community to find new disposal locations.

The transition in disposal type from open water to upland locations is reflected in the Dredging Activity Reports; dozens of projects have been permitted to dispose of in upland locations such as landfills and the Newark Bay CDF. In the July 2002 Report, the number of projects with upland or other types of designated disposal were almost six times greater than those permitted to be placed in open water at HARS.

A CDF involves the construction of dikes or other retention structures lined with impermeable material to contain dredged material isolating it from exposure to the environment. These dikes can be built on land, in water adjacent to land and in open waters to create an upland, nearshore, or island CDF, respectively.[117] The Newark Bay CDF was permitted by the Corps as a disposal site for material originating from the surrounding area and channels within Newark Bay. The facility was specifically designed to accept material from the Kill Van Kull channel up through Newark Bay because it consistently failed HARS testing and could therefore not be disposed of at the open water remediation site. NBCDF is allowed to accept all types of material (including Category III), although it must first theoretically meet state water quality standards. Although the facility was permitted to accept sediment from the Newark Area, exceptions could be made if approved by the State of New Jersey.[118]

The NBCDF has a capacity of two million cubic yards of dredged material, of which there are currently 600,000 cubic yards of capacity remaining.[119] It should be noted, however, that material placed in the CDF consolidates after is it is disposed, creating increased capacity. It

[117] USACE NYD, September 1999.
[118] Monte Greges, personal communication, 9/26/02.
[119] Steve Dorrler, personal communication, 9/26/02.

has been estimated that more than two million cubic yards of material can actually be dredged and then placed at the CDF.

Despite the fact that the Newark Bay CDF is used for disposal, these types of facilities are highly contentious. Since the "upland" facility accepts all categories of material, including the most contaminated types, it is governed under land use regulations instead of being subjected to water quality criteria (which it would almost certainly fail). The Port Authority had attempted to permit two other CDF's in the area, but since the states would govern the facility (rather than the Army Corps, who just permits the site), plans for additional CDF's were halted.[120] It would be in the best interest of sponsors, however, to have more CDF facilities since this type of disposal is more cost-effective.

Similar to CDF's, dredged material proposed for upland placement follows state land use regulations rather than federal regulations that govern ocean disposal. Currently, only two upland sites are fully permitted, these are the Linden and Bayonne landfill sites. Other sites such as Hackensack are in development.[121] In order to place material upland the non-federal sponsor of a dredging project must identify such sites that can accept material for disposal, which includes proving that the sites are permitted. In essence, the sponsor must show the Corps that there is a "home" for the material.[122]

Contract disposal is an option in which a dredging contract includes the requirement to dispose of the dredged material at a permitted site of the contractor's choosing, and is typically used in non-sponsor projects (Corps projects). The DMMP states that "contract disposal may suffice to quickly meet emergency or other unanticipated short-term needs, but it is inappropriate for consideration as an integral part of a comprehensive, long-term cost-effective DMMP for the

[120] Bryce Wisemiller, personal communication, 9/26/02.
[121] Ibid.
[122] Ibid.

Port."[123] When the DMMP was written in 1999, contract disposal was used as a last resort for managing dredged material because not many upland sites were available for placement. Currently, however, the Corps utilizes this option more regularly because of the difficulty of placing material at HARS and the increased availability of upland sites. Multiple companies are interested in obtaining the dredged material, and increased competition for the material results in a reduction in costs for placement.[124]

Disposal costs have varied dramatically according to method and availability of associated services. Dredging contractors must include disposal of the dredged material in their bid to receive a project. If it is anticipated that the material will be placed upland, the contractor must first negotiate with processors (who apply additives to the material such as cement or ash) through sub-contracting. Processing is necessary to stabilize and neutralize the material that will eventually be used to cap brownfields and landfills. If the material is to be processed, the processing facility accepts the material and must also take responsibility for the actual disposal, whether that is on-site at the processing facility or whether it will go to a different site. Processors, however, must first demonstrate to the Corps (who ultimately selects the lowest bidder to receive the contract) that the disposal site is permitted by the state, meets state regulations, and has capacity to accept the material.[125]

Cost for upland processing and disposal can vary with availability of services and locations, and has been demonstrated within the past year in the New York/New Jersey area. Processing cost approximately $55-$58 per cubic yard to place when there was only one

[123] USACE NYD, September 1999. Page 30.
[124] Bryce Wisemiller, personal communication, 9/26/02.
[125] Steve Dorrler, personal communication, 9/26/02.

processing facility. With increased competition (there are now three processors), the price decreased to $35 per cubic yard.[126]

In addition to landfills that need capping, many abandoned industrial sites in need of remediation exist in the New York/New Jersey area.[127] However, utilizing these locations for dredged material placement is not always a simple task. Some of these sites are governed by consent decrees, and the cycle of dredging (which can be lengthy and unpredictable) does not always fit that time frame of these sites. Dredging may occur on a one-year, three-year or five-year schedule but may not meet the needs of the landfill and the timely delivery of sediment cannot always be guaranteed to the disposal site.[128]

Currently, a unique option is being explored for the upland disposal of dredged material. A demonstration project is examining the feasibility of using abandoned mines as a location to place contaminated dredged material. Mines, by definition, typically cut into the slope of the hillside (creating a 90 degree angle) and cause hazardous conditions. Processed dredged material would fill this area to re-create a continuous slope. It was also discovered that the filling solved an acid leaking problem at the mines. Extensive testing was completed to analyze potential leaching, and the project appears to be viable.[129] Obstacles to implementing such a program on a wider scale, however, include cost and public opposition. Material, in addition to having costs associated with processing, would have to be transported by rail. In addition, it is anticipated that there might be NIMBY (not-in-my-backyard) movements among local citizens. The Port Authority recognizes that without proper public outreach efforts, the project may fail. However,

[126] Ibid.
[127] Ibid.
[128] Doug Pabst, personal communication, 9/26/02.
[129] Steve Dorrler, personal communication, 9/26/02.

these mines contain billions of cubic yards of capacity for dredged material and the state of Pennsylvania appears to be interested in future projects.[130]

Although the DMMP appears to define priorities and recommended disposal options, and stakeholders have reflected increased environmental values, several issues concerning the system related to dredging are still left unclear. The Corps is required only to pay for dredging that results in navigational benefit, and non-federal sponsors often pay the difference in cost if the material requires more environmentally sound disposal (which can be significant since upland disposal often requires processing). Although the DMMP advocates beneficial use and upland disposal, the system is not currently designed with incentives to do so. When the costs of such upland options as mine reclamation or brownfield remediation are higher than placing the material at a CDF, the latter would be the more economically attractive option with less environmental benefit. Such an option is likely chosen over a more costly environmental solution since project sponsors operate for profit.

Ultimately for those cleaner sediments that can meet the enhanced environmental quality requirements, ocean disposal remains an option. However, the standards, as explained in the next section, remain contentious.

Review of Bioaccumulation Testing for HARS

HARS is the only ocean disposal-turned-remediation site in the country to date. As mentioned earlier, HARS is now a 15.7 square nautical mile area, 9 square nautical miles of which serve as a Prime Remediation Area (PRA), 5.7 square nautical miles which serve as a

[130] Ibid.

Buffer Zone, a 0.27 nautical mile band around the PRA, and a one square nautical mile No Discharge Zone.[131] HARS accepts dredged material that meets previous "Category I" standards.

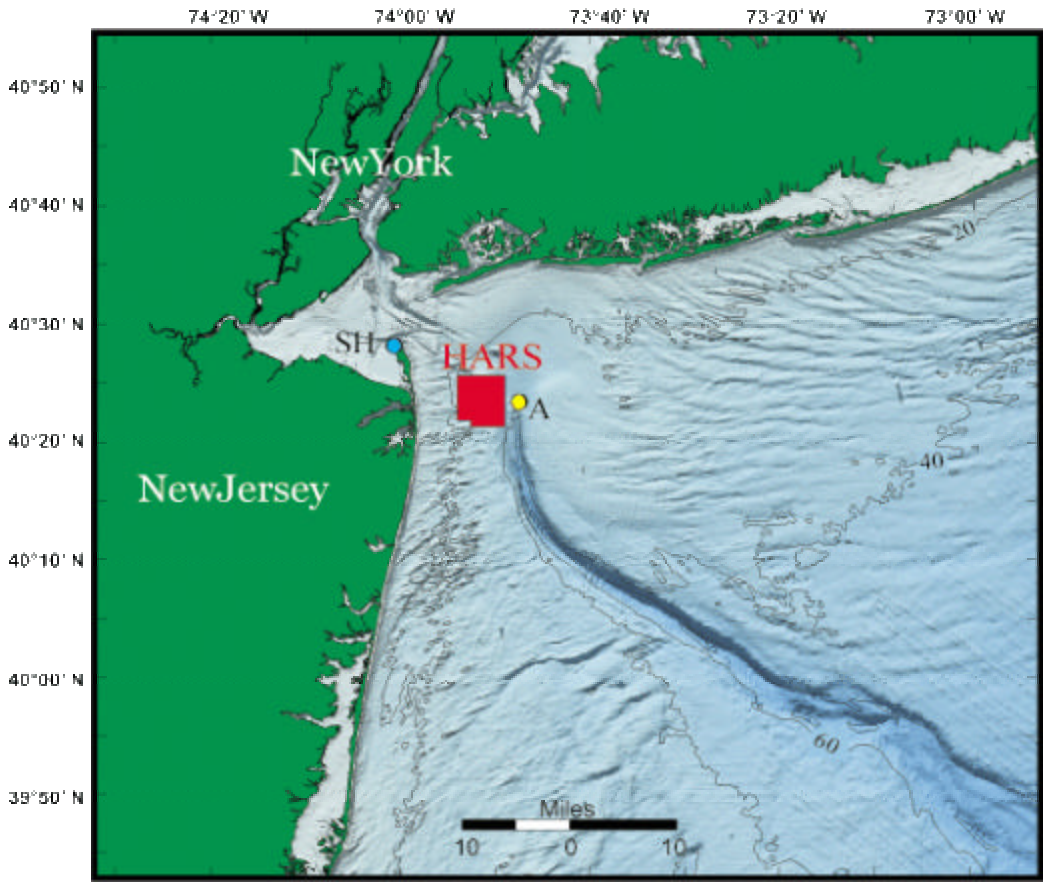


Figure 6. New York Bight Bottom Restoration Locations.
Source: http://pubs.usgs.gov/of/of00-503/reports/Figure1.htm

In 1996, EPA made a commitment to the HEP to conduct a public and scientific review process relating to its dredged material bioaccumulation testing evaluation framework (to ensure that sound science is applied during the decision-making process).[132] In January 1998, EPA began fulfilling its commitment by sending a letter to the Dredged Material Management Forum

[131] EPA Region 2, "Talking Points for HARS Dredging Issues."
[132] EPA Region 2, October 19, 2000.

(of HEP) inviting "interested parties" to participate in a workgroup responsible for developing a charge for peer reviewers who were to evaluate the testing framework.

This stakeholder workgroup, initially called the Criteria Workgroup but later renamed the Remediation Material Workgroup (RMWG), was established by the HEP and developed from the Dredged Material Management forum.[133] It convened in March 1998 to identify the mission and questions to be answered by the assigned fourteen scientific peer reviewers. The process was designed so that a stakeholder group, representing various interests, would convene to design the questions and issues that would be answered and addressed by the experts. This design ensured that stakeholder concerns were properly elicited, while employing expertise that could only be gained by one specific group. Workgroup members submitted comments and produced a final charge relating to bioaccumulation testing (not toxicity or water column testing). This charge was given to the scientific peer reviewers on June 23, 1998.[134] The peer reviewers were asked to respond within sixty days, although the last response was received in March of 1999, well after the deadline. All comments were then distributed to the RMWG members.

The peer review process for the bioaccumulation testing evaluation framework at HARS eventually resulted in two separate efforts; the first peer review was undertaken and completed by the end of 2000, but was eventually replaced by another peer review in 2002. EPA issued their response to the first peer review panel's comments in a document released on October 19, 2000. The document proposed revising the worm PCB matrix value from 400 to 113 ppb. In

[133] See http://www.epa.gov/region02/water/dredge/testing.htm, Chronology section. Last accessed 8/27/02.
[134] EPA Region 2, October 19, 2000.

addition, it proposed revising the existing framework by establishing HARS-specific values for all contaminants of concern (to replace the regional matrix values).[135]

Corps-EPA Memorandum of Agreement

In a Memorandum of Agreement (MOA) signed by the Department of Army, EPA, and the Army Corps of Engineers in 2000, it was declared that a second, new peer review would be undertaken to re-evaluate the bioaccumulation testing evaluation framework and would cover both human health and ecological effects. It specified a timeline to which EPA and the Corps should respond to reviewer comments and provide proposed changes, while a senior oversight panel would ensure that schedules were kept.

In addition to the scientific review process, the MOA formally acknowledged a renewed interagency commitment between the EPA and the Corps, and pledged that the agencies would do a number of things: work closely with NY, NJ and other stakeholders to advance the goals of the 1996 (Three-Party Letter) agreement; help develop economically viable disposal options for HARS unsuitable material; commit to community outreach; and address additional funding needs and new regulatory and programmatic questions. The MOA also addressed the public distribution of monitoring data collected at HARS, and the Corps has accordingly posted such monitoring data (from August 1997 to March 2000) concerning conditions at HARS on its website.[136]

It is important to note that the MOA publicly stated the revision of HARS-specific levels for PCB's from 400 ppb to 113 ppb, as was recommended by the first group of peer reviewers. The manner in which this change was undertaken led to additional litigation.

[135] EPA Region 2, October 19, 2000.
[136] http://www.nan.usace.army.mil/business/prjlinks/dmmp/benefic/pdf/table3.htm. Last accessed 11/18/02.

Recent Litigation: The U.S. Gypsum suit

Although the MOA provided documentation of interagency commitment as well as a schedule for future progress, it also initiated a lawsuit. The revision of HARS-specific levels for PCB's from 400 ppb to 113 ppb in the MOA caused a subsequent permit denial for United States Gypsum to dispose of material at HARS. The company originally applied for a permit in April 1998, and amended their application after discussions with the EPA and Corps in the spring of 2000. The EPA and Corps issued a Joint Evaluation Memorandum on July 19, 2000 that concluded that the sediment was in fact suitable for disposal at HARS. The Corps then issued public notice of the dumping permit to subject the decision to public comment, which was allowed until September 25, 2000. The MOA, which lowered the permissible worm tissue level of PCB's to 113 ppb from 400 ppb for all existing and future disposal permit applications was published on September 26th —essentially changing the status of US Gypsum's sediment from permissible to impermissible. On September 27th, EPA withdrew its consent to issue the permit citing that the sediment failed to meet the new criteria.[137]

Applicable regulations for dredged material disposal state that a permit approval by the Corps requires EPA concurrence (in this case, EPA withdrew concurrence). If the EPA rejects a permit and does not withdraw its objections, the dispute could then be referred to the Chief of Engineers who may request a waiver from the EPA Administrator. In this case, the record does not show that any of these steps were taken, nor did the Corps issue formal notification to the applicant of the denial. The Corps' failure to do so amounted to a practical denial of the permit.[138] US Gypsum responded to this denial with a lawsuit against the agencies.

[137] United States Gypsum Company v. William J. Muszynski et al., July 10, 2002, Decided.
[138] United States Gypsum Company v. William J. Muszynski et al., August 31, 2001 Decided.

In its ruling, the court held that the change in allowable levels of PCB contained in the MOA essentially constituted a legislative rule change (as opposed to an "interpretive" ruling) because the new standard was binding and outcome determinative. Such a change should have been subject to the notice and comment of the Administrative Procedures Act. Summary judgment was granted by the court, who specified that although the rule was unlawfully promulgated:

> "It does not follow, however, that plaintiff is automatically entitled to the permit because it is clear that the defendants never gave any consideration to the public comments that were received during the period that plaintiff's application was submitted for public comment prior to the promulgation of the new standard. Consequently, this matter is remanded to the Corps for reconsideration of plaintiff's permit application, applying pre-Memorandum standards but taking account of such public comments as were received before September 26, 2000. The Corps is further directed to complete its review and make its final determination of whether or not to approve the plaintiff's permit by no later than September 30, 2002."[139]

In response to the court's ruling, the EPA began formal rulemaking procedures on October 1, 2002, when Regional Administrator Jane M. Kenny signed a proposed rule that would change the allowable PCB level in worms from 400 ppb to 113 ppb for dredged material placement at HARS. The Corps was also to respond to the ruling by making a final permit determination. Fortunately, an outside solution was reached that signified compromise among all parties. This solution avoided the contentious issues associated with placing material at HARS and instead would permit the material to be placed upland. In a news release on October 3, 2002, the Army Corps of Engineers New York District stated,

"In response to the controversy, {over placing the material at HARS} the Corps facilitated negotiations between the states of New York and New Jersey and U.S. Gypsum to find reasonable alternatives. As a result of unprecedented cooperation, U.S. Gypsum agreed to beneficially reuse the dredged material in capping the Bayonne Landfill."[140]

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[139] United States Gypsum Company v. William J. Muszynski et al., July 10, 2002, Decided.
[140] Army Corps of Engineers, News Release, October 3, 2002. Found at: http://www.nan.usace.army.mil/news/newsrels/021003gypsum.pdf. Last accessed on 11/18/02.

Although U.S. Gypsum could have insisted that their material be placed at HARS, especially since the court specified application of pre-Memorandum standards and the change had not yet been finalized through the rulemaking process, the company decided to pursue upland options. In addition, the EPA rule became final and is effective as of April 16, 2003. The rule establishes a pass/fail criterion for evaluating PCBs in worm tissue from bioaccumulation tests performed on dredged material proposed as Remediation Material at HARS. This criterion will be applied to the arithmetic mean concentration reported for the analyses of the worm tissue replicates exposed to the tested sediments, without the use of statistical confidence limits. The new standards will remain in effect until after the scientific peer review on the bioaccumulation testing evaluation framework (including assessments of human health and ecological effects) is completed.[141] Although new standards might result from the peer review, these particular criterion would serve as interim values and at least can ensure that material placed at HARS is consistent with its remedial intent.[142]

Status of the Scientific Peer Review

The second peer review process began in January 2002 with a new group of scientists. Consensus opinions of the scientific peer review panel are contained in the June 20, 2002 report entitled *Interim Consensus Report of the HARS Scientific Peer Review Phase 1: Human Health Evaluation*. A central consensus opinion of this panel is that estimates of key exposure parameters be improved, and that site-specific studies be conducted to obtain such updated data. Although this will require lengthy periods of time, EPA and the Corps have

[141] Federal Register, March 17, 2003.
[142] Ibid.

developed several scopes of work for studies designed to obtain this information. EPA also intends to resume RMWG meetings before responding to the peer reviewers' consensus report and finalizing the human health and ecological effects testing evaluation framework.[143]

[143] Ibid.

VI. THE FUTURE OF DREDGED MATERIAL DISPOSAL IN NEW YORK

Channel Deepening

The Corps NYD began undertaking a Harbor Navigation Study (HNS) in 1999, around the same time it was developing the DMMP. This study was authorized by Section 435 of the Water Resources Development Act of 1996,[144] with the primary purpose of addressing future navigation needs of the Port of NY/NJ. It comprehensively investigated the feasibility of deepening all major channels to marine terminals. The resulting Recommended Plan proposed to deepen eight channels to 50-53 feet. An offshore container port and a canal extending the Port Jersey Channel across the Bayonne Peninsula were considered, but were eventually dropped from the planning process.[145] Although this study did not take into account land infrastructure or transportation when recommending which channels were to be deepened (the Comprehensive Port Improvement Plan developed because of this deficiency), the HNS did address where dredged material resulting from the channel deepening would be placed; the HNS specifically reverts to the DMMP when addressing disposal options relating to any recommended channel deepening operations.

The HNS concluded that "unmet cargo demand projected for the Port of New York and New Jersey may necessitate improvements of volume capacity above what is currently planned."[146] The HNS projected that by the year 2060, cargo demands for the metropolitan region would exceed 19 million Twenty-foot Equivalent Units (TEU's), but that the capacity of

[144] USACE. NY/NJ Harbor Navigation Study, December 1999.
[145] Ibid.
[146] http://www.cpiponline.org/project_overview.htm. Last accessed on 7/29/02.

existing port facilities could only be about 9.4 million TEU's.[147] Essentially, the HNS recommended the deepening of several channels to over 50 feet to increase cargo, but did not address the on-land infrastructure or capacity to deal with such increased loads.

A Final EIS (FEIS) accompanied the HNS, which identified alternatives to the Recommended Plan and addressed impacts associated with deepening the Harbor. It documented baseline conditions, outlined project alternatives, and identified direct, indirect, and cumulative impacts that could result from plan implementation. It also specified mitigation plans if impacts proved to be unavoidable.[148]

Many different entities were involved in the design of the HNS and its associated FEIS. Although the Corps NYD is responsible for conducting the overall study, it did so in cooperation with the New York and New Jersey Harbor Navigation Study Executive Committee, which was comprised of representatives from the non-Federal partners (the State of New York, assisted by the City of New York, the State of New Jersey, and the Port Authority of New York and New Jersey). These non-Federal partners are collectively contributing one-half the Feasibility Study costs in cash or in-kind services (such as engineering, funds or environmental information).[149]

Other agencies became involved in the process through NEPA during the FEIS process. EPA, the Federal Highway Administration, and National Marine Fisheries Service served as cooperating agencies, with citizen stakeholder participation through commenting as well. As part of a public outreach program, the Corps NYD formed an advisory group comprised of business, labor and citizen interests. The NYD briefed the group at important points including the public scoping and the completion of the Alternative Formulation Briefing (AFB), and

[147] Memorandum of Understanding, December 1999-January 2000. Obtained from www.cpiponline.org. Last accessed 8/15/02.
[148] Ibid.
[149] USACE. NY/NJ Harbor Navigation Study, December 1999.

formed several workgroups to assist them in completing this study. The groups provided technical information, voiced environmental concerns, and helped steer the formulation process. Participants of each workgroup came from each of the partners' organizations or the various resource agencies. The four major workgroups follow these technical areas:

- Environmental
- Engineering
- Economics
- Infrastructure/Formulation

The following chart describes the authoritative and stakeholder involvement in decision-making for channel deepening in New York Harbor.

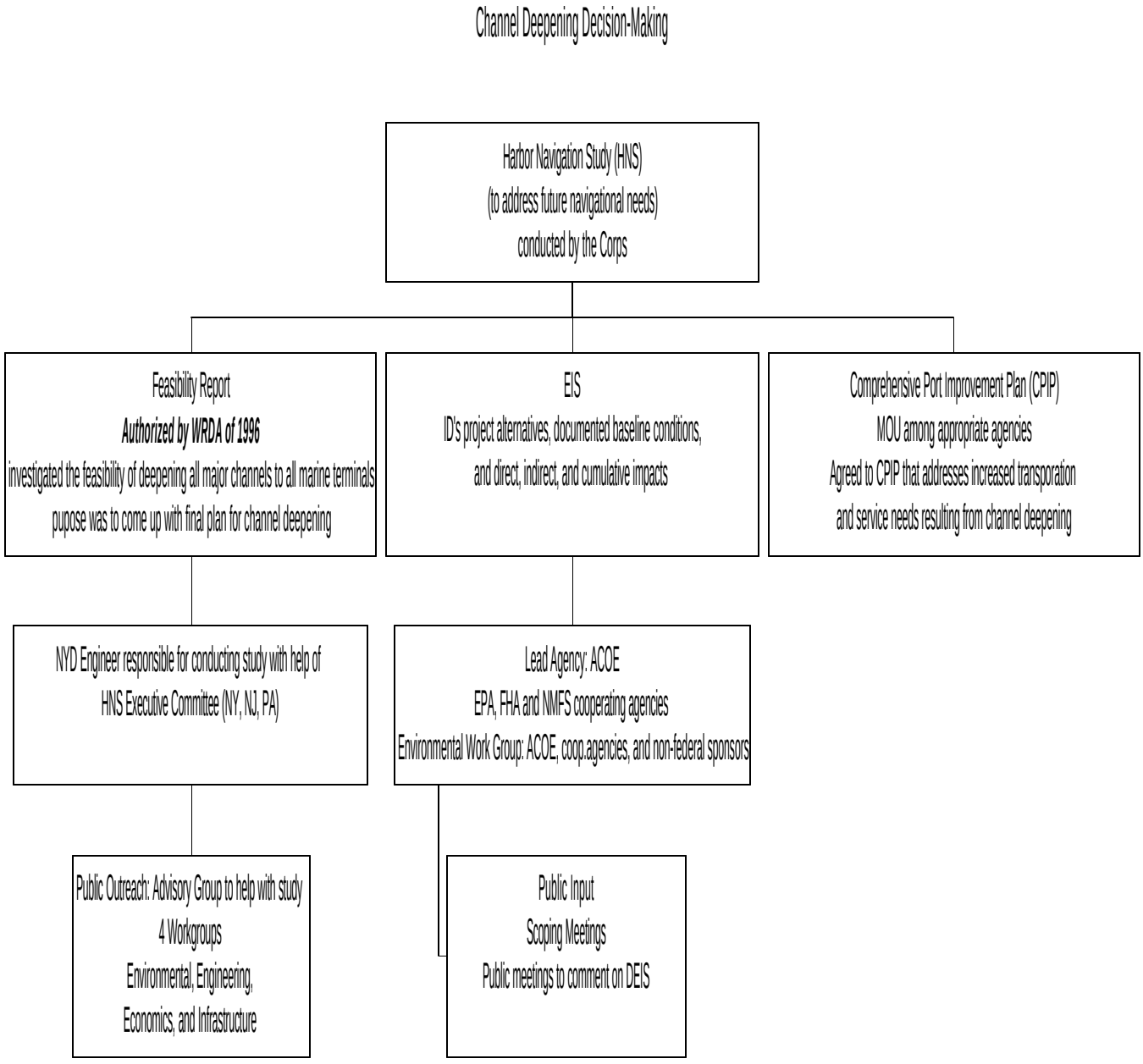

Figure 7. Channel Deepening Decision Making

Comprehensive Port Improvement Plan (CPIP)

Since the HNP was only comprehensive in its examination of channel deepening activity and not in terms of entire port capacity and facilities, in January 2000, a cooperative effort was put forth in a Memorandum of Understanding (MOU) for a Comprehensive Port Improvement Plan (CPIP) for the Port of New York and New Jersey. "The aim of the CPIP is to formulate an environmentally friendly, economically enhancing, and financially viable plan for the progressive development of the Port of NY/NJ over the next 60 years,"[150] and outlines steps needed to further implement the Three-Party letter signed in 1996.

The initiation of a port improvement program requires cooperation of a number of agencies and stakeholders as illustrated in Figure 8. Dredged material testing and placement may be viewed as involving a narrow range of considerations. However, channel deepening as indicated in Figure 7 requires a more complex process. This trend is accelerated when additional aspects of port improvement are included. In each case, expanding the scale of the environmental/transportation issues at stake increases the complexity of the decision process.

The CPIP will be developed to support the goal for economic growth while conserving natural resources and, as such, is the broadest scale and most complex process. It will also look to further the objectives of the Joint Dredging Plan for the Port of NY/NJ agreed to by Governors Pataki and Whitman. The CPIP "shall evaluate future cargo handling capacity needs and alternatives for the Port, including cargo handling capacity at the Port facilities proper, immediately off the port facility's premises, and throughout the 'Port District', which is defined in bi-state legislation, as roughly the area encompassed by a 25 mile radius centered around the Statue of Liberty."[151] In particular, the CPIP will "define the specific water and landside

[150] "CPIP Gets Under Way," *Tidings* (Newsletter of the CPIP for the Port of NY/NJ) Issue 1, Spring 2002.
[151] Memorandum of Understanding, page 7.

infrastructure development initiatives that individual Consortium members believe to be necessary to meet the region's capacity demand of 19 million TEUs (which includes the unsatisfied capacity demand of 9.4 million TEUs) by the year 2060. The plan shall also consider environmental issues, including impact avoidance, minimization and mitigation, air quality, habitat/harbor preservation and restoration opportunities, public access, and sediment contaminant reduction,"[152] as well as promote "green port" principles.

Air quality changes related to the regional development and increased land transportation needs that will be spawned by a deeper channel and more imports remain an important environmental issue beyond dredged material placement. Plans for meeting general and transportation conformity so that federal actions do not jeopardize state implementation plans to meet national ambient air quality standards have been reconsidered recently.[153] Ultimately, comprehensive environmental planning for the region will require assessments of land, air, and sea impacts.

[152] Memorandum of Understanding, page 7.
[153] Alfieri, K.L. and C. Breslin. 2003. Comment: The Meshing of New York City's Transportation Plans and Clean Air Act Requirements Following September 11, 2001. *Villanova Environmental Law Journal 14*:69.

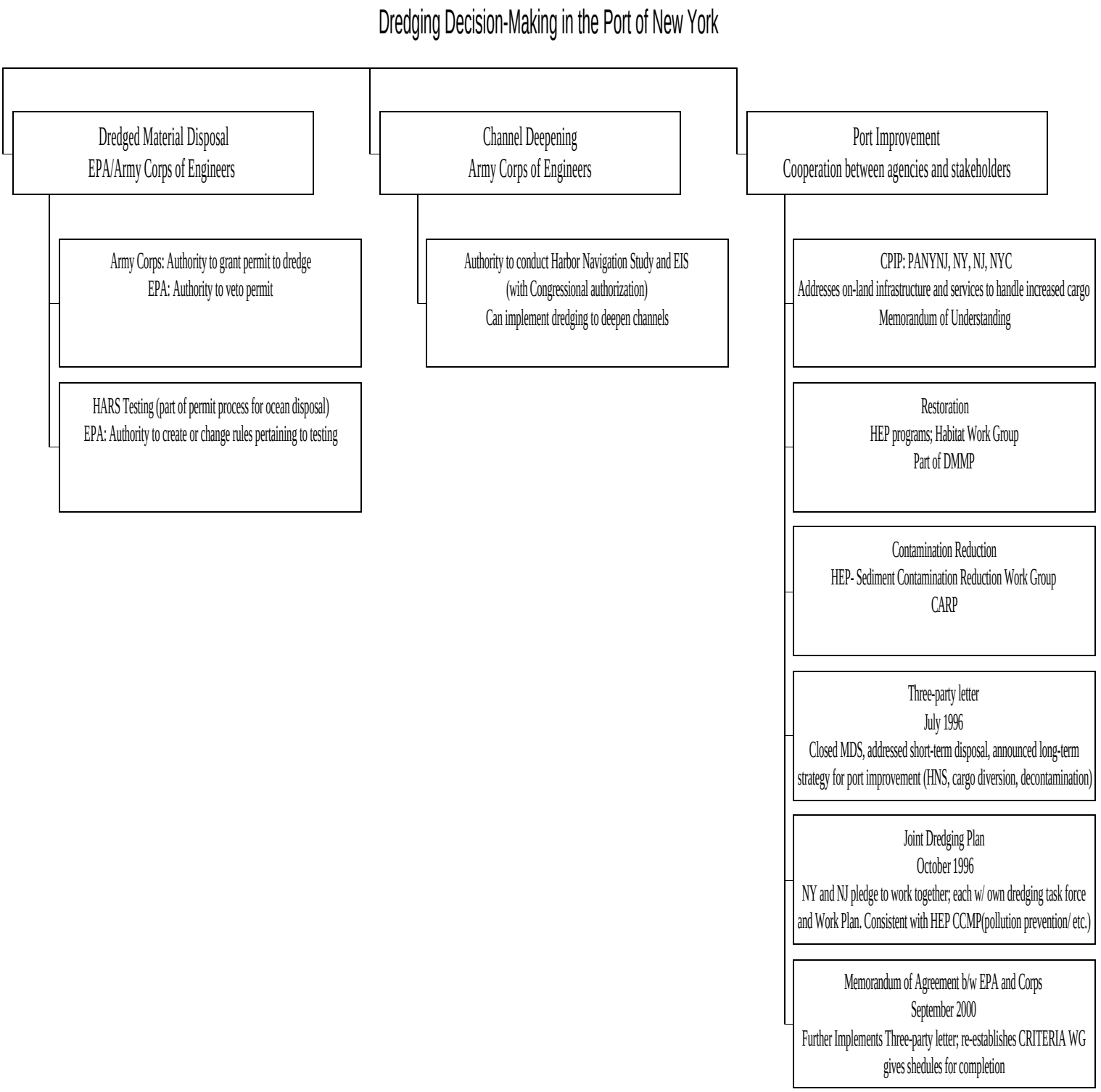

Figure 8. Dredging Decision-Making in the Port of New York

The CPIP EIS will analyze reasonable viable alternatives for development of the Port. Particular attention will be given to the potential impacts of any proposed fills, new pier or berthing facilities, dredging and disposal operations, waterway and land side traffic congestion, air pollution, and other issues identified during the scoping process. Four types of alternatives were specified in the Memorandum:

(1) The No Action alternative.

(2) Port expansion/enhancement/improvement alternatives that increase productivity or cargo handling efficiency at existing terminals.

(3) New terminal alternatives developed in either upland or with fills into the water.

(4) Combinations of the above.

The CPIP-EIS shall also "include analysis of the direct, indirect, and cumulative impacts associated with each alternative discussed in the CPIP-EIS. At a minimum, the CPIP-EIS would evaluate proposed port-related fills, alternatives to fills, associated transportation infrastructure and projects, waterway and land-side traffic congestion, socioeconomic issues, air quality, and other development-induced environmental impacts. To the maximum extent possible, the CPIP-EIS will make use of existing data that has resulted from other plans, studies, and environmental analyses."[154]

Public participation is also encouraged for the development of the CPIP. The participation process itself associated with the environmental analysis of the CPIP shall meet the goal of "Civic Engagement" offering "opportunity for citizens, businesses, and communities to participate in and influence the natural resource, environmental, and economic decisions that

[154] Memorandum of Understanding, page 8.

affect them," which was stated by the President's Council for Sustainable Development in June 1993.

The MOU established parties responsible for the preparation of the CPIP and the CPIP-EIS. The project sponsors, including the Port Authority, the States of New York and New Jersey, and the City of New York, will form a Consortium to advance and/or support future Port economic development and environmental restoration proposals. By mutual agreement, the Consortium will direct, manage, and provide funds for the CPIP preparation, and provide funds and data to support the EIS. The federal Co-lead agencies (EPA, USACE, New Jersey Maritime Resources, and the Empire State Development Corporation), in coordination with the signatories to the MOU, will select the contractor responsible for preparing the CPIP-EIS. The contractor will develop preliminary drafts of the CPIP-EIS documents, subject to approval by the Co-lead agencies, and will be responsive to input provided by cooperating agencies. In addition, the Consortium will play an active role in all public participation activities. The following is the responsibility structure as taken from the Memorandum (2000).

Table 5. Comprehensive Port Improvement Plan – Responsibility

CPIP Responsibility Structure	
Participant	**Responsibility**
Consortium: • Port Authority • New Jersey Maritime Resources • Empire State Development Corporation • New York City Economic Development Corporation	• Cooperatively analyzing Port efficiency, expansion, and development proposals; • Formulating these proposals into the CPIP; making recommendations on permit requests submitted by individual Consortium members; • Conducting appropriate public participation activities; • Reviewing, and preparing CPIP and coastal consistency documents; • Coordinating with Cooperating and

	Participating agencies; and additional activities in other sections of this MOU.
Participating Agencies: *Federal:* USACE, USEPA, U.S. Maritime Administration, U.S. Surface Transportation Board, Federal Highway Administration, U.S.C.G., U.S. F&WS, Federal Railroad Administration, Federal Transit Administration, NOAA, NMFS. *State*: NJDEP, NJDOT, NYDEC, NYDepartment of State, NY DOT, NY Metropolitan Transportation Council. *Local:* North Jersey Transportation Planning Authority, NYC Department of City Planning, NYC Department of Environmental Protection, NYC Department of Transportation, and interested local Port municipalities that apply for Consortium membership.	• Reviewing materials, participating in regular meetings, and providing guidance and advice in areas of special expertise.

Table 6. Comprehensive Port Improvement Plan EIS.

CPIP-Environmental Impact Statement Responsibility Structure	
Participant	**Responsibility**
Co-lead Agencies: • EPA • USACE • NJ Maritime Resources • Empire State Development Corporation.	• Independently evaluating and reviewing all NEPA documents; • Conducting appropriate public participation activities required under NEPA and other statutes and regulations; • Exercising authority consistent with applicable law. • The federal Co-lead agencies, in coordination with the parties to this MOU, will select the contractor responsible for preparing the CPIP-EIS.
Cooperating Agencies: *Federal:* U.S. Maritime Administration, U.S. Surface Transportation Board, U.S. C.G. U.S. F&WS,	• Reviewing materials, participating in regular meetings, and providing guidance and advice in areas of special expertise.

NMFS, NOAA, Federal Highway Administration, Federal Railroad Administration, Federal Transit Administration. *State:* Port Authority, NJDEP, NJDOT, NYDEC, NYS Department of State, NYDOT. *Local:* New York City Economic Development Corporation, New York City Department of Environmental Protection, New York City Department of City Planning, New York City Department of Transportation, New York Metropolitan Transportation Council, and the North Jersey Transportation Planning Authority.	

The Memorandum also presents a plan for implementation by these involved parties. The following implementation measures are taken from the Memorandum:[155]

- **Steering Committee:** Each Consortium member and co-lead agency will appoint a senior level manager to serve as a CPIP and CPIP-EIS "Representative," on a Steering Committee for the purpose of implementing their respective responsibilities under the MOU. The Representatives, consistent with the authority provided by their respective enabling statutes, regulations, and by-laws, shall speak definitively on behalf of their organizations. The Steering Committee shall consist of the Representatives (as specified above) and at least one non-governmental member of the Stakeholder Committee (defined below) who represents environmental interests. The Steering Committee may expand its membership as it deems necessary. The Steering Committee shall meet at least on a quarterly basis to jointly review the progress of the CPIP and CPIP-EIS processes, and discuss resolution of any issues or concerns that have arisen and cannot be resolved at a lower level. Representatives may appoint Designees to represent their organization on a regular basis throughout the CPIP and CPIP-EIS processes through a Management Committee.

- **Management Committee:** The Steering Committee establishes the Management Committee. The Management Committee will be responsible for overseeing and coordinating the day-to-day activities, consistent with each organization's role in preparing the CPIP and EIS, and will ensure the completion of the work and the coordination among the involved agencies. The Management Committee shall meet regularly to ensure that progress is being made, and to establish and dissolve ad-hoc and regular Working Groups as deemed necessary throughout the CPIP and CPIP-EIS

[155] Memorandum of Understanding, pages 10-11.

processes. To the maximum extent practicable, the Management Committee will draw from or utilize existing committees and working groups from other related studies, such as the HNS, the CCMP, and New York City Economic Development Corporation committees augmented and modified as appropriate. The Representatives of the Steering Committee shall participate in the first meeting of the Management Committee; their participation in future meetings is encouraged but optional.

- **Stakeholder Committee:** The Steering Committee will also establish a Stakeholder Committee to aid in public participation required through NEPA and other applicable laws, and to allow stakeholders the opportunity to share information and ideas for consideration by the Steering and Management Committees. To the maximum extent practicable, the Stakeholder Committee will be drawn from or utilize existing committees and working groups from other related studies, such as the HNS, the CCMP, and New York City Economic Development Corporation committees augmented and modified as appropriate. To ensure that all interested stakeholders are represented while still maintaining a manageable number of Stakeholder Committee Members, participation in the Stakeholder Committee meetings will be open to all interested parties, but only "Members" will serve in an official capacity. In addition to open access to meetings, a mailing list will be established whereby all interested parties can be kept informed of discussions taking place during the Stakeholder Committee meetings. The Harbor Estuary Program (HEP) infrastructure and authority will be instrumental in developing mailing lists and supporting the development of the Stakeholder Committee. The Stakeholder Committee shall meet quarterly starting from the effective date of this MOU. The selected Designees shall hold the first Stakeholder Committee meeting specifically for the purpose of establishing a process for selecting non-governmental committee members.

All Committees and Working Groups will also elect a Chair. If a Chair is unable to fulfill her or his responsibilities, a new Chair will be elected. Working Group Chairs shall report to the Management Committee Chair on a regular basis, but not less then bi-weekly.

Once the framework contained in the Memorandum of Understanding was drafted, implementation activity regarding the CPIP began. In early-mid 2002, stakeholder groups were formed representing various interests, draft objectives were created, and workshops were held. In September 2002, the Stakeholder Council (a mix of all the interest groups) agreed to consider the following fourteen objectives:[156]

[156] www.cpiponline.org

- Develop plans in consideration of environmental improvement opportunities to promote the use of new technologies for alternative fuels, clean engines, energy efficiency and renewable energy in port facilities and operations including:

    - Supporting attainment of sediment, water and habitat quality to sustain a diversity of living resources.
    - Investigating innovative best management practices for reduction of non-point sources of water pollutants.
    - The incorporation of green port concepts and technologies.

- Identify and protect significant habitats, including uplands, and avoid, minimize and compensate for adverse impacts while working with environmental regulators and environmental non-governmental organizations to identify appropriate "mitigation" options.

- Identify the costs and economic benefits associated with the proposed improvements, each as stand alone, and as an aggregate plan which results in the greatest public and private benefit.

- Identify coastal and inland sites that can be developed for port usage, avoiding or minimizing fill requirements. Identify a "least-fill" port development strategy.

- Develop CPIP so as to integrate the process with existing regional planning efforts.

- Work closely with public agencies and officials to ensure implementation of port programs are well synchronized with other public policy goals.

- Reduce or minimize potential future increases in regional "Vehicle Miles Traveled" (VMT) and mobile source emissions from port improvement related activities.

- Reuse previously developed sites (brown fields) and reclaim disturbed sites where appropriate.

- Identify upland transportation related improvements directly related to proposed terminal improvements.

- Identify funding sources (federal, state, public/private partnerships) that could be used to finance the improvement initiatives.

- Thoroughly investigate technologies that increase terminal throughput capacity on existing port acreage.

- Promote rail/truck/barge mode split that will support reduced port-related Vehicle Miles Traveled and improve air quality.

- Enhance waterfront public access in conformance with State Coastal Zone Management and local plans.
- Create a meaningful public outreach program that maximizes input from the local community, elected officials, labor and business and environmental interests.

In addition, the feasibility of communication and opinion/comment sharing among different stakeholders and council members through the CPIP website is also being explored. Much work remains to be done on the CPIP project, which is only in its initial stages. For example, reduction of VMT in the New York City area requires the development of feeder ports with regular barge service to reduce the number of truck trips for delivery of containers.

Contamination Reduction

In addition to channel deepening and port improvement commitments, effort was being undertaken to proactively address the problem of dredged material contamination. Since it is obvious that the Port of New York is investing increased amounts of time, stakeholder effort, and financial resources toward expanding its capacity, dredging needs will only increase. With increased dredging needs as well as increasingly stringent ocean disposal standards, placement of contaminated dredged material will continue to be problematic. Thus, several entities have focused on preventing contamination as to avoid controversial placement options and to increase the likelihood of beneficial use options with cleaner dredged material.

The HEP, through its Contamination Assessment and Reduction Project (CARP), is seeking to improve the quality of sediment to be dredged from the harbor. The Sediment Contamination Reduction Workgroup (SCRWG), which was formed in the summer of 1994,[157] facilitates CARP. This ongoing project is an attempt to understand the fate and transport of contaminants discharged into New York Harbor, with a goal to reduce incoming pollutants that

[157] http://www.hudsonriver.org/pp/carpweb/sld004.htm. Last accessed on 11/18/02.

contaminate dredged sediments. CARP intends to specifically identify and quantify sources of problematic contaminants, determine through mass balance predictive models the consequences of contaminant loadings on the estuary, and apply appropriate regulatory tools to reduce or eliminate the inputs.[158]

SCRWG was a result of the HEP Dredging Forum, and CARP is a result of that group's work. In 1994, the group was charged with developing a plan to reduce contaminant loads so that dredged material disposal would not be constrained by contamination; it would ideally be entirely what was considered Category I material (no bioaccumulation or toxicity).[159] Issues given to the SCRWG included types of contaminants present, sources and quantities of those contaminants, methods of how they can be reduced, evaluating if dredged material would be clean if those sources were eliminated, and determining if the CCMP adequately addressed these issues.[160] In September 1994, the SCRWG recommended a plan to the HEP Policy Committee, which was used to make appropriate changes to the CCMP.[161]

EPA later requested further work by the SCRWG in the spring of 1996 to outline a plan for source quantification of contaminants and model calibration, including costs.[162] New York State Department of Environmental Conservation (DEC) was developing its Work Plan to facilitate contamination reduction, called "Sources and Loading of Toxic Substances to New York Harbor," with authority for state participation stemming from the Governors' Joint Dredging Plan (between NY and NJ).[163] Once this plan was announced, NYS DEC's involvement increased. The work plan (including source quantification and models) was

[158] http://www.harborestuary.org/carp.htm, accessed on 4/3/03.
[159] http://www.hudsonriver.org/pp/carpweb/sld004.htm, accessed on 4/3/03.
[160] http://www.hudsonriver.org/pp/carpweb/sld005.htm. Last accessed on 11/18/02.
[161] http://www.hudsonriver.org/pp/carpweb/sld006.htm. Last accessed on 11/18/02.
[162] http://www.hudsonriver.org/pp/carpweb/sld010.htm. Last accessed on 11/18/02.
[163] http://www.dec.state.ny.us/website/dow/carpintro.htm. Last accessed on 11/18/02.

developed in May-June of 1996, and was eventually agreed upon by the SCRWG and the NY Department of Environmental Conservation in April 1997. The cost of the work plan was estimated at 13 million dollars, and monitoring would include external sources, ambient conditions, and biota.[164] Also at that time, Governor Pataki announced the Hudson River Initiative, with contaminant reduction as a key component.[165]

The overall New York State work plan for contamination reduction contained three distinct documents that were issued by the DEC in 1998. First, *Sources and Loadings of Toxic Substances to New York Harbor* was issued to "deal primarily with the collection of field data in support of the CCMP objectives. Field data will be of three kinds: trackdown to identify specific sources of contaminants, loading data from tributaries and point sources, and ambient concentration data taken in and near the core area as defined as extending from the Tappan Zee Bridge to the Sandy Hook/Rockaway line."[166] The loading data have three applications: to support calibration for the simple mass balance model, to assist in trackdown by noting which sources are quantitatively most significant, and to plan a long-term load monitoring effort. The project itself operates under the NYS DEC but receives input from the HEP's Toxics Workgroup, which designed a Monitoring Plan. The Monitoring Plan includes external sources (sewage treatment plants, combined sewer overflows, industrial discharges, tributaries, landfills, accidental spills, and atmospheric deposition), and ambient conditions (water, sediment and biota).

Second, the NYC DEC issued a Quality Assurance Plan document entitled *New York Harbor and Hudson River Technical Program*. The objective of the plan is to help facilitate the

[164] http://www.hudsonriver.org/pp/carpweb/sld013.htm and http://www.hudsonriver.org/pp/carpweb/index.htm. Last accessed on 11/18/02.
[165] http://www.hudsonriver.org/pp/carpweb/sld011.htm. Last accessed on 11/18/02.
[166] http://www.hudsonriver.org/sources.htm. Last accessed on 11/18/02.

work towards cleaner sediments in the future through the reduction of contamination sources. The proposed study is intended to document, in both quantitative and qualitative terms, the level of organic chemicals and trace metals in the bottom sediments of New York Harbor, the Hudson River, and various tributaries. Surface sediments and sediment core samples will be collected as part of this study to determine the levels of contaminant concentration for the parameters of concern. This data is useful for contaminant identification, source identification, dredged material management, and as a baseline for future monitoring.[167]

Third, the NYS DEC issued a series of documents relating to biota sampling entitled *Chemical Contaminants in New York-New Jersey Harbor Biota.* Separate documents address chemical concentrations in zooplankton, benthic invertebrates, fish and crustaceans, and cormorants.[168]

The NYDEC developed this comprehensive work plan (consisting of the above elements) "in concert with New Jersey and the CARP Workgroup—a group of government, academic, and consultant experts," and identified the principle element of concern to be dioxins/furans, PCB's, DDT, dieldrin, chlordane, PAH's, mercury, cadmium and lead.[169] Such state efforts not only serve to reduce contamination to the harbor, but support and integrate HEP efforts as well.

[167] http://www.hudsonriver.org/sedi.htm. Last accessed on 11/18/02.
[168] http://www.hudsonriver.org/carpdown.htm. Last accessed on 11/18/02.
[169] http://www.dec.state.ny.us/website/dow/carpintro.htm. Last accessed on 11/18/02.

VII. Conclusions

This report describes the implementation of federal regulations concerning ocean dumping of dredged material. One element of the federally suggested, tiered process receives full attention in the New York region. It is the bioaccumulation test and related threshold values which purportedly resolve sediment placement in a scientific manner. However, both this technical work and its use are shaped by the perspectives of diverse participants. The strongly held values of these participants shape regional regulatory processes, the use of science, and the ultimate decisions concerning ocean disposal.

Regional Regulatory Processes

In Chapter III, we documented how litigation drives regulatory change in response to one of the primary objectives for this report. In 1993, Clean Ocean Action questioned the application of bioaccumulation testing and ultimately triggered a regulatory change to clarify some of the EPA procedures. More recently, after U.S. Gypsum's permit for ocean disposal was revoked in 2000, an additional round of litigation resulted in further rulemaking by EPA. In this instance, the reduction of a bioaccumulation threshold for PCBs was viewed by the court to require a rulemaking procedure which EPA subsequently undertook. In sum, regulatory change either provoked by or clarified by litigation resulted in a more restrictive approach to ocean disposal.

We also noted shifts in agency relationships and planning procedures. The Harbor Estuary Program utilized a collaborative decision process that appeared to function well when confronted with the need to determine how long the Mud Dump Site should be used and under what conditions. This process was superceded by senior government officials deciding to close the Mud Dump Site more rapidly. Through the Three-Party Letter, EPA, DOT, and the U.S.

Army also pledged to remove obstacles to dredging and ensure both the health of the port and the environment. The letter established a framework for the establishment of the Historic Area Remediation Site at the location of the former Mud Dump Site. One may interpret the emanation of the Three-Party letter as a manifestation of a failure of the existing administrative decision processes to provide an adequate forum for value conflicts. The latter, it can be argued, spilled over into a new forum where political leaders resolved outstanding questions concerning ocean disposal.

This malleability in decision processes may, in part, originate at the federal level. For example, the consideration of sediment toxicity itself is a joint effort of the Corps and EPA as prescribed by federal law, regulations, and guidance. Ultimately, sediments that meet regulatory criteria are placed in the ocean through a Corps permit. Those that do not meet ocean criteria are considered for placement in coastal waters, wetlands, and upland among other locations under state regulatory control. Many of these activities trigger separate assessments. Multiple entities are involved at the local level. Among them are a variety of planning and working groups such as CPIP, DMMIWG, DMMP, HEP, SCRWG, and RMWG. The proliferation of agencies and planning groups related to the harbor and ocean disposal further reinforces the perception of a complex decision process.

Use of Science

Throughout the decade, the use of presumably objective natural science also underwent significant clarification in its application. Chapter II of this report explained scientific testing protocols and their use in response to a primary objective for this report. In concept, federal guidance in the "Green Book" provides a tiered process for assessing sediment

contamination and determining suitability for ocean disposal. In practice, all decisions for the New York region appear to be focused on bioaccumulation in benthic organisms. This departure from national practice may derive from ambiguous guidance concerning assessments of contaminated sediments.

Similarly, flexibility in the selection of reference sediments affects results. Reference sediments function as a control, and serve to determine whether test sediments will be acceptable for ocean disposal. If reference sediments are close to sources of contamination, using such reference sediments can be misleading as the test sediment may pass, thus reducing the protection of ocean areas. Explicit acknowledgement of the value-laden portion of this, and more explicit guidance concerning the selection of reference sites would result in a more transparent decision process.

If the reference sediment issue is resolved, conflict over bioaccumulation analysis and interpretation will remain. While seemingly *scientific*, these processes involve value judgments that can significantly affect outcomes. With respect to thresholds, scientific assessments provide a measure of biological damage associated with certain levels of contamination. Determining what degree of damage is acceptable remains a social judgment. When damage is judged unacceptable, a threshold has been exceeded. Present procedures provide alternatives for specifying thresholds. For example, bioaccumulation may not exceed FDA or matrix values. Alternatively, a LPC may be established at 0.01 acute toxicity. Ultimately, these determinations rely on judgment concerning *acceptable* damage. Whether the threshold should be set at 10%, 20%, or some other level of increased mortality or bioaccumulation relies on values, not science.

In an attempt to be clear about threshold values, a matrix was established in 1981. Both the Corps and EPA agreed that change was needed in recent years, and for PCBs the agency

adjusted the allowable bioaccumulation from 400 ppb to 113 ppb. Litigation established that changing this threshold requires the full rule-making process under the Administrative Procedures Act. Thus, advances in scientific understanding combined with rulemaking procedures have led to ever-increasing process complexity. Peer reviews to change other bioaccumulation thresholds are likely to trigger equally detailed rulemaking.

Currently, the bioaccumulation testing protocol is presumed to be most useful. However, efforts are underway to improve this approach by adding ecosystem risk as a determinant for ocean dumping decisions. The means to operationalize ecosystem risk as a basis for assessing contaminated sediment disposal, and for including it in the decision process are yet to be established in this setting. Pursuit of a scientific ideal in this contentious setting will most likely come at the expense of operational clarity and ease of implementation.

Decisions and Values

In sum, the imperatives of continued port development and ocean environmental protection have resulted in changing decision processes and results. The results reported in Chapters IV and V here allow actions in a number of areas to be related to the clarification of values, a primary objective for this report. In specific, refinements of threshold values for PCB bioaccumulation were developed, and the Mud Dump Site was reconstituted as the Historic Area Remediation Site. The latter accepted much "cleaner" sediments than the former. These actions may be viewed to represent a value shift toward higher levels of environmental protection for the ocean.

Simultaneously, dredging for maintenance and new channel development substantially increased. One estimate of early 1990s dredging volumes is 5.5 mcy/yr. Recently, projected

volumes were in the range of 9 mcy/yr for the future. Over approximately a decade, the amount of sediment that was considered suitable for ocean disposal fell from approximately 95% to approximately 15%. These estimates indicate that harbor development increased and further levels of protection to the ocean environment were both obtained during the period under review.

However, while the transportation infrastructure of the harbor continued to expand, so too did the apparent salience of marine environmental quality. Marine environmental values have altered not only the placement of contaminated dredged materials but, as we have demonstrated, the core processes by which these decisions are made. In the end, value conflicts produced a growing complexity of decision processes. Ultimate decisions may be seen to have provided some measure of satisfaction to port development and marine environmental interests.

References

Army Corps of Engineers New York District and EPA Region 2. Regional Implementation Manual, 1992.

Army Corps of Engineers, New York District and EPA Region 2, Site Management and Monitoring Plan for the Historic Area Remediation Site, 1997.

Army Corps of Engineers, New York District. Dredged Material Management Plan for the Port of New York and New Jersey: Progress Report. December 1997. Page 2. Last Accessed on 7/31/02 at http://www.nan.usace.army.mil/business/prjlinks/dmmp/9712srpt/srpt3all.pdf.

Army Corps of Engineers, New York District. Dredged Material Management Plan Implementation Report. September 1999. Page 4. Last Accessed on 7/31/02 at http://www.nan.usace.army.mil/business/prjlinks/dmmp/9909imprpt/draftimprpt.pdf.

Army Corps of Engineers, New York District. Harbor Navigation Study. December 1999. Obtained through personal communication with Tom Shea.

Army Corps of Engineers New York District, "Dredging and Dredged Material Management Presentation to the HARS Peer Review Panel and Remediation Workgroup, January 10, 2002." Last accessed on 9/5/02 at http://www.nan.usace.army.mil/harbor/links/11002.pdf.

Army Corps of Engineers, New York District and EPA Region 2. Memo for the Record: Review of Compliance with the Testing Requirements of 40 CFR 227.6 and 227.27, and Site Designation Provisions of 40 CFR 228.15 for the American Sugar Refining Company, Hudson River, Yonkers, New York. September 17, 2002.

Army Corps of Engineers, News Release, October 3, 2002. Found at: http://www.nan.usace.army.mil/news/newsrels/021003gypsum.pdf. Last accessed on 11/18/02.

www.CPIPonline.org. "CPIP Gets Under Way," *Tidings* (Newsletter of the CPIP for the Port of NY/NJ) Issue 1, Spring 2002.

R. Engler, R. Peddicord, and R. Pierce. Ocean Disposal of contaminated dredged material: A case study. Unpublished manuscript, undated. p.18.

Environmental Protection Agency and Department of the Army. 1991. Evaluation of dredged material proposed for ocean disposal (Green Book), EPA-503/8-91/001.

Environmental Protection Agency and Department of the Army. 1998. Evaluation of dredged material proposed for discharge in waters of the U.S. (Inland Testing Manual), EPA-823-B-98-004.

EPA Region 2, "Talking Points for HARS Dredging Issues," obtained from Doug Pabst.

EPA Region 2. "Proposed Changes to the Bioaccumulation Testing Evaluation Framework and Response to Scientific Peer Reviewers Comments on the Existing Framework for Determining the Suitability of Dredged Material to be placed at HARS." October 19, 2000. Can be found at www.epa.gov/region02/water/dredge/rtcpcb.pdf.

Environmental Protection Agency, Press Release, October 1, 2002. Found at: http://www.epa.gov/region02/news/2002/02106.htm. Last accessed on 11/18/02.

Federal Register. Interim Final Rule: Clarification of Suspended Particulate Phase Bioaccumulation Testing Requirements for Material Dumped in Ocean Waters. May 20, 1994.

Federal Register. Final Rule: Clarification of Suspended Particulate Phase Bioaccumulation Testing Requirements for Material Dumped in Ocean Waters. October 18, 1994.

Federal Register. Proposed Rule: Testing Requirements for Ocean Dumping. Vol. 61, Number 41. Thursday, February 29, 1996.

Federal Register. Final Rule: Ocean Dumping Testing Requirements. Volume 61, Number 190. September 30, 1996.

Federal Register. Final Rule: Simultaneous De-designation and Termination of the Mud Dump Site and Designation of the Historic Area Remediation Site. Volume 62, Number 168. August 29, 1997.

Federal Register. EPA Final Rule: Historic Area Remediation Site (HARS)--Specific Polychlorinated Biphenyl Worm Tissue Criterion. Volume 68, Number 51. March 17, 2003.

Grigalunas, T., Luo, M. and Y.T. Chang. 2001. Comprehensive Framework for Sustainable Container Port Development for the United States East Cost Year One Final Report. URITC Project Grant 536106.

Harbor Estuary Program. Comprehensive Conservation Management Plan, March 1996. Page 133. Last accessed on 8/7/02 at http://www.harborestuary.org/_pdf/ccmpdredge.PDF.

Pabst, Douglas. "NY/NJ Harbor Dredged Material Management," Powerpoint Presentation obtained through personal communication on 9/25/02.

Memorandum of Understanding, December 1999-January 2000. Obtained from www.cpiponline.org. Last accessed 8/15/02.

New York Times. "Commercial Property; Making Way for Bigger Ships" by John Holusha. Section 11; Page 1; Column 2; Real Estate Desk. Sunday, August 5, 2001.

New York Times, July 12, 2002, Page C13.

Robinson, George. 1981. Memorandum with attachments.

U.S. Congress. Office of Technology Assessment "Wastes in Marine Environments" April 1987. Report OTA-O-334

Van Houten, Christopher S. 1998. "The New York/New Jersey Harbor: A Dredging Crisis?" *Seton Hall Legislative Journal* (23): 219.

Websites

http://www.nan.usace.army.mil/business/prjlinks/dmmp/benefic/hars.htm. Last accessed on 10/09/02.

http://www.harborestuary.org/about.htm. Last accessed on 11/18/02.

http://www.epa.gov/region02/water/dredge/testing.htm, Chronology section. Last accessed 8/27/02.

http://www.nan.usace.army.mil/business/prjlinks/dmmp/benefic/pdf/table3.htm. Last accessed 11/18/02.

http://www.cpiponline.org/project_overview.htm. Last accessed on 7/29/02.

http://www.hudsonriver.org/pp/carpweb/index.htm. (This is the index of a slide show in which all of the slides were viewed). Last accessed on 11/18/02.

http://www.dec.state.ny.us/website/dow/carpintro.htm. Last accessed on 11/18/02.

http://www.hudsonriver.org/sources.htm. Last accessed on 11/18/02.

http://www.hudsonriver.org/sedi.htm. Last accessed on 11/18/02.

http://www.hudsonriver.org/carpdown.htm. Last accessed on 11/18/02.

Regulations

33 U.S.C Section 1412.

40 CFR Sections 220-227.

Court Cases

U.S District Court for the District of New Jersey. Civil No. 93-2402. June 7, 1993 Decided.

U.S District Court for the District of New Jersey. Civil No. 93-2402. June 24, 1994 Decided. June 28, 1994 Filed.

U.S. Court of Appeals for the Third Circuit. No 94-5489. June 12, 1995 Filed.

United States Gypsum Company v. William J. Muszynski et al. U.S. District Court for the Southern District of New York. July 10, 2002, Decided, July 11, 2002, Filed.

United States Gypsum Company v. William J. Muszynski et al. U.S. District Court for the Southern District of New York. 161 F. Supp. 2d 289; 2001. August 31, 2001 Decided, September 4, 2001 Filed.

United States Gypsum Company v. William J. Muszynski et al. U.S. District Court for the Southern District of New York. July 10, 2002, Decided, July 11, 2002, Filed.

Personal Communications

Steve Dorrler, Port Authority of New York/New Jersey, 9/26/02.

Monte Greges, Army Corps of Engineers New York District, 9/26/02.

Doug Pabst, Environmental Protection Agency Region 2, 9/26/02.

Bryce Wisemiller, Army Corps of Engineers New York District, 9/26/02.